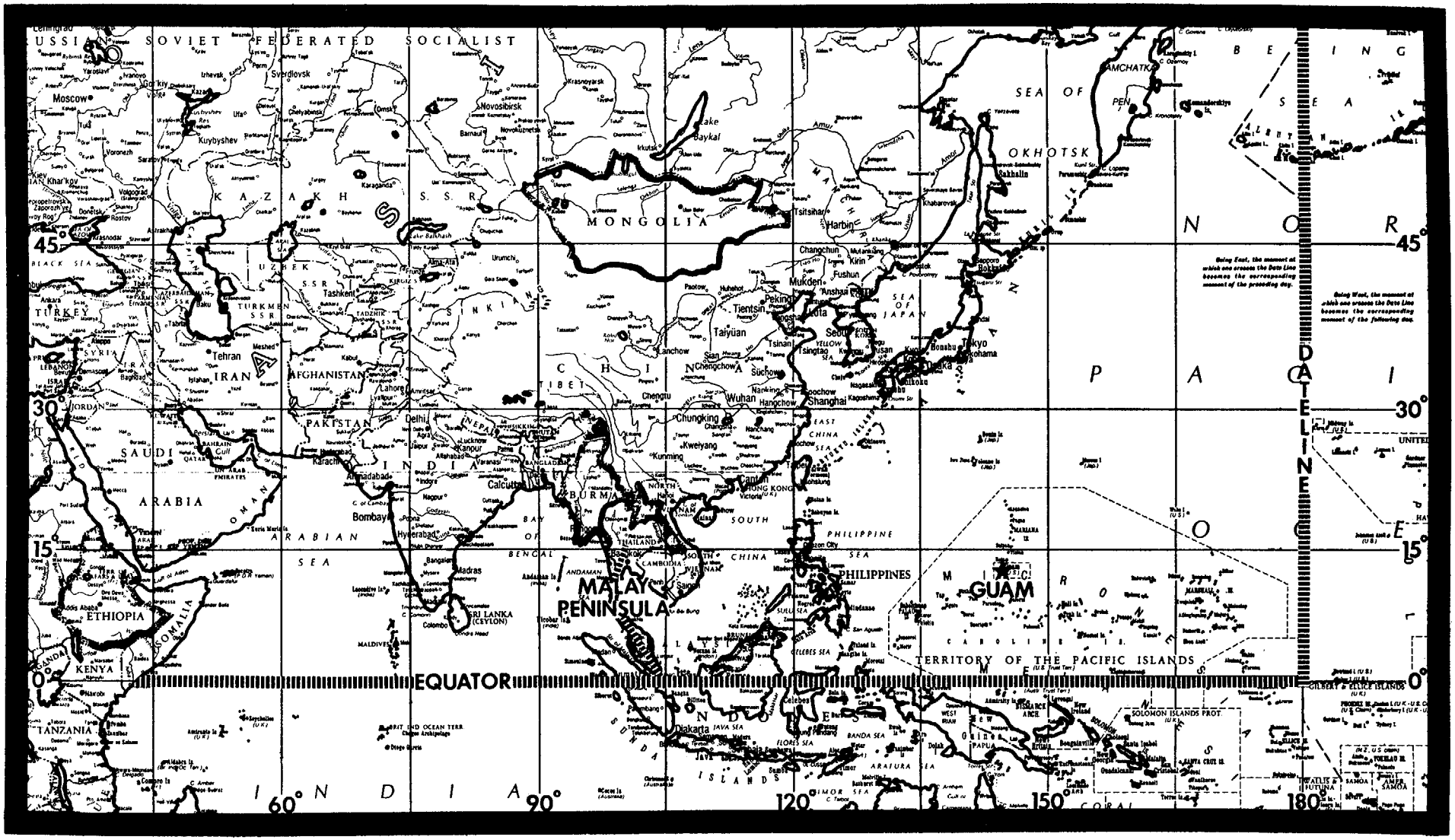
1978

ANNUAL TYPHOON REPORT

JOINT TYPHOON WARNING CENTER
GUAM, MARIANA ISLANDS



AREA OF RESPONSIBILITY - JOINT TYPHOON WARNING CENTER, GUAM

U. S. FLEET WEATHER CENTRAL
JOINT TYPHOON WARNING CENTER
COMNAVMARIANAS BOX 17
FPO SAN FRANCISCO 96630

DEAN R. MORFORD
Captain, United States Navy

COMMANDING

JAMES K. LAVIN
Lieutenant Colonel, United States Air Force

DIRECTOR, JOINT TYPHOON WARNING CENTER

STAFF

*LCDR David Sokol, USN
LCDR Carl B. Ihli, Jr., USN
*LT Gary R. Willms, USN
*CAPT Alan W. Hassebrock, USAF
LT Olaf M. Lubeck, USN
*CAPT Charles P. Guard, USAF
CAPT John D. Shewchuk, USAF
CAPT Gerald A. Guay, USAF
LTJG George M. Dunnavan, USNR
*LTJG Edward M. Fukada, USN
ENS William T. Curry, USN
MSGT Hans J. Hassl, USAF
SSGT Bobby L. Setliff, USAF
AG2 Donald L. McGowan, USN
*AG2 Andree S. Webster, USN
*SGT Paul D. Edwards, USAF
SGT William H. Taylor, USAF
*SRA Vandora A. Barnes, USAF
SRA Charles J. Lee, USAF
AG3 Kenneth A. Kellogg, USN
*AG3 John A. Kilburn, USN
A1C Timothy J. Sowell, USAF
*AGAN Karen F. Moorefield, USN
AGAN Carl A. Gantz, USN
AGAN Kathleen S. Minerich, USN
AGAN Gregory M. Hardyman, USN

CONTRIBUTOR

Det 1, 1WW - USAF

1978
ANNUAL TYPHOON REPORT

*Departed during 1978

FRONT COVER: *Super Typhoon Rita at 150 kt (77 m/sec) strength and intensifying over the Philippine Sea, 24 October 1978, 2319Z. Details of Rita can be found on page 57. (DMSP imagery)*

FOREWORD

The Annual Typhoon Report is prepared by the staff of the Joint Typhoon Warning Center (JTWC). JTWC is a combined USAF/USN entity operating under the command of the U. S. Fleet Weather Central, Guam. The senior Air Force officer assigned is designated as Director, JTWC and is responsible to the Commanding Officer, U. S. Fleet Weather Central, Guam for the operation of the JTWC. The senior Naval Officer of the JTWC is designated as the Deputy Director/ Operations Officer. The JTWC was established by CINCPACFLT message 280208Z April 1959 when directed by CINCPAC message 230233Z April 1959. Its operation is guided by the CINCPACINST 3140.1 (series).

The Fleet Weather Central/Joint Typhoon Warning Center, Guam has the responsibility to:

1. Provide continuous meteorological watch of all tropical activity north of the equator, west of the Date Line, and east of the African coast (JTWC area of responsibility) for potential tropical cyclone development;

2. Provide warnings for all significant tropical cyclones in the assigned area of responsibility;

3. Determine tropical cyclone reconnaissance requirements and assign priorities;

4. Conduct an annual post analysis of all tropical cyclones occurring within the area north of the equator from 140W west to the coast of Africa and prepare an Annual Typhoon Report for issuance to interested agencies; and

5. Conduct tropical cyclone forecasting and detection research as practicable.

In the event of incapacitation of the JTWC, the alternate (AJTWC) assumes the responsibility for the issuance of warnings. The U. S. Fleet Weather Central, Pearl Harbor, Hawaii is designated as the AJTWC. Assistance in determining tropical cyclone reconnaissance requirements and in obtaining reconnaissance data is provided by Detachment 4, 1st Weather Wing, Hickam AFB, Hawaii.

The Central Pacific Hurricane Center, (CPHC) Honolulu, Hawaii is manned by personnel of the U. S. National Weather Service who are responsible for the issuance of tropical cyclone warnings for the area north of the equator from the Date Line east to 140W. Warnings are issued in coordination with the U. S. Fleet Weather Central, Pearl Harbor and Detachment 4, 1WW, Hickam AFB, Hawaii. Post analysis information is forwarded to the JTWC for inclusion in the Annual Typhoon Report.

The meteorological services of the United States are planning to implement the metric system of measurement over the next few years. Some civilian and military agencies have started the education program by showing the metric equivalents to current units of measure. This Annual Typhoon Report includes metric equivalents to most measures.

Unless otherwise stated all satellite data used in this ATR are Air Force Weather Service DMSP Data as acquired by OL-C, 27CS personnel and analyzed by Det 1, 1WW personnel colocated with the JTWC at Nimitz Hill, Guam.

TABLE OF CONTENTS

CHAPTER I – OPERATIONAL PROCEDURES

1. GENERAL

Routine services provided by the Joint Typhoon Warning Center (JTWC) include the following: (1) Significant Tropical Weather Advisories issued daily describing all tropical disturbances and their potential for further development; (2) Tropical Cyclone Formation Alerts issued whenever interpretation of satellite and synoptic data indicates likely formation of a significant tropical cyclone; (3) Tropical Cyclone Warnings issued four times daily whenever a significant tropical cyclone exists in the Pacific area; (4) Tropical Cyclone Warnings issued twice daily whenever a significant tropical cyclone exists in the Indian Ocean area; and (5) Prognostic Reasoning messages issued twice daily for tropical storms and typhoons in the Pacific area.

JTWC responds to changing requirements of activities serviced. Therefore, contents of routine services are subject to change from year to year usually as a result of the Annual Tropical Cyclone Conference deliberations.

2. DATA SOURCES

a. COMPUTER PRODUCTS:

FLEWEACEN Guam provides computerized meteorological/oceanographic products for JTWC. In addition, the standard array of synoptic-scale computer analyses and prognostic charts are available from the Fleet Numerical Weather Central (FNWC) at Monterey, California via FLEWEACEN Guam. With the installation of the Naval Environmental Display Stations (NEDS) during 1978, JTWC now has very timely access to necessary FNWC products and is thereby able to more efficiently and effectively use this information.

b. CONVENTIONAL DATA:

Conventional meteorological data are defined as surface and upper air observations from island, ship and land stations plus weather observations from commercial and military aircraft (AIREPS). Computer plotted charts of 0000Z and 1200Z conventional data are produced daily for the surface, 700 mb, and 500 mb levels. A chart of upper air data is produced which utilizes 200 mb rawinsonde data and AIREPS above 29,000 ft within 6 hours of the 0000Z and 1200Z synoptic times.

c. AIRCRAFT RECONNAISSANCE:

Aircraft weather reconnaissance data are invaluable in the positioning of centers of developing systems and essential for the accurate determination of the eye/center, maximum intensity, minimum sea-level pressure and radius of significant winds exhibited by tropical cyclones. Winds and pressure height data at the 500 and/or 400 mb level, provided by reconnaissance aircraft while enroute to, or returning from, fix missions, is also used to supplement the sparse data in the tropics and subtropics. These data are plotted on large-scale sectional charts for each mission flown. A comprehensive discussion of aircraft weather reconnaissance is presented in Chapter II.

d. SATELLITE RECONNAISSANCE:

Meteorological satellite data from the Defense Meteorological Satellite Program (DMSP) and the National Oceanic and Atmospheric Administration played a major role in the early detection and tracking of tropical cyclones in 1978. A discussion of this role is presented in Chapter II.

e. RADAR RECONNAISSANCE:

During 1978, as in recent years, land radar coverage was utilized extensively when available. Once a storm moved within the range of a land radar site, reports were usually received hourly. Use of radar during 1978 is discussed in Chapter II.

3. COMMUNICATIONS

a. FWC/JTWC currently has access to three primary communications circuits:

(1) The Automated Digital Network (AUTODIN) is used for dissemination of warnings and other related bulletins to Department of Defense installations. These messages are relayed for further transmission over U. S. Navy Fleet Broadcasts, U. S. Coast Guard CW (continuous wave morse code) and voice communications. Inbound message traffic for JTWC is received via AUTODIN addressed to FLEWEACEN GUAM.

(2) The Air Force Automated Weather Network (AWN) provides necessary weather data to JTWC through a dedicated circuit from the automated digital weather switch (ADWS) at Clark AB, R.P. The ADWS selects and routes the large volume of meteorological reports necessary to satisfy JTWC requirements for the right data at the right time. Weather bulletins prepared by JTWC are inserted into the AWN circuit by the Nimitz Hill Naval Telecommunications Center (NTCC) of the Naval Communications Area Master Station Western Pacific.

(3) The Naval Environmental Data Network (NEDN) connects FWC/JTWC with the computers at FNWC. FWC/JTWC is able to both receive environmental data from FNWC and access the computers directly to run various programs.

b. Besides providing forecasters with the ability to rapidly access computer products from FNWC, the NEDS has recently become the backbone of the FWC/JTWC communications system. AUTODIN and AWN message tapes can now be prepared by JTWC personnel for insertion into the AUTODIN and AWN circuits by the NTCC. The NEDS is also used by the TDO to request forecast aids which are

processed by the computers at FNWC Monterey and transmitted back to the TDO over the NEDN circuit.

4. ANALYSES

A composite surface/gradient level (3000 ft) manual analysis is accomplished on the 0000Z and 1200Z conventional data. Analysis of the wind field using streamlines is stressed for tropical and subtropical regions. Analysis of the pressure field is stressed for higher latitudes and in the vicinity of tropical cyclones.

Manual analysis of the 500 mb level is accomplished on the 0000Z and 1200Z data when significant tropical cyclones exist. Although the analysis of the 500 mb height field is stressed, analysis of the wind field to more clearly delineate steering currents is equally important.

A composite upper-tropospheric manual analysis, utilizing rawinsonde data from 300 mb through 100 mb, wind directions extracted from satellite data by Det 1, 1WW and AIREPS (plus or minus 6 hours) at or above 29,000 feet is accomplished on 0000Z and 1200Z data daily. Wind and height data are used to arrive at a representative analysis of tropical cyclone outflow patterns, of steering currents and of areas that may indicate tropical cyclone intensity change. All charts are hand plotted over areas of tropical cyclone activity, to provide all available data as soon as possible, to the TDO, and then augmented by the computer plotted charts for the final analyses.

Additional sectional charts at intermediate synoptic times and auxiliary charts such as checkerboard diagrams and pressure change charts are also analyzed during periods of significant tropical cyclone activity.

5. FORECAST AIDS

a. CLIMATOLOGY:

Climatological publications utilized during the 1978 typhoon season include previous JTWC Annual Typhoon Reports and climatic publications from Fleet Weather Central, Guam, Naval Environmental Prediction Research Facility, Naval Postgraduate School, Air Weather Service, First Weather Wing and Chanute Technical Training Center, plus publications from other Air Force and Navy activities, various universities and foreign countries.

b. OBJECTIVE TECHNIQUES:

The following objective techniques were employed in tropical cyclone forecasting during 1978. A description of these techniques is presented in Chapter IV.

(1) TYFN75

(2) MOHATT 700/500

(3) FCSTINST

(4) 12 HR EXTRAPOLATION

(5) CLIMATOLOGY

(6) HPAC

(7) TROPICAL CYCLONE MODEL

(8) INJAH74

(9) CYCLOPS

(10) TYAN78

6. FORECASTING PROCEDURES

a. INITIALIZATION:

In the preparation of each warning, the actual surface location (fix) of the tropical cyclone eye/center just prior to (within three hours of) warning time is of prime importance. JTWC uses the Selective Reconnaissance Program (SRP) to levy an optimum mix of aircraft, satellite and radar resources to obtain fix information. When tropical cyclones are either poorly defined or the actual surface location cannot be determined, or when conflicting fix information is received, the "best estimate" of the surface location is subjectively determined from the analysis of all available data. If fix data is not available due to reconnaissance platform malfunctions or communication problems, synoptic data or extrapolation from previous fixes is used. The initial forecast (warning time) position is then obtained by extrapolation using the current fix and a "best track" of the cyclone movement to date.

b. TRACK FORECASTING:

An initial forecast track is developed based on the previous forecast and the objective techniques. This initial track is subjectively modified based on the following:

(1) The prospects for recurvature are evaluated for all westward and northward moving storms. This evaluation is based primarily on present and forecast position and amplitude of middle tropospheric mid-latitude troughs from the latest 500 mb analysis and numerical prognoses.

(2) Determination of steering level is partly influenced by maturity and vertical extent of the system. For mature storms located south of the 500 mb subtropical ridge, forecast changes in speed of movement are closely correlated with forecast changes in the intensity of the ridge. When steering currents are very weak, the tendency for cyclones to move northward due to their internal forces is an important consideration.

(3) The proximity of the tropical cyclone to other tropical cyclones is evaluated to determine if there is a possibility of Fujiwhara interaction.

(4) Over the 12- to 72-hr forecast spectrum; speed of movement during the early time frame is biased toward persistence (12 hr extrapolation) while that near the end of the time frame is biased towards objective techniques and climatology.

(5) A final check is made against climatology to ascertain the likelihood of the forecast track. If the forecast deviates greatly from climatology, the forecast rationale is reappraised and the track adjusted as necessary.

c. INTENSITY FORECASTING:

In forecasting intensity, heavy reliance is placed on aircraft reconnaissance reports, the Dvorak satellite interpretation model, wind and pressure data from ships and land stations in the vicinity of the cyclone, and the objective techniques. Additional considerations are the position and intensity of the tropical upper-tropospheric trough (TUTT), extent and intensity of upper-level outflow, sea surface temperature, terrain influences, speed of movement and proximity to an extratropical environment.

7. WARNINGS

Tropical cyclone warnings are issued when a definite closed circulation is evident and maximum sustained wind speeds are forecast to increase to 34 or more knots within 48 hours, or the cyclone is in such a position that life or property may be endangered within 72 hours. Warnings are also issued in other situations if it is determined that there is a need to alert military and civil interests to conditions which may become hazardous in a short period of time. Each tropical cyclone warning is numbered sequentially and includes the initial warning time, eye/center position, intensity, the radial extent of 30, 50 and 100 knot surface winds (when applicable), the levied fix position used, the instantaneous speed and direction of movement of the cyclone's surface center at warning time and the forecast information. The forecast intervals for all tropical cyclones, regardless of intensity, are 12-, 24-, 48- and 72-hr. Warnings within the JTWC Pacific area are issued within two hours of 0000Z, 0600Z, 1200Z and 1800Z with the constraint that two consecutive warnings may not be more than seven hours apart. Warnings in the JTWC Indian Ocean area are issued within two hours of 0800Z and 2000Z with the constraint that two consecutive warnings may not be more than fourteen hours apart. These variable warning times allow for maximum use of all available reconnaissance platforms and more effectively distribute the workload in multiple storm situations. If warnings are discontinued and a cyclone reintensifies, warnings are numbered consecutively from the last warning issued. Warning forecast positions are verified against the corresponding post analysis "best track" positions. A summary of the verification results for 1978 is presented in Chapter IV.

8. PROGNOSTIC REASONING MESSAGE

In the Pacific Area, prognostic reasoning messages are transmitted based on the 0000Z and 1200Z warnings or whenever the previous reasoning is no longer valid. This plain language message is intended to provide field meteorologists with the reasoning behind the latest JTWC forecast. Prognostic reasoning messages are not prepared for tropical depressions nor for the cyclones in the Indian Ocean area.

For the 1978 season, JTWC included confidence statements for the 24 and 48-hour forecasts. The confidence values were percentage probabilities that the 24-hour forecast position error would be less than 100 nm and less than 150 nm, respectively; and that the 48-hour error would be less than 200 nm and less than 300 nm, respectively. These probabilities were based on objective data from error analysis studies of past cyclones and were a function of latitude, longitude, storm intensity and organization. The forecaster added objective data based on the subjective analysis of the synoptic situation and the variance in the objective forecast aids available.

Prognostic reasoning information applicable to all customers is provided in the remarks section of warnings when significant changes are made or when deemed appropriate.

9. SIGNIFICANT TROPICAL WEATHER ADVISORY

This plain language message, summarizing significant weather in the entire JTWC area of responsibility, is issued by 0600Z daily. It contains a detailed, non-technical description of all significant tropical disturbances and the JTWC evaluation of potential for significant tropical cyclone development within the 24-hour forecast period.

10. TROPICAL CYCLONE FORMATION ALERT

Alerts are issued whenever interpretation of satellite and other meteorological data indicates significant tropical cyclone formation is likely. These alerts will specify a valid period not to exceed 24 hours and must either be cancelled, reissued or superseded by a warning prior to expiration of the valid period.

CHAPTER II - RECONNAISSANCE & FIXES

1. GENERAL

The Joint Typhoon Warning Center depends on reconnaissance to provide necessary, accurate and timely meteorological information in support of each warning. JTWC relies primarily on three sources of reconnaissance: aircraft, satellite and radar. Optimum utilization of all available reconnaissance resources is obtained through use of the Selective Reconnaissance Program (SRP) whereby various factors are considered in selecting a specific reconnaissance platform for each warning. These factors include: cyclone location and intensity, reconnaissance platform capabilities and limitations, and the cyclone's threat to life/property afloat and ashore. A summary of reconnaissance fixes received during 1978 is included in Section 6.

2. RECONNAISSANCE AVAILABILITY

a. Aircraft:

Aircraft weather reconnaissance is performed in the JTWC area of responsibility by the 54th Weather Reconnaissance Squadron (54 WRS). The squadron, presently equipped with six WC-130 aircraft, is located at Andersen Air Force Base, Guam. From July through October, augmentation by the 53rd WRS at Keesler Air Force Base, Mississippi brings the total number of available aircraft to nine. The JTWC reconnaissance requirements are provided daily throughout the year to the Tropical Cyclone Aircraft Reconnaissance Coordinator (TCARC). These requirements include area(s) to be investigated, tropical cyclone(s) to be fixed, fix times and forecast positions of fixes. The following priorities are utilized in acquiring meteorological data from aircraft, satellite and land-based radar in accordance with CINCPACINST 3140.1N:

"(1) Investigative flights and vortex or center fixes for each scheduled warning in the Pacific area of responsibility. One aircraft fix per day of each cyclone of tropical storm or typhoon intensity is considered the minimum desired.

(2) Center or vortex fixes for each scheduled warning of tropical cyclones in the Indian Ocean Area of responsibility.

(3) Supplementary fixes.

(4) Synoptic data acquisition."

As in previous years, aircraft reconnaissance provided direct measurements of height, temperature, flight-level winds, sea level pressure, estimated surface winds (when observable) and numerous additional parameters. The meteorological data are gathered by the Aerial Reconnaissance Weather Officers (ARWO) and dropsonde operators of Detachment 4, Hq AWS who crew with the 54th. These data provide the Typhoon Duty Officer (TDO) indications of changing cyclone characteristics, radius of cyclone associated winds, and present cyclone position and intensity. Another important aspect of this data is its availability for research in tropical cyclone analysis and forecasting. Aircraft reconnaissance will become even more important in years to come when high-resolution tropical cyclone dynamic steering programs will require a dense input of wind and temperature data.

b. Satellite

Satellite fixes from USAF ground sites and USN ships provide day and night coverage in the JTWC area of responsibility. Interpretation of this satellite imagery provides cyclone positions and estimates of storm intensities through the Dvorak technique (for daytime passes).

Detachment 1, 1st Weather Wing is the primary fix site for the western North Pacific. Both DMSP and NOAA data are received and processed. DMSP fix positions received at JTWC from the Air Force Global Weather Central (AFGWC), Offutt Air Force Base, Nebraska were the major source of satellite data for the Indian Ocean. GOES fixes were also provided by the National Environmental Satellite Service, Honolulu, Hawaii for tropical cyclones near the dateline.

c. Radar

Land radar provides positioning data on well developed cyclones when in proximity (usually within 175 nm of the radar site) of the Republic of the Philippines, Taiwan, Hong Kong, Japan, the Republic of Korea, Kwajalein, and Guam.

3. AIRCRAFT RECONNAISSANCE SUMMARY

During the 1978 tropical cyclone season, JTWC levied 290 six-hourly vortex fixes (Table 2-1). New storm tracks developed by Det 4, AWS and JTWC increased the number of supplemental fixes from 4 in 1977 to 149 in 1978. These tracks require reconnaissance aircraft to penetrate a tropical cyclone twice on a one-fix mission and three times on a two-fix mission; the extra fix is termed supplemental. In addition to vortex fixes, 38 investigative missions were levied (the 1976-1978 average is 38 invests). Of 1978's 32 tropical cyclones, investigative missions were not flown on nine.

Reconnaissance effectiveness is summarized in Table 2-1 using the criteria as set forth in CINCPACINST 3140.1N.

TABLE 2-1. AIRCRAFT RECONNAISSANCE EFFECTIVENESS

EFFECTIVENESS	NUMBER OF FIXES	PERCENT
COMPLETED ON TIME	272	93.8
EARLY	6	2.1
LATE	10	3.4
MISSED	2	0.7
TOTAL	290	100.0

LEVIED VS. MISSED FIXES

	LEVIED	MISSED	PERCENT
AVERAGE 1965-1970	507	10	2.0
1971	802	61	7.6
1972	624	126	20.2
1973	227	13	5.7
1974	358	30	8.4
1975	217	7	3.2
1976	317	11	3.5
1977	203	3	1.5
1978	290	2	0.7

4. SATELLITE RECONNAISSANCE SUMMARY

The Air Force provides satellite reconnaissance support to JTWC using meteorological data from DMSP polar orbiting meteorological satellites.

A network of tactical DMSP sites at Nimitz Hill, Guam; Clark AB, Philippines; Kadena AB, Japan; Osan AB, Korea; and Hickam AFB, Hawaii provides direct readout coverage north of the equator from the dateline west into the South China Sea. In February 1977, the Guam site was modified to acquire very high resolution data from the National Oceanic and Atmospheric Administration (NOAA) satellites. The Hawaii site was modified soon thereafter.

The Air Force Global Weather Central (AFGWC) at Offutt AFB, Nebraska, using stored data readout, provides satellite reconnaissance over the Indean Ocean and backup for the tactical sites in WESTPAC. Det 1, 1WW colocated with the JTWC, operates the network tasking appropriate sites for tropical cyclone position reports.

Satellite positions are assigned Position Code Numbers (PCN's) depending on the availability of geography for precise gridding and the state of the tropical cyclone's circulation (Table 2-2). Estimates of tropical cyclone intensity are obtained from visual data using the Dvorak technique (NOAA Technical Memorandum NESS 45 and later refinements).

TABLE 2-2. POSITION CODE NUMBERS

PCN	METHOD OF CENTER DETERMINATION/GRIDDING
1	EYE/GEOGRAPHY
2	EYE/EPHEMERIS
3	WELL DEFINED CC/GEOGRAPHY
4	WELL DEFINED CC/EPHEMERIS
5	POORLY DEFINED CC/GEOGRAPHY
6	POORLY DEFINED CC/EPHEMERIS

CC=Circulation Center

Availability of satellite data enabled JTWC to effectively use satellite reconnaissance through the Selective Reconnaissance. Program (SRP). During the 1978 season over 1900 satellite fixes were made on unnumbered as well as numbered tropical cyclones in WESTPAC.

By using a dual-site tasking concept which requires at least two separate DMSP sites to make each JTWC levied tropical cyclone fix, satellite reconnaissance reliability in meeting JTWC's fix requirements was 96%. Most missed fixes were due to an unreliable late morning/late evening satellite. Because of this satellite's unreliability, aircraft reconnaissance routinely supported 0600Z and 1800Z warnings with radar and NOAA-5 satellite data also being used on occasion. Use of the NOAA-5 satellite for fixing tropical cyclones ended in September 1978 when the satellite became too unstable for accurate positioning.

A comparison of satellite derived positions and the JTWC Best Track positions is included in Table 2-3. The relative accuracies of satellite positions can be obtained from this table.

TABLE 2-3. MEAN DEVIATIONS (NM) OF DMSP DERIVED TROPICAL CYCLONE POSITIONS FROM JTWC BEST TRACK POSITIONS, 1974-1978 (ALL SITES). NUMBER OF CASES SHOWN IN PARENTHESIS.

PCN	1974 (ALL SITES)	1975 (ALL SITES)	1976 (ALL SITES)	1977 (ALL SITES)	1978 (ALL SITES)
1	13.6 (224)	11.8 (214)	12.4 (131)	15.7 (134)	13.8 (189)
2	17.4 (37)	20.4 (35)	20.1 (124)	19.1 (47)	16.0 (95)
3	20.1 (422)	21.2 (271)	21.7 (161)	22.4 (141)	21.9 (353)
4	23.9 (70)	22.4 (50)	29.3 (152)	30.0 (75)	21.8 (156)
5	35.4 (342)	34.2 (323)	40.4 (247)	37.7 (357)	38.1 (571)
6	49.4 (108)	44.7 (71)	49.0 (153)	40.9 (247)	50.5 (370)
1&2	14.2 (261)	13.0 (249)	16.1 (255)	16.6 (181)	14.6 (284)
3&4	20.6 (492)	21.4 (321)	25.4 (313)	25.0 (216)	21.9 (509)
5&6	38.8 (450)	36.1 (394)	43.7 (400)	39.0 (604)	43.0 (941)

Satellite derived fixes were also obtained from: USN ships equipped for DMSP or TIROS-N/NOAA APT direct readout; the National Environmental Satellite Service using NOAA and GOES data; and Fleet Weather Facility (FLEWEAFAC), Suitland, Maryland using stored NOAA and DMSP data. This information was invaluable to the warning service. Since these were secondary sources, they were not included in statistics.

5. RADAR RECONNAISSANCE SUMMARY

Fifteen of the 32 significant tropical cyclones occurring over the western North Pacific during 1978 passed within range of land based radars with sufficient cloud pattern organization to be fixed. The hourly and oftentimes, half-hourly land radar fixes that were obtained and transmitted to JTWC totaled 848. A percentage breakdown by country is as follows: Japan-Ryukyu Islands 62%, Republic of the Philippines 18%, Hong Kong 8%, Guam (U.S.) 7%, and Taiwan 4%.

The WMO radar code defines three categories of accuracy: good (within 10 km (5.4 nm)), fair (within 10-30 km (5.4-16.2 nm)) and poor (within 30-50 km (16.2-27 nm)). This year 308 radar fixes were coded in this manner; 49% were good, 20% fair and 31% poor. Compared to the JTWC best track, the mean vector deviation for land radar sites was 13 nm (24 km).

Of the 15 tropical cyclones which were monitored with radar, 10 were typhoons (Olive, Virginia, Wendy, Carmen, Elaine, Faye, Irma, Lola, Ora and Rita). These 10 typhoons accounted for 74% of all radar fixes received this season. Excellent support through timely and accurate radar fix positioning allowed JTWC to track and forecast tropical cyclone movement through even the most difficult and erractic tracks.

The 54 WRS made four radar center fixes from their WC-130 aircraft when actual penetration was restricted. One aircraft radar fix of TC 20-78 when over the Arabian Sea was relayed to JTWC from Diego Garcia. No ship radar center fixes were received during 1978.

6. TROPICAL CYCLONE FIX DATA

A total of 3172 fixes on 32 northwest Pacific tropical cyclones and 117 fixes on four northern Indian Ocean tropical cyclones were received at JTWC. Table 2-4, Fix Platform Summary, delineates the number of fixes per platform for each individual tropical cyclone. Season totals and percentages are also indicated.

Annex B is an output of program PRNTFIX which lists individual fixes sequentially for each tropical cyclone. Fix data is divided into three categories; Satellite, Aircraft and Radar. Those fixes labeled with an asterisk (*) were determined to be unrepresentative of the surface center and were not used in determining the best tracks. Within each category, the first three columns are as follows:

FIX NO. - Sequential fix number

TABLE 2-4. FIX PLATFORM SUMMARY

	FIX PLATFORM						
	AIRCRAFT*	DMSP	NOAA-5	GOES	LAND RADAR	ACFT RADAR	TOTAL
WESTERN PACIFIC							
TS NADINE	9	29	24	3	-	-	65
TY OLIVE	25	66	23	-	17	-	131
TS POLLY	35	58	12	-	124	-	209
TS ROSE	7	25	7	-	-	-	39
TS SHIRLEY	-	21	6	-	-	1	28
TY TRIX	29	84	18	-	-	-	131
TY VIRGINIA	36	85	6	-	42	-	169
TY WENDY	26	130	7	-	100	-	263
TS AGNES	-	63	6	-	50	-	119
TS BONNIE	-	15	4	-	-	-	19
TY CARMEN	22	104	12	-	125	-	263
TS DELLA	6	22	2	-	9	-	39
TD 14	6	24	6	-	2	-	38
TY ELAINE	12	38	14	-	24	-	88
TY FAYE	45	87	6	-	9	-	147
TS GLORIA	7	36	1	-	-	-	44
TS HESTER	1	31	-	-	-	-	32
TY IRMA	7	41	-	-	72	2	122
TY JUDY	14	50	-	-	-	-	64
TS KIT	12	50	-	-	-	-	62
TY LOLA	17	90	-	-	29	-	136
TY MAMIE	12	38	-	-	-	-	50
TS NIKA	16	74	-	-	34	-	124
TY ORA	18	59	-	-	96	-	173
TD 26	-	17	-	-	-	-	17
TD 27	2	28	-	-	-	-	30
TY PHYLLIS	8	58	-	-	-	1	67
ST RITA	43	110	3	5	115	-	276
TS TESS	17	42	-	-	-	-	59
TD 32	-	36	-	-	-	-	36
TY VIOLA	22	70	-	-	-	-	92
TS WINNIE	12	28	-	-	-	-	40
TOTAL	446	1709	157	8	848	4	3172
% OF TOTAL NO. OF FIXES	14.1	53.9	4.9	.3	26.7	.1	100

	DMSP	TIROS-N	ACFT RADAR	TOTAL
INDIAN OCEAN				
TC 18-78	21	-	-	21
TC 19-78	13	-	-	13
TC 20-78	30	6	1	37
TC 21-78	40	6	-	46
TOTAL	104	12	1	117
% OF TOTAL NO. OF FIXES	88.9	10.2	.9	100

* FIX POSITIONS QUOTED WERE ONLY THOSE WHERE A SPECIFIC LATITUDE AND LONGITUDE WERE GIVEN.

TIME (Z) - GMT time in day, hours and minutes

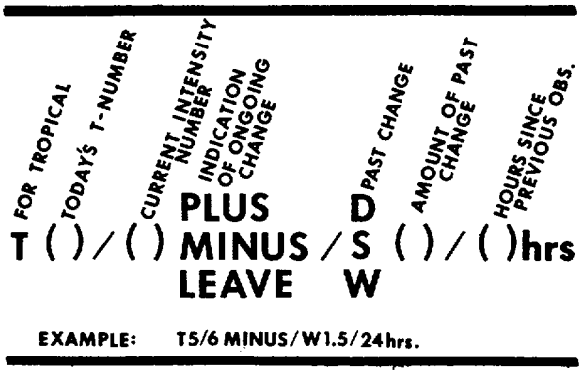
FIX POSITION - Latitude and longitude to the nearest tenth of a degree

Depending upon the category, the remainder of the format varies as follows:

a. Satellite

(1) ACCRY - Position Code Number (PCN) (See Sec. 5). The accuracy for FWF Suitland fix positions are given as confidence numbers (CONF) (See Table 2-5 for details).

(2) DVORAK CODE - Intensity evaluation and trend utilizing DMSP visual satellite data.



EXAMPLE: T5/6 MINUS/W1.5/24hrs.

(For specifics refer to NOAA TM; NESS-45)

TABLE 2-5. CONFIDENCE (CONF) NUMBERS AS A FUNCTION OF DVORAK T NUMBER AND RADIUS OF 90% PROBABILITY AREA (NM).

TROPICAL CYCLONE INTENSITY	CONF (1)	CONF (2)	CONF (3)
T1.5	60	120	170
T2.0	60	120	170
T2.5	60	120	170
T3.0	50	100	150
T3.5	45	90	140
T4.0	45	90	140
T4.5	45	90	140
T5.0	40	90	130
T5.5	40	80	130
T6.0	40	80	130
T6.5	30	70	120
T7.0	30	70	120
T7.5	30	60	100
T8.0	30	60	100

(3) SAT - Specific satellite used for fix position (DMSP 35, 36 or 37, NOAA-5, TIROS-N, or Geostationary Operational Environmental Satellite (GOES)).

(4) COMMENTS - For explanation of abbreviations see Appendix.

(5) SITE - ICAO call sign of the specific satellite tracking station.

b. Radar

(1) RADAR - Specific type of platform utilized for fix (land radar site, aircraft or ship).

(2) ACCRY - Accuracy of fix position (good, fair or poor) as given in the WMO ground radar weather observation code (FM20-V).

(3) EYE SHAPE - Geometrical representation of the eye given in plain language (Circular, Elliptical, etc.).

(4) EYE DIAM - Diameter of eye given in nautical miles.

(5) RADOB CODE - Taken directly from WMO ground weather radar observation code FM20-V. First group specifies the vortex parameters while the second group describes the movement of the vortex center.

(6) RADAR POSITION - Latitude and longitude of tracking station given in tenths of a degree.

(7) SITE - WMO station number of the specific tracking station.

c. Aircraft

(1) FLT LVL - The constant pressure surface level, in mb, maintained during the penetration. 700 mb is the normal level flown in developed cyclones due to turbulence factors with low level missions flown at 1500 ft.

(2) MIN HGT - Minimum height of the 700 mb pressure surface within the vortex recorded in meters.

(3) OBS MSLP - The minimum observed sea level pressure on a 700 mb fix mission is obtained by applying the minimum 700 mb height to the following regression equation:

SLP (MB)=.115 (700 mb HGT [M]) + 645

This relationship is accurate within ± 3 mb in most cases. However, if the 700 mb center and the surface center are not vertically alligned, the minimum sea level pressure will be erroneously high. If the surface center can be visually detected (e.g., in the eye), the minimum sea level pressure is obtained by a dropsonde released above the surface vortex center.

If the fix is made at the 1500 foot level, the sea level pressure is extrapolated from that level.

(4) MAX-SFC-WND - The maximum surface wind (knots) is an estimate made by the ARWO based on sea state. This observation is limited to the region of the flight path, and may not be representative of the entire cyclone. Availability of data is also dependent upon the absence of undercast conditions and the presence of adequate illumination. The positions of the maximum flight level wind and the maximum observed surface wind do not necessarily coincide.

(5) MAX-FLT-LVL-WND - Wind speed (knots) at flight level is measured by the AN/APN 147 doppler radar system aboard the WC-130 aircraft. Values entered in this category represent the maximum wind measured prior to obtaining a scheduled fix. This measurement may not represent the maximum flight level wind associated with the tropical cyclone because the aircraft only samples those portions of the tropical cyclone along the flight path. In many instances the flight path may be through the weak sector of the cyclone. In areas of heavy rainfall, the doppler radar may track energy reflected from precipitation rather than from the sea surface; thus preventing accurate wind speed measurement. In obvious cases such erroneous wind data will not be reported. In addition, the doppler radar system on the WC-130 restricts wind measurements to drift angles less than or equal to 27 degrees if the wind is normal to the aircraft heading.

(6) ACCRY - Fix position accuracy. Both navigational (OMEGA and LORAN) and meteorological (by the ARWO) estimates are given in nautical miles.

(7) EYE SHAPE - Geometrical representation of the eye based on the aircraft radar presentation. Reported only if center is 50% or more surrounded by wall cloud.

(8) EYE DIAM/ORIENTATION - Diameter of the eye in nautical miles. In case of elliptical eye, the orientation describes the nautical mile lengths of the major and minor axes.

CHAPTER III - SUMMARY OF TROPICAL CYCLONES

1. WESTERN NORTH PACIFIC TROPICAL CYCLONES

During 1978, the western North Pacific experienced a near-climatological average with a total of 32 cyclones (Table 3-1; cyclones 10 and 30 occurred in the central North Pacific area). Four, significant tropical cyclones never developed beyond tropical depression (TD) stage. Of the 2° that became tropical storms (TS), 15 developed to typhoon (TY) stage only one of which reached the 130 kt (67 m/sec) intensity necessasry to be classified as a super typhoon (ST).

Even though the 1978 season had a near-average number of cyclones (Tables 3-2 and 3-3), it was a season full of surprises. Ten of the tropical storms and typhoons exhibited erratic movement. Typhoon Carmen remained quasi-stationary for three days over the East China Sea. Typhoon Faye executed a large anticyclonic loop and subsequently underwent explosive deepening as the surface central pressure fell 18 mb in six hours. The most ill-behaved typhoon of the season, Trix, truly lived up to her name. As Tropical Storm Kit crossed Luzon, the surface circulation dissipated while the mid- and upper-level circulations continued across and eventually became aligned with a secondary or "lee-side" low that had formed west of Luzon. Tropical Storms Hester and Phyllis attained post-recurvature speeds of 40 kt (74 km/hr) and 50 kt (93 km/hr), respectively, in extratropical transition. Typhoons Virginia and Mamie were unusually compact and could, thus, be termed midget typhoons. Virginia also traveled the farthest north (47N) while retaining tropical characteristics. Having first been detected in the central Pacific near 175W, Super Typhoon Rita traveled a record distance for the season (4142 nm (7671 km)), and was second overall only to Typhoon Sarah of 1976 (4499 nm (8332 km)).

During 1978, 32 Tropical Cyclone Formation Alerts were issued. Of these, 27 (84%) developed into significant tropical cyclones (Table 3-4). Five tropical cyclones were immediately placed into warning status without first issuing Formation Alerts due to their rapid development.

During 1978, there were 715 warnings issued for the WESTPAC region with a total of 131 "warning days" (Table 3-5). On 46 of these 131 days, two or more cyclones existed and on 16 days three cyclones were in existence.

TABLE 3-1. WESTERN NORTH PACIFIC

1978 SIGNIFICANT TROPICAL CYCLONES

CYCLONE	TYPE	NAME	PRD OF WARNING	CALENDER DAYS OF WARNING	MAX SFC WIND	MIN OBS SLP	NO. OF WARNINGS TOTAL	NO. OF WARNINGS AS TY	DISTANCE TRAVELLED
01	TS	NADINE	08 JAN-13 JAN	6	60	973	21		1340
02	TY	OLIVE	18 APR-26 APR	9	85	955	36	14	2669
03	TS	POLLY	16 JUN-20 JUN	5	50	985	16		788
04	TS	ROSE	23 JUN-24 JUN	2	40	993	7		352
05	TS	SHIRLEY	30 JUN-30 JUN	1	35	990	3		161
06	TY	TRIX	13 JUL-22 JUL	10	70	967	38	9	2326
07	TY	VIRGINIA	23 JUL-02 AUG	11	70	972	43	31	2052
08	TY	WENDY	24 JUL-03 AUG	11	80	962	42	27	1372
09	TS	AGNES	24 JUL-30 JUL	7	50	985	22		667
11	TS	BONNIE	10 AUG-12 AUG	3	40	984	9		481
12	TY	CARMEN	11 AUG-20 AUG	10	80	961	37	16	2076
13	TS	DELLA	11 AUG-13 AUG	3	45	984	10		774
14	TD	TD-14	19 AUG-20 AUG	2	30	991	6		556
15	TY	ELAINE	23 AUG-28 AUG	6	65	974	20		1036
16	TY	FAYE	28 AUG-07 SEP	11	105	936	44	17	2127
17	TS	GLORIA	29 AUG-01 SEP	4	40	990	12		553
18	TS	HESTER	30 AUG-01 SEP	3	50	987	11		851
19	TY	IRMA	12 SEP-15 SEP	4	65	972	15	3	854
20	TY	JUDY	13 SEP-17 SEP	5	90	950	18	10	1296
21	TS	KIT	21 SEP-26 SEP	6	50	992	21		1382
22	TY	LOLA	24 SEP-03 OCT	10	75	963	35	13	1672
23	TY	MAMIE	30 SEP-04 OCT	5	70	963	19	3	1578
24	TS	NINA	08 OCT-17 OCT	10	60	981	37		1299
25	TY	ORA	10 OCT-15 OCT	6	85	944	22	7	1370
26	TD	TD-26	11 OCT-12 OCT	2	30	998	7		519
27	TD	TD-27	15 OCT-16 OCT	2	20	1003	6		155
28	TY	PHYLLIS	15 OCT-22 OCT	8	95	953	30	17	1687
29	ST	RITA	17 OCT-30 OCT	14	155	878	51	34	4142
31	TS	TESS	01 NOV-07 NOV	7	60	975	22		1346
32	TD	TD-32	17 NOV-20 NOV	4	25	1002	12		296
33	TY	VIOLA	17 NOV-24 NOV	8	125	911	29	15	2042
34	TS	WINNIE	27 NOV-30 NOV	4	55	977	14		1287
			1978 TOTALS	131**			715	216	

** OVERLAPPING DAYS INCLUDED ONLY ONCE IN SUM

JTWC

TABLE 3-2.

FREQUENCY OF TYPHOONS BY MONTH AND YEAR

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
AVERAGE (1945-58)	0.4	0.1	0.3	0.4	0.7	1.1	2.0	2.9	3.2	2.4	2.0	0.9	16.3
1959	0	0	0	1	0	0	1	5	3	3	2	2	17
1960	0	0	0	1	0	2	2	8	0	4	1	1	19
1961	0	0	1	0	2	1	3	3	5	3	1	1	20
1962	0	0	0	1	2	0	5	7	2	4	3	0	24
1963	0	0	0	1	1	2	3	3	3	4	0	2	19
1964	0	0	0	0	2	2	6	3	5	3	4	1	26
1965	1	0	0	1	2	2	4	3	5	2	1	0	21
1966	0	0	0	1	2	1	3	6	4	2	0	1	20
1967	0	0	1	1	0	1	3	4	4	3	3	0	20
1968	0	0	0	1	1	1	1	4	3	5	4	0	20
1969	1	0	0	1	0	0	2	3	2	3	1	0	13
1970	0	1	0	0	0	1	0	4	2	3	1	0	12
1971	0	0	0	3	1	2	6	3	5	3	1	0	24
1972	1	0	0	0	1	1	4	4	3	4	2	2	22
1973	0	0	0	0	0	0	4	2	2	4	0	0	12
1974	0	0	0	0	1	2	1	2	3	4	2	0	14
1975	1	0	0	0	0	0	1	3	4	3	2	0	15
1976	1	0	0	1	2	2	2	1	4	1	1	0	15
1977	0	0	0	0	0	0	3	0	2	3	2	1	11
1978	0	0	0	1	0	0	3	2	4	3	2	0	15
AVERAGE (1959-78)	0.25	0.05	0.10	0.70	0.85	0.95	2.85	3.55	3.25	3.20	1.65	0.55	17.95

JTWC

TABLE 3-3.

FREQUENCY OF TROPICAL STORMS AND TYPHOONS BY MONTH AND YEAR

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
AVERAGE (1945-58)	0.4	0.1	0.4	0.5	0.8	1.3	3.0	3.9	4.1	3.3	2.7	1.1	21.6
1959	0	1	1	1	0	0	3	6	6	4	2	2	26
1960	0	0	0	1	1	3	3	10	3	4	1	1	27
1961	1	1	1	1	3	2	5	4	6	5	1	1	31
1962	0	1	0	1	2	0	6	7	3	5	3	2	30
1963	0	0	0	1	1	3	4	3	5	5	0	3	25
1964	0	0	0	0	2	2	7	9	7	6	6	1	40
1965	2	2	1	1	2	3	5	6	7	2	2	1	34
1966	0	0	0	1	2	1	5	8	7	3	2	1	30
1967	1	0	2	1	1	1	6	8	7	4	3	1	35
1968	0	0	0	1	1	1	3	8	3	6	4	0	27
1969	1	0	1	1	0	0	3	4	3	3	2	1	19
1970	0	1	0	0	0	2	2	6	4	5	4	0	24
1971	1	0	1	3	4	2	8	4	6	4	2	0	35
1972	1	0	0	0	1	3	6	5	4	5	2	3	30
1973	0	0	0	0	0	0	7	5	2	4	3	0	21
1974	1	0	1	1	1	4	4	5	5	4	4	2	32
1975	1	0	0	0	0	0	2	4	5	5	3	0	20
1976	1	1	0	2	2	2	4	4	5	1	1	2	25
1977	0	0	1	0	0	1	4	1	5	4	2	1	19
1978	1	0	0	1	0	3	4	7	5	4	3	0	28
AVERAGE (1959-78)	0.55	0.35	0.45	0.85	1.15	1.65	4.55	5.70	4.90	4.15	2.50	1.10	27.90

JTWC

TABLE 3-4.

FORMATION ALERT SUMMARY

WESTERN NORTH PACIFIC

YEAR	NUMBER OF ALERT SYSTEMS	ALERT SYSTEMS WHICH BECAME NUMBERED TROPICAL CYCLONES	TOTAL NUMBERED TROPICAL CYCLONES	DEVELOPMENT RATE
1972	41	29	32	71%
1973	26	22	23	85%
1974	35	30	36	86%
1975	34	25	25	74%
1976	34	25	25	74%
1977	26	20	21	77%
1978	32	27	32	84%

MONTHLY DISTRIBUTION

	J	F	M	A	M	J	J	A	S	O	N	D
FORMATION ALERTS	1	0	0	1	0	4	3	7	5	8	3	0

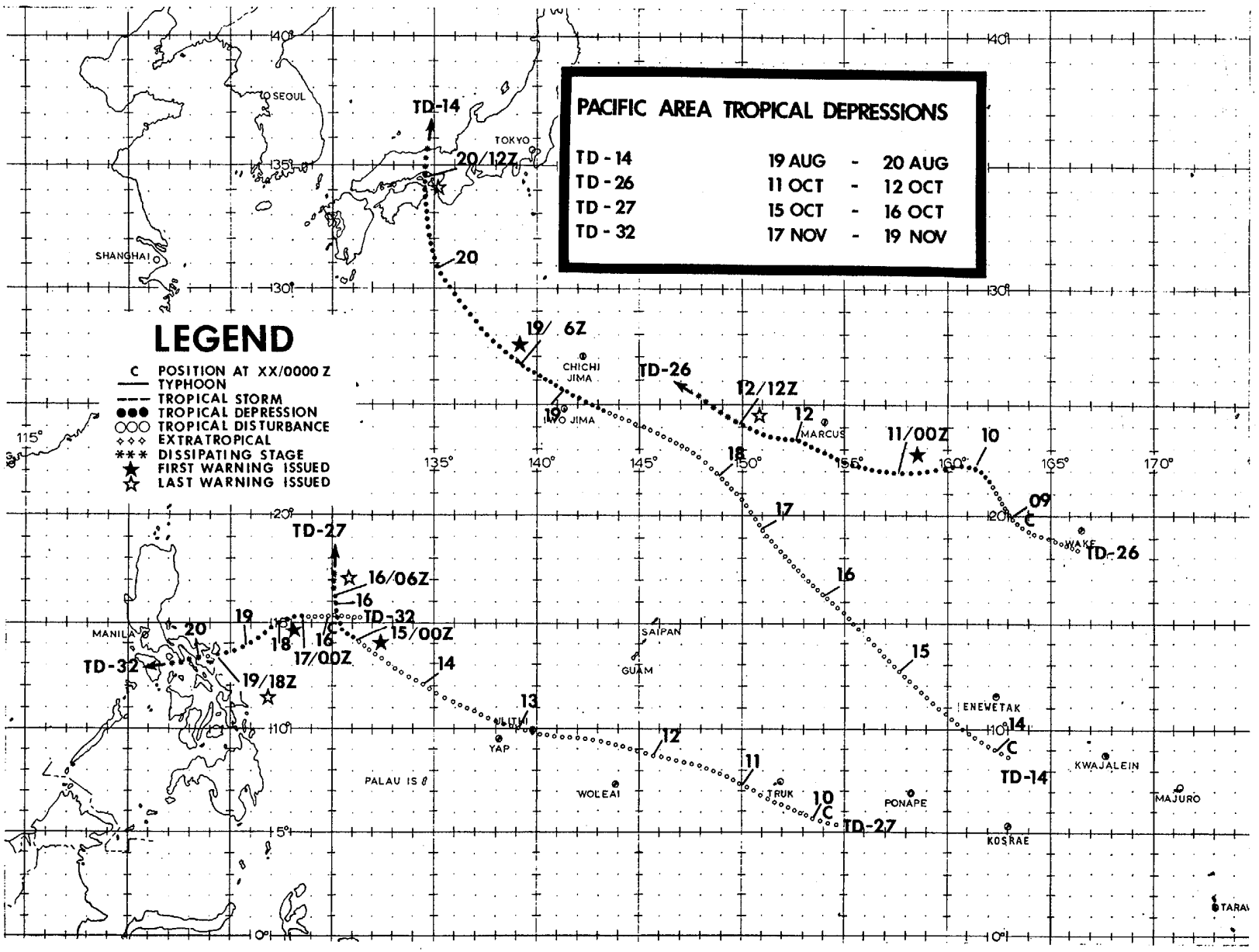
TABLE 3-5.

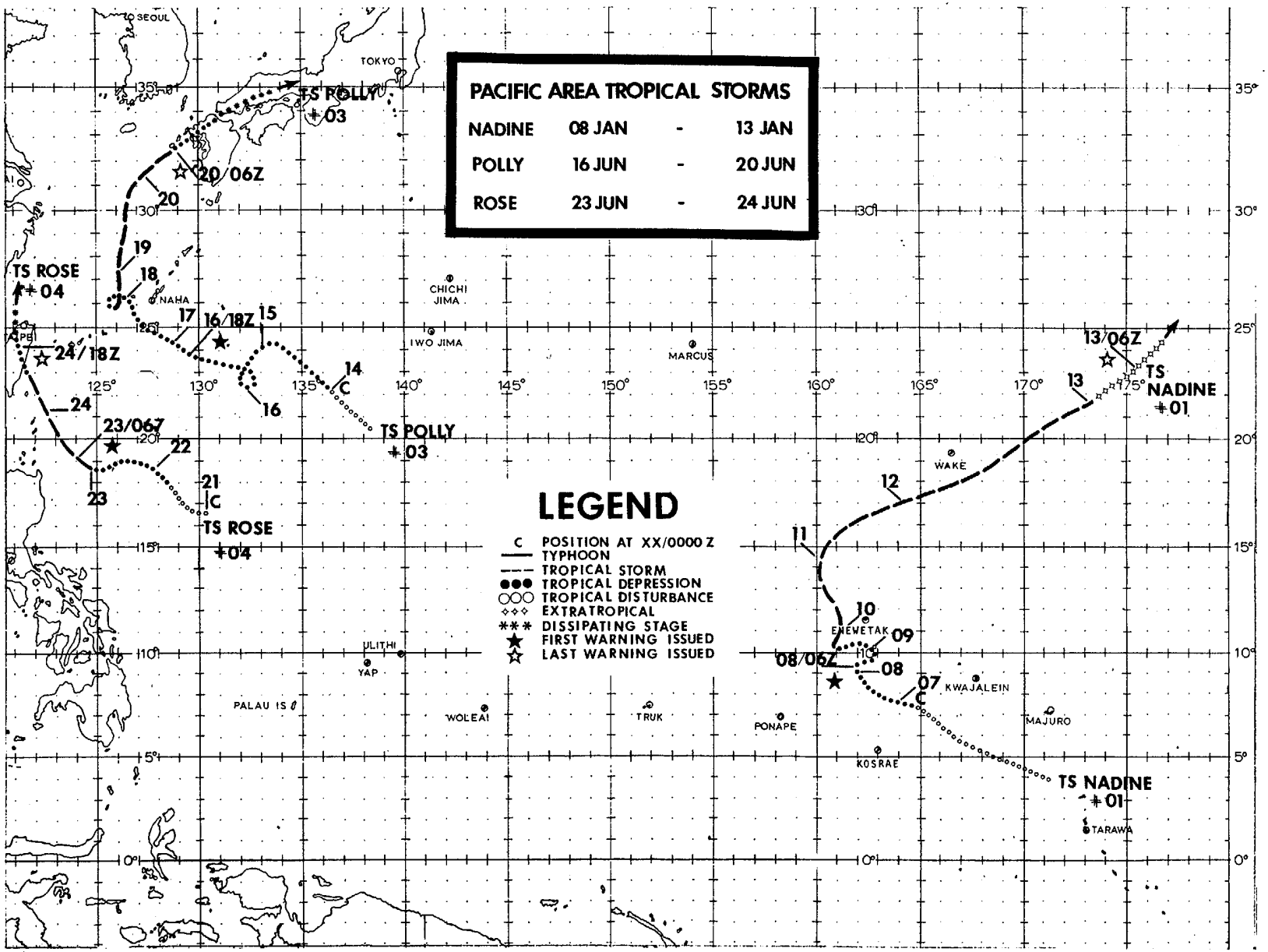
WARNING SUMMARY

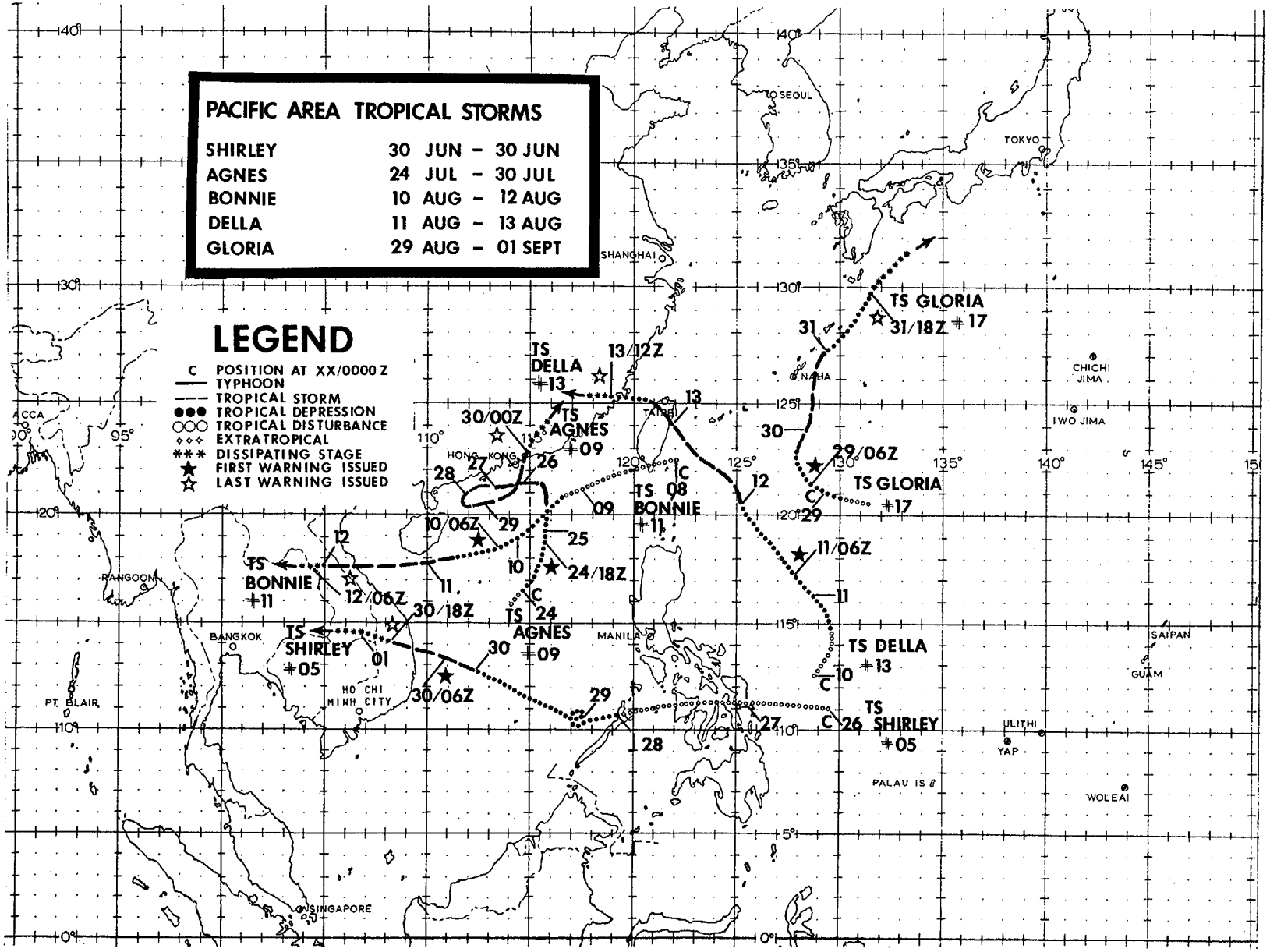
WESTERN NORTH PACIFIC

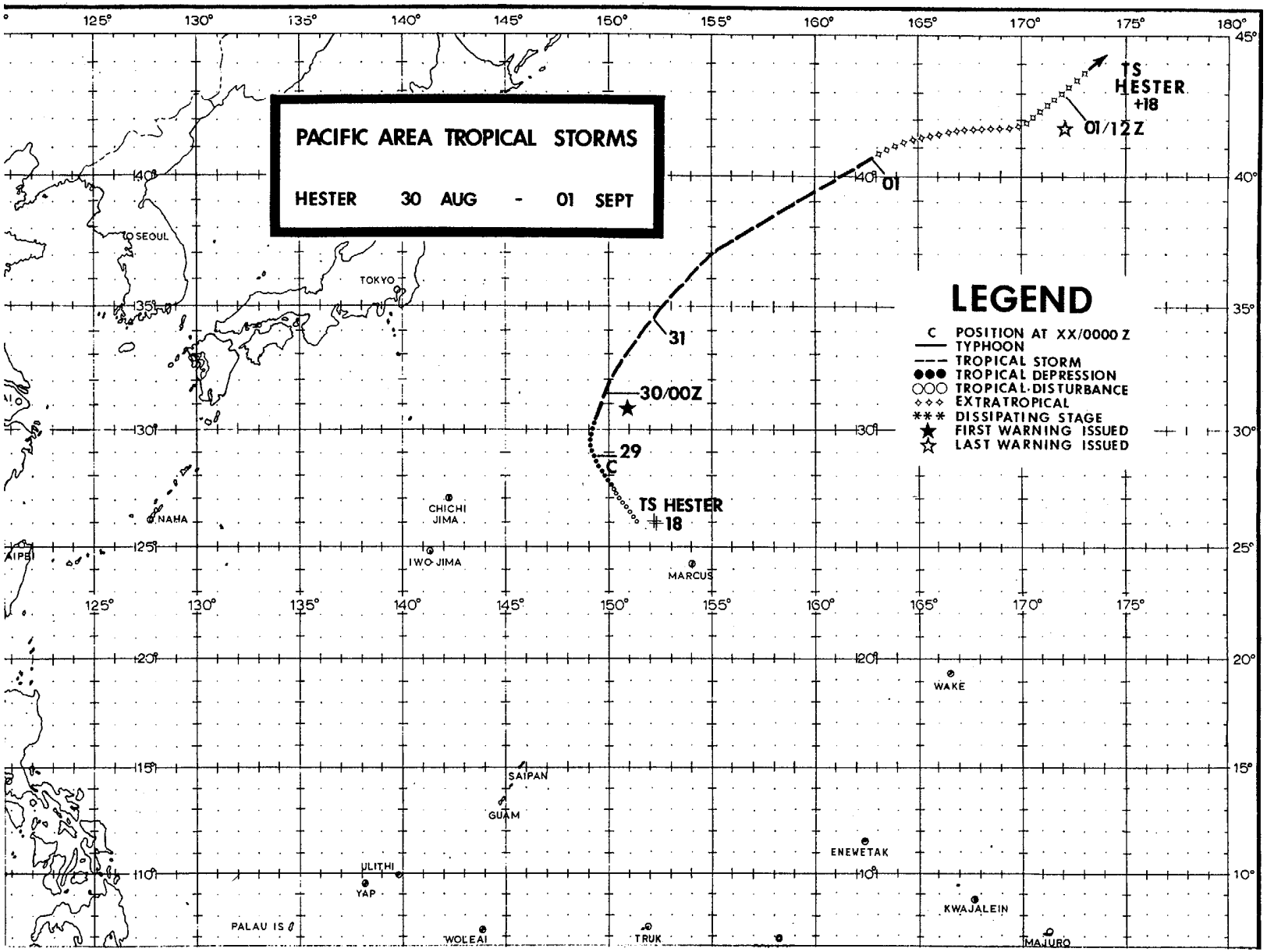
	1978	AVERAGE 1959-1977
TOTAL NUMBER OF WARNINGS	715	669
NUMBER OF WARNING DAYS	131	141
NUMBER OF WARNING DAYS WITH 2 OR MORE CYCLONES	46	46
NUMBER OF WARNING DAYS WITH 3 OR MORE CYCLONES	16	9
TROPICAL DEPRESSIONS	4	5
TROPICAL STORMS	13	11
TYPHOONS	15	19
TOTAL TROPICAL CYCLONES	32	35

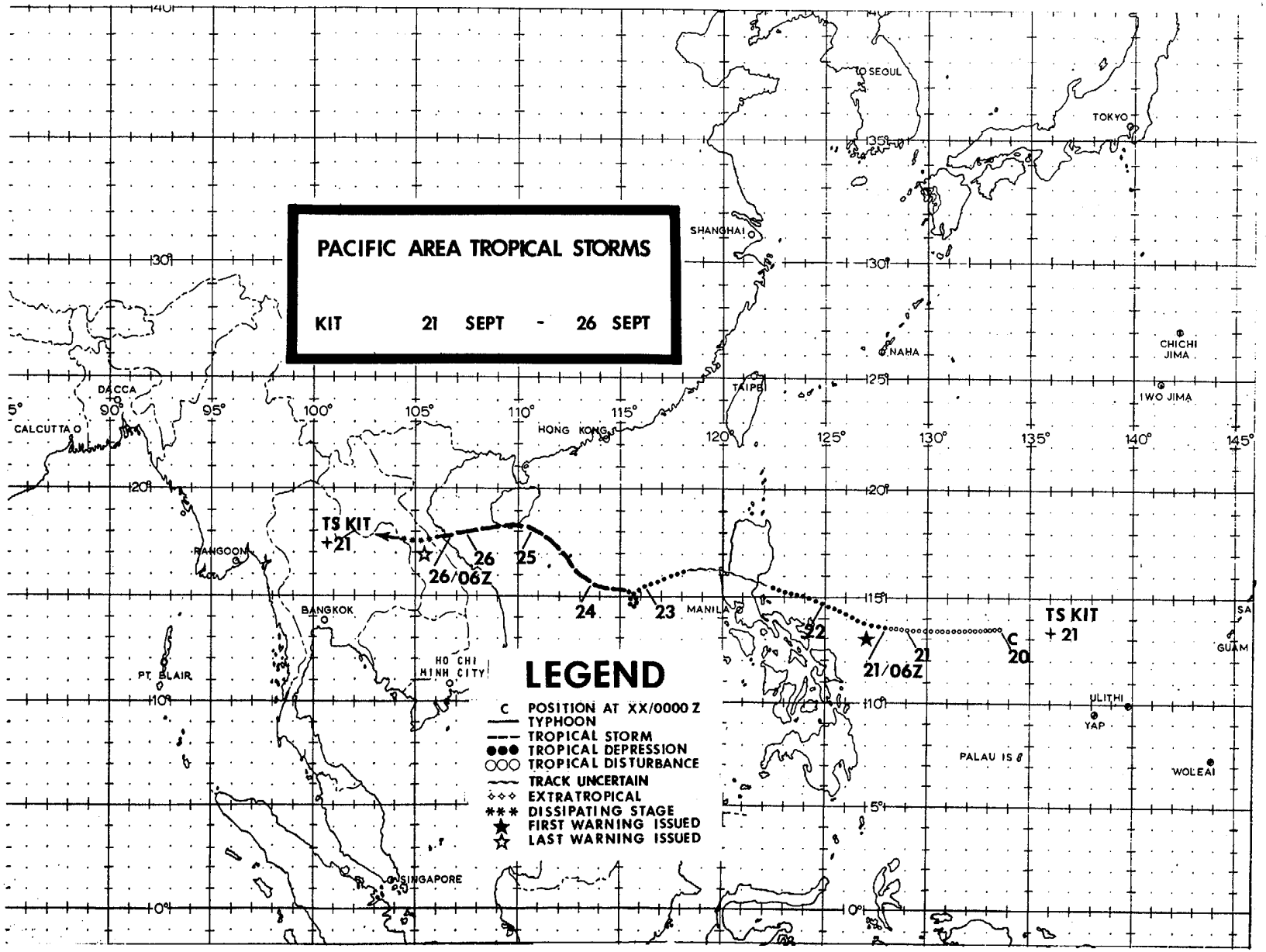
JTWC

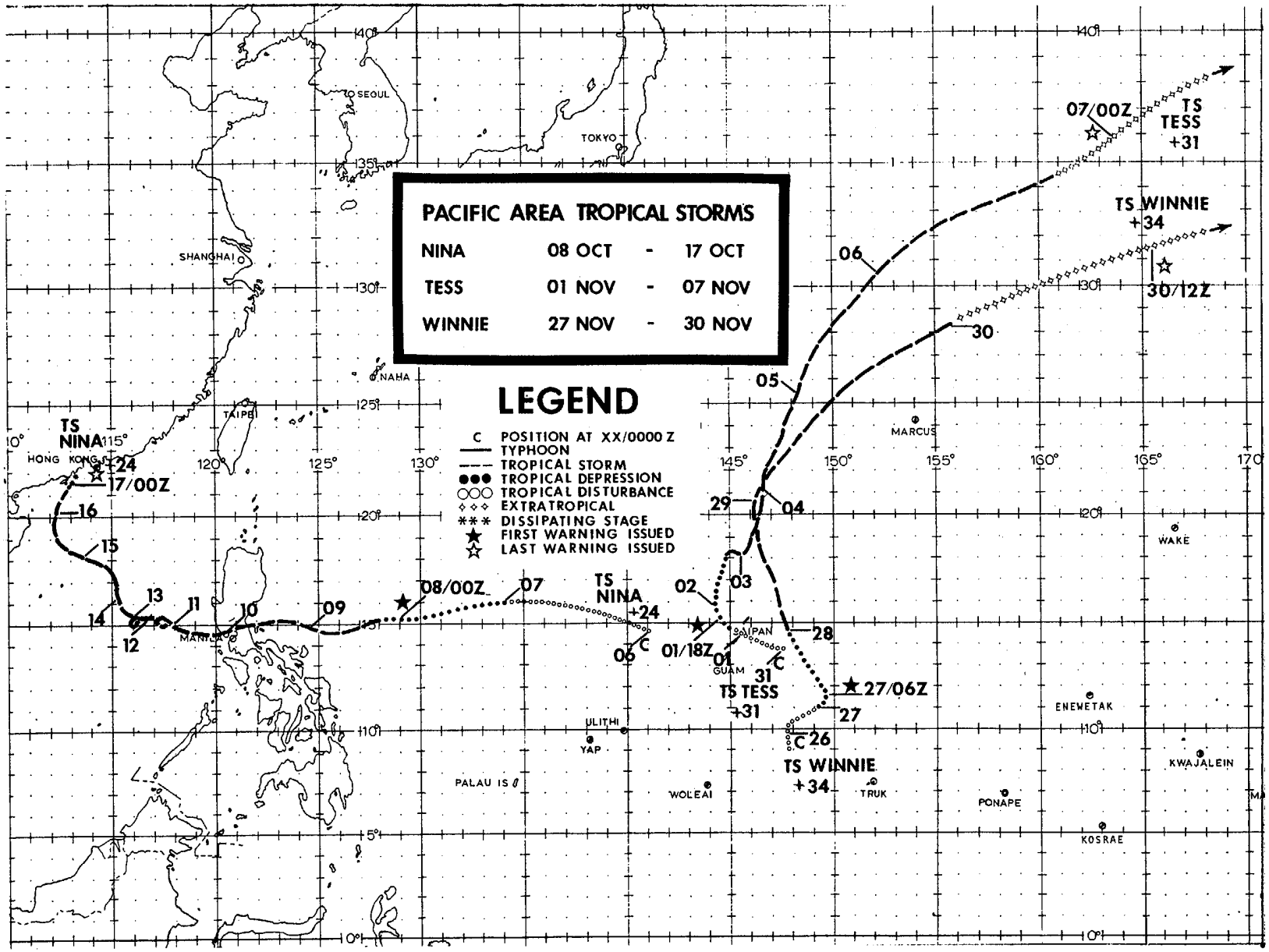

PACIFIC AREA TROPICAL DEPRESSIONS
TD - 14 19 AUG - 20 AUG
TD - 26 11 OCT - 12 OCT
TD - 27 15 OCT - 16 OCT
TD - 32 17 NOV - 19 NOV
LEGEND
C POSITION AT XX/0000 Z
TYPHOON
TROPICAL STORM
TROPICAL DEPRESSION
TROPICAL DISTURBANCE
EXTRATROPICAL
DISSIPATING STAGE
FIRST WARNING ISSUED
LAST WARNING ISSUED
SEOUL
TOKYO
SHANGHAI
CHICHI JIMA
IWO JIMA
MARCUS
WAKE
MANILA
SAIPAN
GUAM
YAP
ULITHI
WOLEAI
PALAU IS
TRUK
PONAPE
ENEWETAK
KWAJALEIN
MAJURO
KOSRAE
TD-14
TD-26
TD-27
TD-32
20/12Z
19/ 6Z
12/12Z
11/00Z
09
C
16/06Z
15/00Z
17/00Z
19/18Z
14
C
10
C
115°
135°
140°
145°
150°
155°
160°
165°
170°
40°
35°
30°
20°
15°
10°
5°
0°

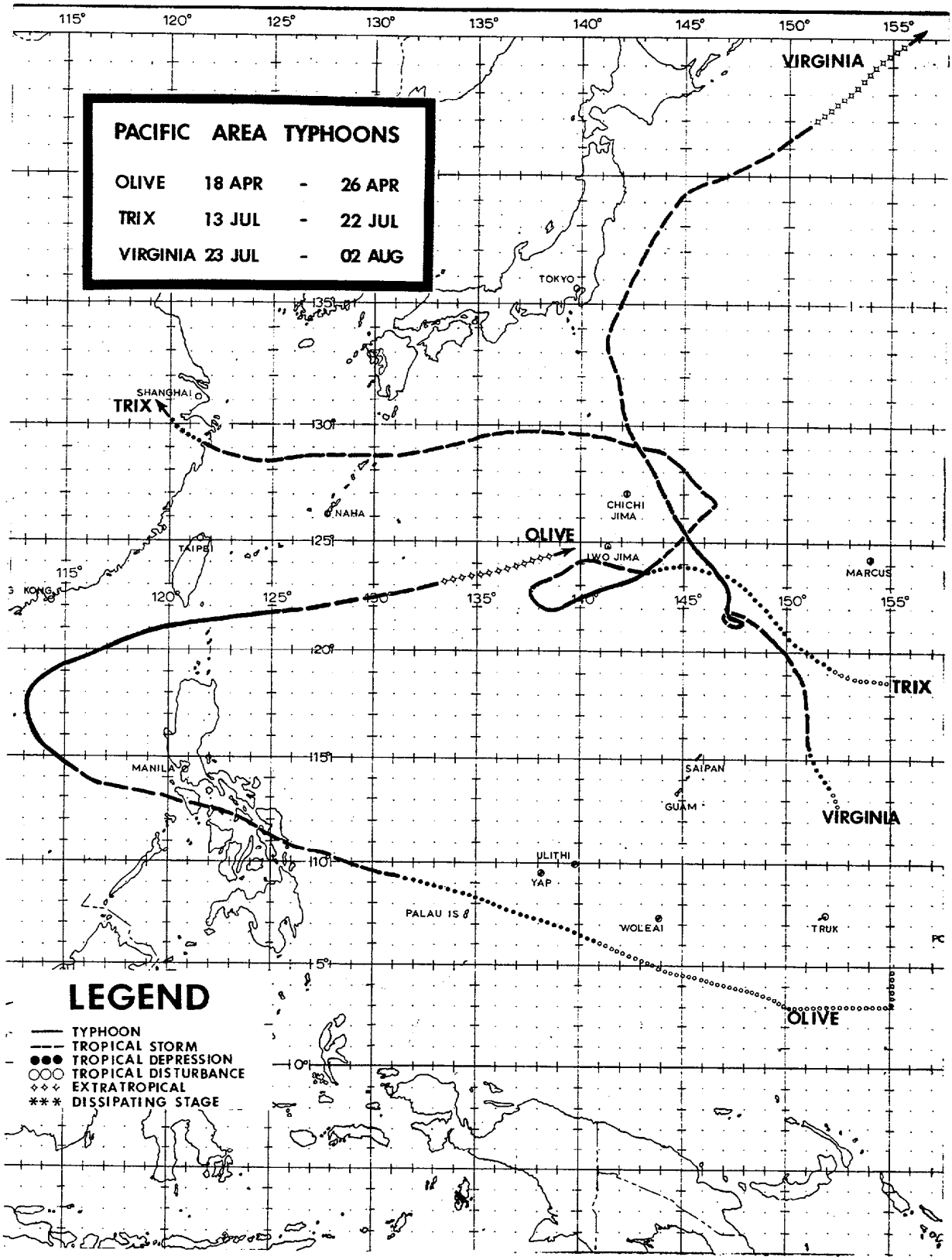

PACIFIC AREA TROPICAL STORMS
NADINE 08 JAN - 13 JAN
POLLY 16 JUN - 20 JUN
ROSE 23 JUN - 24 JUN
LEGEND
C POSITION AT XX/0000 Z
TYPHOON
TROPICAL STORM
TROPICAL DEPRESSION
TROPICAL DISTURBANCE
EXTRATROPICAL
DISSIPATING STAGE
FIRST WARNING ISSUED
LAST WARNING ISSUED
TS POLLY #03
TS ROSE #04
TS NADINE #01
SEOUL
TOKYO
NAHA
CHICHI JIMA
IWO JIMA
MARCUS
WAKE
YAP
ULITHI
PALAU IS
WOLEAI
TRUK
PONAPE
KOSRAE
KWAJALEIN
MAJURO
ENEWETAK
TARAWA
20/06Z
24/18Z
23/06Z
16/18Z
13/06Z
08/06Z

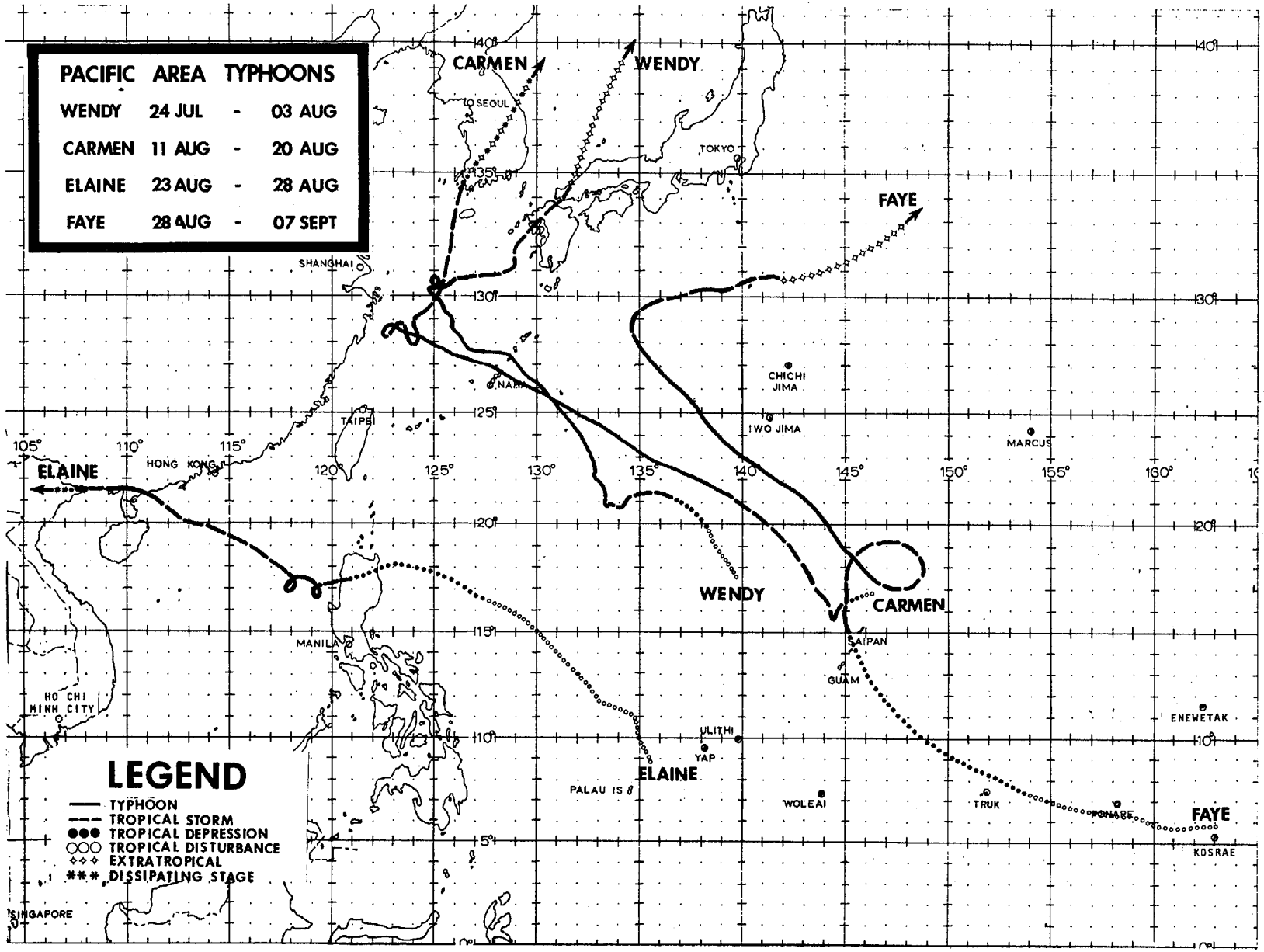

PACIFIC AREA TROPICAL STORMS
SHIRLEY 30 JUN - 30 JUN
AGNES 24 JUL - 30 JUL
BONNIE 10 AUG - 12 AUG
DELLA 11 AUG - 13 AUG
GLORIA 29 AUG - 01 SEPT
LEGEND
C POSITION AT XX/0000 Z
TYPHOON
TROPICAL STORM
TROPICAL DEPRESSION
TROPICAL DISTURBANCE
EXTRATROPICAL
DISSIPATING STAGE
FIRST WARNING ISSUED
LAST WARNING ISSUED
SEOUL
TOKYO
SHANGHAI
NAHA
CHICHI JIMA
IWO JIMA
TAIPEI
HONG KONG
RANGOON
BANGKOK
MANILA
SAIPAN
GUAM
PT. BLAIR
HO CHI MINH CITY
SINGAPORE
ULITHI
YAP
PALAU IS
WOLEAI
TS GLORIA 31/18Z +17
TS DELLA 13/12Z +13
TS AGNES 30/00Z +09
TS BONNIE 10/06Z +11
TS BONNIE 12/06Z +11
TS SHIRLEY 30/18Z +05
TS AGNES 24/18Z +09
TS SHIRLEY 30/06Z +05
TS GLORIA 29/06Z +17
TS BONNIE 08 +11
TS DELLA 11/06Z +13
TS SHIRLEY 26 +05

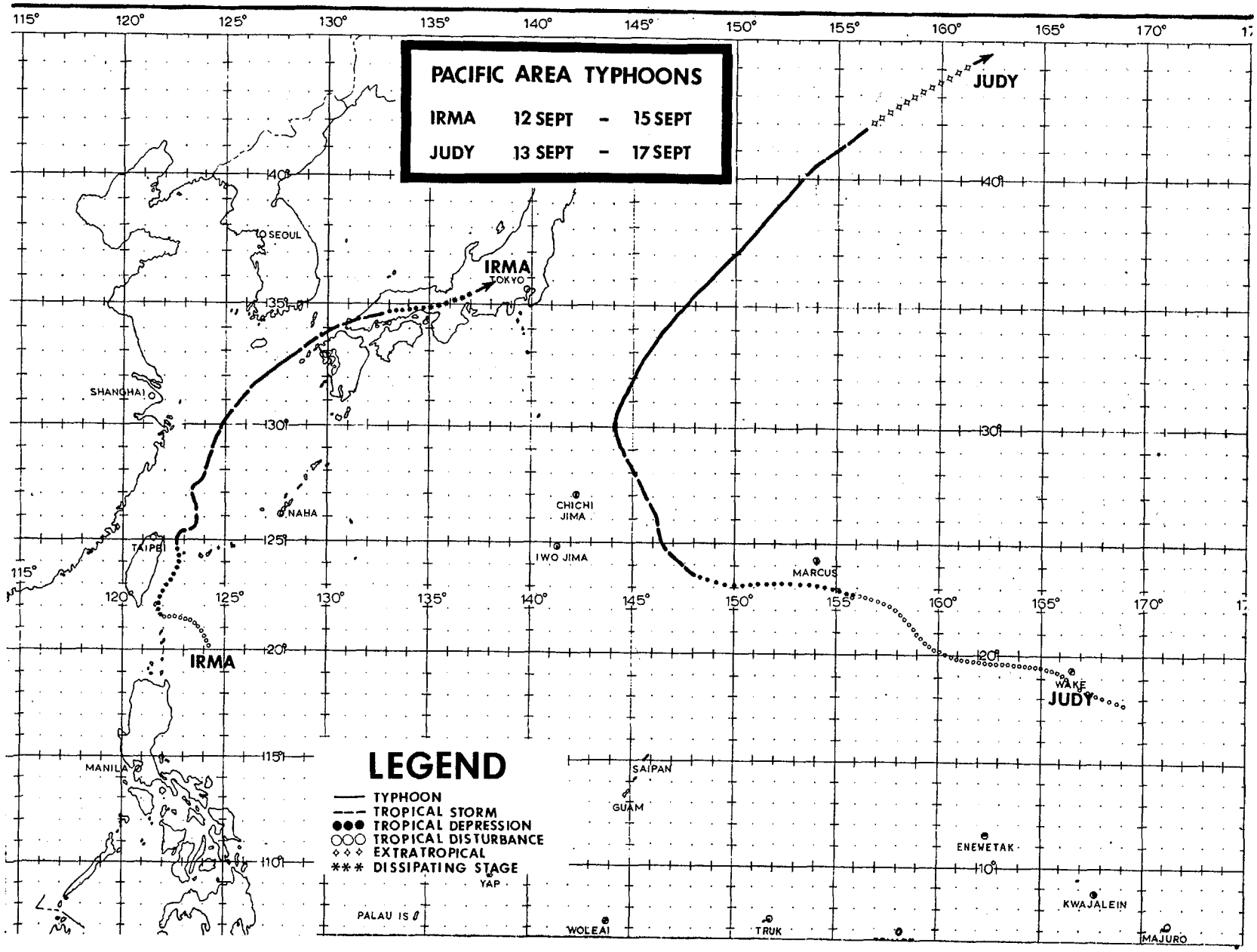

PACIFIC AREA TROPICAL STORMS
HESTER 30 AUG - 01 SEPT
TS HESTER +18
01/12Z
01
31
30/00Z
29
TS HESTER +18
LEGEND
C POSITION AT XX/0000 Z
TYPHOON
TROPICAL STORM
TROPICAL DEPRESSION
TROPICAL DISTURBANCE
EXTRATROPICAL
DISSIPATING STAGE
FIRST WARNING ISSUED
LAST WARNING ISSUED
SEOUL
TOKYO
NAHA
CHICHI JIMA
IWO JIMA
MARCUS
WAKE
SAIPAN
GUAM
ULITHI
YAP
PALAU IS
WOLEAI
TRUK
ENEWETAK
KWAJALEIN
MAJURO
AIPEI

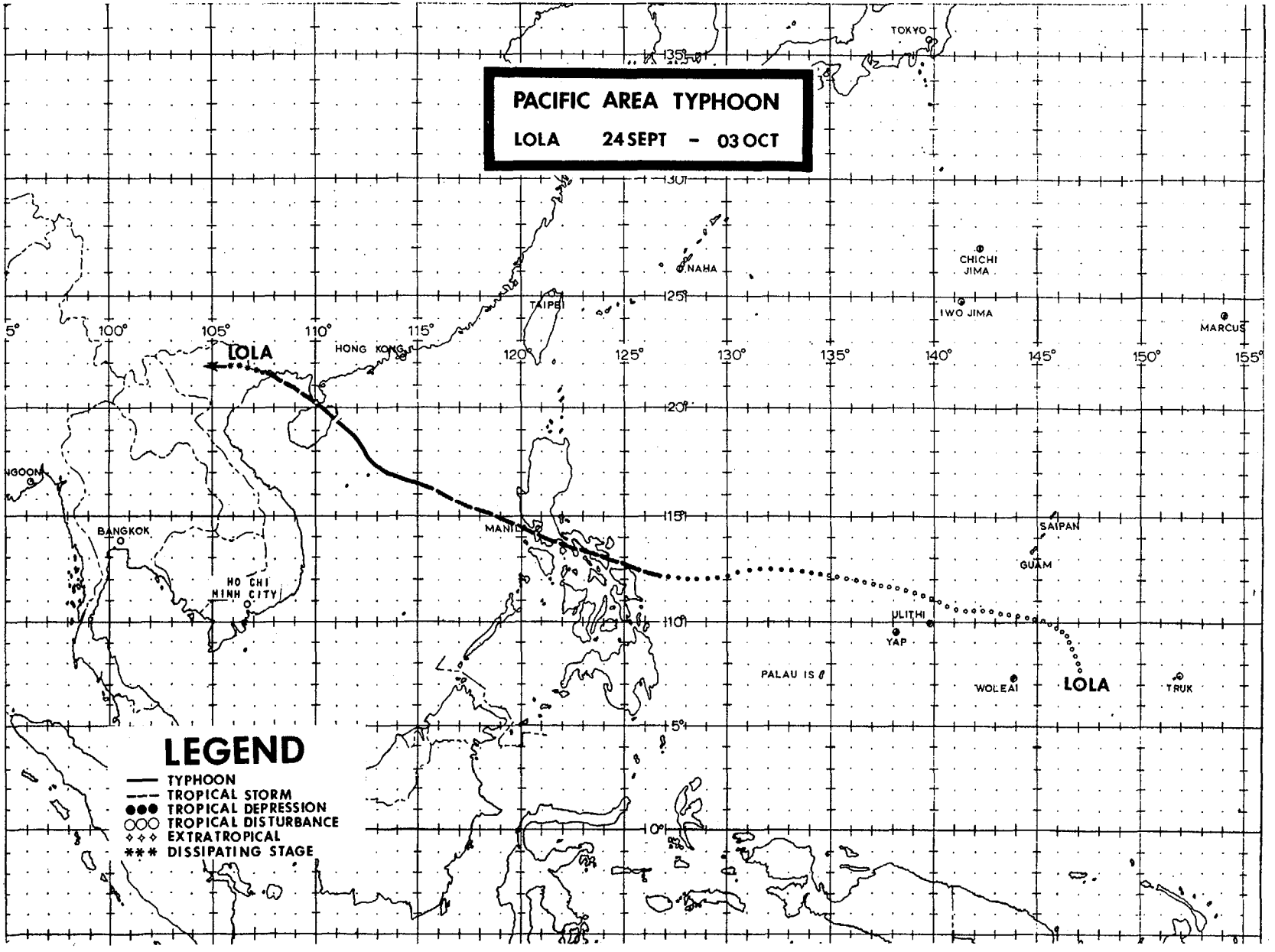

PACIFIC AREA TROPICAL STORMS
KIT 21 SEPT - 26 SEPT
TS KIT +21
26/06Z
26
25
24
23
22
21/06Z
21
C
20
TS KIT + 21
LEGEND
C POSITION AT XX/0000 Z
TYPHOON
TROPICAL STORM
TROPICAL DEPRESSION
TROPICAL DISTURBANCE
TRACK UNCERTAIN
EXTRATROPICAL
DISSIPATING STAGE
FIRST WARNING ISSUED
LAST WARNING ISSUED
SEOUL
TOKYO
SHANGHAI
NAHA
CHICHI JIMA
IWO JIMA
TAIPEI
DACCA
CALCUTTA
HONG KONG
RANGOON
BANGKOK
MANILA
PT BLAIR
HO CHI MINH CITY
SINGAPORE
GUAM
ULITHI
YAP
PALAU IS
WOLEAI

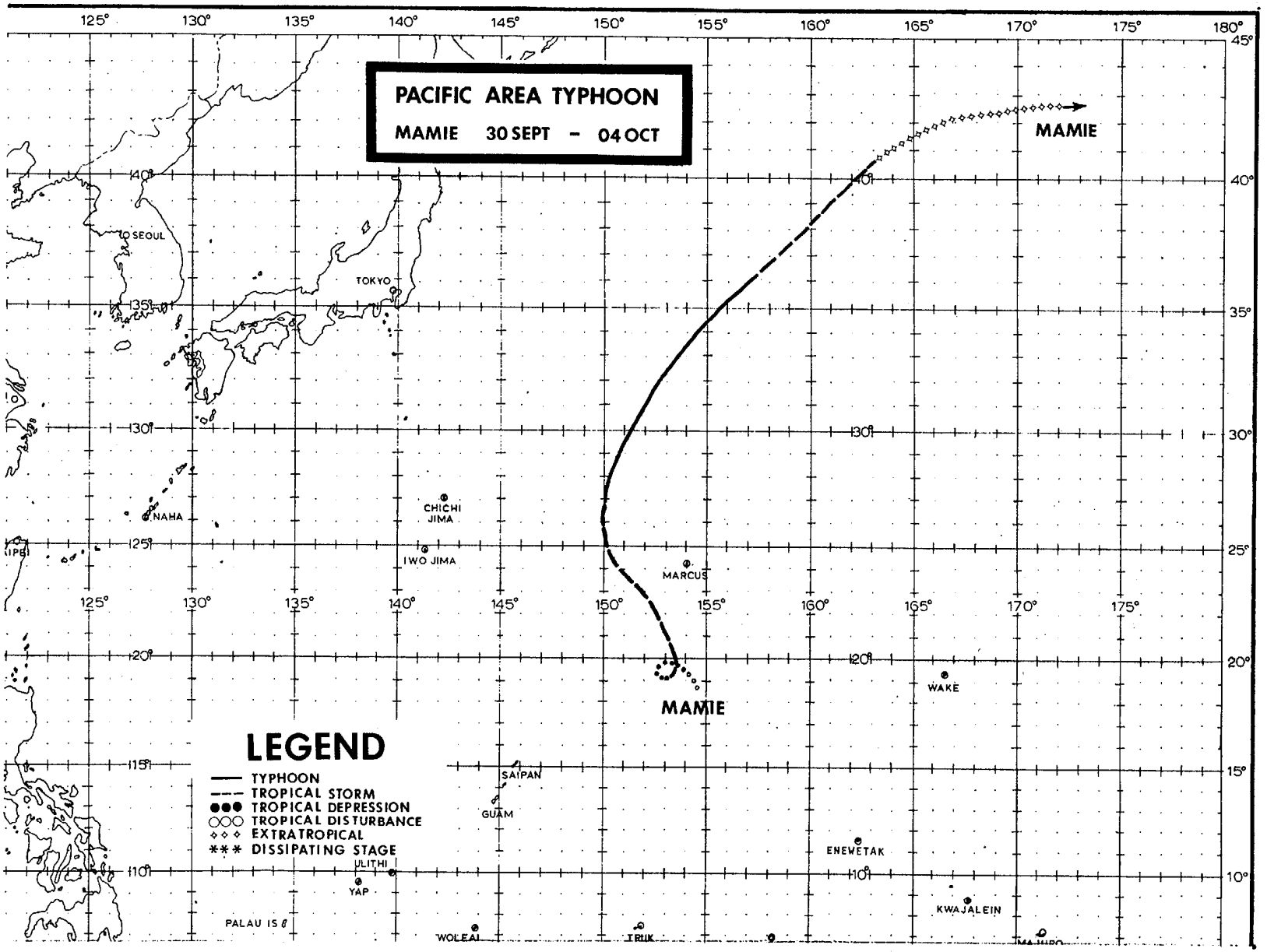

PACIFIC AREA TROPICAL STORMS
NINA 08 OCT - 17 OCT
TESS 01 NOV - 07 NOV
WINNIE 27 NOV - 30 NOV
LEGEND
C POSITION AT XX/0000 Z
TYPHOON
TROPICAL STORM
TROPICAL DEPRESSION
TROPICAL DISTURBANCE
EXTRATROPICAL
DISSIPATING STAGE
FIRST WARNING ISSUED
LAST WARNING ISSUED
TS NINA +24
17/00Z
08/00Z
01/18Z
27/06Z
07/00Z
TS TESS +31
TS WINNIE +34
30/12Z
TS NINA +24
TS TESS +31
TS WINNIE +34
SEOUL
TOKYO
SHANGHAI
NAHA
TAIPEI
HONG KONG
MANILA
GUAM
SAIPAN
MARCUS
WAKE
ENEWETAK
KWAJALEIN
ULITHI
YAP
PALAU IS
WOLEAI
TRUK
PONAPE
KOSRAE
140°
135°
130°
125°
120°
115°
145°
150°
155°
160°
165°
170°
10°
5°

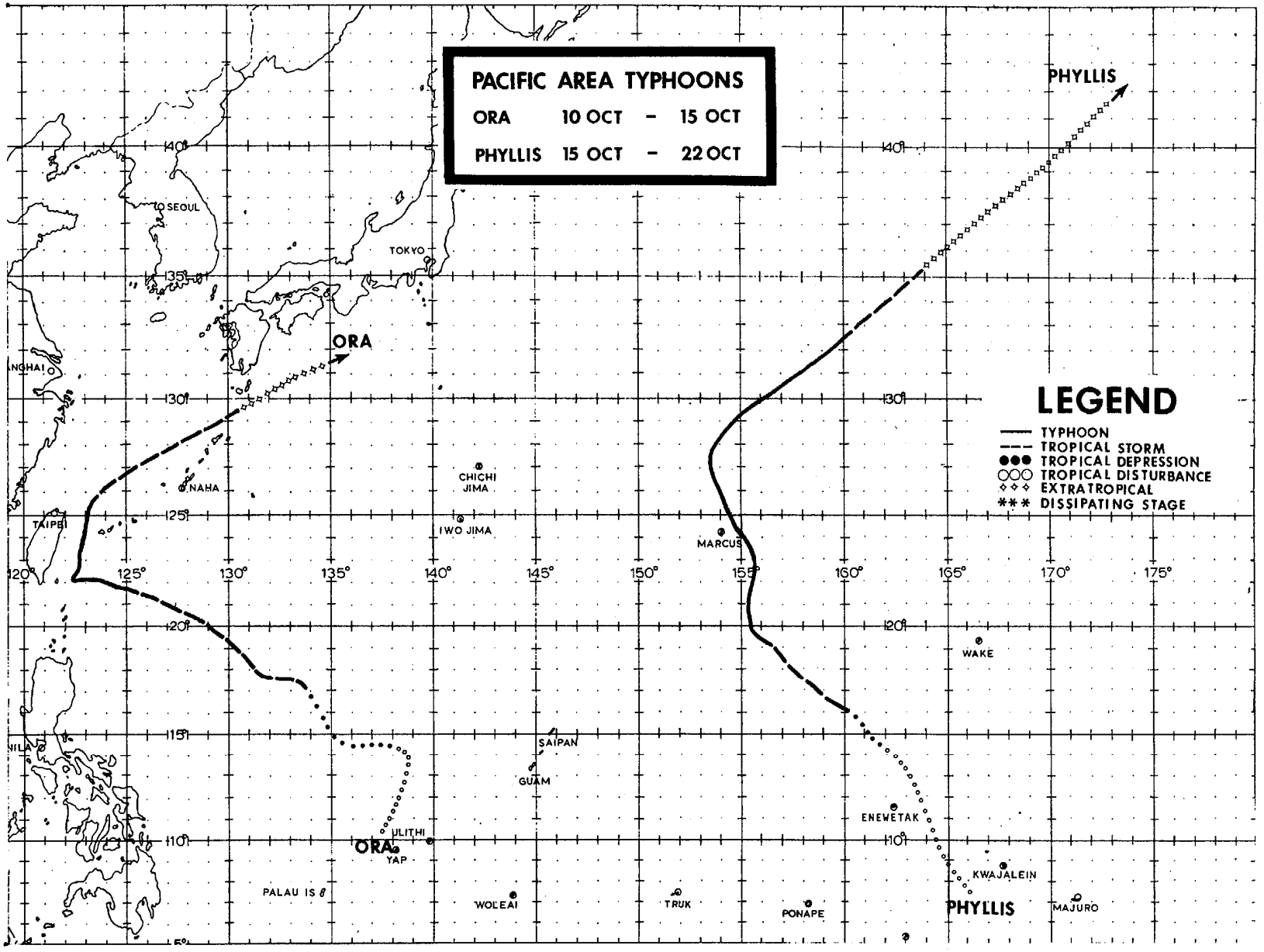

PACIFIC AREA TYPHOONS
OLIVE 18 APR - 26 APR
TRIX 13 JUL - 22 JUL
VIRGINIA 23 JUL - 02 AUG
VIRGINIA
TOKYO
SHANGHAI
TRIX
NAHA
CHICHI JIMA
OLIVE
IWO JIMA
TAIPEI
MARCUS
TRIX
MANILA
SAIPAN
GUAM
VIRGINIA
ULITHI
YAP
PALAU IS
WOLEAI
TRUK
OLIVE
LEGEND
TYPHOON
TROPICAL STORM
TROPICAL DEPRESSION
TROPICAL DISTURBANCE
EXTRATROPICAL
DISSIPATING STAGE

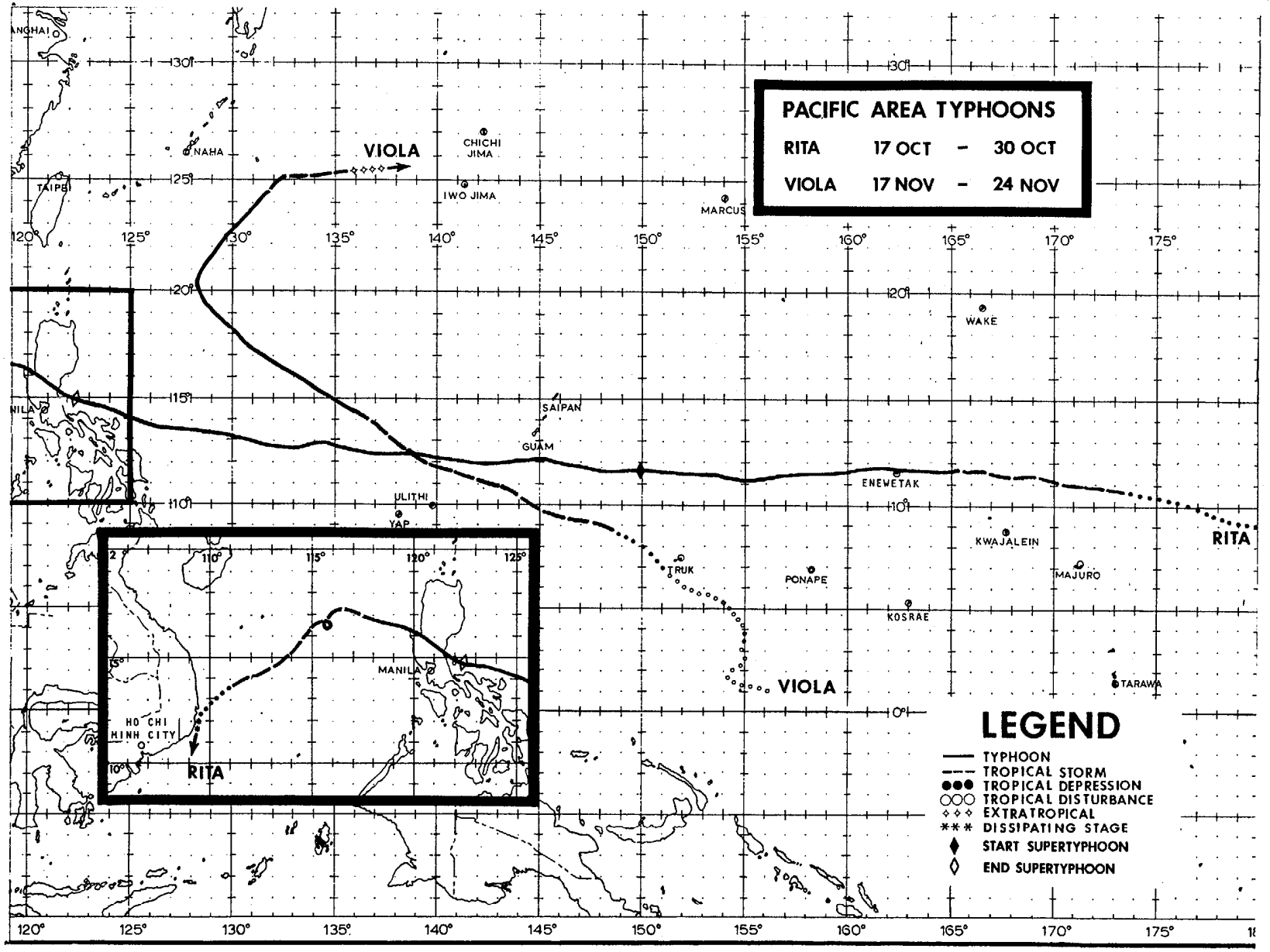

PACIFIC AREA TYPHOONS
WENDY 24 JUL - 03 AUG
CARMEN 11 AUG - 20 AUG
ELAINE 23 AUG - 28 AUG
FAYE 28 AUG - 07 SEPT
CARMEN
WENDY
FAYE
ELAINE
WENDY
CARMEN
ELAINE
FAYE
TO SEOUL
TOKYO
SHANGHAI
NAHA
TAIPEI
HONG KONG
CHICHI JIMA
IWO JIMA
MARCUS
MANILA
SAIPAN
GUAM
HO CHI MINH CITY
ULITHI
YAP
PALAU IS
WOLEAI
TRUK
PONAPE
KOSRAE
ENEWETAK
SINGAPORE
LEGEND
TYPHOON
TROPICAL STORM
TROPICAL DEPRESSION
TROPICAL DISTURBANCE
EXTRATROPICAL
DISSIPATING STAGE

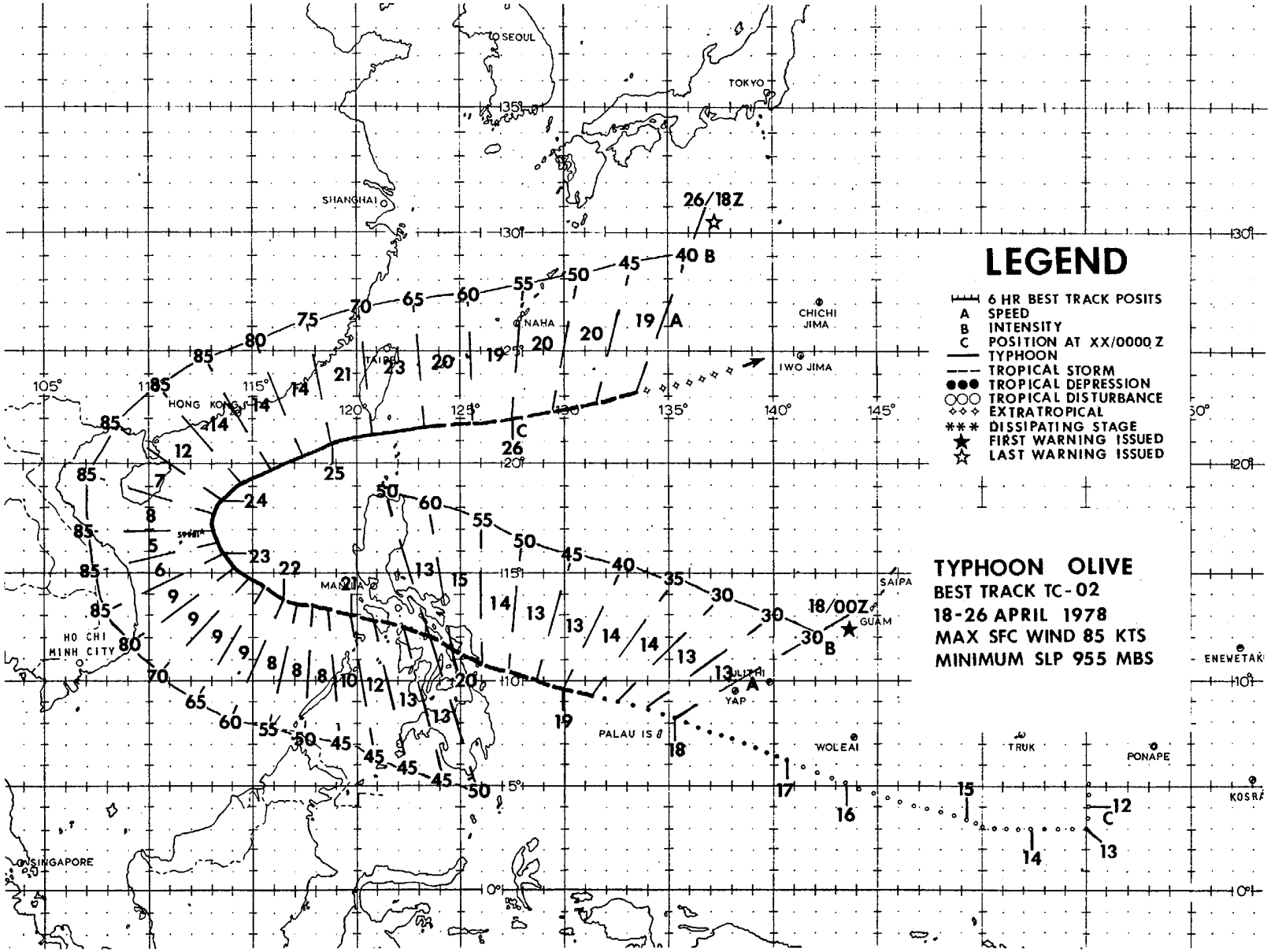

PACIFIC AREA TYPHOONS
IRMA 12 SEPT - 15 SEPT
JUDY 13 SEPT - 17 SEPT
JUDY
IRMA
TOKYO
SEOUL
SHANGHAI
NAHA
TAIPEI
CHICHI JIMA
IWO JIMA
MARCUS
WAKE
IRMA
JUDY
MANILA
SAIPAN
GUAM
ENEWETAK
KWAJALEIN
MAJURO
YAP
PALAU IS
WOLEAI
TRUK
LEGEND
TYPHOON
TROPICAL STORM
TROPICAL DEPRESSION
TROPICAL DISTURBANCE
EXTRATROPICAL
DISSIPATING STAGE


PACIFIC AREA TYPHOON
LOLA 24 SEPT - 03 OCT
TOKYO
NAHA
CHICHI JIMA
IWO JIMA
MARCUS
TAIPEI
HONG KONG
LOLA
RANGOON
BANGKOK
HO CHI MINH CITY
MANILA
SAIPAN
GUAM
ULITHI
YAP
PALAU IS
WOLEAI
LOLA
TRUK
LEGEND
TYPHOON
TROPICAL STORM
TROPICAL DEPRESSION
TROPICAL DISTURBANCE
EXTRATROPICAL
DISSIPATING STAGE


PACIFIC AREA TYPHOON
MAMIE 30 SEPT - 04 OCT
MAMIE
MAMIE
SEOUL
TOKYO
NAHA
CHICHI JIMA
IWO JIMA
MARCUS
WAKE
SAIPAN
GUAM
ENEWETAK
KWAJALEIN
ULITHI
YAP
PALAU IS
WOLEAI
TRUK
LEGEND
TYPHOON
TROPICAL STORM
TROPICAL DEPRESSION
TROPICAL DISTURBANCE
EXTRATROPICAL
DISSIPATING STAGE


PACIFIC AREA TYPHOONS
ORA 10 OCT - 15 OCT
PHYLLIS 15 OCT - 22 OCT
PHYLLIS
ORA
LEGEND
TYPHOON
TROPICAL STORM
TROPICAL DEPRESSION
TROPICAL DISTURBANCE
EXTRATROPICAL
*** DISSIPATING STAGE
TO SEOUL
TOKYO
NAHA
TAIPEI
CHICHI JIMA
IWO JIMA
MARCUS
WAKE
SAIPAN
GUAM
ULITHI
YAP
ENEWETAK
KWAJALEIN
MAJURO
PALAU IS
WOLEAI
TRUK
PONAPE
120°
125°
130°
135°
140°
145°
150°
155°
160°
165°
170°
175°
40°
35°
30°
25°
20°
15°
10°
5°


PACIFIC AREA TYPHOONS
RITA 17 OCT - 30 OCT
VIOLA 17 NOV - 24 NOV
VIOLA
RITA
NAHA
TAIPEI
CHICHI JIMA
IWO JIMA
MARCUS
WAKE
SAIPAN
GUAM
ULITHI
YAP
ENEWETAK
KWAJALEIN
MAJURO
TARAWA
TRUK
PONAPE
KOSRAE
MANILA
HO CHI MINH CITY
LEGEND
TYPHOON
TROPICAL STORM
TROPICAL DEPRESSION
TROPICAL DISTURBANCE
EXTRATROPICAL
DISSIPATING STAGE
START SUPERTYPHOON
END SUPERTYPHOON


SEOUL
TOKYO
SHANGHAI
NAHA
CHICHI JIMA
IWO JIMA
TAIPEI
HONG KONG
HO CHI MINH CITY
MANILA
SAIPA
GUAM
YAP
ULITHI
PALAU IS
WOLEAI
TRUK
PONAPE
ENEWETAK
KOSRAE
SINGAPORE
26/18Z
18/00Z
105°
115°
120°
125°
130°
135°
140°
145°
150°
30°
20°
10°
5°
0°
LEGEND
6 HR BEST TRACK POSITS
A SPEED
B INTENSITY
C POSITION AT XX/0000 Z
TYPHOON
TROPICAL STORM
TROPICAL DEPRESSION
TROPICAL DISTURBANCE
EXTRATROPICAL
DISSIPATING STAGE
FIRST WARNING ISSUED
LAST WARNING ISSUED
TYPHOON OLIVE
BEST TRACK TC-02
18-26 APRIL 1978
MAX SFC WIND 85 KTS
MINIMUM SLP 955 MBS

Early April 1978 saw the near-equatorial trough (NET) slowly shift northward and become more active as the sun made its seasonal progression toward summer solstice. Within the NET, a surface circulation was first analyzed on the 11th at 1200Z near 05N-155E and initially meandered southward then westward at approximately 8 kt (15 km/hr) over the next four days. This circulation eventually developed into the first typhoon of the year, Olive.

Anticyclonic outflow at the 200 mb level was first noted in the vicinity over the surface circulation at 131200Z. Although weak, this outflow persisted for the next two days. By the 16th, satellite imagery and synoptic data indicated increased organization. A formation alert was issued at 160600Z and extended for another 24 hours at 170600Z as aircraft and satellite data confirmed that development was slower than expected. Based on satellite and synoptic data, the first warning on Tropical Depression 02 was issued at 180000Z. A subsequent aircraft fix at 180252Z found a central pressure of 1001 mb and estimated the maximum surface winds to be 30-35 kt (15-18 m/sec).

The mid-tropospheric subtropical ridge was well established at this time with the east-west axis varying between 17-20N. This resulted in the cyclone, once organized, tracking west-northwest at speeds faster than climatology. Satellite data indicated good outflow aloft with continuous intensification resulting. The intensification noted in the 24 hours prior to landfall was in good agreement with climatology. TD-02 was upgraded to Tropical Storm Olive on the 18th at 1800Z. Tropical Storm Olive passed through the Leyte Gulf with maximum sustained winds of 60 kt (31 m/sec).

While crossing the central Philippine Islands, Olive continued her 13 kt (24 km/hr) speed but weakened to 45 kt (23 m/sec) intensity. Upper level outflow remained good during the transit and Olive exited intact into the South China Sea after 201800Z. The combination of good outflow aloft and warm water in the South China Sea caused Olive to reintensify and reach typhoon intensity at 220600Z. The storm recurved through a break in the subtropical ridge along 113E that had been forming since 220000Z. Figure 3-1 shows the three-hourly surface reports from the Paracel Islands (WMO 59981) when Olive passed nearby. A maximum intensity of 85 kt (44 m/sec) was reached 12 hours before recurvature and continued until the 24th at 1200Z.

The recurvature was quite sharp due to strong, deep westerly upper-air flow in the latitudes of 20-30N. Figure 3-2 shows the cirrus outflow to the north and northeast of Olive being affected by the strong westerlies. After recurvature, Olive accelerated out to the east-northeast, staying approximately 180 nm (330 km) south of the maximum wind zone. Gradual weakening occurred after recurvature as cooler, drier air was ingested into the storm with Olive finally becoming extratropical over cooler waters at 1800Z on the 26th of April.

Post-analysis showed that numbered warnings should have begun near 170000Z. Although the system was not fully defined at this time and difficult to pinpoint on satellite data, enough information was available to predict storm force winds were possible within 48 hours. Recurvature was considered probable early in Olive's life and discussed on prognostic reasoning messages. However, the recurvature track was much sharper than initially forecast. More emphasis should have been placed on the depth and strength of the westerlies north of the narrow, subtropical ridge and tracks of previous April cyclones (analogs) should have been studied closely.

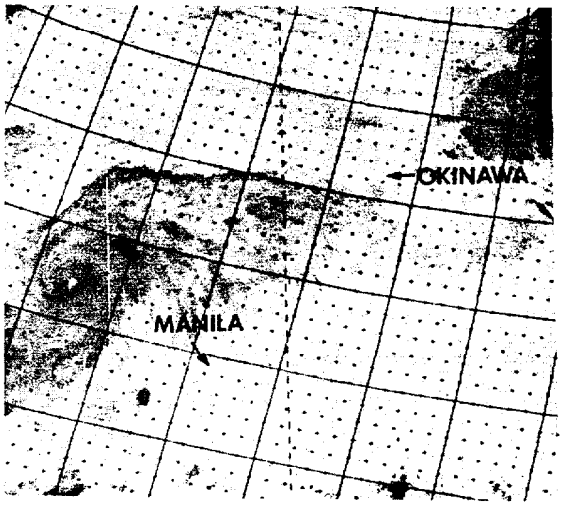
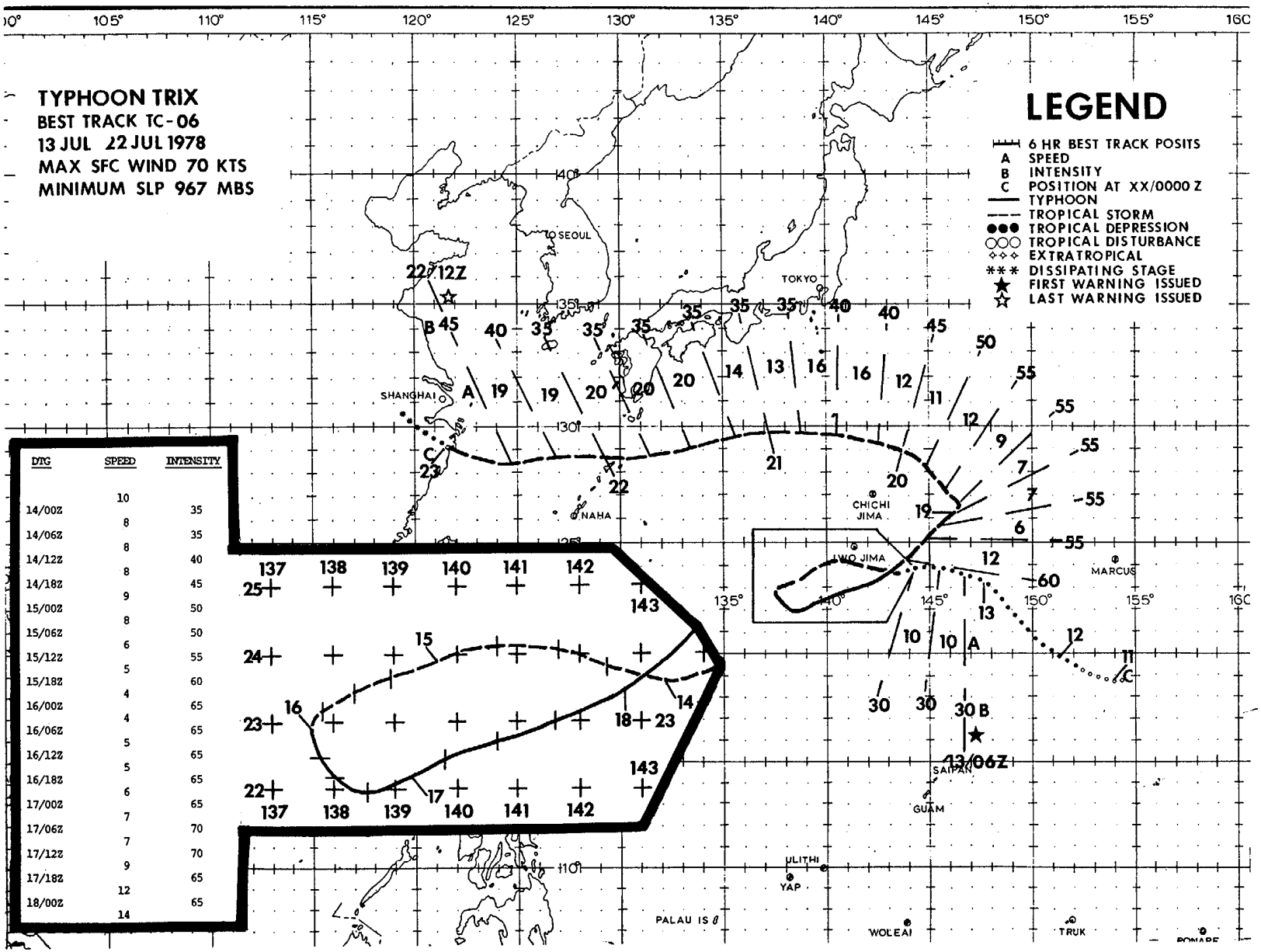


FIGURE 3-2. Infrared imagery of Typhoon Olive at maximum intensity of 85 kt (44 m/sec) during recurvature, 23 April 1978, 1158Z. (NOAA-5 imagery)

FWC/JTWC GUAM

DATE: 22-23 APRIL 1978	22/18Z	22/21Z	23/00Z	23/03Z	23/06Z	23/09Z	23/12Z	23/15Z	23/18Z	23/21Z
59981 PARACEL ISLANDS	053	029	029	009	951	896	916	973	002	015

FIGURE 3-1. Three-hourly surface synoptic observations from the Paracel Islands during passage of Typhoon Olive.


TYPHOON TRIX
BEST TRACK TC-06
13 JUL 22 JUL 1978
MAX SFC WIND 70 KTS
MINIMUM SLP 967 MBS
LEGEND
6 HR BEST TRACK POSITS
A SPEED
B INTENSITY
C POSITION AT XX/0000 Z
TYPHOON
TROPICAL STORM
TROPICAL DEPRESSION
TROPICAL DISTURBANCE
EXTRATROPICAL
*** DISSIPATING STAGE
FIRST WARNING ISSUED
LAST WARNING ISSUED
DTG SPEED INTENSITY
14/00Z 10 35
14/06Z 8 35
14/12Z 8 40
14/18Z 8 45
15/00Z 9 50
15/06Z 8 50
15/12Z 6 55
15/18Z 5 60
16/00Z 4 65
16/06Z 4 65
16/12Z 5 65
16/18Z 5 65
17/00Z 6 65
17/06Z 7 70
17/12Z 7 70
17/18Z 9 65
18/00Z 12 65
13/06Z
SEOUL
TOKYO
SHANGHAI
NAHA
CHICHI JIMA
IWO JIMA
MARCUS
SAIPAN
GUAM
ULITHI
YAP
PALAU IS
WOLEAI
TRUK

Trix, 1978's second typhoon, was a difficult tropical cyclone to forecast due to an unusual track which included a four day, 700 nm (1300 km) perimeter, cyclonic loop. The degree of difficulty was reflected in warning statistics such as: eleven warning relocations, two warning amendments, and an average 24 hour forecast error of 174 nm (322 km).

Trix originated from a wave in the easterlies which became significant along 148E from 10N-25N on the 10th of July. A day later, a surface circulation was noted within the wave 550 nm (1000 km) northeast of Guam. Over the next 48 hours, the wave drifted northwest at 05-07 kt (09-13 km/hr) and moved under an area of diffluence caused by a tropical upper tropospheric trough (TUTT) to the west. Potential for development being excellent, a formation alert was issued at 0600Z on the 12th.

The first aircraft reconnaissance flight into the alert area found a cyclonic circulation with a circular area of calm winds, 100 nm (185 km) in diameter. Based on this 130407Z information and continued outflow aloft possible, the first warning was issued at 130600Z on Tropical Depression 06 (TD 06).

Over the next 18 hours, TD 06 moved west at approximately 10 kt (18 km/hr). Subsequent aircraft reconnaissance observed the minimum sea level pressure continuing to decrease; tropical storm intensity was reached on the 14th at 0000Z.

Metsat data at 142220Z (Fig. 3-3) showed Trix to be a very compact tropical storm with outflow only three degrees in diameter. Midget storms have been reviewed in the literature and been found to exhibit erratic intensity trends and Trix held true to form. Figure 3-4 shows the diurnal variation of the sea level pressure as observed by dropsonde.

Also shown are the differences between the maximum sustained surface winds as estimated from aircraft reconnaissance and those obtained from an empirically derived JTWC formula:

Vmax = 6.7(1010. - MSLP)exp 0.644

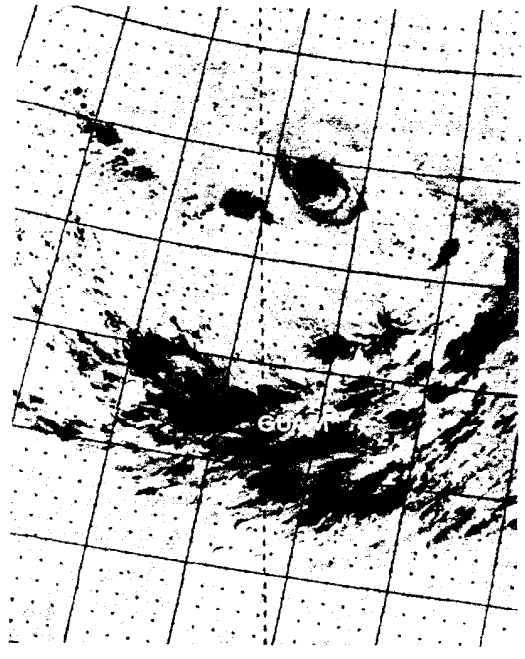


FIGURE 3-3 . Infrared image of Trix at tropical storm intensity, 14 July 1978, 2220Z. The cloudiness over Guam in the deep convergent southwest flow is quite a distance from Trix, signifying the large extent of the cyclonic circulation in which Trix was embedded. (DMSP imagery)

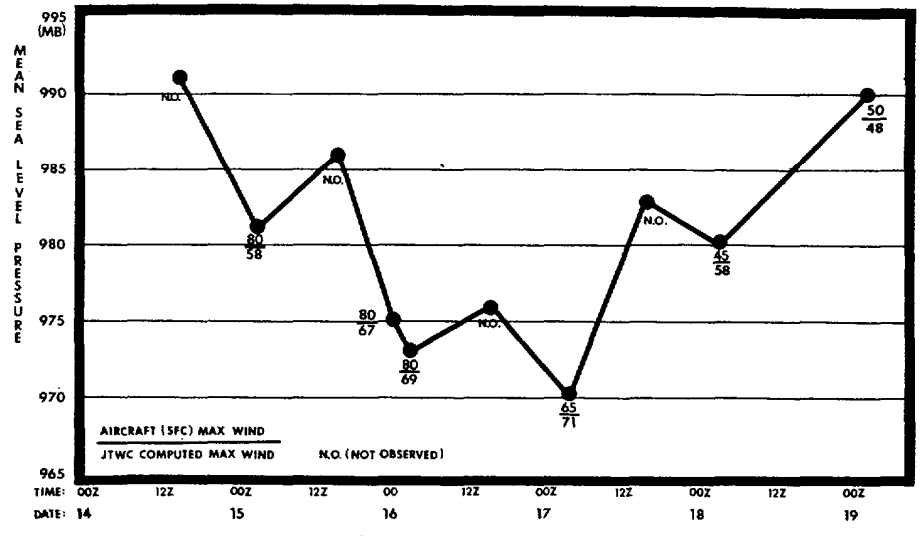


FIGURE 3-4 . Time cross section of Trix's minimum sea level pressure.

These differences may be due to larger gust spreads in compact storms which may give the appearance of stronger maximum surface winds than were actually present.

In addition to erratic intensity trends, Trix's track was quite extraordinary. On the 15th at 0000Z, a large cyclonic circulation dominated the mid-tropospheric flow in the western Pacific between 13N and 23N. Trix, embedded in this large circulation, made a large cyclonic loop along the periphery. During this loop, Trix traveled approximately 700 nm (1300 km) in four days. Trix continued intensifying while looping and typhoon intensity was attained on the 16th at 0000Z.

The Aerial Reconnaissance Weather Officer (ARWO) reported on his post-mission report for the 160326Z fix that "the storm had all the typical parameters of a typhoon but on a miniature scale." Figure 3-5 shows Trix still compact, even as a typhoon.

A large, subtropical high pressure center began building near 40N-170W at 0000Z on the 19th. This feature finally provided the necessary strong easterlies to break Trix out of her loop by 0600Z on the 19th. Prior to this change in track, Trix had weakened again to tropical storm strength (on the 18th at 1200Z).

The subtropical ridge continued building westward over Japan steering Trix westward by 1200Z on the 20th. This was the final, significant change in track. Trix meandered westward thereafter and made landfall on the east coast of China near Linhai.

The 211800Z, official warning indicated downgrading of Trix to tropical depression stage with maximum sustained winds of 30 kt (15 m/sec) as satellite and aircraft reconnaissance data showed a weakening trend. However, post-analysis of synoptic data recieved after-the-fact revealed that Trix maintained minimal tropical storm intensity and reached a secondary maximum intensity just prior to landfall. The aircraft no-fly -line prohibited aircraft reconnaissance from observing this secondary maxima.

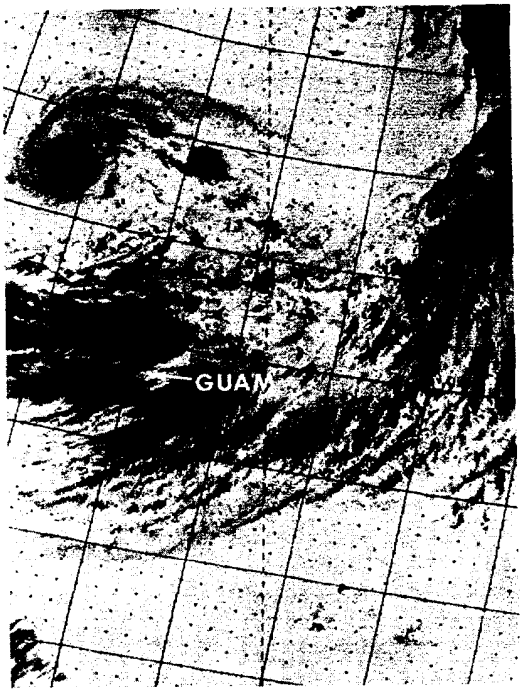
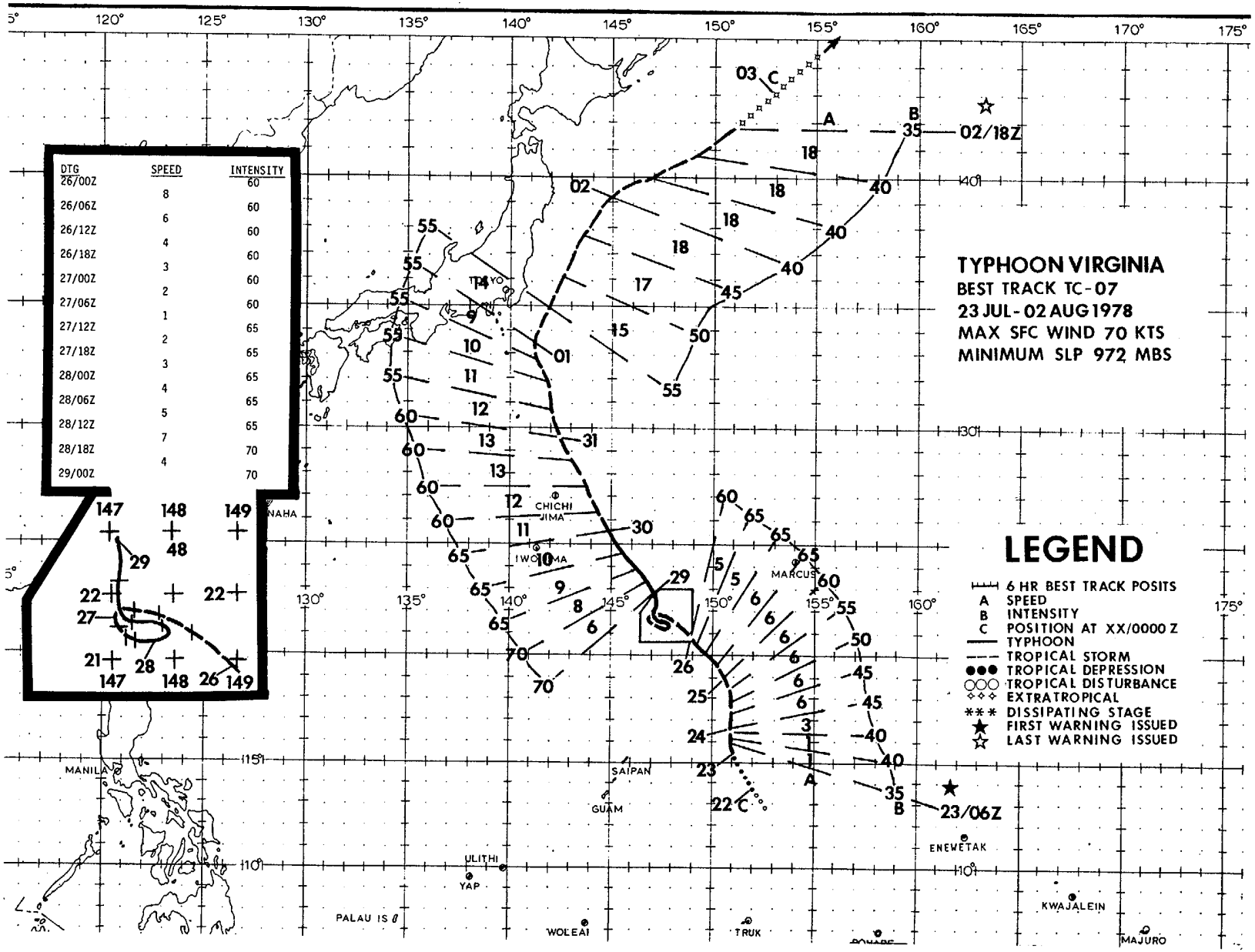


FIGURE 3-5 . Infrared image of Trix at typhoon intensity, still very compact, and still embedded in the larger circulation, 16 July 1978, 0107Z. (DMSP imagery).


TYPHOON VIRGINIA
BEST TRACK TC-07
23 JUL - 02 AUG 1978
MAX SFC WIND 70 KTS
MINIMUM SLP 972 MBS
LEGEND
6 HR BEST TRACK POSITS
A SPEED
B INTENSITY
C POSITION AT XX/0000 Z
TYPHOON
TROPICAL STORM
TROPICAL DEPRESSION
TROPICAL DISTURBANCE
EXTRATROPICAL
*** DISSIPATING STAGE
FIRST WARNING ISSUED
LAST WARNING ISSUED
DTG SPEED INTENSITY
26/00Z 60
26/06Z 8 60
26/12Z 6 60
26/18Z 4 60
27/00Z 3 60
27/06Z 2 60
27/12Z 1 65
27/18Z 2 65
28/00Z 3 65
28/06Z 4 65
28/12Z 5 65
28/18Z 7 70
29/00Z 4 70
02/18Z
23/06Z
TOKYO
NAHA
CHICHI JIMA
IWO JIMA
MARCUS
SAIPAN
GUAM
MANILA
YAP
ULITHI
WOLEAI
PALAU IS
TRUK
ENEWETAK
KWAJALEIN
MAJURO

Virginia developed during July as the third typhoon of the 1978 season. Virginia was relatively small compared to the much larger Typhoon Wendy which developed simultaneously to the west. Except for an unexpected loop, Virginia's track was definable as an uncomplicated, broad recurvature track. However, higher than average forecast errors resulted due to the difficult forecasting situations produced by complex interactions with the nearby Typhoon Wendy and the Tropical Upper Tropospheric Trough (TUTT).

Virginia first appeared as a small tropical disturbance on satellite imagery on 21 July. This disturbance was believed to be associated with a low-level convergence zone feeding into a much larger disturbance which was developing over the Philippine Sea. There were no nearby land/ship reports to indicate any evidence of a surface circulation at this time. Therefore, this disturbance was discussed in the Significant Tropical Weather Advisory (ABEH PGTW) as having poor potential for development during the advisory period. On the 23rd, a weather reconnaissance aircraft was first sent to investigate the larger disturbance (then estimated at 30 kt (15 m/sec) intensity) and was later sent east into the smaller disturbance. The aircraft penetrated the smaller disturbance and found an unexpected, well-developed circulation. Aircraft radar showed a well-defined 40 nm (74 km) diameter eye and the weather officer estimated surface gusts at 55 kt (28 m/sec). The first tropical cyclone warning was immediately issued on TS Virginia at 230600Z. Post analysis showed tropical storm stage was reached 6 to 12 hours before the first warning. However, the lack of significant data and Virginia's unusually small cloud signature on satellite imagery delayed earlier interpretation of Virginia as a significant tropical cyclone.

Virginia and Wendy intensified simultaneously (Fig. 3-6). Because Wendy's circulation was so much larger, Virginia was expected to travel in a counter-clockwise direction about Wendy. Virginia did travel as predicted for the first four days, but the speed of movement was slower than expected. During the next two days, Wendy moved northwestward away from Virginia and interaction between the two storms became less noticeable. Virginia continued to decrease in speed of movement and then executed a loop; Wendy and Virginia were separated by over 800 nm (1482 km) during the loop.

Macro-scale features over the western North Pacific at this time included a TUTT. The TUTT was initially situated between Virginia and Japan. Analysis of all data sources, including satellite-derived winds, indicated the TUTT extended southward along Virginia's western side during the loop. This caused inconsistent steering flow with height, contributing to Virginia's lack of significant forward movement. Virginia's maximum intensity of 70 kt (36 m/sec) was attained during this period (Fig. 3-7).

Virginia slowly weakened after the loop as the TUTT axis became situated just west of Virginia and restricted upper-level outflow to the west. Virginia also began moving toward recurvature by traveling around the western periphery of a large subtropical anticyclone. Virginia's recurvature was also believed to be partially aided by the TUTT, which provided southerly upper-level steering flow. Virginia remained just east of the TUTT axis throughout recurvature.

Virginia produced no known damage. Even though Virginia passed within 80 nm (148 km) of Japan, only 20 kt (10 m/sec) maximum surface winds were reported along the east coast of Honshu. Besides Virginia's small size, the winds were always weaker on the west side due to the TUTT axis being so close to the storm.

Virginia holds the 1978 record for a tropical cyclone tracking the farthest north (47N) before losing its tropical characteristics.

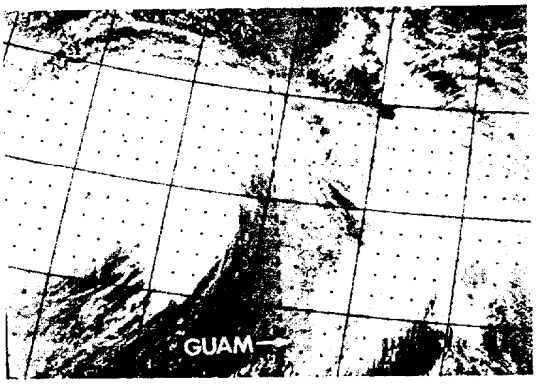


FIGURE 3-6. Early stages of Typhoons Wendy (left) and Virginia (right), 26 July 1978, 0133Z. (DMSP imagery)

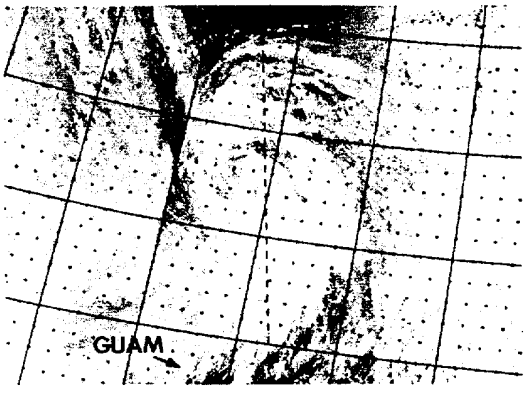
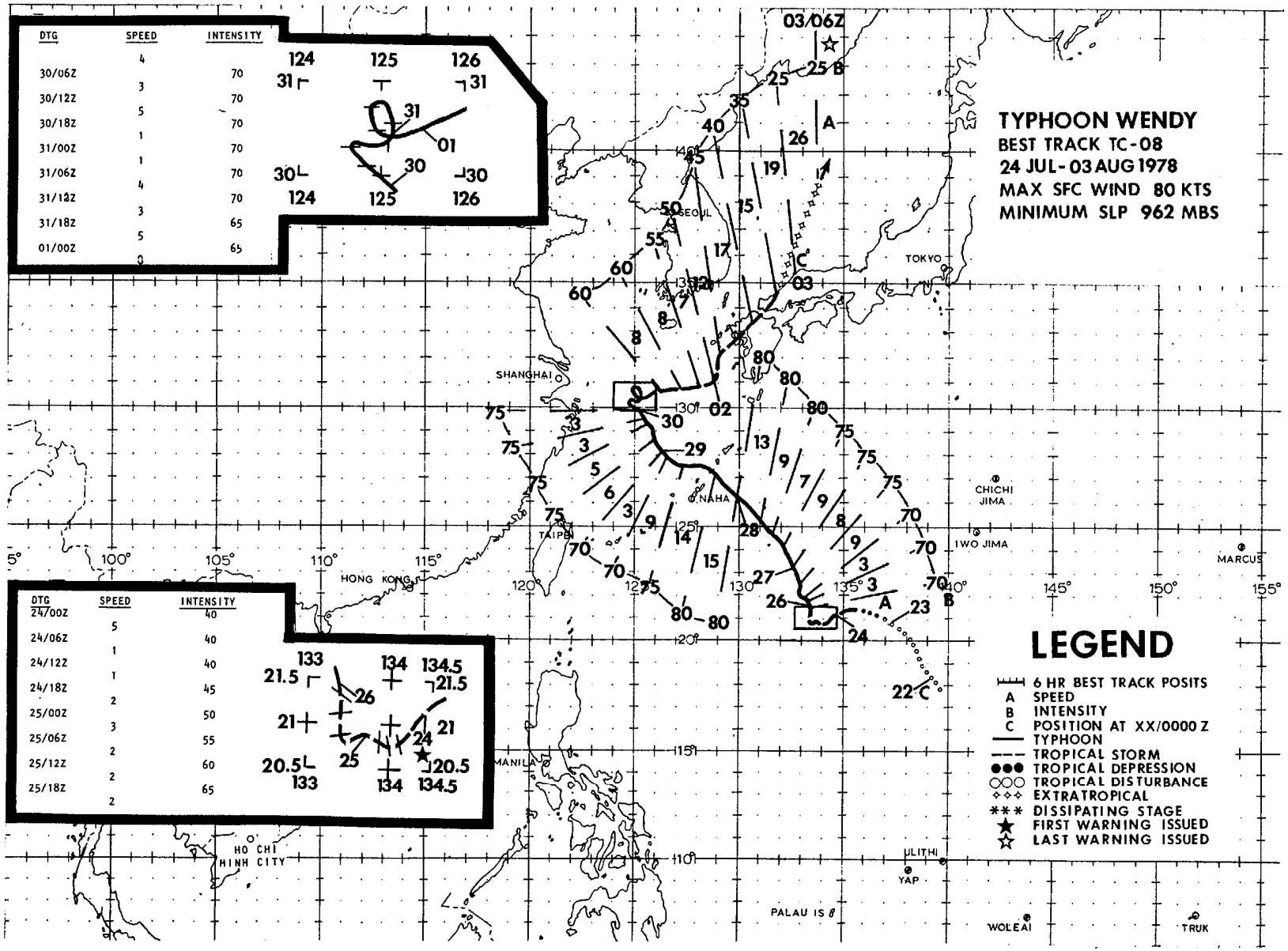


FIGURE 3-7. Typhoon Virginia at maximum intensity of 70 kt (36 m/sec) while undergoing strong TUTT interaction, 28 July 1978, 2141Z. (DMSP imagery)


TYPHOON WENDY
BEST TRACK TC-08
24 JUL-03 AUG 1978
MAX SFC WIND 80 KTS
MINIMUM SLP 962 MBS
LEGEND
6 HR BEST TRACK POSITS
A SPEED
B INTENSITY
C POSITION AT XX/0000 Z
TYPHOON
TROPICAL STORM
TROPICAL DEPRESSION
TROPICAL DISTURBANCE
EXTRATROPICAL
DISSIPATING STAGE
FIRST WARNING ISSUED
LAST WARNING ISSUED
DTG SPEED INTENSITY
30/06Z 4 70
30/12Z 3 70
30/18Z 5 70
31/00Z 1 70
31/06Z 1 70
31/12Z 4 70
31/18Z 3 65
01/00Z 5 65
DTG SPEED INTENSITY
24/00Z 5 40
24/06Z 1 40
24/12Z 1 45
24/18Z 2 50
25/00Z 3 55
25/06Z 2 60
25/12Z 2 65
25/18Z 2
03/06Z
SEOUL
TOKYO
SHANGHAI
NAHA
TAIPEI
HONG KONG
MANILA
CHICHI JIMA
IWO JIMA
MARCUS
HO CHI MINH CITY
ULITHI
YAP
PALAU IS
WOLEAI
TRUK

Wendy, the fourth typhoon of 1978, developed in a well-established monsoon trough. The trough, which had existed for seven to ten days prior to significant tropical cyclone development, laid over WESTPAC from 07N at the Dateline west-northwest over the Mariana Islands to the Luzon Straits. By 1200Z on the 22nd of July, two weak surface circulations were evident in the trough, one centered at 19.8N-138.2E which eventually became Wendy and the other at 14.5N-151.4E (Virginia). With the Tropical Upper Tropospheric Trough (TUTT) lying just to the north of the surface trough, the dynamics for significant tropical cyclone development were present.

Increased organization on the 22nd prompted the initial reconnaissance aircraft launch at 2130Z. The ARWO observed 25-30 kt (13-15 m/sec) surface winds, but could not locate a definable surface circulation center. Based on this aircraft data and the good potential for increased development a formation alert was issued at 230456Z for an area 660 nm (1222 km) northwest of Guam. The tropical cyclone developed rapidly thereafter; it reached tropical storm intensity near 231800Z (Fig. 3-8) and obtained typhoon strength by 1800Z on the 25th.

Wendy meandered westward from the 23rd till the 25th when a break developed in the subtropical ridge with the high center, northeast of Wendy, dominating and building. In response to stronger, mid-level southeasterlies, Wendy accelerated northwestward. Wendy slowly reached her maximum intensity of 80 kt (41 m/sec) during this time and maintained it for 24 hours before she began a slow weakening trend after passing over the Ryukyu Islands. A marked decrease in low-level inflow and convection near the center appeared to have affected Wendy's development at this point.

Wendy stalled again in the central East China Sea, 180 nm (333 km) east-southeast of Shanghai, when steering currents weakened. The cooler and drier environment, the decreased inflow, and finally the decrease in outflow aloft weakened Wendy. Most storms that stall in movement, intensify; Wendy weakened.

Late on the 31st, the break in the subtropical ridge became more pronounced and Wendy began to recurve northeastward at 8 kt (15 km/hr). A succession of minor, mid-level troughs first forced Wendy northward early on the 2nd of August, then accelerated her northeastward.

The cooler environment and increased frictional effects caused Wendy to weaken and lose tropical characteristics by 18Z on the 2nd after existing as a significant tropical cyclone for 10 days.

Twice during Wendy's existence (240000Z to 260000Z and 300600Z to 311800Z), she slowed significantly. The portions of the best track shown for these periods are among many possible solutions. With fix-to-fix movement near to or less than the fix accuracies, it was almost impossible to determine if Wendy just slowed to 1-3 kt (2-6 km/hr), underwent looping, or simply remained "quasi-stationary".

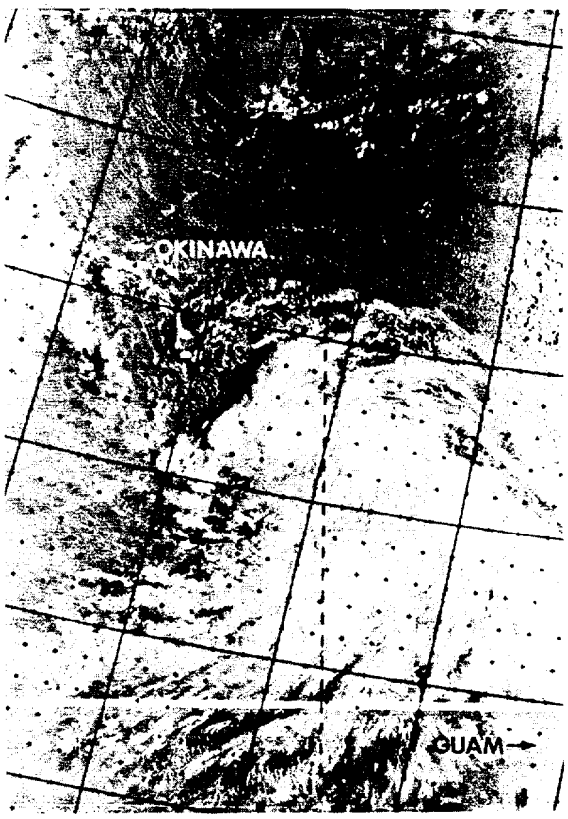
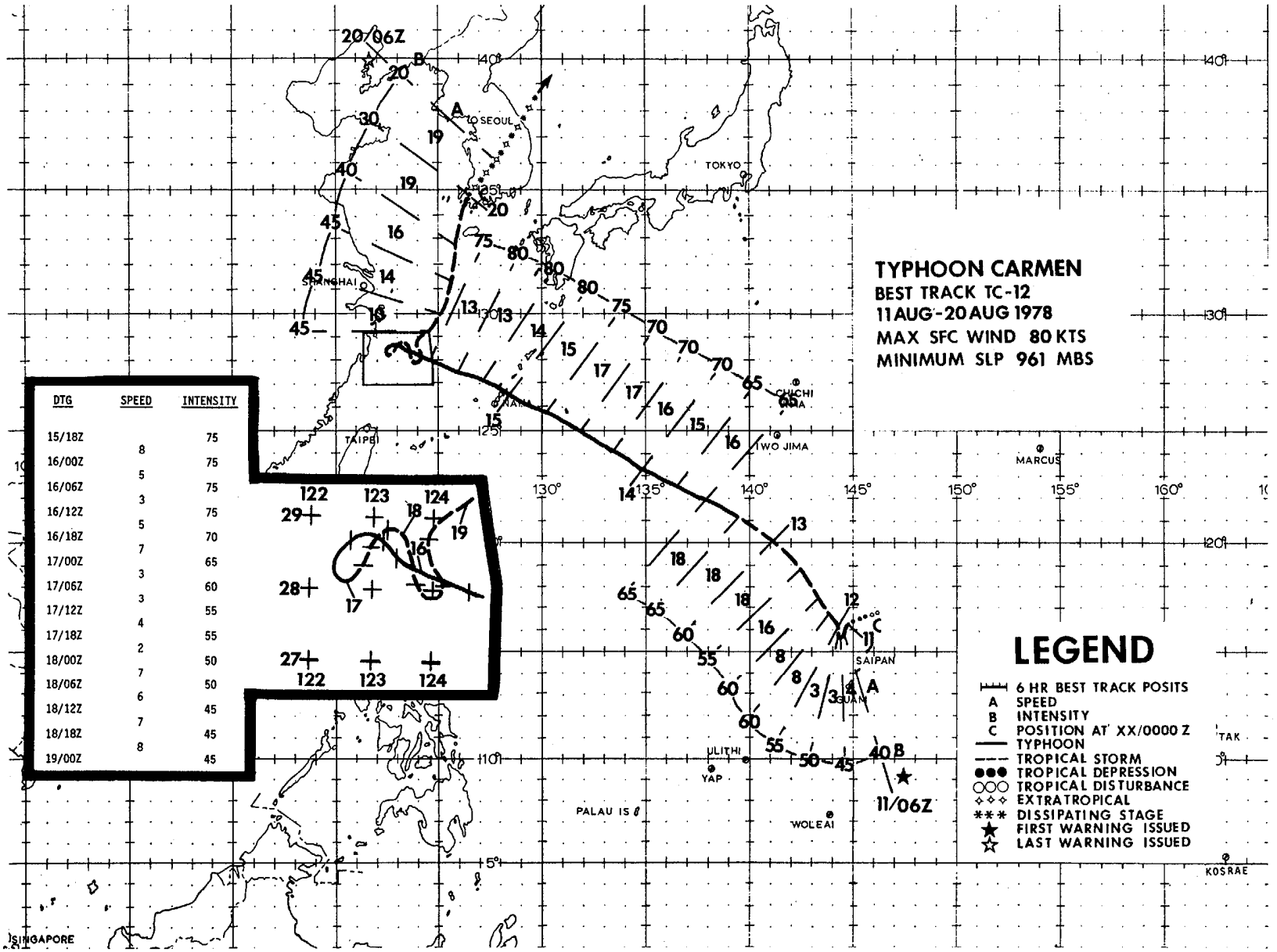


FIGURE 3-8 . Wendy as a young tropical storm, 23 July 1978, 2117Z. Typical of circulations in the monsoon trough, maximum cloudiness exists in the deep southwesterlies just south of the trough axis. (DMSP imagery)


TYPHOON CARMEN
BEST TRACK TC-12
11 AUG - 20 AUG 1978
MAX SFC WIND 80 KTS
MINIMUM SLP 961 MBS
DTG SPEED INTENSITY
15/18Z 75
16/00Z 8 75
16/06Z 5 75
16/12Z 3 75
16/18Z 5 70
17/00Z 7 65
17/06Z 3 60
17/12Z 3 55
17/18Z 4 55
18/00Z 2 50
18/06Z 7 50
18/12Z 6 45
18/18Z 7 45
19/00Z 8 45
LEGEND
6 HR BEST TRACK POSITS
A SPEED
B INTENSITY
C POSITION AT XX/0000 Z
TYPHOON
TROPICAL STORM
TROPICAL DEPRESSION
TROPICAL DISTURBANCE
EXTRATROPICAL
DISSIPATING STAGE
FIRST WARNING ISSUED
LAST WARNING ISSUED
20/06Z
11/06Z
TO SEOUL
TOKYO
SHANGHAI
TAIPEI
IWO JIMA
MARCUS
SAIPAN
GUAM
YAP
ULITHI
WOLEAI
PALAU IS
KOSRAE
SINGAPORE

The genesis of Typhoon Carmen provides an interesting example of the interaction of two synoptic features in generating a tropical cyclone. These features began interacting on 7 August 1978. On that day, Guam's surface winds shifted from easterly to southwesterly as the southwest monsoon surged well east of its normal habitat. Metsat imagery showed a noticeable upsurge in convective activity along and to the south of the low level monsoon trough, the axis of which now extended from Southeast Asia across the Philippines and over the western North Pacific to near the dateline. In Guam's vicinity, southwesterly flow persisted, deepened and strengthened. At 081200Z Guam's gradient level wind was 20 kt (10 m/sec) from the southwest.

During the same time frame, a Tropical Upper Tropospheric Trough (TUTT) northwest of Guam was deepening southward. Satellite derived upper-air winds at 081200Z confirmed considerable divergence existed south and east of the TUTT overlying the monsoon trough just north of Guam and definite signs of tropical cyclone organization were appearing. Six hours later, Guam's gradient wind had increased to 31 kt (16 m/sec) out of the southwest.

For the next day, this upper-level/lower-level interaction persisted and the developing disturbance, one of many along the monsoon trough discussed in the daily Significant Tropical Weather Advisory (ABEH PGTW), was written as having fair to good development potential. A formation alert was issued at 100156Z and two subsequent aircraft reconnaissance missions showed a minimum sea level pressure of 1004 mb and 25 kt (13 m/sec) estimated maximum surface winds. The surface center, however, was difficult to fix and the decision was to reissue the alert at 110134Z. Three hours later, however, aircraft data reported a 992 mb central pressure. Subsequently, the first warning was issued at 110600z with 40 kt (21 m/sec) intensity. Meanwhile, the activity in the monsoon trough had also rapidly organized in another area; Tropical Storm Della was forming just east of the Philippines.

The TUTT's influence on Carmen continued beyond her early developmental stages. TUTT interaction also influenced her track and affected her size and intensification rate. Initially, Carmen's track was expected to be climatological since the overall synoptic environment in which Carmen was situated was typical of the August climatology. A strong, mid-tropospheric, subtropical ridge existed north of her and Carmen was forecast to follow a west-northwest track. In actuality, Carmen moved erratically for one day and then accelerated to the north-northwest. It appears that upper-level steering from southeasterlies east of the TUTT was a major influence on her track.

The TUTT also influenced Carmen's development rate. At 120000Z, Carmen was beginning to accelerate to the north-northwest with an intensity of 55 kt (28 m/sec). Three days later she had only intensified to 80 kt (41 m/sec) - an intensification rate which was half of the average rate for August cyclones. A partial explanation for this slow intensification was the fact that Carmen had a faster than average forward speed of 16 kt (30 km/hr) during this period and also that she was part of a two storm situation (Fig. 3-9). However, it is equally possible that the TUTT (still west of Carmen) also had a part in influencing Carmen's slow intensification rate and small size by restricting upper level outflow in her western and southern quadrants (Figs. 3-9 & 3-10). The 200 mb analyses indicated that the TUTT moved with Carmen and strengthened from the 11th to the 14th.

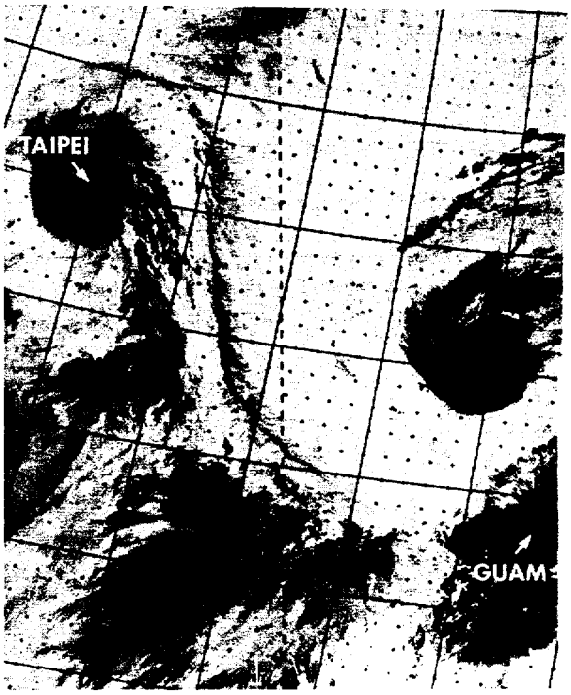


FIGURE 3-9. Infrared image of Typhoon Carmen (right) and Tropical Storm Della (left), 12 August 1978, 2134Z. (DMSP imagery)

By 151200Z, the TUTT axis had curled to the south of Carmen. Satellite imagery at this time (Fig. 3-11) showed a more symmetrical typhoon but small in areal extent. The strong mid-tropospheric subtropical ridge still existed to the north and Carmen was expected to track westward into the China coast. However, a high pressure cell was building ahead of Carmen over the Asian coast. By the 16th, Carmen was caught in a weak steering flow between high pressure cells to the east and west and, for three days, Carmen looped erratically and weakened in intensity. On the 17th, a developing short wave trough was analyzed over the Asian mainland and warnings reflected

recurvature toward Korea. At 181200Z, Carmen did begin to track northward and eventually dissipated over Korea. Despite Carmen's erratic behavior, 24-hour forecast errors matched the average for the year.

During her lifetime, Carmen was responsible for considerable damage. Before dissipating over South Korea, she caused widespread flooding, a reported 21 deaths and $3 million worth of property damage. Saipan, affected by Carmen in her formative stage, reported flooding and property damage and was designated a national disaster area. At maximum intensity of 80 kt (41 m/sec) on August 15, Carmen passed over Okinawa about 26 nm (48 km) north of Kadena AB with little damage to DoD facilities.

The disturbance in the monsoon trough that eventually became Carmen was similar to many others that did and did not develop. And, of those that did develop, many only reached the monsoon depression stage. The difficulty in determining the development potential of these monsoon disturbances affected the timeliness of issuance of the formation alert and initial warning on Carmen. Near perfect forecasting to meet customer requirements would have allowed the initial warning to be issued 48 to 72 hours prior to the actual 110600Z issuance.

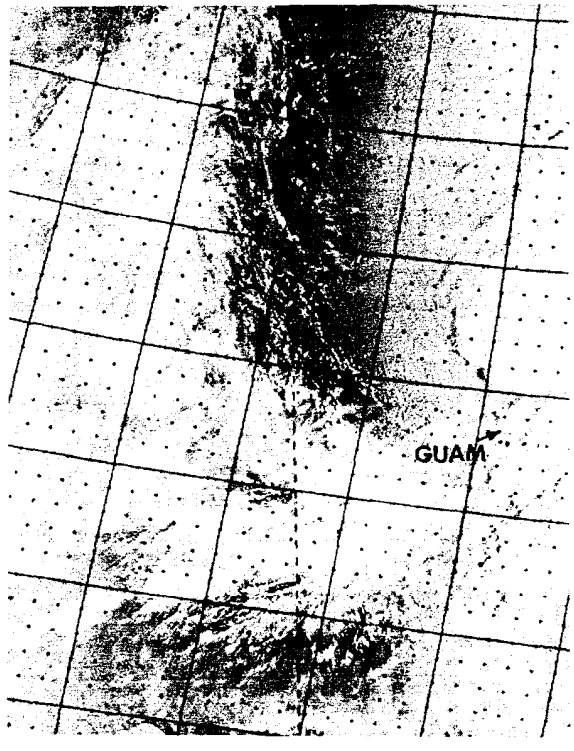


FIGURE 3-10. Restricted upper-level outflow over Carmen's western and southern quadrants, 11 August 1978, 2243Z. (DMSP imagery)

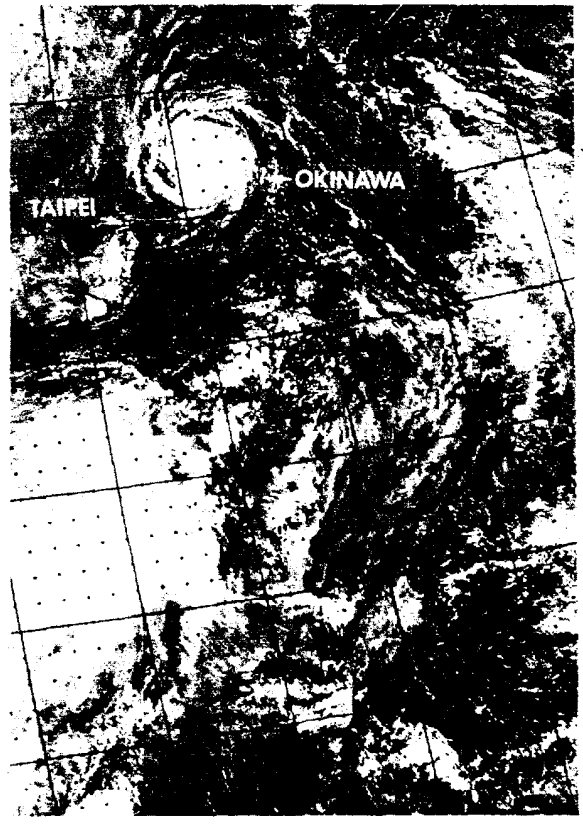
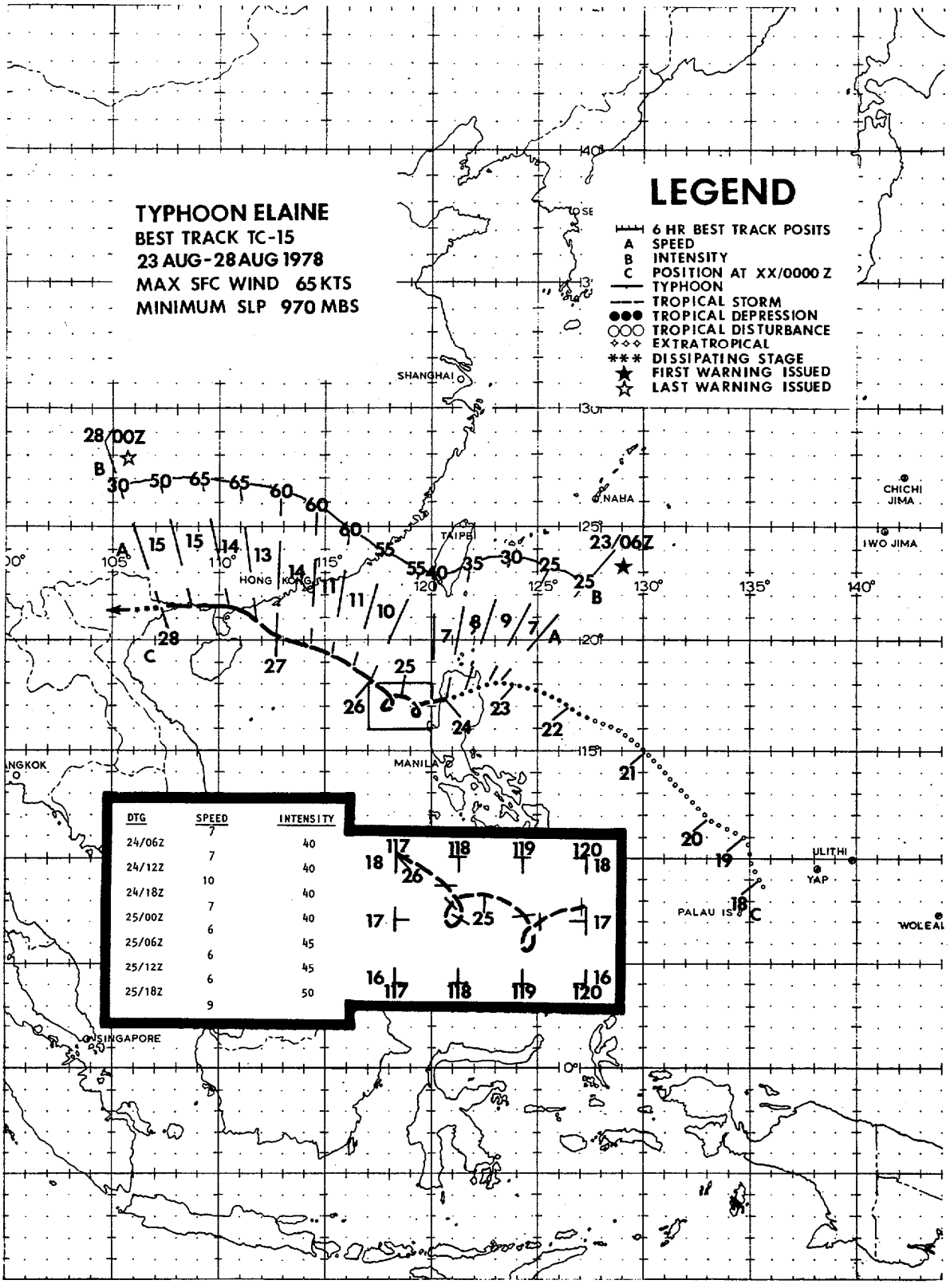


FIGURE 3-11. Carmen's small areal extent, 15 August 1978, 1505Z. (DMSP imagery)


TYPHOON ELAINE
BEST TRACK TC-15
23 AUG-28 AUG 1978
MAX SFC WIND 65 KTS
MINIMUM SLP 970 MBS
LEGEND
6 HR BEST TRACK POSITS
A SPEED
B INTENSITY
C POSITION AT XX/0000 Z
TYPHOON
TROPICAL STORM
TROPICAL DEPRESSION
TROPICAL DISTURBANCE
EXTRATROPICAL
DISSIPATING STAGE
FIRST WARNING ISSUED
LAST WARNING ISSUED
28/00Z
23/06Z
SHANGHAI
NAHA
TAIPEI
HONG KONG
MANILA
SINGAPORE
CHICHI JIMA
IWO JIMA
ULITHI
YAP
PALAU IS
WOLEAI
DTG SPEED INTENSITY
24/06Z 7 40
24/12Z 7 40
24/18Z 10 40
25/00Z 7 40
25/06Z 6 45
25/12Z 6 45
25/18Z 6 50
9

The 17th of August 1978 saw the monsoon trough extending as far east as 140E providing the breeding ground for Typhoon Elaine. Synoptic and satellite data on the 18th indicated a tropical disturbance, with maximum winds of 15 kt (8 m/sec), organizing to the northeast of Palau. From the 18th through the 20th, this system was discussed on the Significant Tropical Weather Advisory (ABEH PGTW) with poor to fair potential for significant tropical cyclone development. The relative position of the Tropical Upper Tropospheric Trough (TUTT), north of the disturbance during this period, indicated suppression of upper level outflow in the northern portion of the system. Issuance of a Tropical Cyclone Formation Alert was delayed as a result of expected strong upper-level directional shear. The advisories on the 21st and the 22nd carried fair to good potential; however, based on sparse synoptic data and little organization evident on the satellite data, the system was still thought to be in the formative stage. The initial warning was issued at 230600Z by which time increased organization and banding features were indicated on satellite imagery. Post analysis indicated the system was a tropical depression 36 hours prior to this time.

By 240000Z, the mid-tropospheric ridge provided more definitive east-northeast steering flow across northern Luzon resulting in Elaine's southwest track, contrary to a favored climatological track to the west-northwest. Climatological studies also indicate weakening during passage over Luzon. Based on synoptic data, however, Elaine continued to intensify and was upgraded to a tropical storm at 240000Z while still over land 170 nm (315 km) north of Manila. Heavy storm damage was reported in northern Luzon.

As Elaine exited Luzon into the South China Sea, her associated cloud pattern lacked sufficient organization for optimum satellite (Fig. 3-12) and radar fixes; aircraft reconnaissance at low flight levels (restricted at times by terrain) was heavily relied on for definitive surface center fixes. During this same period, 24 - 25 August 1978, Elaine was caught between strong southwest monsoon flow and strong northeast flow. As a result, Elaine looped twice and forecast errors increased considerably.

After completing the second loop, Elaine accelerated to the northwest in response to the mid-tropospheric ridge axis' northward migration. A weakness in this ridge was apparent on the 26th and developed northeast of Vietnam due to a mid-latitude short wave. By the 27th this short wave trough was within 10 degrees of Elaine and a noticeable northward adjustment in her track resulted. The closest point of approach (CPA) to Hong Kong occurred at 270200Z with Elaine 155 nm (287 km) to the southwest.

At 270300Z, the S.S. Seal and Trade located at 21N-113E reported surface winds of 65 kt (33 m/sec) and a surface pressure of 974 mb. Based on this ship report, Elaine was upgraded to typhoon strength just prior to landfall over the southern coast of China near the Luichow Peninsula. Subsequent to landfall, Elaine tracked westward and dissipated rapidly as a result of frictional/terrain effects. Downgrading to tropical storm intensity occurred by 271800Z with the final warning issued at 280000Z.

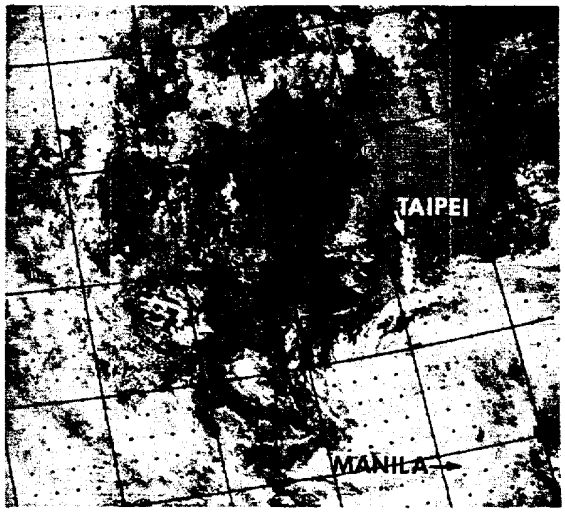
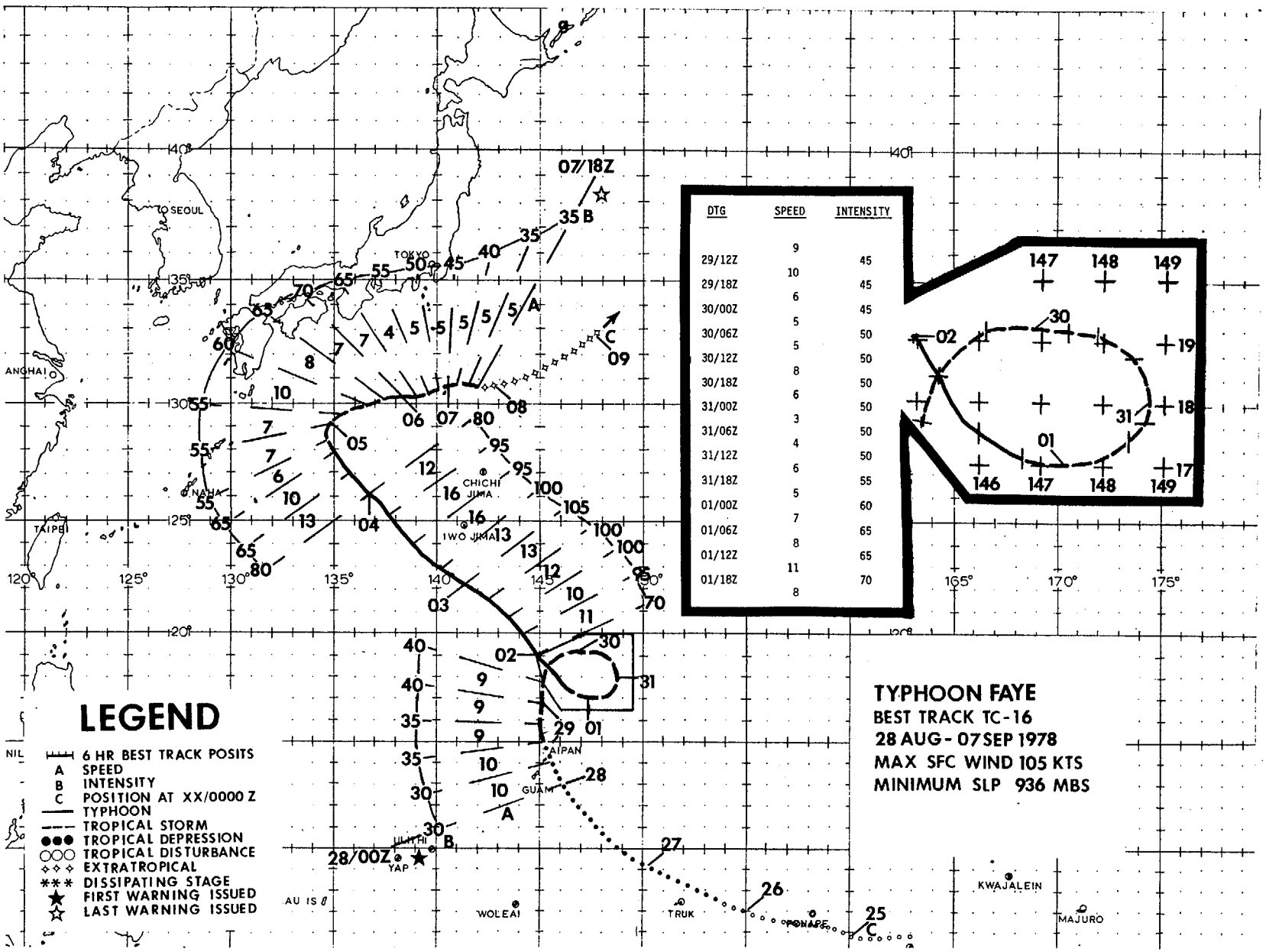


FIGURE 3-12. Visual imagery at 0134Z on 25 August 1978, showing Elaine's typical satellite signature during her erratic movement period, 24 - 25 August 1978. (NOAA-5 imagery)


07/18Z
35 B
SEOUL
TOKYO
ANGHAI
NAHA
TAIPEI
CHICHI JIMA
IWO JIMA
SAIPAN
GUAM
YAP
ULITHI
WOLEAI
TRUK
PONAPE
KWAJALEIN
MAJURO
28/00Z
DTG SPEED INTENSITY
29/12Z 9 45
29/18Z 10 45
30/00Z 6 45
30/06Z 5 50
30/12Z 5 50
30/18Z 8 50
31/00Z 6 50
31/06Z 3 50
31/12Z 4 50
31/18Z 6 55
01/00Z 5 60
01/06Z 7 65
01/12Z 8 65
01/18Z 11 70
8
LEGEND
6 HR BEST TRACK POSITS
A SPEED
B INTENSITY
C POSITION AT XX/0000 Z
TYPHOON
TROPICAL STORM
TROPICAL DEPRESSION
TROPICAL DISTURBANCE
EXTRATROPICAL
DISSIPATING STAGE
FIRST WARNING ISSUED
LAST WARNING ISSUED
TYPHOON FAYE
BEST TRACK TC-16
28 AUG - 07 SEP 1978
MAX SFC WIND 105 KTS
MINIMUM SLP 936 MBS

TYPHOON FAYE

Typhoon Faye, the seventh typhoon of the 1978 season, was one of the most interesting, but unfortunately, also one of the year's most difficult typhoons to forecast. Besides executing an uncommon anticyclonic loop early in her development, Faye also unexpectedly reintensified to typhoon strength shortly before becoming extratropical.

The tropical disturbance that was to become Typhoon Faye was first sighted southeast of Ponape at 242142Z, August 1978 by satellite reconnaissance. The disturbance moved west-northwest at 13 kt (24 km/hr) and at 261200Z passed north of Truk. During this period, 200 mb analyses showed a tropical upper tropospheric trough (TUTT) with an imbedded low northwest of the disturbance. This TUTT moved west-northwest in conjunction with the surface circulation thereby keeping excellent upper-level outflow in the diffluent region, southeast of the TUTT cell, over the developing tropical disturbance.

Based on an improved satellite signature and on ship synoptic data, a Tropical Cyclone Formation Alert was issued on the disturbance at 272334Z. Shortly thereafter, a reconnaissance aircraft confirmed the existence of a closed surface circulation with a minimum sea level pressure of 1000 mb. Based on this aircraft data, the disturbance was upgraded to Tropical Depression 16 at 280000Z with max winds of 30 kt (15 m/sec). The 500 mb subtropical ridge axis was at that time oriented east-west along 36N.

At 280600Z, TD-16 passed 60 nm (111 km) to the northeast of Guam and was upgraded to Tropical Storm Faye six hours later. During the next 24 hours the storm moved straight north while slowly intensifying. The 500 mb flow pattern became complex during this period due to the influence of two new developing tropical systems: TS Gloria between Luzon and Japan and TS Hester west of Marcus Island (Fig. 3-13). The 500 mb analysis at 281200Z (Fig. 3-14) showed that the Pacific Ocean south of Japan between Guam and the Philippine Islands was dominated by an elongated monsoon trough holding multiple circulation centers, one of which was to become TS Gloria. High pressure cells were located east of Tokyo and southeast of Marcus Island.

The 281200Z objective steering aids indicated Faye would track northeastward. However, because the initial pattern itself was confused, a more climatological north-northwestward track was forecast.

By 291200Z Faye began to execute a rare, anticyclonic loop. The 300000Z, 500 mb analysis (Fig. 3-15) showed that Faye was now positioned between two high pressure centers: one located between Marcus Island and the Volcano Islands, and the other located south of Guam. This pattern was the result of the combined influence of Gloria, Hester, Faye, and a long-wave, mid-level trough that was developing far to the northeast of Faye. It was now possible for Faye to choose one of two routes: (1) move north-northeast in the weakness between Marcus Island and Wake Island; or (2) move west-northwest along the southern periphery of the high pressure center to her north.

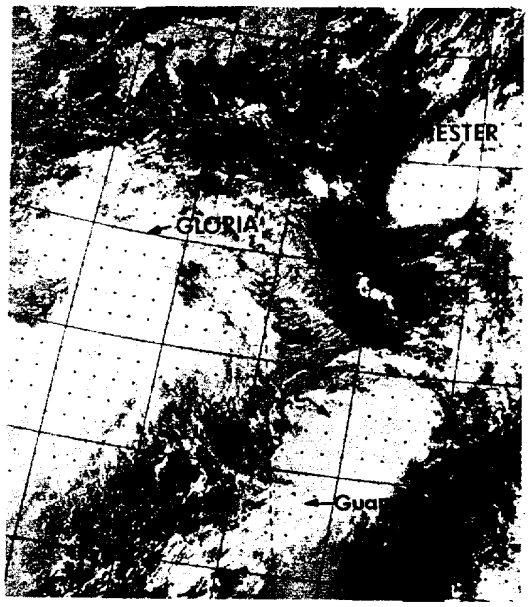


FIGURE 3-13. Tropical Storm Faye just prior to executing an anticyclonic loop north of Guam, while at an intensity of 40 kt (21 m/sec). TS Gloria is southeast of Okinawa and TS Hester is northwest of Marcus Island, 29 August 1978, 0137Z. (DMSP imagery)

Unfortunately, by 310000Z, the high pressure center south of Guam shifted further to the west. This change in the flow pattern allowed Faye to swing to the south and thus complete her anticyclonic loop.

Faye reached the southernmost point of her looping track at 010000Z September and six hours later was upgraded to typhoon strength based upon the development of a poorly defined eye and a central pressure drop to 984 mb as reported by reconnaissance aircraft. At 020000Z September, the 500 mb pattern again changed radically (Fig. 3-16). Ridging, albeit weak, now dominated the Pacific east of Faye. Troughing, enhanced by a long wave east of Japan dominated the Pacific west of Typhoon Faye. Faye was now under the influence of southeasterly steering flow and began tracking steadily northwestward around the western periphery of the ridge.

As the ridge strengthened, Faye accelerated from 8 kt (15 km/hr) to 16 kt (30 km/hr) by 031200Z. Thereafter she began to decelerate again and weaken as she approached the axis of the mid-tropospheric subtropical ridge. By 041800Z, Faye

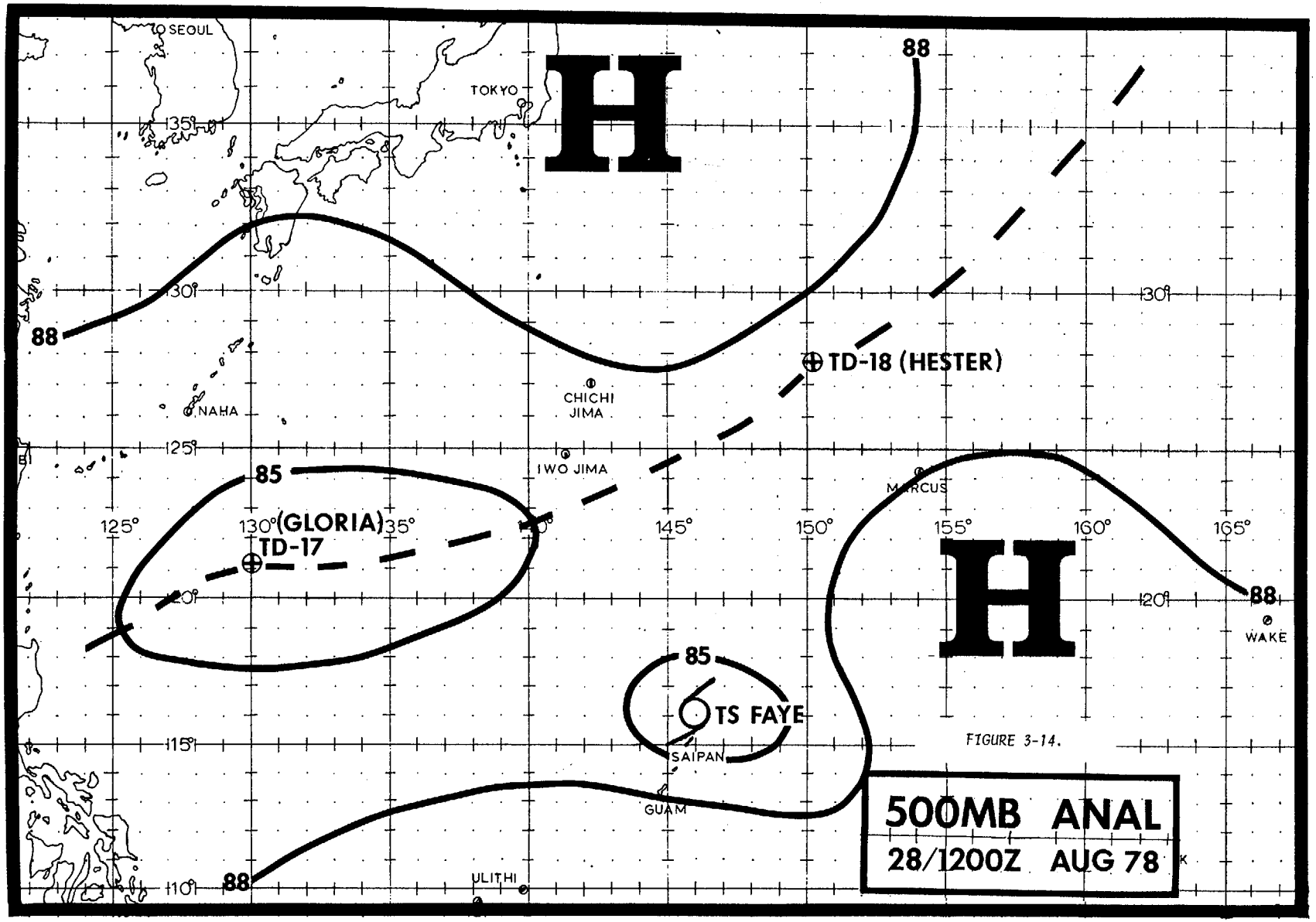

SEOUL
TOKYO
H
88
88
TD-18 (HESTER)
NAHA
CHICHI JIMA
IWO JIMA
MARCUS
85
(GLORIA)
TD-17
125°
130°
135°
140°
145°
150°
155°
160°
165°
35°
30°
25°
20°
15°
10°
H
88
WAKE
85
TS FAYE
SAIPAN
GUAM
88
ULITHI
500MB ANAL
28/1200Z AUG 78

FIGURE 3-14.

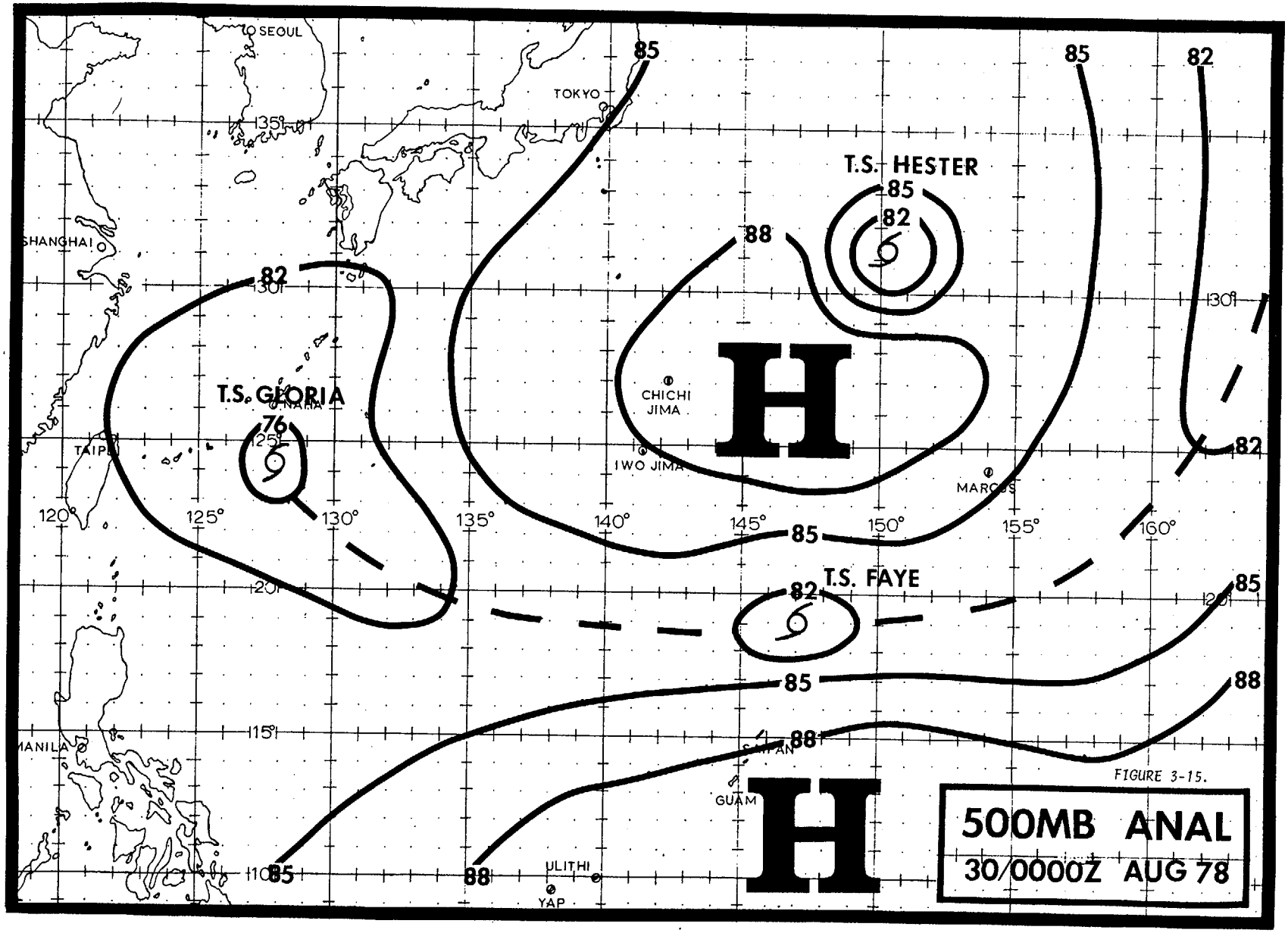

SEOUL
TOKYO
SHANGHAI
T.S. HESTER
T.S. GLORIA
T.S. FAYE
CHICHI JIMA
IWO JIMA
MARCUS
TAIPEI
MANILA
SAIPAN
GUAM
ULITHI
YAP
85
82
88
76
H
120°
125°
130°
135°
140°
145°
150°
155°
160°
30°
20°
15°
500MB ANAL
30/0000Z AUG 78

FIGURE 3-15.

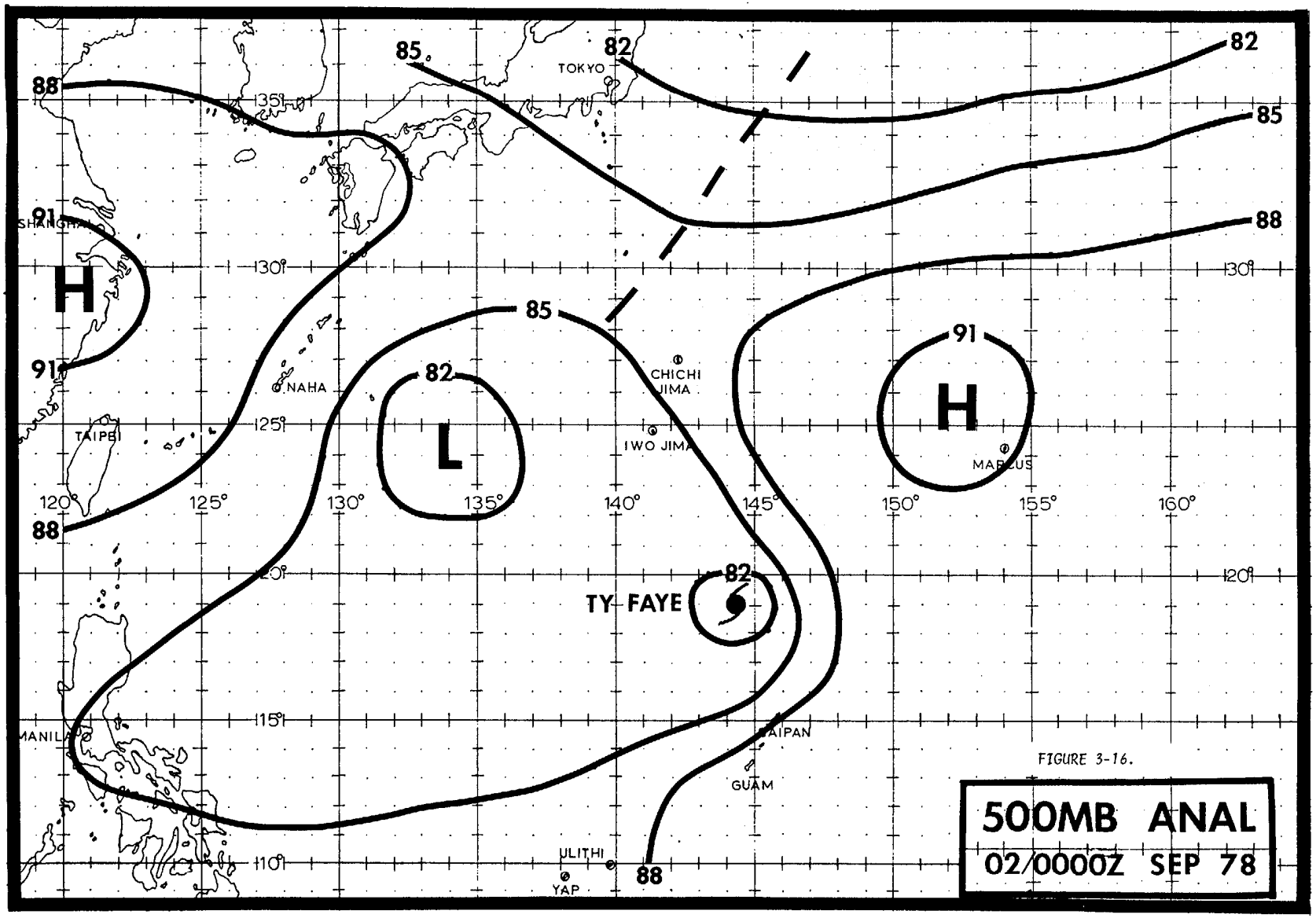

88
85
82
82
TOKYO
85
91
SHANGHAI
H
88
130°
130°
91
85
CHICHI JIMA
82
NAHA
L
91
H
TAIPEI
IWO JIMA
MARCUS
125°
120°
125°
130°
135°
140°
145°
150°
155°
160°
88
82
TY FAYE
120°
115°
MANILA
SAIPAN
GUAM
110°
ULITHI
YAP
88
500MB ANAL
02/0000Z SEP 78

FIGURE 3-16.

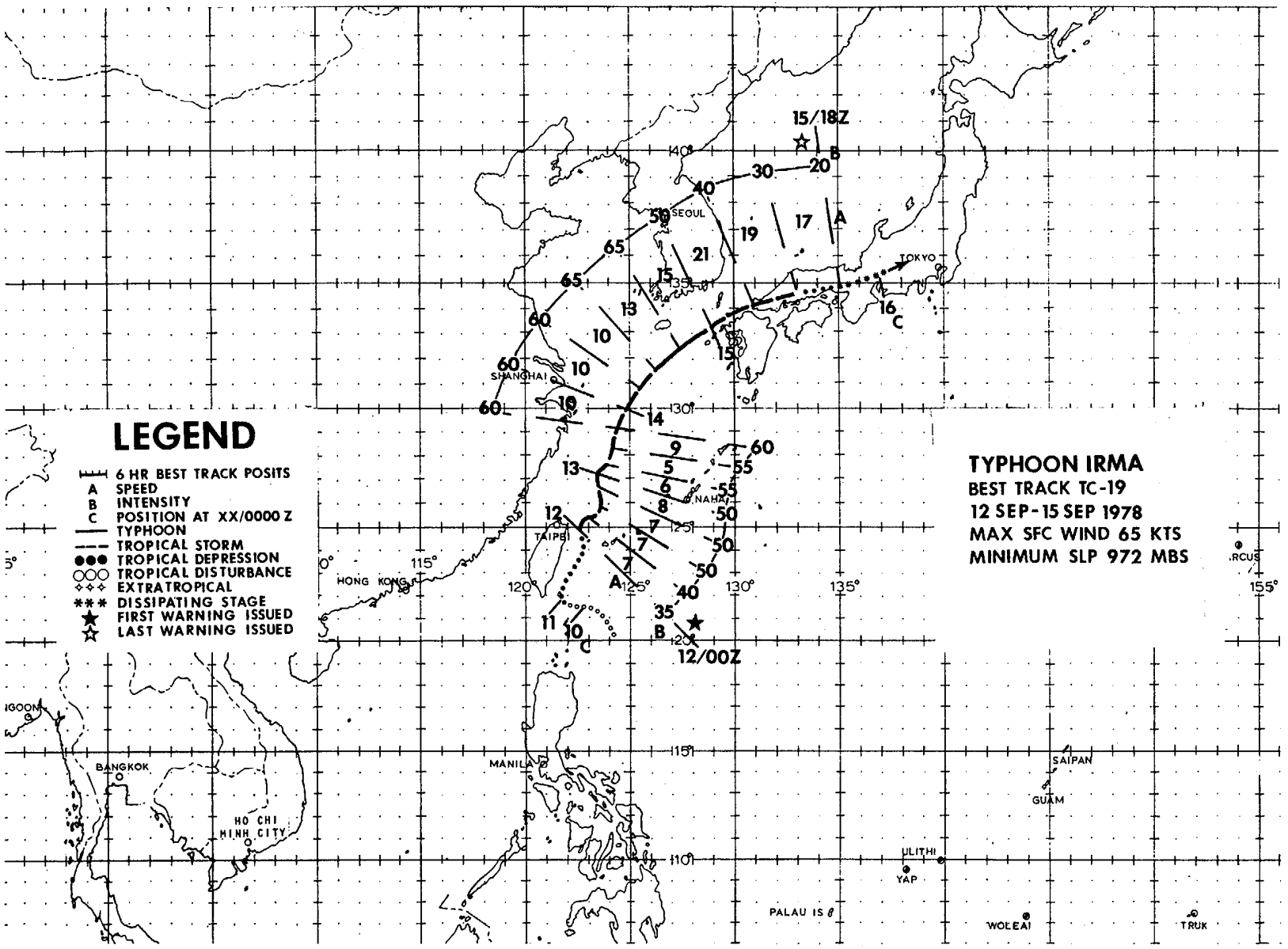
weakened to tropical storm strength and within six hours had crossed the ridge axis and began to recurve to the northeast.

Normally a system would be expected to accelerate after crossing the ridge axis, but in this case the mid-latitude westerly jet stream was located considerably to the north; the mid-level steering was therefore very weak and Faye actually continued a slowing trend. Likewise, a tropical system would be expected to continue weakening after recurvature as it moves over cooler water, begins to entrain cold air at mid-levels from the north and comes under the influence of strong vertical wind shear. A reconnaissance aircraft at 050541Z, however, reported that Faye's central pressure had dropped to 975 mb with an increase in overall organization also noted. Faye was upgraded to typhoon strength based on aircraft reconnaissance and ship data at 051800Z.

The reason for Faye's reintensification was related to the weak, upper-level flow pattern. During Faye's period of reintensification, mid- and upper-level winds were basically zonal and light, thereby minimizing the cold air entrainment. Reconnaissance aircraft reports indicated that Faye was distinctly warm core during this period. Because of the weak flow between 500 and 200 mb, vertical wind shear was small and, thus, Faye was able to maintain vertical organization longer than was anticipated.

By 061200Z September, Faye again weakened to tropical storm intensity due to increasing vertical wind shear. Upper-level winds increased and satellite imagery showed that her upper-level center was finally being sheared off from the surface center. The final warning on TS Faye was issued at 071800Z at which time she was fully extratropical and in the process of merging with the polar front.

Although Typhoon Faye avoided the major land masses of the Pacific area, she did cause damage to the Northern Mariana Islands. During her anticyclonic loop, the islands of Agrihan, Alamagan, and Pagan were directly affected twice. Pagan sustained the most damage with sixty-five homes destroyed and one merchant vessel grounded.


LEGEND
6 HR BEST TRACK POSITS
A SPEED
B INTENSITY
C POSITION AT XX/0000 Z
TYPHOON
TROPICAL STORM
TROPICAL DEPRESSION
TROPICAL DISTURBANCE
EXTRATROPICAL
DISSIPATING STAGE
FIRST WARNING ISSUED
LAST WARNING ISSUED
TYPHOON IRMA
BEST TRACK TC-19
12 SEP-15 SEP 1978
MAX SFC WIND 65 KTS
MINIMUM SLP 972 MBS
15/18Z
12/00Z
SEOUL
TOKYO
SHANGHAI
TAIPEI
NAHA
HONG KONG
BANGKOK
HO CHI MINH CITY
MANILA
SAIPAN
GUAM
ULITHI
YAP
PALAU IS
WOLEAI
TRUK

Irma, the eighth typhoon of the 1978 season, developed in the monsoon trough southeast of Taiwan. Located in the Luzon Straits over the previous week, the monsoon trough slowly drifted northward and a weak surface circulation became evident southeast of Taiwan on the 11th. The monsoon trough at 500 mb was also observed to have shifted well northward signifying the trough becoming vertically aligned with the surface circulation. This northward shift also moved the monsoon circulation under favorable outflow aloft. The mechanism for rapid tropical cyclone development being present, numbered warnings began without the issuance of a formation alert.

Aircraft reconnaissance, at 0935Z on the 12th, confirmed TD-19 had undergone rapid development. Post analysis determined that the cyclone reached tropical storm strength at 120000Z. Due to the lack of a strong subtropical high pressure ridge to the north of Irma and the fact that the southwest monsoon flow was more intense than the easterlies north of the monsoon trough, Irma moved northeast. Then, on the 13th at 1800Z, Irma began accelerating northeastward as mid-level steering strengthened when a short-wave, westerly trough tracked eastward off China. Diffluence aloft, ahead of the short-wave, allowed Irma to reach a maximum intensity of 65 kt (33 m/sec) by 141200Z.

Irma remained a typhoon for only 12 hours becoming the shortest-lived typhoon of the season. The 140000Z, 500 mb analysis indicated that Irma was north of the broad subtropical ridge axis, building in behind her, and she was accelerating northeastward. Her maximum forward speed of 21 kt (39 km/hr) was obtained while tracking through the Tsushima Straits prior to making landfall on Honshu.

In the last 24-36 hours of her existence, Irma experienced increased vertical shear which brought on rapid weakening. The terrain effects of Kyushu and Honshu caused Irma to dissipate near 1200Z on the 15th.

Although remaining a typhoon for only 12 hours and weakening rapidly as she tracked towards southwest Japan, Irma produced widespread damage to Kyushu with estimated gusts in excess of 100 mph (45 m/sec) reported. Irma smashed windows, overturned cars, and capsized several fishing boats. Several athletes at the Japan-China Friendship Track and Field Meet in Kitakyushu were injured when a freak gust blew them ten feet in the air.

Irma exhibited a movement to the northeast similar to previous 1978 recurvers (Olive, Polly, Virginia, Gloria and Hester).

Irma's track indicates she traveled parallel to, but just outside, the 200 mb strong wind flow; actually just outside the 50 kt (26 m/sec) isotach (Fig. 3-17). The observed relationship appears to provide an excellent forecast aid and was particularly important during Irma. All forecasts, however, must take into account the possible northward adjustment of the max wind band as well as the possible deepening of short-wave troughs off the China mainland. An accurate 36-hour to 48-hour, 200 mb prog should help greatly.

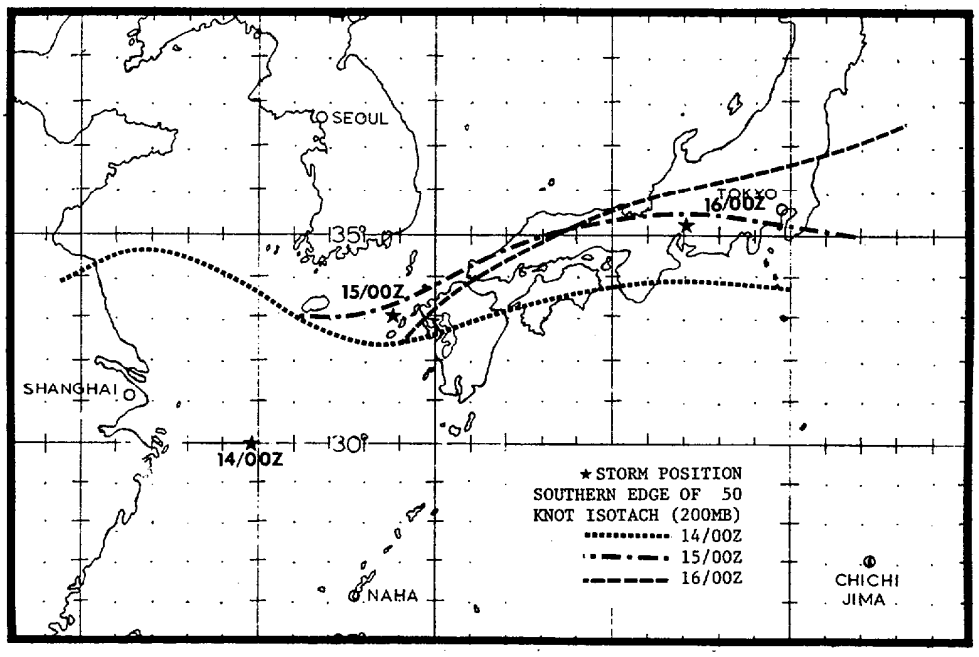
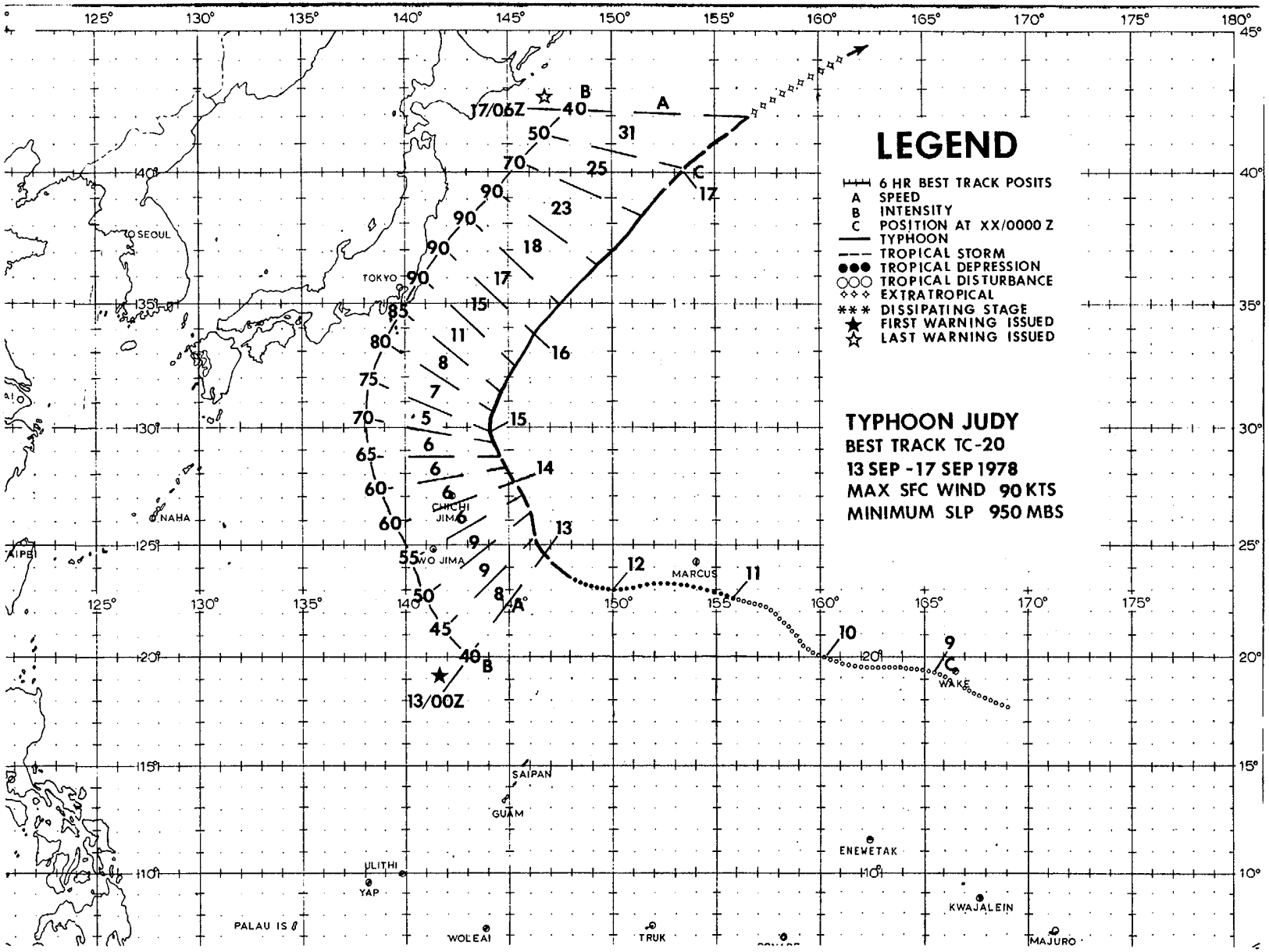


FIGURE 3-17. Irma's positions relative to the southern boundary of the 200 mb, 50 kt isotach from 140000Z to 160000Z September 1978.


LEGEND
6 HR BEST TRACK POSITS
A SPEED
B INTENSITY
C POSITION AT XX/0000 Z
TYPHOON
TROPICAL STORM
TROPICAL DEPRESSION
TROPICAL DISTURBANCE
EXTRATROPICAL
*** DISSIPATING STAGE
FIRST WARNING ISSUED
LAST WARNING ISSUED
TYPHOON JUDY
BEST TRACK TC-20
13 SEP - 17 SEP 1978
MAX SFC WIND 90 KTS
MINIMUM SLP 950 MBS
17/06Z
13/00Z
SEOUL
TOKYO
NAHA
CHICHI JIMA
IWO JIMA
MARCUS
WAKE
SAIPAN
GUAM
ENEWETAK
ULITHI
YAP
PALAU IS
WOLEAI
TRUK
KWAJALEIN
MAJURO

Typhoon Judy was first evident on satellite imagery as an area of convective activity in the easterlies. Further evidence of the initial disturbance was provided by surface observations from Wake Island during the period of 081200Z to 090000Z September 1978 showing a wind shift, maximum sustained winds of 20 kt (10 m/sec), and a minimum sea level pressure of 1005 mb. For the next three days, the disturbance was monitored by satellite reconnaissance and discussed in the Significant Tropical Weather Advisory (ABEH PGTW). Based on September's climatology for disturbances north of 20N latitude, potential for development was considered to be poor. At times during this period, this potential was supported by satellite imagery showing weak vertical development associated with the disturbance (Fig. 3-18). However, on the 12th, satellite imagery showed increased organization. A Tropical Cyclone Formation Alert was issued as 120440Z and aircraft reconnaissance was scheduled. The first aircraft penetration was 16 hours later and aircraft data along with satellite imagery (Fig. 3-19) supported a cyclone of tropical storm intensity. Consequently, the first warning was issued at 130000Z. Even though Judy was detected very early in her developmental stages, the issuance of an earlier warning was delayed primarily due to a lack of significant skill over climatology in forecasting rapid tropical cyclone development.

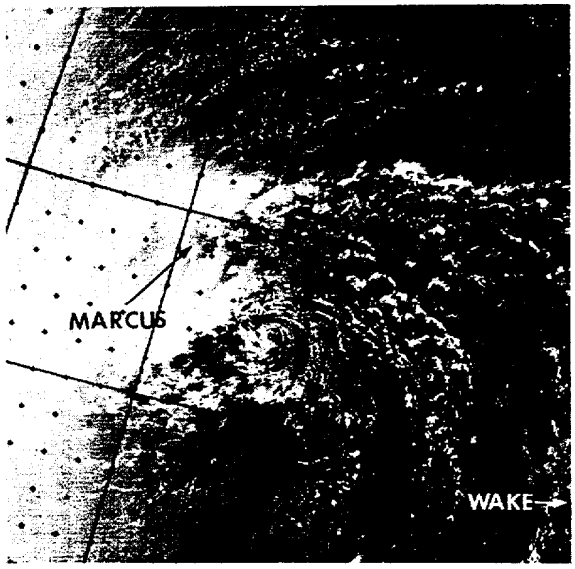


FIGURE 3-18. Tropical Disturbance which developed into Typhoon Judy. At this time the disturbance lacked vertical development, 10 September 1978, 2049Z. (DMSP imagery)

From the time of the first warning until the last, Judy's track was one of classical recurvature, slowing in forward movement to 5 kt (9 km/hr) at the recurvature point and accelerating to 31 kt (57 km/hr) under strong westerly upper-level steering north of the subtropical ridge axis. Although part of a two-storm situation with Typhoon Irma (Fig. 3-20), Judy never appeared to be influenced by Irma's presence. Warnings on Judy showed excellent continuity. From the second warning on, a recurvature path was forecast. This was due in part to the early detection which provided considerable history in Judy's past track before the first warning was issued. As a result, the forecast errors for Typhoon Judy were considerably better than average for cyclones undergoing recurvature. The intensity forecasts for Judy, however, always lagged her true intensification rate. The maximum intensity of 90 kt (46 m/sec) which Judy attained after recurvature was not foreseen, nor was the rate at which Judy weakened.

At the time of the last warning issued on Typhoon Judy at 170600Z, satellite imagery showed that Judy was merging with an extratropical system to the north. The added influx of energy into this system caused it to deepen rapidly in 12 hours from an estimated 1000 mb to 988 mb with observed 50 kt (26 m/sec) surface winds. During her life, no reported damage was done by Typhoon Judy.

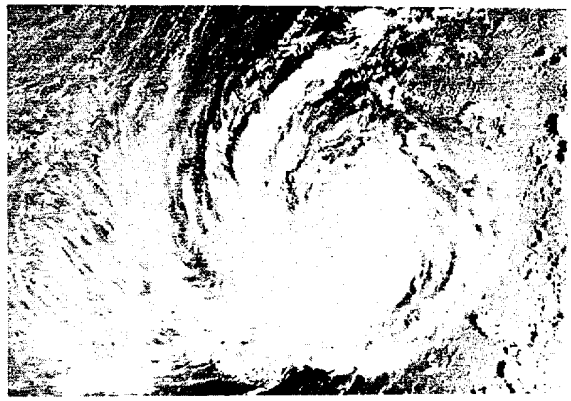


FIGURE 3-19. Judy was at tropical storm intensity at this time, 12 September 1978, 2156Z. (DMSP imagery)

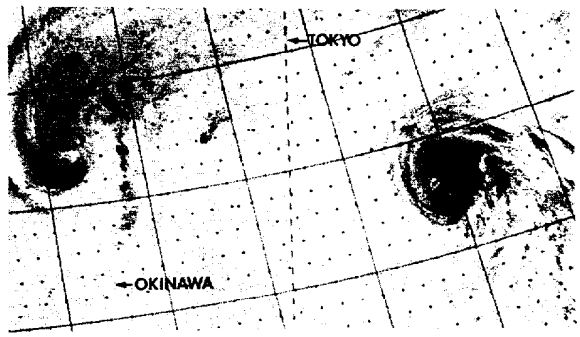
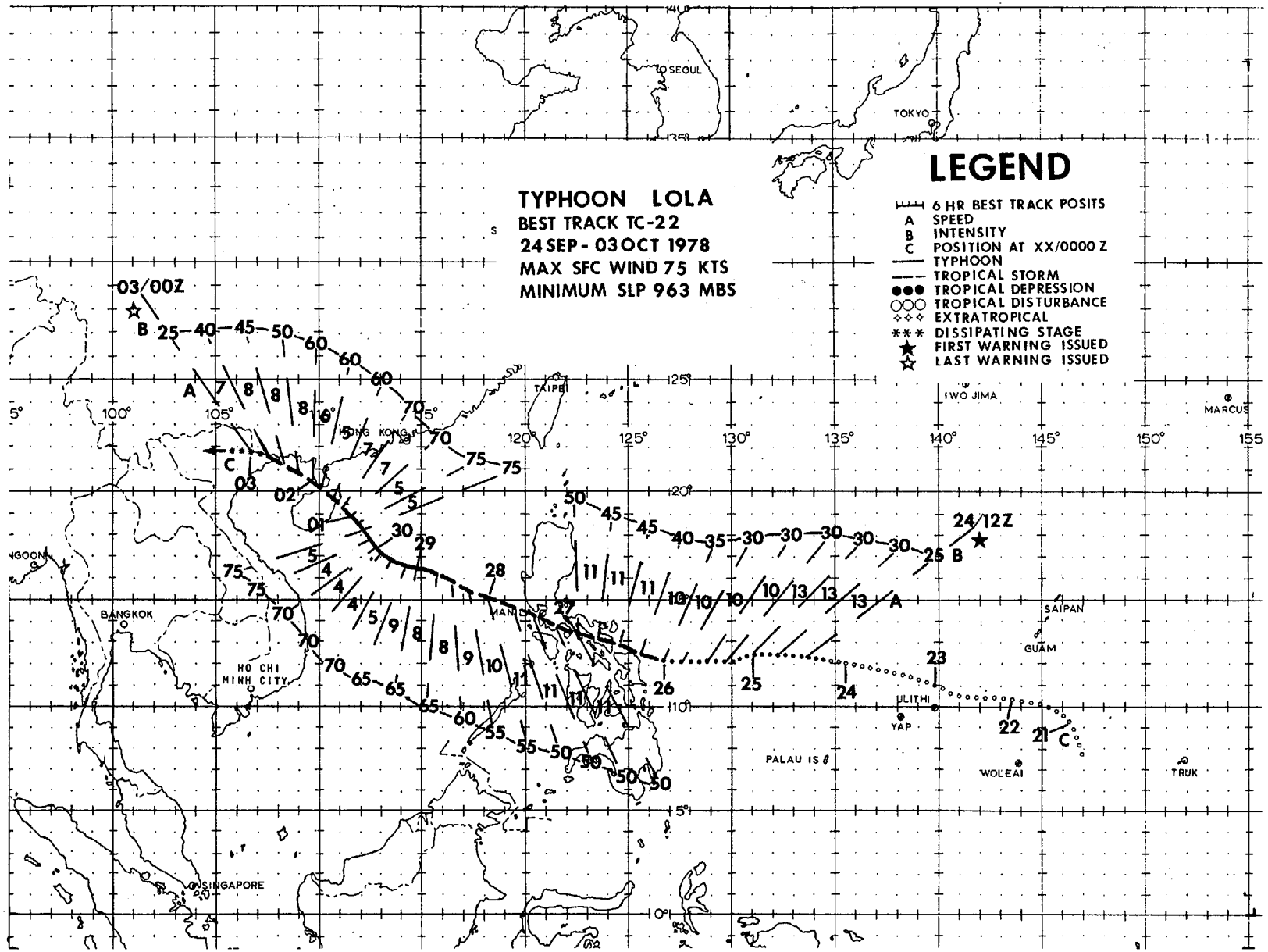


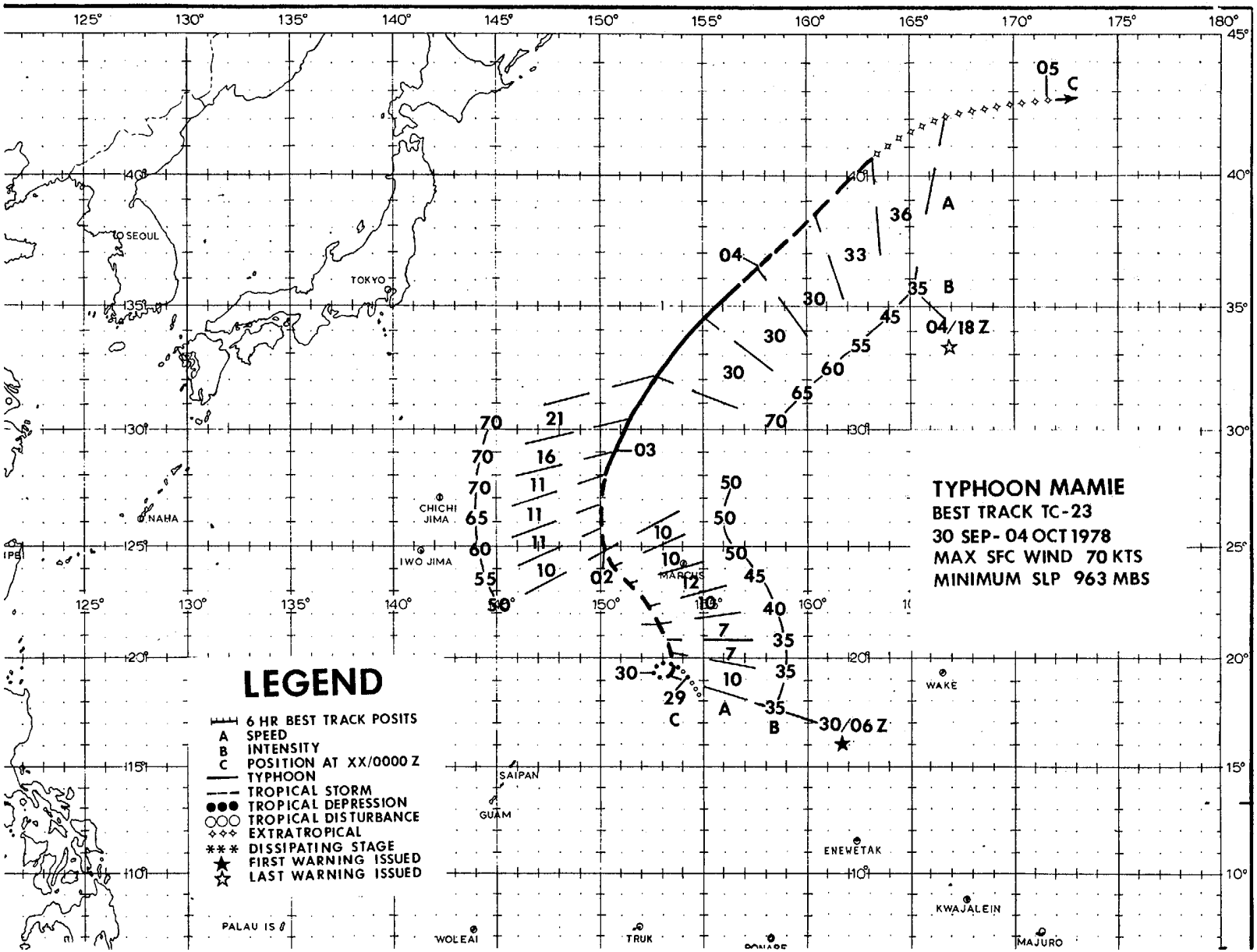
FIGURE 3-20. Infrared imagery of Typhoons Judy (right) and Irma (left), 14 September 1978, 1438Z. (DMSP imagery)


TYPHOON LOLA
BEST TRACK TC-22
24 SEP - 03 OCT 1978
MAX SFC WIND 75 KTS
MINIMUM SLP 963 MBS
LEGEND
6 HR BEST TRACK POSITS
A SPEED
B INTENSITY
C POSITION AT XX/0000 Z
TYPHOON
TROPICAL STORM
TROPICAL DEPRESSION
TROPICAL DISTURBANCE
EXTRATROPICAL
DISSIPATING STAGE
FIRST WARNING ISSUED
LAST WARNING ISSUED
03/00Z
24/12Z
SEOUL
TOKYO
TAIPEI
HONG KONG
IWO JIMA
MARCUS
SAIPAN
GUAM
YAP
ULITHI
WOLEAI
TRUK
PALAU IS
BANGKOK
HO CHI MINH CITY
SINGAPORE
RANGOON
100°
105°
120°
125°
130°
135°
140°
145°
150°
155
5°
0°

Typhoon Lola was spawned within a very active trough located between the equator and 12N, from the Philippines eastward to 150E. On the 20th of September 1978, satellite imagery gave the first indication of a disturbance near 08N-147E; however, a distinct surface circulation was not evident. Between the 20th and the 24th, the disturbance slowly accelerated to the northwest then west-northwest through the Caroline Islands passing between Ulithi and Guam on the 22nd with 15-20 kt (7-10 m/sec) intensity. A tropical cyclone formation alert was issued at 240600Z when increased organization in feeder band activity was noted on satellite imagery and potential for further development was evident. Based on aircraft and satellite data, the first warning on Tropical Depression 22 (TD-22) was issued at 241200Z with 25 kt (13 m/sec) intensity.

During the 24th and 25th, TD-22 maintained a westward movement within the near equatorial trough on a heading 10 degrees north of the trough axis. This westward movement toward the central Philippines was supported by easterlies along the southern periphery of the mid-tropospheric subtropical ridge. Aircraft data at 252100Z positioned the circulation 110 nm (205 km) east of Samar. Increased organization and a central pressure of 995 mb were noted which resulted in upgrading the system to Tropical Storm Lola at 260000Z. Landfall was made on the southeastern tip of Luzon at 261500Z. Lola's subsequent track during the 27th took her along the southern coast of Luzon passing over the cities of Legaspi and Batangas. The closest point of approach (CPA) to Manila occurred at 271000Z as Lola passed 35 nm (65 km) to the southwest. At this time, the International Airport at Manila reported 30 kt (15 m/sec) sustained winds with gusts to 50 kt (26 m/sec). The Naval Weather Service Environmental Detachment (NWSED) at Cubi Pt. recorded maximum sustained winds of 40 kt (21 m/sec) with a peak gust of 59 kt (30 m/sec) at 271241Z. Nineteen deaths and heavy property damage in the southern Tagaloc and Bical regions were attributed to Lola's passage. As Lola exited into the South China Sea, the 500 mb analysis indicated a short wave trough in the westerlies over China extending as far south as 27N with a weakness in the subtropical ridge forming over southern China. By 280000Z, the trough extended to 23N along 105E and the subtropical high center east of the weakness had moved eastward across the northern Philippines. This caused Lola's dominant mid-level steering flow to become southeasterly which resulted in her more climatological northwest track over the South China Sea. Supported by good upper-tropospheric outflow and strong low-level energy input, gradual intensification occurred from 271800Z through 301800Z. Based on aircraft data, Lola was upgraded to typhoon intensity at 281800Z. During the 29th and 30th of September, Lola reached maximum intensity with sustained winds of 75 kt (39 m/sec) and a minimum pressure of 963 mb. The mid-tropospheric ridge began strengthening westward resulting in Lola's track becoming more west-northwest toward Hainan Island. Landfall over Hainan occurred at 010900Z October, 10 nm (19 km) southeast of Wenchang.

Weakened by terrain features, Lola was downgraded to a tropical storm at 011200Z as she continued west-northwestward into northern Vietnam. The final warning downgrading Lola to tropical depression intensity was issued at 030000Z. Lola's overall uncomplicated track produced the lowest 24-, 48- and 72-hour forecast vector errors (54, 116 and 139 nm respectively) of the 1978 storm season. The 24- and 48-hour forecast vector errors were expecially low (average of 21 nm (39km) and 40 nm (74km) respectively) during Lola's passage over the Philippines. This resulted from the increased accuracy of fix positions due to additional land radar and synoptic reports, the uncomplicated track, and the fact that Lola remained a well-organized system during transit allowing accurate fixing.


TYPHOON MAMIE
BEST TRACK TC-23
30 SEP- 04 OCT 1978
MAX SFC WIND 70 KTS
MINIMUM SLP 963 MBS
LEGEND
6 HR BEST TRACK POSITS
A SPEED
B INTENSITY
C POSITION AT XX/0000 Z
TYPHOON
TROPICAL STORM
TROPICAL DEPRESSION
TROPICAL DISTURBANCE
EXTRATROPICAL
DISSIPATING STAGE
FIRST WARNING ISSUED
LAST WARNING ISSUED
04/18 Z
30/06 Z
TO SEOUL
TOKYO
NAHA
CHICHI JIMA
IWO JIMA
MARCUS
WAKE
SAIPAN
GUAM
ENEWETAK
KWAJALEIN
MAJURO
WOLEAI
TRUK
PALAU IS

Typhoon Mamie was yet another of the compact typhoons of 1978. Mamie was also an open ocean typhoon (i.e., it formed and dissipated over the ocean, and affected shipping lanes) and never really threatened any land stations.

Tropical Depression 23 (Mamie) developed from a wave in the easterlies. On the 27th of September at 0000Z this wave was approximately 100 nm (185 km) east of Guam and was oriented southwest-northeast from 10N to 25N. Within the wave, there were two disturbance areas. The northernmost area eventually developed when it moved under an upper air difluent region. By the 30th, a compact tropical depression was easily noted on satellite data (Fig. 3-21). Also noted were cirrus cloud streamers showing outflow existed in all quadrants. The first warning on TD-23 was issued immediately thereafter.

Remaining a very compact system (Fig. 3-22), Mamie tracked on a recurvature path along the western periphery of a mid-tropospheric, subtropical high pressure system whose 500 mb height center was near 25N-175E. The direction-of-track forecasts were good; however, the speed-of-movement forecasts were underestimated. Mamie accelerated much more rapidly than expected (twice climatological speeds) after passing north of 30N. Due to sparse, upper-air reports in the vicinity of the typhoon, analysis and forecast aids did not indicate such a rapid acceleration would occur. Mamie eventually weakened and transitioned into an extratropical system on 4 October 1978. Without satellite reconnaissance it is conceivable that the compact, Typhoon Mamie would not have made history.

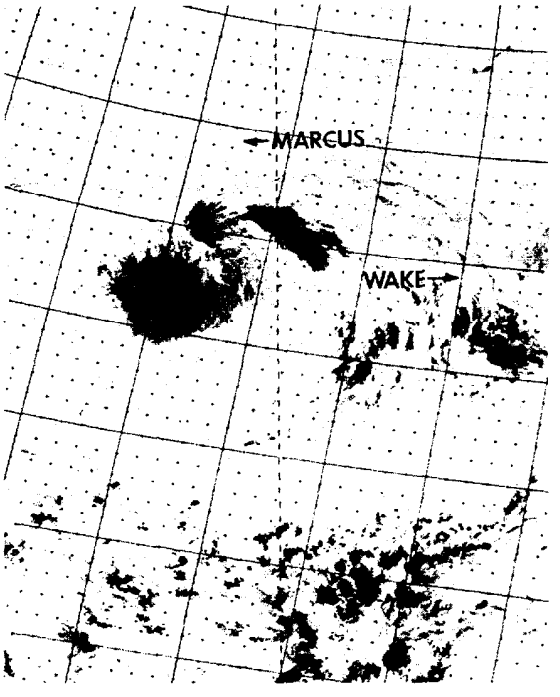


FIGURE 3-21. Infrared imagery of TD-23 (Mamie) at 30 kt (15 m/sec) intensity, 30 September 1978, 0035Z. (DMSP imagery)

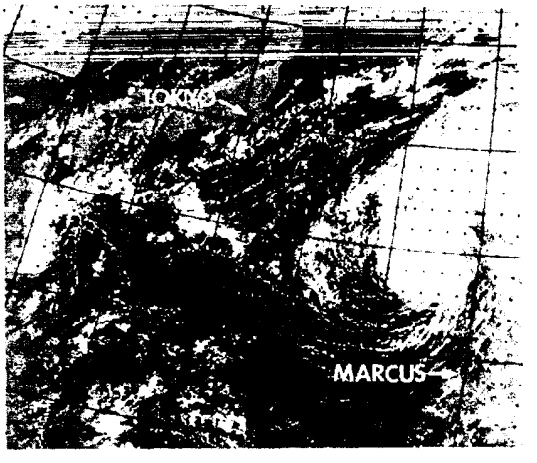
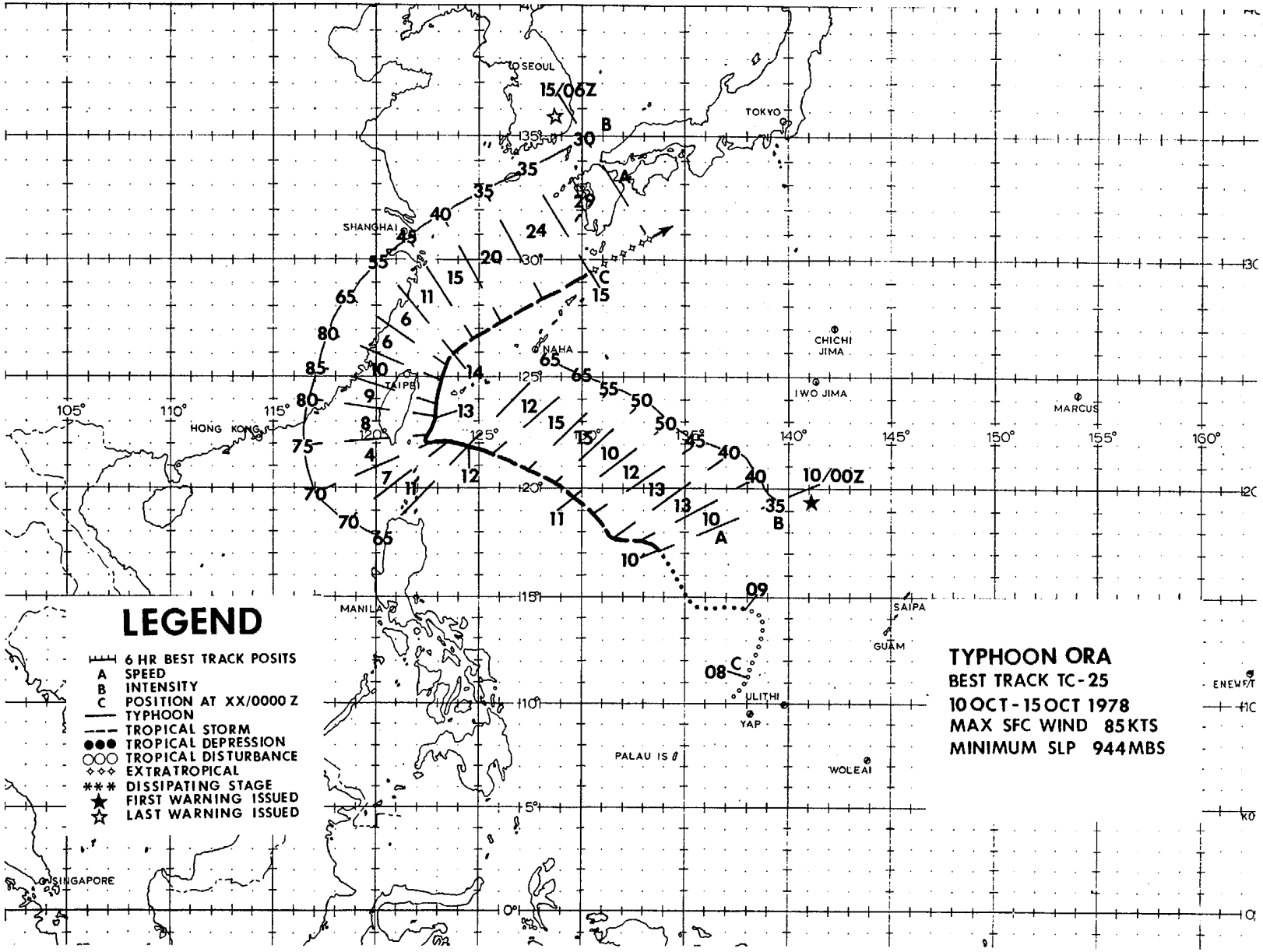


FIGURE 3-22. Typhoon Mamie, remaining compact, moving northeastward while at maximum intensity of 70 kt (36 m/sec), 03 October 1978, 0123Z. (DMSP imagery)


SEOUL
15/06Z
TOKYO
SHANGHAI
NAHA
TAIPEI
HONG KONG
CHICHI JIMA
IWO JIMA
MARCUS
10/00Z
MANILA
SAIPA
GUAM
08
ULITHI
YAP
PALAU IS
WOLEAI
SINGAPORE
105°
110°
115°
120°
125°
130°
135°
140°
145°
150°
155°
160°
LEGEND
6 HR BEST TRACK POSITS
A SPEED
B INTENSITY
C POSITION AT XX/0000 Z
TYPHOON
TROPICAL STORM
TROPICAL DEPRESSION
TROPICAL DISTURBANCE
EXTRATROPICAL
DISSIPATING STAGE
FIRST WARNING ISSUED
LAST WARNING ISSUED
TYPHOON ORA
BEST TRACK TC-25
10 OCT - 15 OCT 1978
MAX SFC WIND 85 KTS
MINIMUM SLP 944 MBS

During the early part of October, extensive monsoon troughing existed from the South China Sea, across the Philippine Islands to an area southeast of Guam. The surface analyses for that period showed a combination of strong northeasterlies north of the monsoon trough axis and well defined cross-equatorial flow into the trough from the Southern Hemisphere. The entire area was, therefore, ripe for continued tropical cyclone development and, indeed, by 081200Z, Tropical Storm Nina was gathering strength east of the Philippines. At about the same time an area of convergence about 300 nm (556 km) west-southwest of Guam began to show increased organization.

JTWC began to monitor this area using satellite and ship synoptic data and issued a Tropical Cyclone Formation Alert at 090707Z. Based on reconnaissance aircraft data at 092254Z October, the disturbance was upgraded to Tropical Storm Ora with the first warning valid at 100000Z October 1978.

The 500 mb analysis at this time showed that the mid-tropospheric subtropical ridge axis was broken between Japan and the Philippine Islands, with a high pressure cell centered over Thailand and another located near Marcus Island. This break was created by a deepening long wave trough that was moving into the western Pacific from the Asian mainland. The circulations of Tropical Storm Nina and Tropical Storm Ora also helped to maintain this break.

Computer aids, climatology and the current synoptic situation supported a northward track; the JTWC forecast showed Ora recurving to the north-northeast around the western periphery of the high pressure cell that was centered near Marcus Island.

By 101800Z, however, it became apparent that Ora and Nina were beginning to interact. At this time Nina, the dominant system, was trying to force Ora to follow a westward track, while at the same time the long-wave trough, then over the Sea of Japan, was inducing more northward movement. The net effect of these two steering influences caused Ora to follow an overall northwestward track at a speed of 12-15 kt (22-28 km/hr).

On the 11th, it was apparent that Tropical Storm Nina and Tropical Storm Ora were engaging in a Fujiwhara interaction. Nina would have been expected to move eastward in the classic Fujiwhara style. However, because she was the dominant system, the axis of rotation was closer to her. (Figure 3-23 shows the relative positions of Nina and Ora at 112342Z.) Instead of moving eastward, therefore, she merely stalled and then executed two, small loops while causing Ora to move west-northwestward. During this time period, JTWC continued to forecast Ora to cross the southern tip of Taiwan. This forecast was based on persistence and objective forecast aids which had been verifying quite well up to that point. Tropical Storm Ora then began to show increased organization on satellite and radar data. Aircraft reconnaissance at 120304Z reported the first signs of eye formation and a central pressure of 969.6 mb. Post analysis revealed that typhoon intensity was reached at 111800Z.

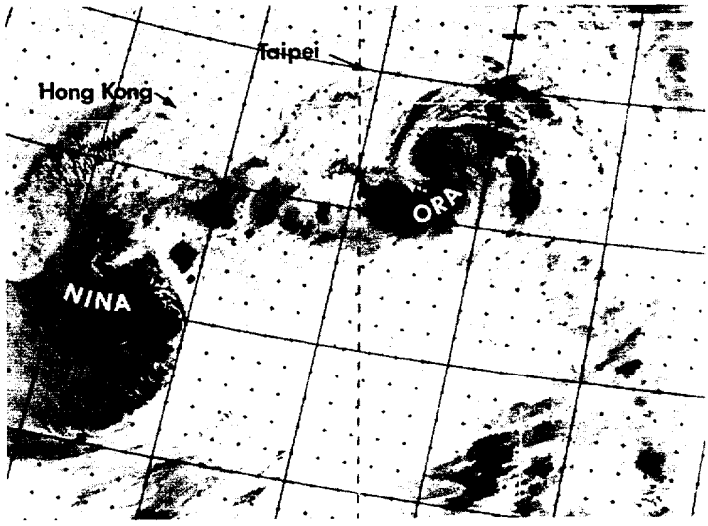


FIGURE 3-23. Infrared image of Typhoon Ora and Tropical Storm Nina during Fujiwhara interaction, 11 October 1978, 2342Z. Post-analysis showed that when the feeder band connecting the two cyclones disappeared, interaction ceased and Ora later turned north. (DMSP imagery)

As Ora approached the east coast of Taiwan, hourly radar fixes from Ishigaki-Shima, Miyako-Jima and Hua-lien indicated deceleration and by 121200Z, Ora had slowed to 4 kt (7 km/hr). By this time, Tropical Storm Nina had evidently weakened to the point where she no longer had any major influence on Ora's movement. The break in the ridge axis then became the controlling factor in determining Ora's track. Westward movement was forecast, in keeping with the upper-air, numerical progs that showed the ridge building back. Fortunately for Taiwan, this ridge failed to build back and Ora veered sharply to the north never making landfall on Taiwan (Fig. 3-24). When unexpected, northward movement was noted, an amended forecast was issued. Without constant reconnaissance, it is conceivable that the change in Ora's movement would not have been noticed until the next scheduled, 6-hourly fix.

Ora reached her peak intensity of 85 kt (44 m/sec) near 130600Z October as a compact typhoon (Fig. 3-25). By 131800Z, however, reconnaissance aircraft indicated that her central pressure had increased rapidly (44 mb in 17 hours) and there was evidence that her upper level center was beginning to shear off. By 140000Z Ora had weakened to tropical storm strength and was accelerating to the northeast under the influence of strong mid-level westerlies. Tropical Storm Ora then merged with the polar front and was fully extratropical by 150600Z October.

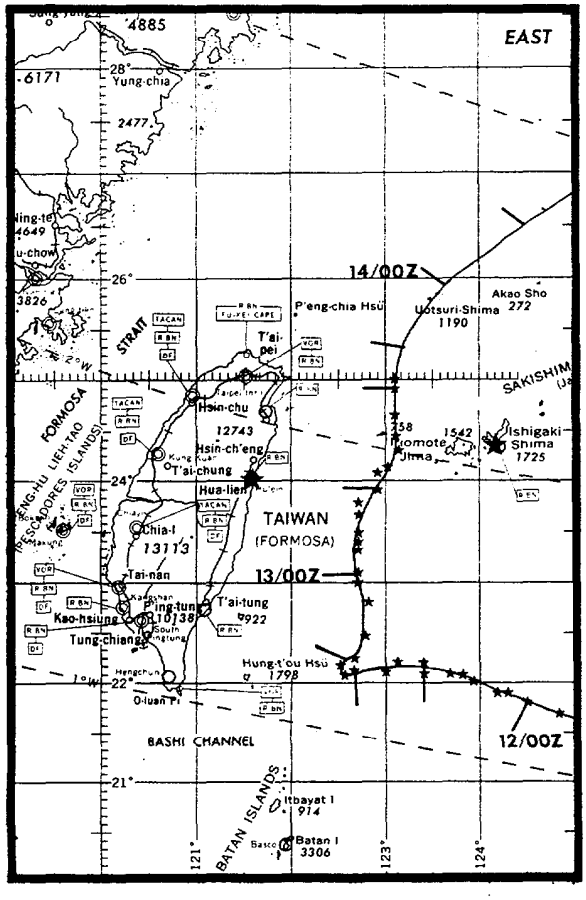
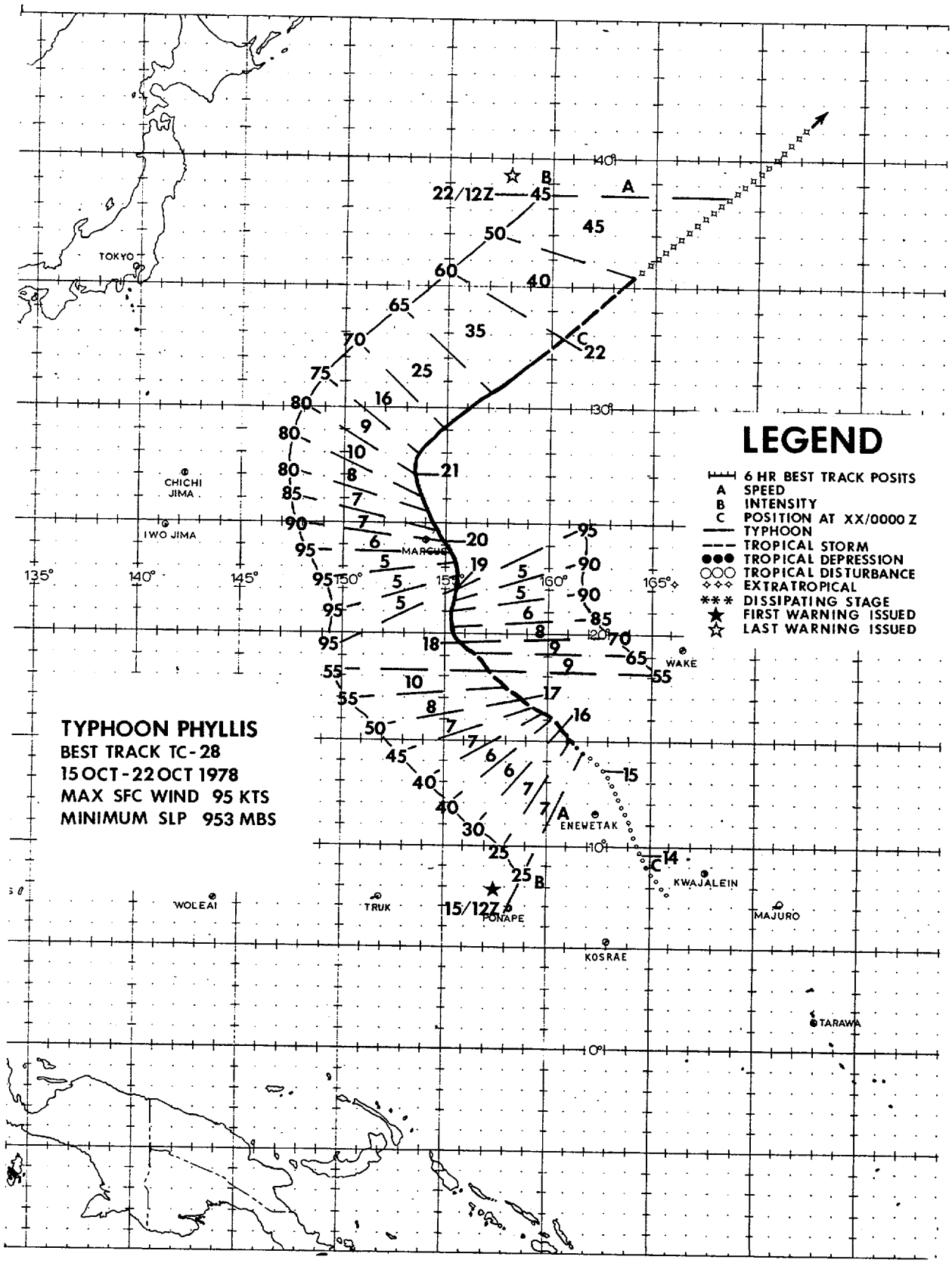


FIGURE 3-24. Hourly radar fixes show Ora's sudden turn to the North after 121200Z October 1978.

FIGURE 3-25. Hua-Lien radar presentation of Typhoon Ora at 130100Z October just prior to her reaching maximum intensity. (Photograph courtesy of the Central Weather Bureau, Taipei, Taiwan.)


TYPHOON PHYLLIS
BEST TRACK TC-28
15 OCT - 22 OCT 1978
MAX SFC WIND 95 KTS
MINIMUM SLP 953 MBS
LEGEND
6 HR BEST TRACK POSITS
A SPEED
B INTENSITY
C POSITION AT XX/0000 Z
TYPHOON
TROPICAL STORM
TROPICAL DEPRESSION
TROPICAL DISTURBANCE
EXTRATROPICAL
DISSIPATING STAGE
FIRST WARNING ISSUED
LAST WARNING ISSUED
TOKYO
CHICHI JIMA
IWO JIMA
MARCUS
WAKE
ENEWETAK
KWAJALEIN
MAJURO
WOLEAI
TRUK
PONAPE
KOSRAE
TARAWA
22/12Z
15/12Z
140°
130°
120°
110°
0°
135°
140°
145°
150°
155°
160°
165°

The tropical disturbance that eventually developed into Typhoon Phyllis formed in a well established, near-equatorial trough lying over the southern Marshall Islands on 13 October 1978. By 1200Z on the 14th, the disturbance had moved north-northwest and under moderate upper level divergence which existed south of a TUTT. Increased organization of the disturbance was observed on satellite imagery at 142108Z and a Tropical Cyclone Formation Alert (TCFA) was issued at 142235Z for an area 100 to 350 nm (185-556 km) north and north-northwest of Enewetak.

Upper-air data at 150000Z suggested a weakness in the subtropical ridge (STR) axis near 155E. As the tropical disturbance tracked northwestward toward the weakness, increasing vertical organization between low-level inflow and upper-level outflow continued. The disturbance was upgraded to tropical depression (TD) status and numbered warnings on TD-28 began at 151200Z. Phyllis remained a tropical depression for 18 hours and was upgraded to a tropical storm based on aircraft reconnaissance information which indicated Phyllis to be a small compact storm with small wind radii and therefore virtually invisible from synoptic reports alone.

By the 16th, the break in the STR axis was well established. The dominant high pressure center was northeast of Wake Island and the secondary center was southwest of Iwo Jima. The dominant high slowly strengthened causing Phyllis to accelerate northwestward from 6-10 kt (11-19 km/hr). Simultaneously, the TUTT moved northward allowing Phyllis to continue to have excellent outflow aloft. In this regime, Phyllis gradually intensified to typhoon strength by the 17th at 1800Z.

When Phyllis finally reached the break in the STR on the 18th, the dominant high weakened leaving a large col area causing Phyllis to drift slowly for a day. Then on the 19th, the high pressure system east of Phyllis began building to the west which eventually caused Phyllis to slowly accelerate northwestward and delayed recurvature for two more days. Cooler waters and reduced, upper-level outflow weakened Phyllis as she recurved northeastward. Then, north of the STR, Phyllis rapidly accelerated under stronger-than-expected steering currents. Phyllis accelerated from 9 kt (17 km/hr) at the ridge axis to 45 kt (83 km/hr) in less than 30 hours.

Increased vertical shear caused Phyllis to weaken to tropical storm intensity by 0000Z on the 22nd. Thereafter, the pressure gradient between a major surface low moving eastward off Japan and the strong surface ridge east of Phyllis helped maintain storm force winds around Phyllis as she became extratropical.

The STR built westward as Phyllis began her track toward recurvature (Fig. 3-26). After recurvature, Phyllis' foward speed increased dramatically; extratropical transition was complete after 220600Z.

Phyllis remained a typhoon for four days during which her closest approach to land was 40 nm (74 km) northeast of Marcus Island. Her compactness and over-open water track resulted in no major reported damage.

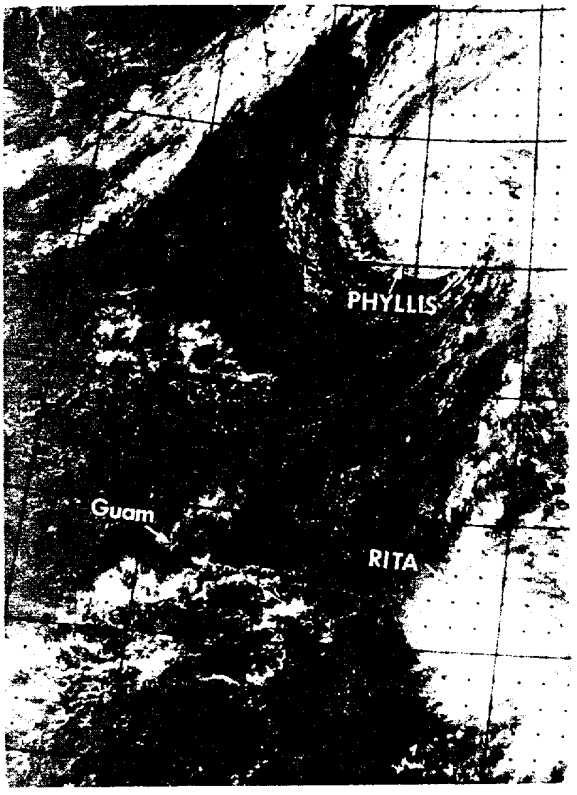
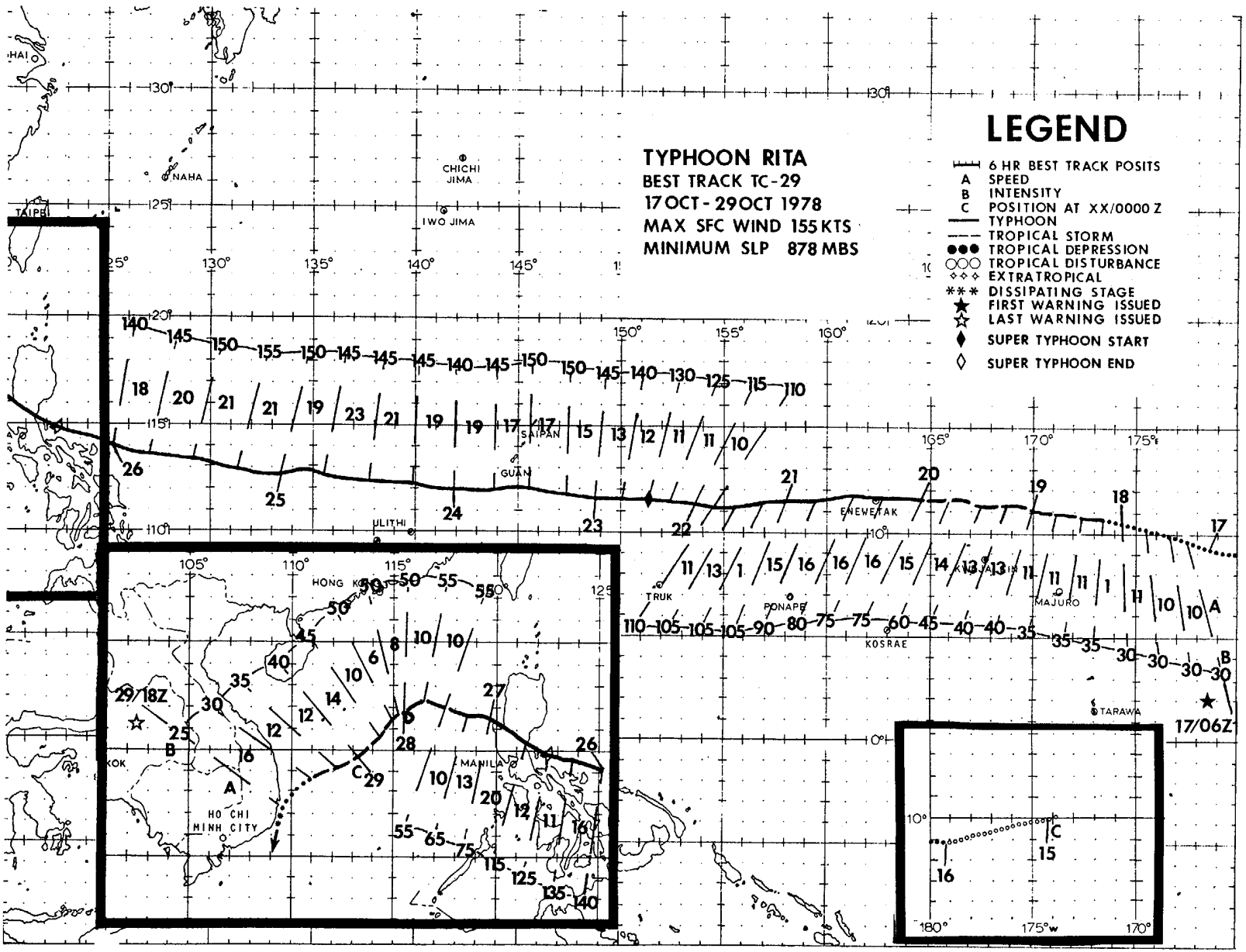


FIGURE 3-26. Typhoon Phyllis at her recurvature point, Typhoon Rita on a track toward Guam and the STR builds in between them as noted by the weakness in the band of showers connecting the two compact typhoons, 21 October 1978, 0106Z. (DMSP imagery)


TYPHOON RITA
BEST TRACK TC-29
17 OCT - 29 OCT 1978
MAX SFC WIND 155 KTS
MINIMUM SLP 878 MBS
LEGEND
6 HR BEST TRACK POSITS
A SPEED
B INTENSITY
C POSITION AT XX/0000 Z
TYPHOON
TROPICAL STORM
TROPICAL DEPRESSION
TROPICAL DISTURBANCE
EXTRATROPICAL
DISSIPATING STAGE
FIRST WARNING ISSUED
LAST WARNING ISSUED
SUPER TYPHOON START
SUPER TYPHOON END
NAHA
CHICHI JIMA
IWO JIMA
TAIPEI
SAIPAN
GUAM
ULITHI
ENEWETAK
TRUK
PONAPE
KOSRAE
MAJURO
TARAWA
HONG KONG
MANILA
HO CHI MINH CITY
29/18Z
17/06Z

Rita, 1978's only super typhoon, was first detected as a cloud cluster in the tropical central North Pacific on the 14th of October. Migrating westward, she crossed the dateline early on the 16th and by 162300Z (Fig. 3-27) satellite imagery showed increased organization and developing feeder band activity. Consequently, a formation alert was issued on the system at 162347Z and six hours later, after continued development, the first warning was issued with 30 kt (15 m/sec) intensity. Thus, Rita was detected very early in her developmental stages and, based on the availability and maximum use of satellite data, a timely warning service was provided.

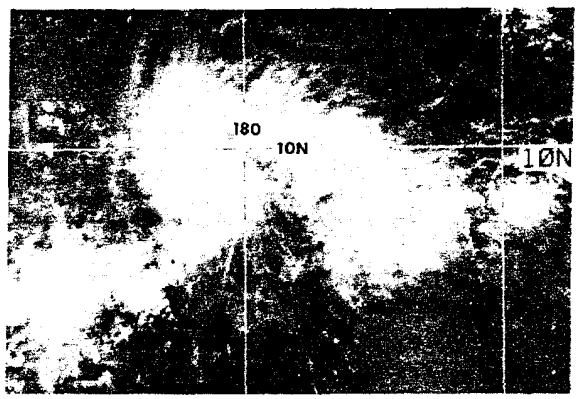


FIGURE 3-27. Rita, as she appeared just before issuance of her first warning, 16 October 1978, 2245Z. (DMSP imagery from AFGWC, Offutt AFB, NE)

From the time of the first warning until landfall on the Philippines, Rita tracked virtually straight westward. The major influence on her movement was the unusually strong mid-tropospheric subtropical ridge that built in over WESTPAC as Typhoon Phyllis was recurving. The strength of the easterly current south of the ridge steered Rita at forward speeds of up to 20 to 23 kt (37 to 43 km/hr); almost twice that of the climatological average. As could be anticipated from her track, JTWC's forecasts were consistent and errors were less than average. The larger errors were due to underestimates of forward speed and initial expectations of recurvature similar to Phyllis'. During her track across WESTPAC, Rita threatened a number of Pacific islands and atolls including those in the northeastern Marshalls, Enewetak and Guam. Rita's track near Enewetak brushed the northern tip of the atoll when maximum sustained winds were 75 kt (39 m/sec). At this time, Rita was a very compact typhoon and the main island on the southeastern portion of the atoll reported maximum sustained winds of only 35 kt (18 m/sec) with gusts to 45 kt (23 m/sec). By the time Rita approached Guam (Fig. 3-28) however, she had intensified dramatically to 150 kt (77 m/sec) and, therefore, posed a serious threat to the island.

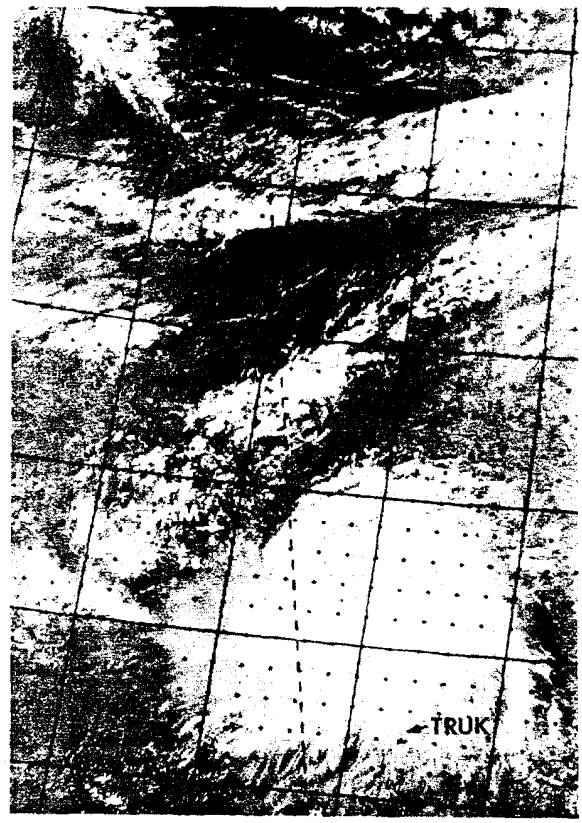


FIGURE 3-28. Rita, at 145 kt (75 m/sec) intensity, 16 hours before her closest point of approach to Guam, 22 October 1978, 2212Z. (DMSP imagery)

Rita was forecast to track south of Guam and maximum sustained winds expected for the center of the island (at Naval Air Station (NAS), Agana) were 70 kt (36 m/sec). Rita did indeed track south of Guam as forecast but maximum sustained winds reported at NAS Agana were only 35 kt (18 m/sec) with gusts to 55 kt (28 m/sec). In addition, precipitation on the island from Rita was unusually low. Post analysis reveals that the overestimation of the maximum winds on the island was caused by two factors. The first factor was that Rita's actual track was 30-35 nm (56-65 km) south of the forecast track with actual CPA (closest point of approach) to NAS, Agana of 85 nm (157 km). Because Rita was compact, this 30 nm (56 km) error in track meant a large difference in Rita's influence on Guam. Had this been the only error, sustained winds would nevertheless have been over 50 kt (26 m/sec) at NAS, Agana. The second factor was the over-estimation of the over-30-kt (15 m/sec) and over-50-kt (26 m/sec) wind radii. These radii were based on surface wind estimates from aircraft reconnaissance (Fig. 3-29) and were forecast to expand. The 230600Z warning

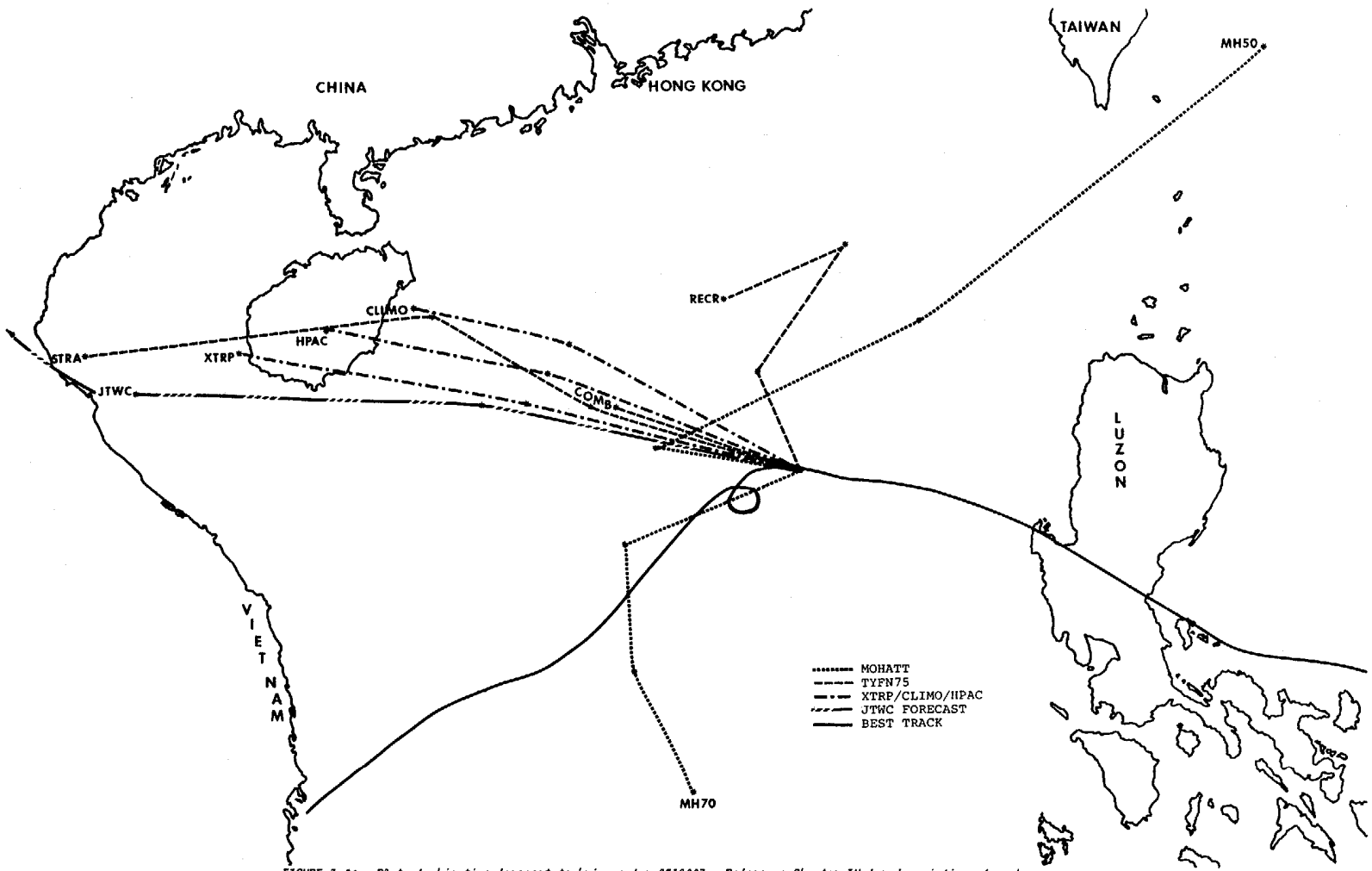


FIGURE 3-30. Plot of objective forecast techniques for 271200Z. Reference Chapter IV for description of each objective technique. Each * represents a 24-hour forecast segment. The solid line represents Rita's best track.

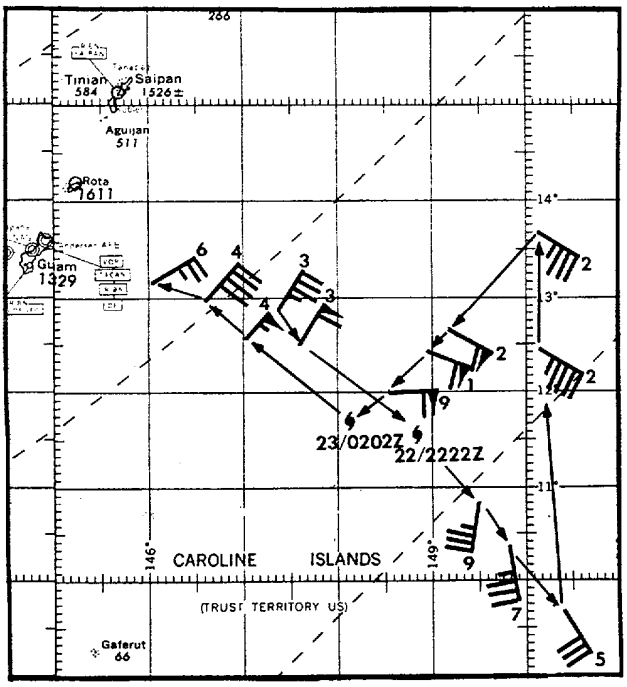


FIGURE 3-29. Plot of aircraft reconnaissance data. Typhoon positions are noted at 230200Z and 222222Z. Wind barbs are the estimated surface winds from the ARWO aboard the aircraft. The tens digit of the wind direction is also plotted with the wind barbs.

showed a 185 nm (343 km) radius for over-30-kt (15 m/sec) winds and 100 nm (185 km) radius for over-50-kt (26 m/sec) winds in Rita's northern semicircle. Actual surface reports from the southern tip of Guam indicated the over-50-kt (26 m/sec) radius was actually only 70 nm (130 km). The over-30-kt (15 m/sec) wind radius was also too large as judged by the nine hour duration of sustained 30 kt (15 m/sec) winds at NASA Dan Dan. If the over-30-kt (15 m/sec) wind radius had been 185 nm (343 km), the duration of sustained 30 kt (15 m/sec) winds would have been closer to 19 hours. It was evident that the wind field did not expand as forecast.

Unlike the relatively mild influence on Guam and Enewetak, the Philippines experienced considerable damage and many lives were lost during Rita's passage. Heavy flooding was reported throughout many of the cities and villages on Luzon, especially those just east and north of Clark AB. DoD facilities, however, sustained little damage in Rita's 12-hour passage over central Luzon. As she entered the South China Sea, aircraft and satellite data indicated that she had weakened considerably.

In contrast to the persistent synoptic situation over the Western Pacific which had steered Rita ever westward, the large scale features in the South China Sea were complex. As Rita exited the Philippines, a short-wave westerly trough was developing and moving eastward over the Asian mainland. The trough created a break in the mid-tropospheric subtropical ridge allowing for a northward adjustment in Rita's track. During this same time, however, a surge in the northeast monsoon was developing over China at low tropospheric levels which tended to steer Rita southward. Objective aids lacked consistency and reflected the contrast in the synoptic situation (Fig. 3-30). Eventually, the northeast monsoon surge proved to be the deciding factor in Rita's movement and she tracked southwestward toward the Vietnam coast and dissipated over water. Forecast errors were considerably larger during this latter segment of Rita's track.

Overall, Rita was the record setter for the 1978 season. Her track was the longest of the season and at her peak intensity of 155 kt, aircraft data recorded an 878 mb central pressure, only 2 mb higher than the record set by Typhoon June in 1975 (Fig. 3-31).

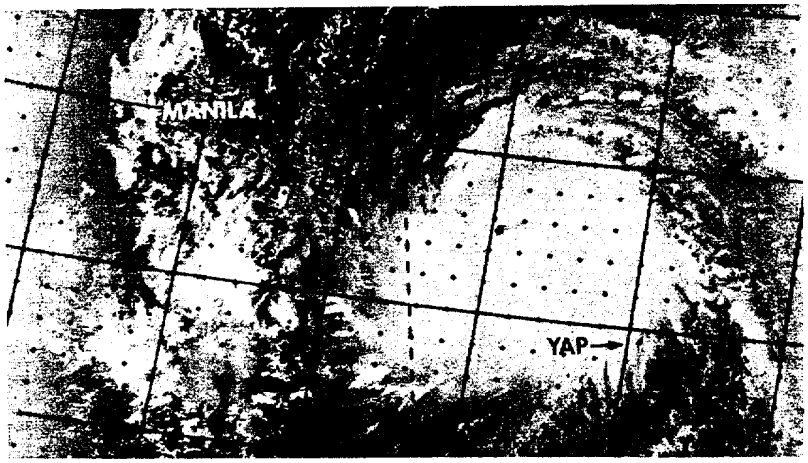
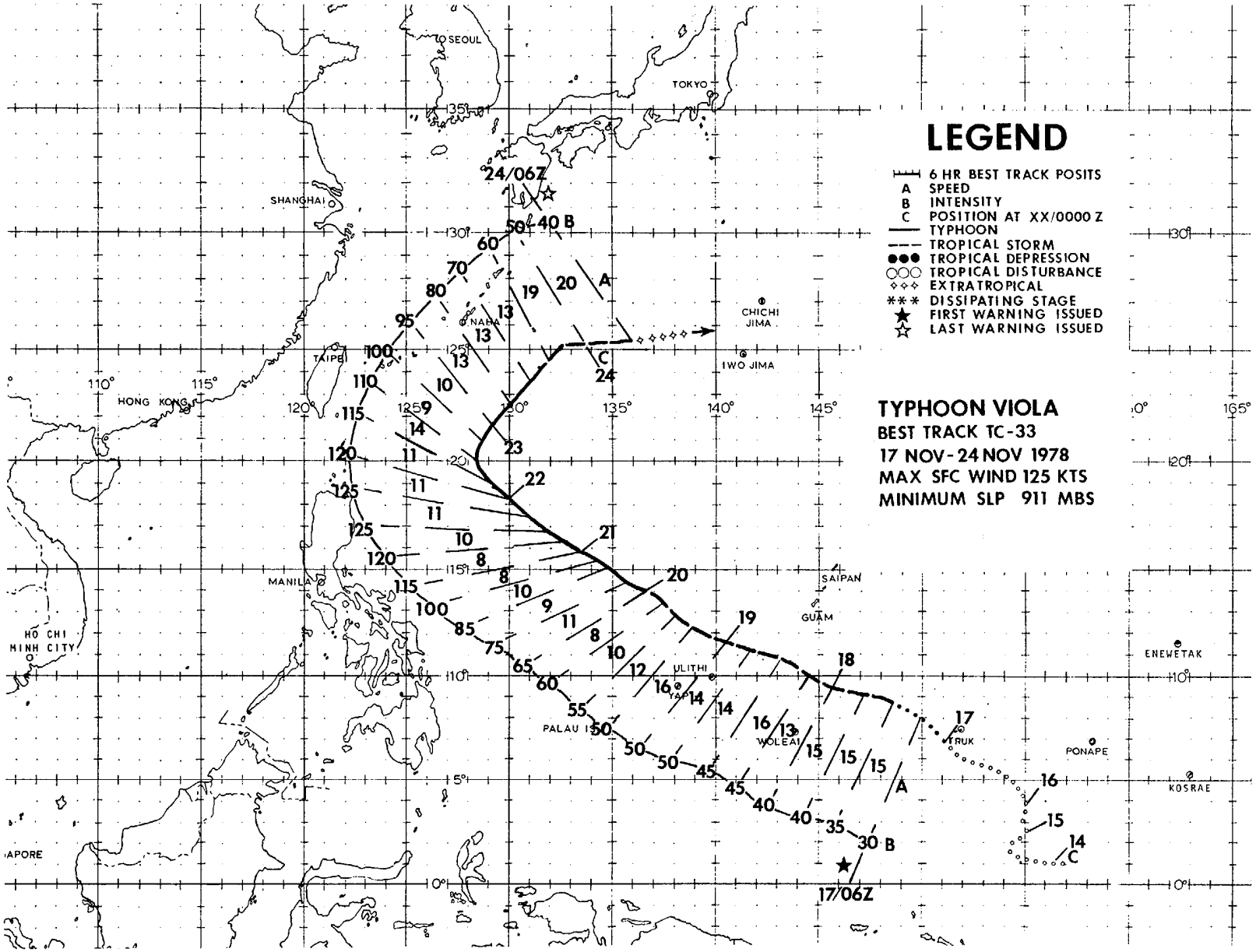


FIGURE 3-31. Rita, at 150 kt [77 m/sec] intensity, 6 hours prior to her peak intensity, 24 October 1978, 2319Z. [DMSP imagery].


LEGEND
6 HR BEST TRACK POSITS
A SPEED
B INTENSITY
C POSITION AT XX/0000 Z
TYPHOON
TROPICAL STORM
TROPICAL DEPRESSION
TROPICAL DISTURBANCE
EXTRATROPICAL
DISSIPATING STAGE
FIRST WARNING ISSUED
LAST WARNING ISSUED
TYPHOON VIOLA
BEST TRACK TC-33
17 NOV-24 NOV 1978
MAX SFC WIND 125 KTS
MINIMUM SLP 911 MBS
SEOUL
TOKYO
SHANGHAI
NAHA
CHICHI JIMA
IWO JIMA
TAIPEI
HONG KONG
MANILA
SAIPAN
GUAM
ULITHI
WOLEAI
TRUK
PONAPE
KOSRAE
ENEWETAK
PALAU I
HO CHI MINH CITY
24/06Z
17/06Z

Of the typhoons of 1978, none could be considered to be more classic or more well-behaved than Typhoon Viola, the last typhoon of the season.

Increased convective activity in the monsoon trough about 600 nm (1111 km) southeast of Truk was first noticed on satellite data at 132159Z November. By 162142Z, satellite data showed continued development and a Tropical Cyclone Formation Alert was issued. Well-defined, upper atmospheric outflow was evident in all quadrants and at 170710Z, a reconnaissance aircraft reported surface winds of 30 kt (15 m/sec) and a surface pressure of 998 mb. Based on this information the disturbance was upgraded to Tropical Depression 33 and numbered warnings began

The mid-tropospheric flow pattern at this time was characterized by strong high pressure ridging to the north and east of TD-33 with a weakness apparent in the ridge axis near Luzon. This weakness was induced both by a deepening long wave trough that extended from Siberia south along the coast of China and by TD-32, which was at this time off the coast of Luzon in the Philippine Sea. Although TD-32 was short-lived and never intensified above tropical depression strength, it nonetheless was strong enough to alter the mid-level flow pattern and become a determining factor in TD-33's (Viola's) ultimate movement.

Under the influence of the strong easterlies south of the mid-tropospheric ridge, TD-33 began tracking to the west-northwest at 12 to 16 kt (22 to 30 km/hr) toward the weakness near Luzon.

Based on an improved satellite signature, TD-33 was upgraded to Tropical Storm Viola at 171200Z. A careful comparison of the satellite data, along with the aircraft reports, indicated that Viola was still not vertically stacked. Late on the 19th, she slowed to 8 kt (15 km/hr) and this deceleration was apparently enough to allow her time to become better organized in the vertical. A 191505Z reconnaissance aircraft confirmed that: the surface center was within 5 nm (9 km) of the 700 mb center; Viola's surface pressure had fallen to 977 mb; and, an eye was beginning to form. She finally reached typhoon strength near 200000Z. By this time, Viola had completely overpowered TD-32, whose circulation was no longer evident on the surface analysis. With TD-32 "out of the way", Viola now had access to all available energy and, as a result, rapid intensification followed. At 211200Z she attained her minimum sea level pressure of 911 mb and maximum wind speed of 125 kt (64 m/sec) just 5 kt (2.6 m/sec) below super-typhoon strength (Fig. 3-32). Viola's tremendous intensification is reflected in the ten thousand foot temperatures that were reported by aircraft at about that time; the outside temperature was 14 Celsius but the inside (eye) was a very warm 29 Celsius (with a dewpoint of 16 Celsius).

Up to this point JTWC's forecasts had been verifying quite well. While Viola was forecast to cross the northern tip of Luzon, the break in the ridge near the Philippines was continually monitored and the prospects for Viola to recurve were evaluated with the issuance of each warning.

500 mb reports in that area were sparse; as a result, the true situation was often difficult to evaluate due to the generally weak overall pattern. Available numerical progs continued to show the ridge building back between Luzon and Taiwan, and as late as 210000Z the 500 mb analysis, more definitive than usual, seemed to support this rebuilding.

In an attempt to obtain more steering level data to augment the sparse land station reports, reconnaissance aircraft were requested to fly at 500 mb in the area directly north of Viola. The wind data provided was invaluable and confirmed that a definite break in the ridge axis existed. The first forecast noting a recurvature track was issued at 220600Z. Subsequent aircraft and satellite fixes verified northward, then northeastward movement.

After recurvature, satellite data began to show that Viola's upper-level center was being sheared off from her surface circulation center. By 231800Z she had weakened to tropical storm strength. She weakened rapidly thereafter; the 240030Z reconnaissance aircraft was unable to locate a 700 mb center. A weak low-level circulation remained for a short time after losing tropical characteristics.

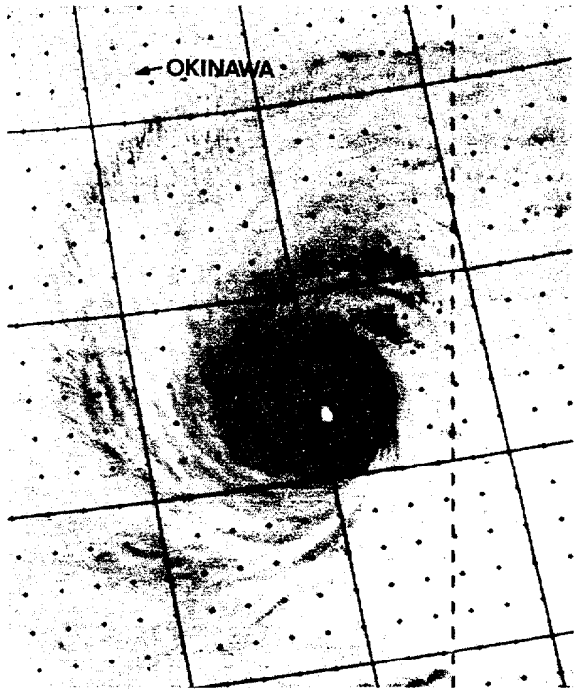


FIGURE 3-32. Infrared image of Typhoon Viola nearing her maximum intensity of 125 kt (64 m/sec), 21 November 1978, 0945Z. (DMSP imagery)

2. NORTH INDIAN OCEAN TROPICAL CYCLONES

During 1978, four significant tropical cyclones occurred in the North Indian Ocean area (Table 3-6). As usual, the transition seasons between the northeast and southwest monsoon periods were the favored "cyclone seasons" (Table 3-7). This year's cyclones lived longer than others on record as noted by the above-average number of warnings shown in Table 3-8.

Tropical Cyclone (TC) 18-78 occurred just prior to the start of the southwest monsoon season over Southeast Asia. Steering flow was weak which caused forecasting the speed of movement to be difficult. The lack of surface observations forced reliance on the interpretation of satellite data for position and intensity. TC 18-78 made landfall on Burma with estimated, maximum sustained winds of 50 kt (26 m/sec). News reports stated, " the town of Kyaukpyu reported 90% property damage and the coastal village of Narakway was demolished when estimated peak wind gusts of 80 to 100 mph were experienced." These extreme winds, although estimated, could have been produced by squall lines or tornados.

TC 19-78 dissipated prior to making landfall on Bangladesh; no "ground truth" reports were received confirming it's strength.

TABLE 3-6.

NORTH INDIAN OCEAN AREA

1978 TROPICAL CYCLONES

CYCLONE	PRD OF WARNING	CALENDAR DAYS OF WARNING	MAX SFC WIND	EST MIN SLP	NO. OF WARNINGS	DISTANCE TRAVELLED
TC 18-78	15 MAY-17 MAY	3	60	955	4	362
TC 19-78	26 OCT-28 OCT	3	40	995	7	451
TC 20-78	06 NOV-11 NOV	6	80	965	12	1213
TC 21-78	20 NOV-29 NOV	10	95	955	19	1397
	1978 TOTALS	22			42	

JTWC

TABLE 3-7.

FREQUENCY OF NORTH INDIAN OCEAN CYCLONES BY MONTH AND YEAR

YEAR*	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1971	**	**	**	**	**	0	0	0	0	1	1	0	2
1972	0	0	0	1	0	0	0	0	2	0	1	0	4
1973	0	0	0	0	0	0	0	0	0	1	2	1	4
1974	0	0	0	0	0	0	0	0	0	0	1	0	1
1975	1	0	0	0	2	0	0	0	0	1	2	0	6
1976	0	0	0	1	0	1	0	0	1	1	0	1	5
1977	0	0	0	0	1	1	0	0	0	1	2	0	5
1978	0	0	0	0	1	0	0	0	0	1	2	0	4
AVERAGE (1971-78)	0.1	0	0	0.3	0.5	0.3	0	0	0.4	0.8	1.4	0.3	3.9

*1971-1974 REPRESENT BAY OF BENGAL CYCLONES ONLY

**JTWC RESPONSIBILITY FOR BAY OF BENGAL CYCLONES BEGAN ON 4 JUNE 1971

TABLE 3-8.

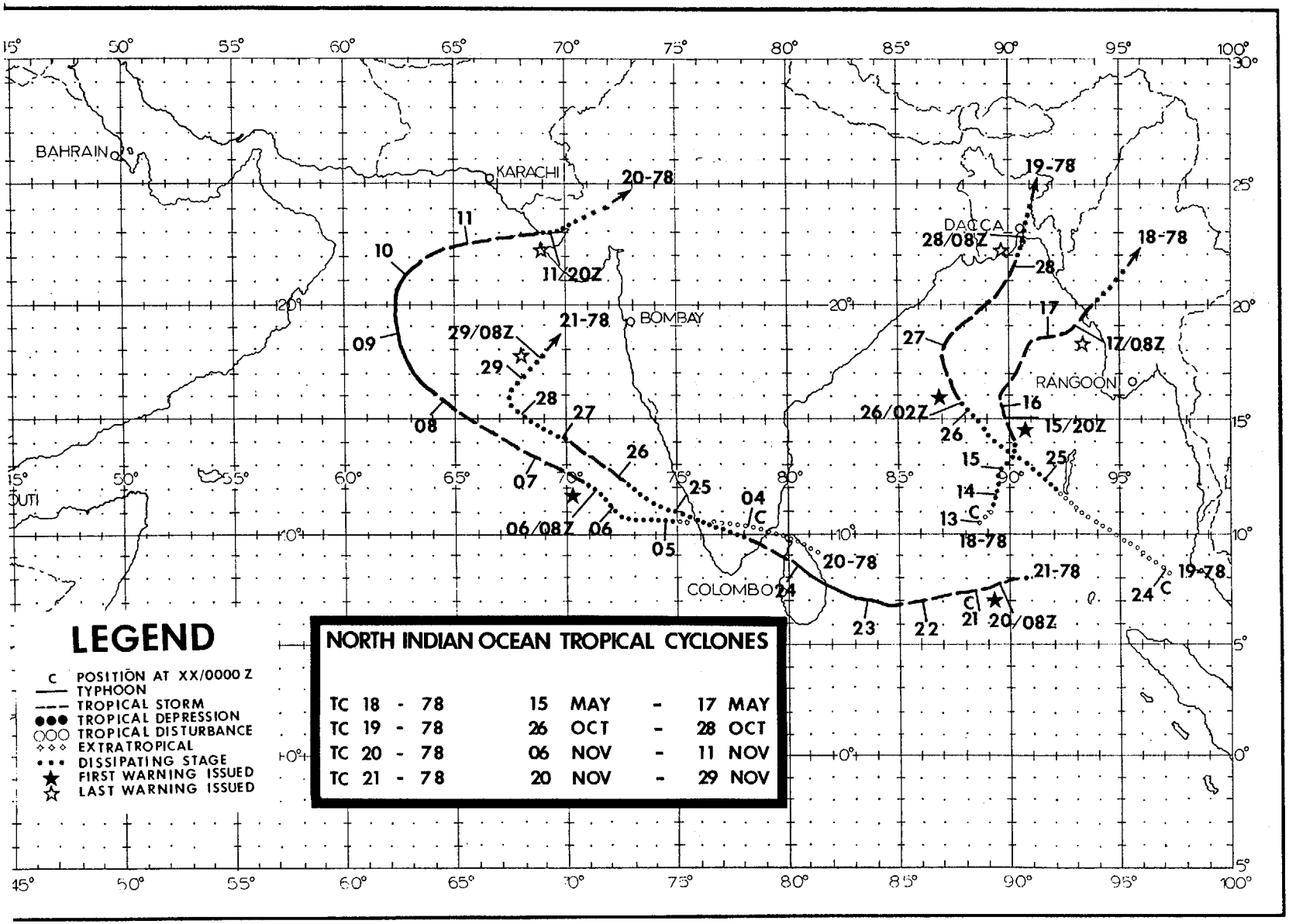
WARNING SUMMARY

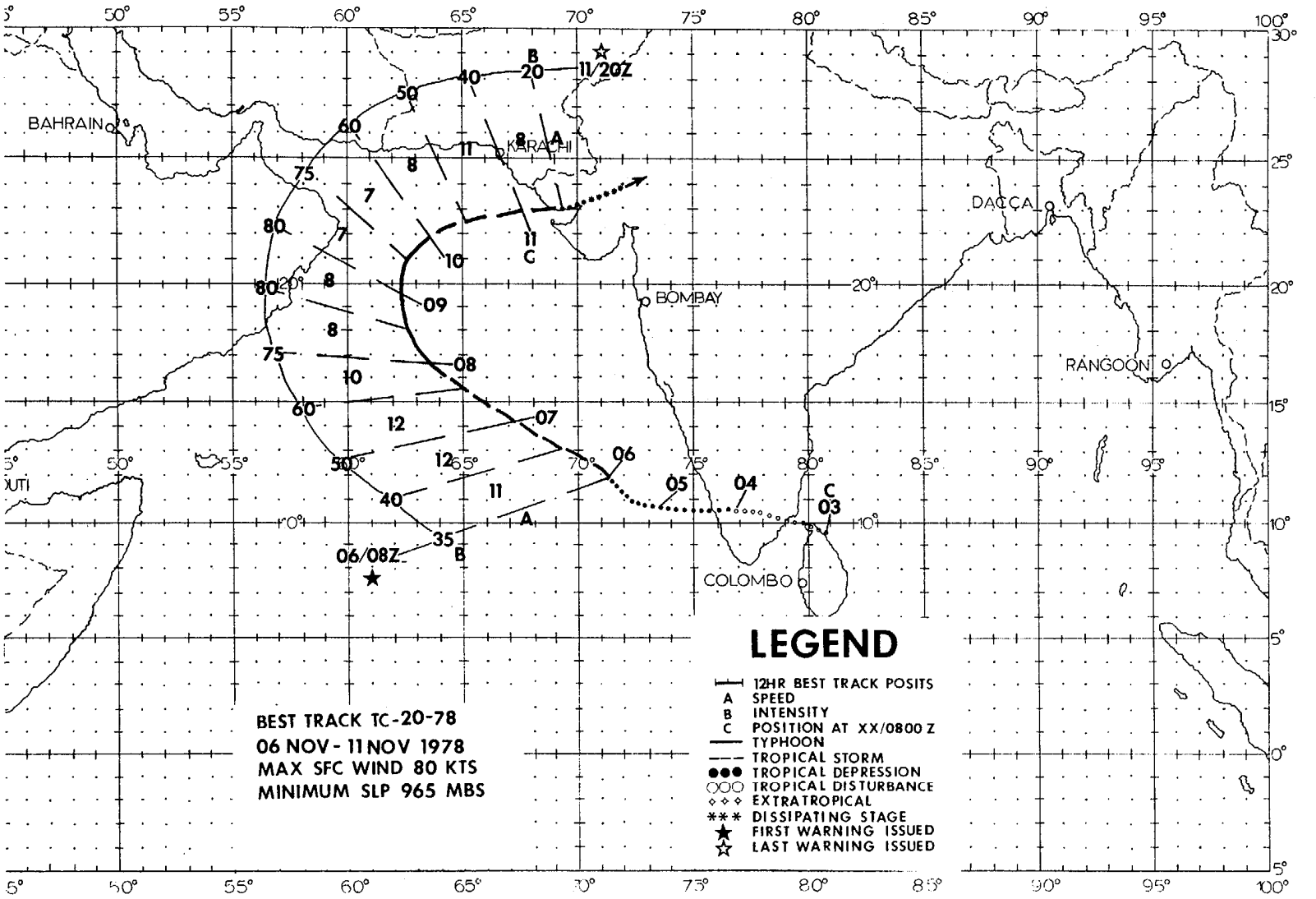
NORTH INDIAN OCEAN

	1978	AVERAGE 1971-1977*
TOTAL NUMBER OF WARNINGS	42	29
NUMBER OF WARNING DAYS	22	17
NUMBER OF WARNING DAYS WITH 2 OR MORE CYCLONES	0	2
NUMBER OF WARNING DAYS WITH 3 OR MORE CYCLONES	0	0
TOTAL TROPICAL CYCLONES	4	4

*From 1971 through 1974, only Bay of Bengal cyclones were considered; the JTWC area of responsibility was extended in 1975 to include Arabian Sea cyclones.

JTWC


BAHRAIN
KARACHI
BOMBAY
DACCA
RANGOON
COLOMBO
DJIBOUTI
20-78
19-78
18-78
21-78
11/20Z
28/08Z
17/08Z
29/08Z
26/02Z
15/20Z
06/08Z
LEGEND
C POSITION AT XX/0000 Z
TYPHOON
TROPICAL STORM
TROPICAL DEPRESSION
TROPICAL DISTURBANCE
EXTRATROPICAL
DISSIPATING STAGE
FIRST WARNING ISSUED
LAST WARNING ISSUED
NORTH INDIAN OCEAN TROPICAL CYCLONES
TC 18 - 78 15 MAY - 17 MAY
TC 19 - 78 26 OCT - 28 OCT
TC 20 - 78 06 NOV - 11 NOV
TC 21 - 78 20 NOV - 29 NOV


BAHRAIN
KARACHI
BOMBAY
DACCA
RANGOON
COLOMBO
11/20Z
06/08Z
BEST TRACK TC-20-78
06 NOV - 11 NOV 1978
MAX SFC WIND 80 KTS
MINIMUM SLP 965 MBS
LEGEND
12HR BEST TRACK POSITS
A SPEED
B INTENSITY
C POSITION AT XX/0800 Z
TYPHOON
TROPICAL STORM
TROPICAL DEPRESSION
TROPICAL DISTURBANCE
EXTRATROPICAL
DISSIPATING STAGE
FIRST WARNING ISSUED
LAST WARNING ISSUED

(NEW 2-76)

A cyclonic wind shift and decreasing surface pressures on Sri Lanka were the first indications of the tropical disturbance which eventually developed into Tropical Cyclone 20-78. Tracking west-northwest along the monsoon trough axis, the disturbance made landfall over the southern tip of India 66 nm (122 km) east of Madura at 1800Z on the 3rd of November 1978. Still in the formative stage, with 20 kt (10 m/sec) intensity, the disturbance tracked westward over southern India during the 3rd and 4th with little intensification. Property damage was limited to, and essentially caused by, flooding on the coastal plains.

After exiting into the Arabian Sea, a westward movement at 07 kt (13 km/hr) and gradual intensification occurred. Satellite data at 050647Z indicated increased organization and feeder band activity had formed south of the center. JTWC thus issued a Tropical Cyclone Formation Alert at 051239Z as the system moved into the Laccadive Islands. During the 5th and 6th, the mid-tropospheric subtropical ridge axis shifted northward from 16N to 20N allowing TC 20-78 to track more north of west from 051400Z through 082000Z.

Increased feeder band activity and good outflow aloft indicated that steady intensification occurred from the 5th through the 8th. Tropical storm intensity was attained by 060800Z with satellite data revealing an eye early on the 7th. As indicated by satellite imagery on the 7th and 8th, upper-level outflow was enhanced by a channel to the strong westerlies existing to the north of the cyclone center. By 080200Z, TC 20-78 had reached typhoon intensity according to the Dvorak visual satellite intensity analysis. Evaluation of the cyclone's position and intensity estimates provided by the USS LaSalle's (AGF-3) TIROS-N APT satellite data proved to be an invaluable addition to the normal DMSP satellite coverage of this area.

By the 9th of November, the mid-level subtropical ridge axis in the Arabian Sea was oriented east-west along 19N. Recurvature around this axis occurred during the 9th concurrent with TC 20-78's maximum intensity of 80 kt (41 m/sec) at 090900Z. TC 20-78 then moved northeastward into an area dominated by strong westerlies aloft. The strong vertical shear that resulted caused the system to weaken to tropical storm intensity by 100800Z (Fig. 3-33). By the 11th, the strong vertical wind shear had reduced the cyclone to a shallow system noted on satellite imagery as spiral bands of low clouds and minimum to no deep convection - "an exposed low level circulation". Continued dissipation caused the satellite fixes to decrease in accuracy and conventional data, being sparse, aided little in pinpointing the center. As a result, the landfall of TC 20-78 on northwest India could only be approximated.

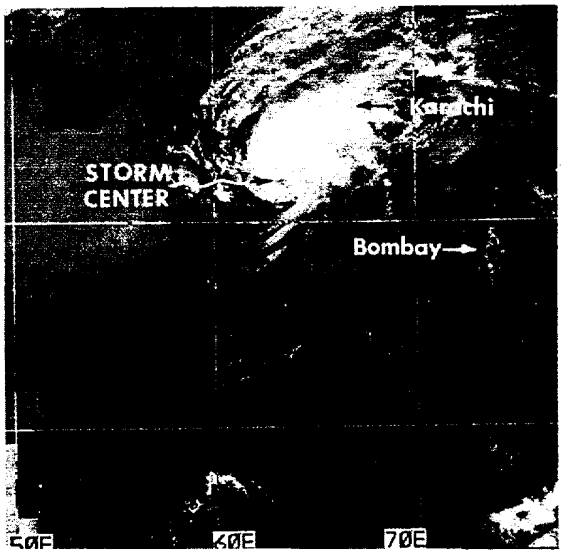
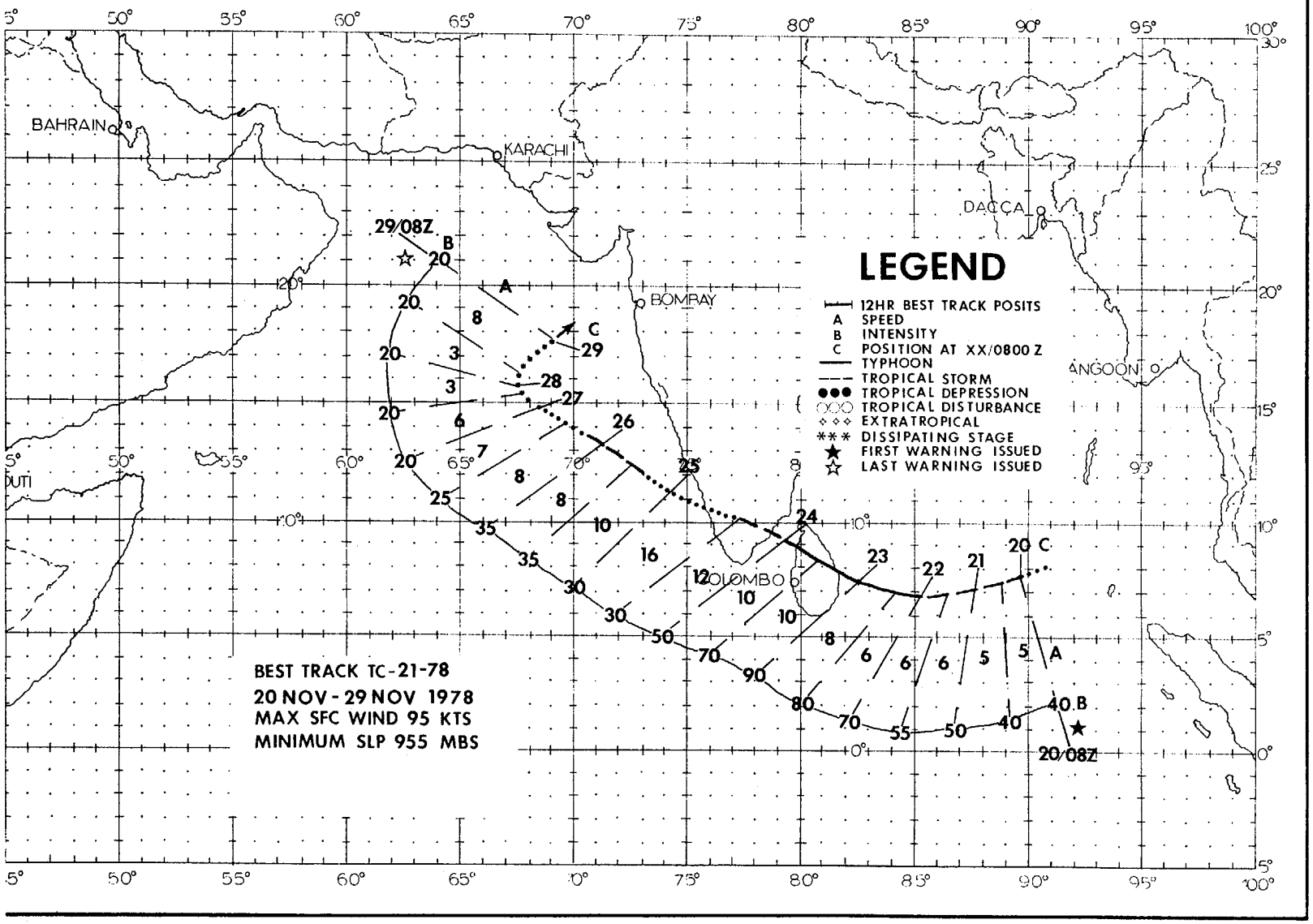


FIGURE 3-33. TC 20-78, 260 nm (482 km) southwest of Karachi on 10 November 1978 at 0659Z. The concentration of convective activity to one side of the cyclone and the cirrus showing unidirectional, upper-air flow are typical of cyclones in strong, vertical shear environments. A cyclonic circulation is becoming evident in the orientation of low clouds over the southern "exposed" portion of the cyclone. (DMSP imagery from AFGWC, Offutt AFB, NE)


BAHRAIN
KARACHI
BOMBAY
DACCA
RANGOON
COLOMBO
DUTI
LEGEND
12HR BEST TRACK POSITS
A SPEED
B INTENSITY
C POSITION AT XX/0800 Z
TYPHOON
TROPICAL STORM
TROPICAL DEPRESSION
TROPICAL DISTURBANCE
EXTRATROPICAL
DISSIPATING STAGE
FIRST WARNING ISSUED
LAST WARNING ISSUED
BEST TRACK TC-21-78
20 NOV - 29 NOV 1978
MAX SFC WIND 95 KTS
MINIMUM SLP 955 MBS
29/08Z
20/08Z

(NEW 2-76)

Tropical Cyclone 21-78, the 4th cyclone of the year in the north Indian Ocean, presented forecast problems for JTWC. More importantly, however, the small country of Sri Lanka suffered one of the worst disasters in its history.

Forecasting problems were related, primarily, to the paucity of data in the Indian Ocean. Reconnaissance aircraft are not routinely tasked on missions in the Bay of Bengal. Radar data is practically unheard of, and conventional data, especially from ships and aircraft transitting the Arabian Sea and Bay of Bengal, are minimal to non-existent. Therefore, almost total reliance on satellite data is the rule. Real-time satellite imagery of this area is not available at JTWC. Data is received at AFGWC, analyzed and reports are sent some three to five hours after data time. Analysis of TIROS-N, APT satellite data from the USS LaSalle was used to supplement fix data.

On the 19th of November, an area of convective activity about 300 nm (556 km) northwest of Sumatra began to show increased organization, and a Tropical Cyclone Formation Alert was issued at 0705Z on the 20th of November. 200542Z satellite data, received from AFGWC just after the formation alert was issued, showed that a 15 nm (28 km) eye had formed and the tropical disturbance was immediately upgraded to Tropical Cyclone 21-78 with maximum winds of 40 kt (21 m/sec). The presence of an eye is often indicative of typhoon intensity; however, because TC 21-78 appeared quite compact and also because satellite intensity analysis techniques are not specifically designed for application to Indian Ocean cyclones, a more conservative 40 kt (21 m/sec) was deemed more representative of the cyclone's true surface intensity.

Even though synoptic data were generally quite sparse, sufficient upper-air reports were available to indicate that a well-defined mid-tropospheric high pressure cell was situated over central India, with strong ridging extending eastward over the Bay of Bengal to Southeast Asia. 500 mb winds over the east Indian coast were from the northeast at 25 to 30 kt (13 to 15 m/sec) at that time. Initial forecasts showed TC 21-78 tracking slightly north of west, then west. It was reasoned that the west-northwest track would be forced more westward as the cyclone came under the influence of mid-level northeasterly steering flow nearer the Indian coast.

The mid-level northeasterlies apparently extended considerably further into the Bay of Bengal than analyzed, because TC 21-78 actually moved west-southwest at 5 to 7 kt (9 to 13 km/hr) for the next 48 hours (Fig. 3-34), continued to intensify slowly and reached typhoon intensity by 220800Z November.

During the subsequent 48-hour period, the high pressure cell over central India migrated eastward into the Bay of Bengal to a position north of the cyclone. Northerly 500 mb winds reported by stations along the

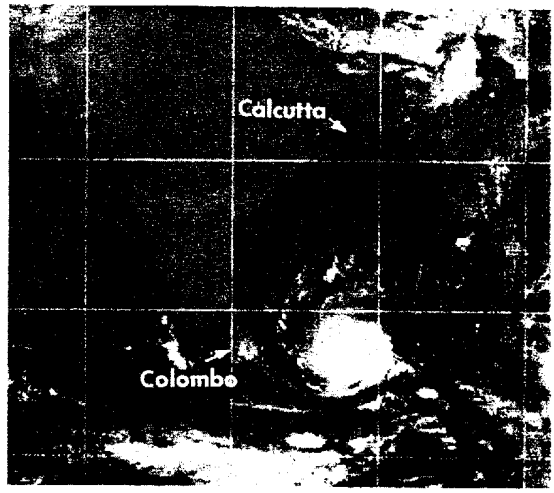


FIGURE 3-34. Infrared image of TC 21-78 at 50 kt (26 m/sec) intensity moving slowly toward Sri-Lanka, 21 November 1978, 0542Z. (DMSP imagery from AFGWC, Offutt AFB, Nebraska as received by FWF Suitland, Maryland)

west coast of India were the first clue that still another high pressure cell had developed over the Arabian Sea. TC 21-78 reached the southernmost point of its track at 220800Z and thereafter began to move to the west-northwest toward a weakness between the Arabian Sea and Bay of Bengal highs.

The system continued to intensify and made landfall on the east coast of Sri Lanka, near Batticaloa, with maximum sustained winds of 95 kt (49 m/sec), at 231400Z. At 231200Z, Batticaloa had reported a surface wind of 85 kt (44 M/sec) from the north. TC 21-78 crossed Sri Lanka in slightly over 12 hours and exited into the Gulf of Mannar (near the city of Mannar) on Sri Lanka's west coast (Fig. 3-35).

With max winds reduced to 45 kt (23 m/sec) due to the terrain effects of Sri Lanka, the cyclone then struck the southern coast of India north of Tuticorin weakening still further to 30 kt (15 m/sec), before it moved into the Arabian Sea north of Cochin.

From 240000Z to 280000Z a basic northwestward track was evident. The key to understanding this movement can be found by examining the 500 mb analyses during that period. The high pressure cell that was over the Arabian Sea moved eastward into central India, then shifted east-southeastward into the Bay of Bengal. 500 mb reports from Sri Lanka and southern India at 251200Z showed 20 to 25 kt (10 to 13 m/sec) winds from the southeast, which supported the cyclone's northwest movement.

TC 21-78 did not reintensify significantly after its passage across Sri Lanka and India. (It was expected to reintensify once it was again over warm water, but reintensification was slight and the system never again developed above tropical storm strength.) By 270600Z the cyclone's upper level center began to shear off from its surface center and satellite data revealed only low-level cloudiness signifying a low-level circulation. Warnings continued on the cyclone until 290800Z because it was felt that regeneration was still possible. By the 29th, satellite data indicated that TC 21-78 had weakened to the point that it was no longer a significant tropical circulation.

TC 21-78 was one of the most destructive storms of the year in either the Indian Ocean or West Pacific. Approximately one thousand people were killed and thousands of acres of crops were destroyed in Sri Lanka by the cyclone's winds, rain, and associated storm surge. In southern India only 10 people were killed; however, eighteen to twenty-five foot waves produced by the storm surge submerged 45 villages. Luckily, because of ample advance warning, the inhabitants were evacuated in time.

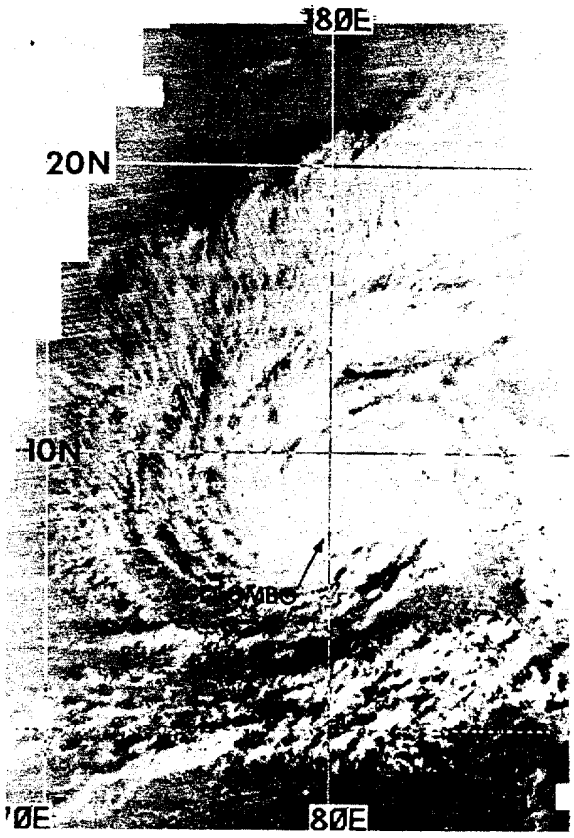


FIGURE 3-35. TC 21-78 located over north-central Sri-Lanka, 24 November 1978, 0118Z. (DMSP imagery from AFGWC, Offutt AFB, Nebraska)

3. CENTRAL NORTH PACIFIC TROPICAL CYCLONES

The Central Pacific Hurricane Center (CPHC) personnel saw 1978 as the most active tropical cyclone year on record for their area of responsibility (north of the equator from 140W to 180). Table 3-9 details the seven tropical cyclones that either formed in the central Pacific area or moved in from the eastern Pacific area. Table 3-10 shows the central Pacific tropical cyclone "season" is well-defined and that 1978 was a record year for the number of tropical storms and hurricanes. This season not only set a record number of occurrences but also produced a cyclone with an exceptional length of travel and persistence of hurricane intensity (Fico), as well as one of the two most intense hurricanes on record in the central Pacific (Susan). Table 3-11 is a warning summary for the central North Pacific.

TABLE 3-9.

CENTRAL NORTH PACIFIC

1978 SIGNIFICANT TROPICAL CYCLONES

CYCLONE	TYPE	NAME	PRD OF WARNING*	CALENDAR DAYS OF WARNING	MAX SFC WIND	MIN OBS SLP	NO. OF WARNINGS TOTAL	NO. OF WARNINGS AS HU
07	HU	FICO	17 JUL - 28 JUL	12	100	955	43	39
10A**	TD	TD 10A	07 AUG - 09 AUG	3	30	-	11	-
12	HU	JOHN	23 AUG - 31 AUG	9	90	965	31	8
13	TS	KRISTY	26 AUG - 28 AUG	3	50	-	11	-
14	TS	LANE	20 AUG - 24 AUG	5	50	-	18	-
15	TS	MIRIAM	28 AUG - 01 SEP	5	55	-	18	-
30**	HU	SUSAN	18 OCT - 24 OCT	7	120	954	24	15
			1978 TOTALS	35***			156	62

* Warning period while in central Pacific area.

** Cyclones that formed in the central Pacific area; all others began in the eastern Pacific area. Tropical Depression 10A was given the "A" suffix to clarify its individuality when Tropical Depression 10 formed in the eastern Pacific area.

*** Overlapping days included once in sum.

TABLE 3-10.

FREQUENCY OF CENTRAL PACIFIC STORMS BY MONTH AND YEAR

(NUMBERS IN PARENTHESES INDICATE STORMS REACHING HURRICANE INTENSITY)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1967	0	0	0	0	0	0	0	0	0	1	0	0	1
1968	0	0	0	0	0	0	0	2	0	0	0	0	2
1969	0	0	0	0	0	0	0	0	0	0	0	0	0
1970	0	0	0	0	0	0	0	1	0	0	0	0	1(1)
1971	0	0	0	0	0	0	1(1)	1	0	0	0	0	2(1)
1972	0	0	0	0	0	0	0	3(1)	1	0	0	0	4(1)
1973	0	0	0	0	0	0	1(1)	0	0	0	0	0	1(1)
1974	0	0	0	0	0	0	0	2(1)	0	0	0	0	2(1)
1975	0	0	0	0	0	0	0	0	0	0	0	0	0
1976	0	0	0	0	0	0	0	0	1(1)	0	0	0	1(1)
1977	0	0	0	0	0	0	0	0	0	0	0	0	0
1978	0	0	0	0	0	0	1(1)	4(1)	0	1(1)	0	0	6(3)
AVERAGE (1967-78)	0	0	0	0	0	0	.3(.3)	1.1(.3)	.2(.1)	.2(.1)	0	0	1.8(.8)

TABLE 3-11.

WARNING SUMMARY

CENTRAL NORTH PACIFIC

	1978	AVERAGE 1971-1977
TOTAL NUMBER OF WARNINGS	156	30
NUMBER OF WARNING DAYS	35	9
NUMBER OF WARNING DAYS WITH 2 OR MORE CYCLONES	8	1
NUMBER OF WARNING DAYS WITH 3 OR MORE CYCLONES	1	0
TROPICAL DEPRESSIONS	1	1
TROPICAL STORMS	3	1
HURRICANES	3	1
TOTAL TROPICAL CYCLONES	7	3

JTWC

Hurricane Fico, 9-28 July, was the longest lived and most intense eastern Pacific cyclone of historical record. Fico reached hurricane strength at 111 degrees west longitude and maintained winds in excess of 65 kt (33 m/sec) for 18 days while traveling 4,200 miles (6758 km) westward to 176W, near Midway Island. Although Fico's maximum intensity of 115 kt (59 m/sec) occurred just prior to entering the central Pacific (140W), Hurricane Susan, in October attained winds of 120 kt (62 m/sec) while 360 miles (579 km) southeast of Hilo, Hawaii, making her the strongest tropical cyclone ever observed near the Hawaiian Islands.

Hurricane John and Tropical Storm Kristy were named at the same time, 0000 GMT, 19 August 1978, while in the eastern Pacific. At this time Tropical Storm Lane was centered further west than the others, thereby explaining why it entered the central Pacific out of alphabetical order.

GOES-3 imagery (Fig. 3-36) depicts three cyclones; John, Kristy, and Miriam. At the time of this satellite photograph, John was at tropical storm intensity and subsequently weakened further and meandered west-southwestward to 170W.

With the demise of Tropical Storm Miriam, the Honolulu staff felt that the central Pacific season was likely over. But on the 18th of October, a suspicious area southeast of Hawaii rapidly developed into a full-fledged tropical storm. This was the capricious Susan, the last storm of the season. Susan attained tropical storm intensity at precisely the same location where the first eastern Pacific storm of the season, to threaten the central Pacific area, Bud, dissipated; near 10N-145W. Continuing to intensify, by the 21st, Susan became one of the two most intense hurricanes on record in the central Pacific. Maximum sustained winds of 120 kt (62 m/sec) equaled those attained by Celeste in August of 1972. Figure 3-37 depicts Susan at 220016Z during peak intensity while a very real threat to the Hawaiian Islands. After reaching a point 220 nm (408 km) southeast of the Big Island, however, Susan turned sharply to the southwest, very rapidly dissipated, and luckily the Hawaiian Islands were once again spared.

An individual summary of Hurricane Fico follows.

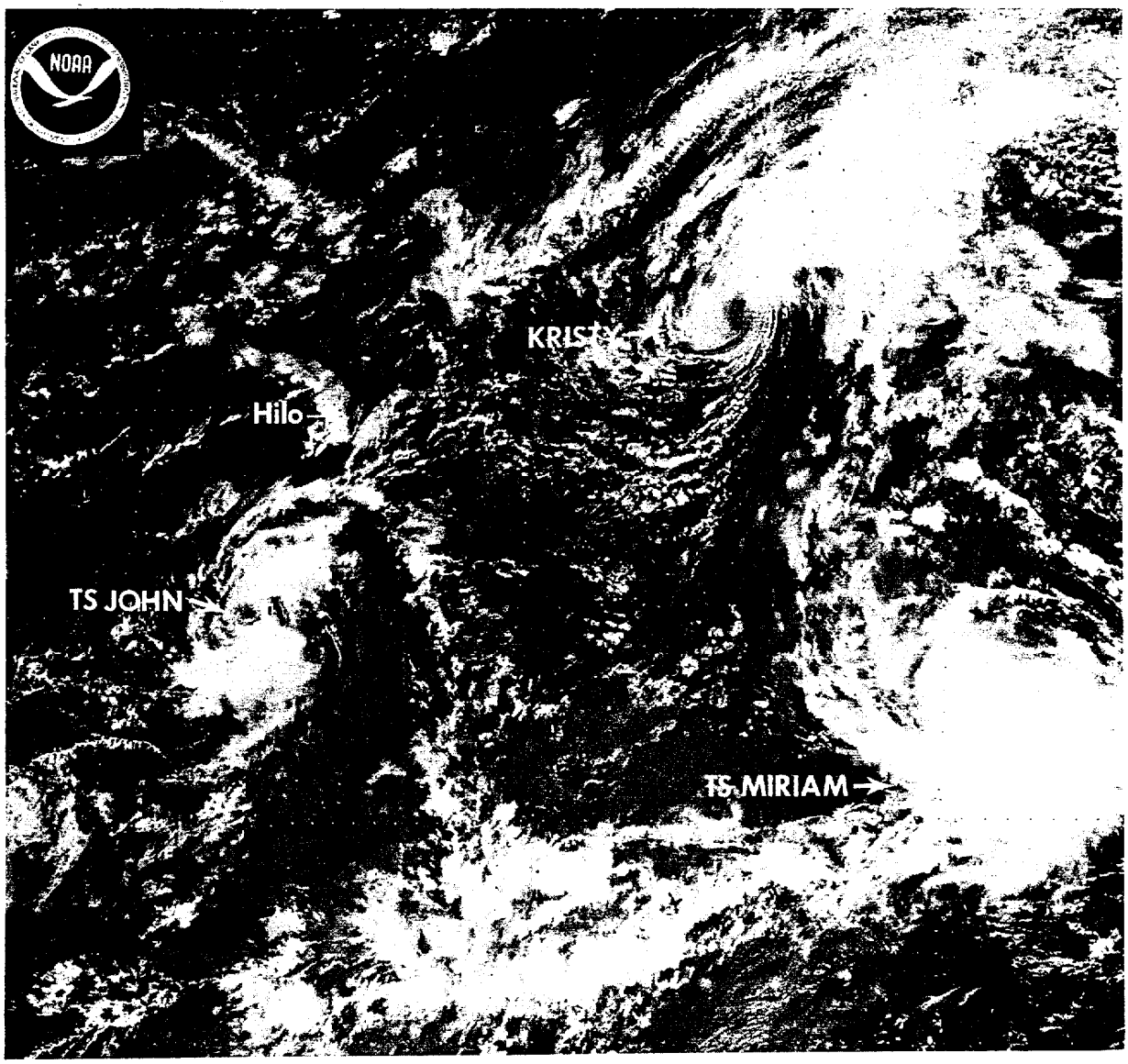


FIGURE 3-36. Tropical Storm John (downgraded from Hurricane John) is centered 240 nm (417 km) south-southwest of South Point, Hawaii. Kristy, downgraded to a tropical disturbance, 600 nm (1120 km) east-northeast of Hilo, Hawaii, and Tropical Storm Miriam 925 nm (1714 km) southeast of Hilo, Hawaii, 27 August 1978, 2315Z. (GOES imagery from SFSS, Honolulu, Hawaii)

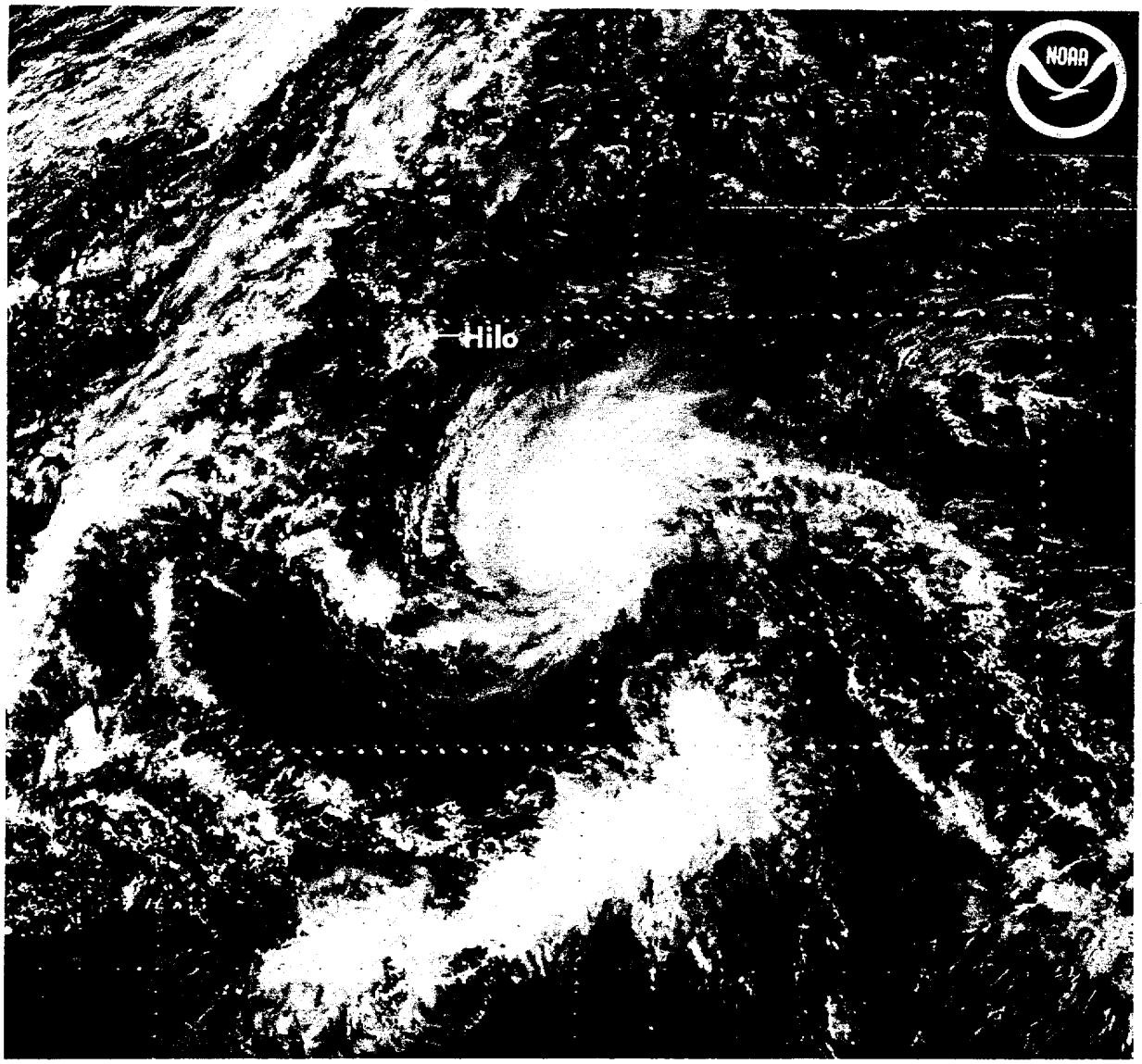
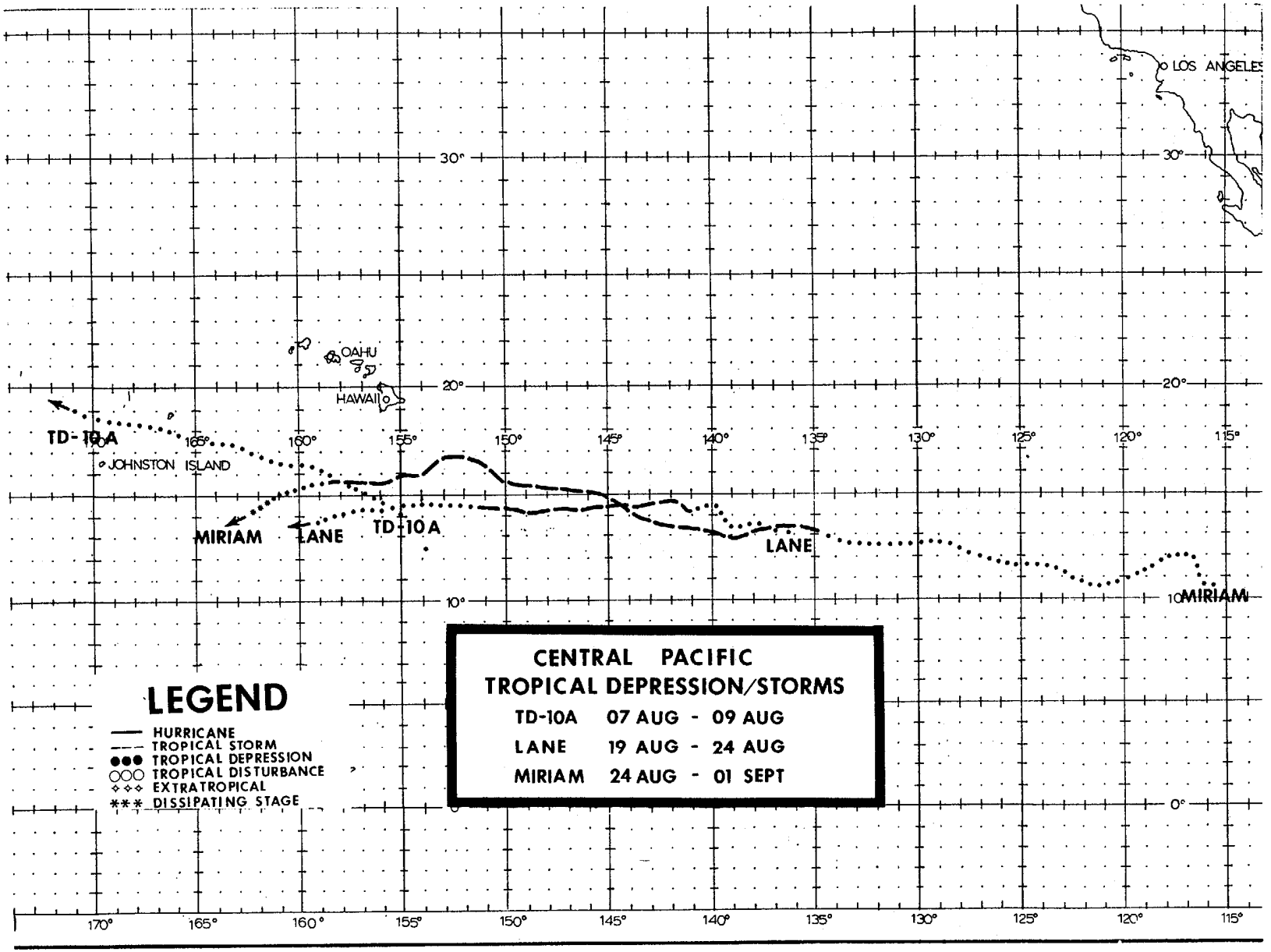
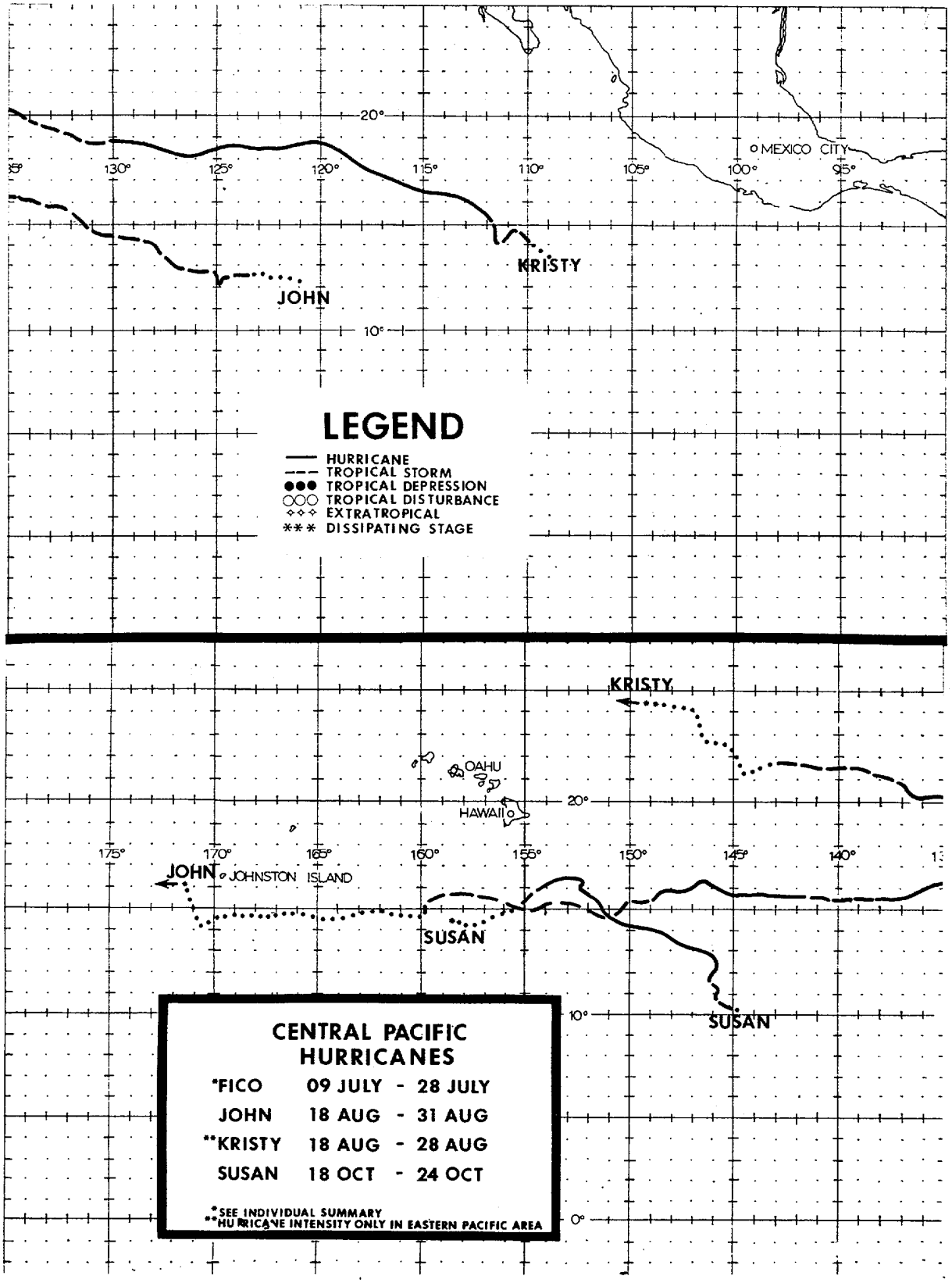
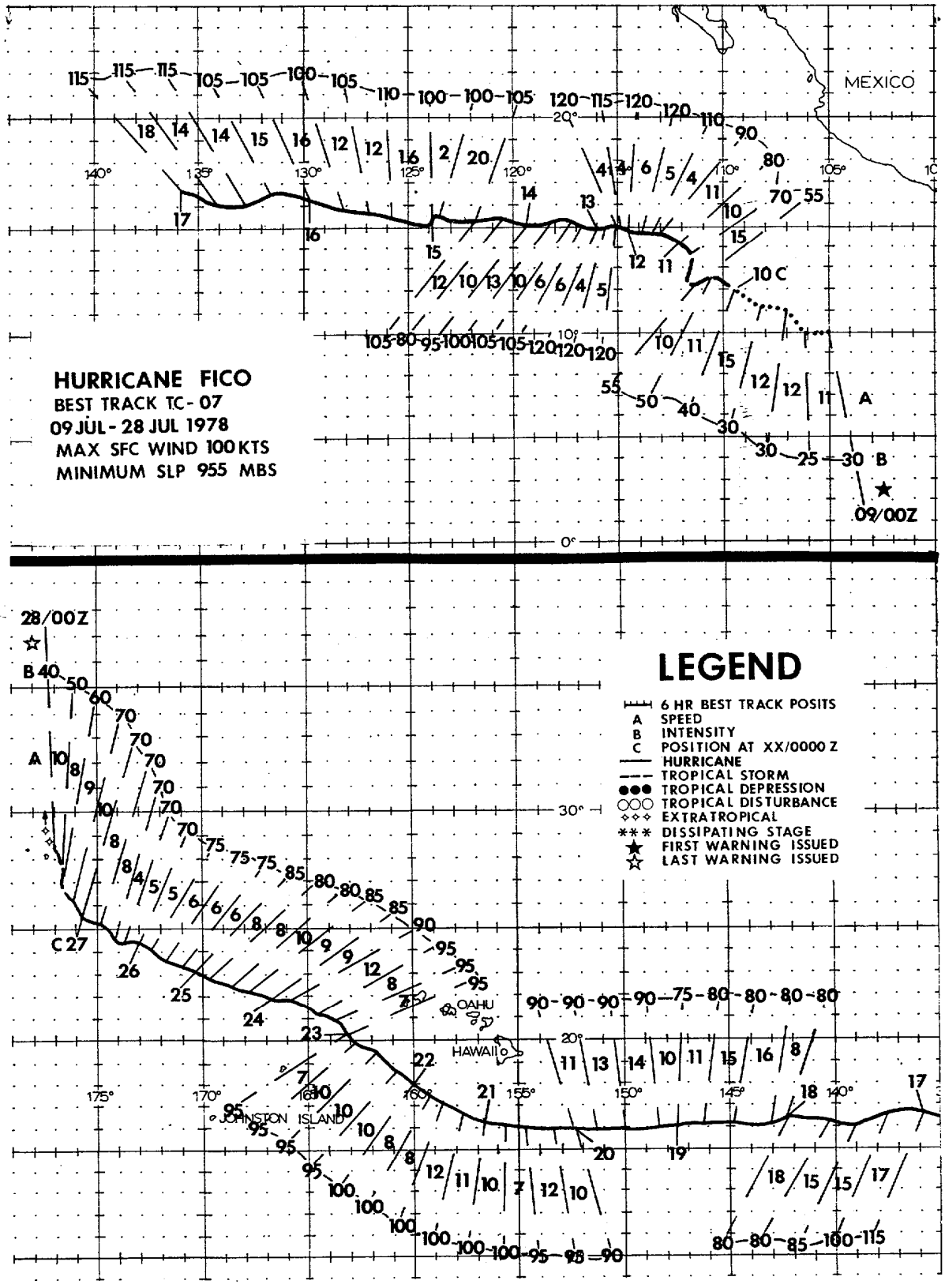


FIGURE 3-37. Hurricane Susan at 120 kt (62 m/sec) maximum intensity, 22 October 1978, 0016Z. (GOES imagery from SFSS, Honolulu, Hawaii)


LOS ANGELES
OAHU
HAWAII
JOHNSTON ISLAND
TD-10A
MIRIAM
LANE
TD-10A
LANE
MIRIAM
30°
20°
10°
0°
170°
165°
160°
155°
150°
145°
140°
135°
130°
125°
120°
115°
LEGEND
HURRICANE
TROPICAL STORM
TROPICAL DEPRESSION
TROPICAL DISTURBANCE
EXTRATROPICAL
DISSIPATING STAGE
CENTRAL PACIFIC
TROPICAL DEPRESSION/STORMS
TD-10A 07 AUG - 09 AUG
LANE 19 AUG - 24 AUG
MIRIAM 24 AUG - 01 SEPT


20°
130°
125°
120°
115°
110°
105°
100°
95°
MEXICO CITY
KRISTY
JOHN
10°
LEGEND
HURRICANE
TROPICAL STORM
TROPICAL DEPRESSION
TROPICAL DISTURBANCE
EXTRATROPICAL
*** DISSIPATING STAGE
KRISTY
OAHU
HAWAII
20°
175°
170°
165°
160°
155°
150°
145°
140°
JOHN
JOHNSTON ISLAND
SUSAN
SUSAN
10°
0°
CENTRAL PACIFIC HURRICANES
*FICO 09 JULY - 28 JULY
JOHN 18 AUG - 31 AUG
**KRISTY 18 AUG - 28 AUG
SUSAN 18 OCT - 24 OCT
*SEE INDIVIDUAL SUMMARY
**HURRICANE INTENSITY ONLY IN EASTERN PACIFIC AREA


HURRICANE FICO
BEST TRACK TC-07
09 JUL - 28 JUL 1978
MAX SFC WIND 100 KTS
MINIMUM SLP 955 MBS
MEXICO
HAWAII
OAHU
JOHNSTON ISLAND
09/00Z
28/00Z
LEGEND
6 HR BEST TRACK POSITS
A SPEED
B INTENSITY
C POSITION AT XX/0000 Z
HURRICANE
TROPICAL STORM
TROPICAL DEPRESSION
TROPICAL DISTURBANCE
EXTRATROPICAL
DISSIPATING STAGE
FIRST WARNING ISSUED
LAST WARNING ISSUED

Hurricane Fico entered the Central Pacific at 16N-140W on 17 July 1978 with maximum sustained winds near 80 kt (41 m/sec). Fico attained a maximum intensity of 115 kt (59 m/sec) while still in the Eastern Pacific east of 140W. Fico proceeded along the 16th parallel to a point due south of South Point, Hawaii. U. S. Air Force aircraft and satellite reconnaissance and NESS satellite imagery showed a steady increase in Fico's intensity during its travel from 140W to its position south of South Point.

Surf due to open ocean swell from Fico began to rise on the 18th, with some beach road flooding along the southeast coast of the Big Island when Fico was 500 nm (927 km) to the southeast. Higher than normal surf at this time was also enhanced by southerly swell from a southern hemisphere storm. By the morning of the 19th, Civil Defense officials reported 30 foot (9.1 m) surf breaking well offshore with smaller 15 to 20 foot (4.6 to 6.1 m) short period surf doing considerable damage to beachfront homes and roads on the Big Island. Eight to 12 foot (2.4 to 3.7 m) surf was observed on Eastern Maui by noon of the 19th, with water over roads but no damage reported. Very short period surf of similar heights reached southern Oahu and southern Kauai on the following day.

On July 20 (Fig. 3-38), the hurricane was 175 nm (324 km) south-southeast of South Point with maximum sustained winds of 100 kt (51 m/sec). Late on the 20th, Fico began moving northwestward and maintained 100 kt (51 m/sec) winds until 190 nm (325 km) due south of Kauai. A strong trade wind gradient, increased by the proximity of Fico, caused strong gusty winds over all the Hawaiian Islands with numerous reports of 50 kt (26 m/sec) or more, accompanied by falling trees and power line outages.

Fico maintained hurricane intensity for 17 days and was tracked by the Honolulu and San Francisco National Weather Service forecast offices (with much support from respective NESS units) for approximately 5000 nm (9266 km). The effects of Fico were felt during and after extratropical transition; remnants of Fico, enmeshed in a strong cold frontal system, inflicted heavy rain and up to 40 kt (21 m/sec) winds on ships southeast of Cold Bay in the Aleutians on July 31.

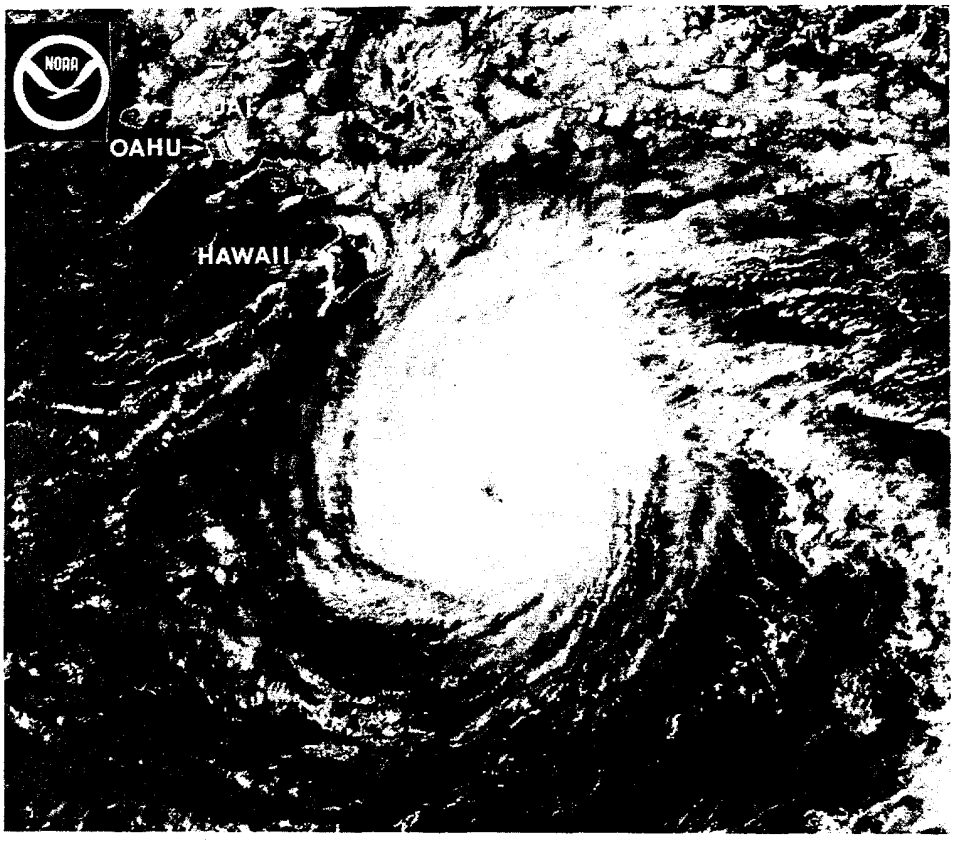


FIGURE 3-38. Hurricane Fico threatening Hawaii, 20 July 1978, 0115Z. (GOES imagery from SFSS, Honolulu, HI)

CHAPTER IV - SUMMARY OF FORECAST VERIFICATION

1. ANNUAL FORECAST VERIFICATION

a. Western North Pacific Area

Forecast positions at warning times and 24-, 48- and 72-hour valid times were verified against corresponding best tracks and vector errors and right angle errors were calculated (Table 4-1). Annual, mean errors are listed in Table 4-2 for comparison. Frequency distributions of the vector errors of the 24-, 48- and 72-hour forecasts on all 1978 cyclones are shown in Figure 4-1 and annual, mean vector errors are graphed in Figure 4-2. Previous reports have shown a graph of the annual, mean vector errors for typhoons when best track intensity at verifying time was 35 kt or greater. This, subset, error graph is shown in Figure 4-3. Mean vector errors shown in Figure 4-3 are lower than those depicted in Figure 4-2; nonetheless, similar trends are evident from year to year.

TABLE 4-1. FORECAST ERROR SUMMARY FOR THE 1978 WESTERN NORTH PACIFIC SIGNIFICANT TROPICAL CYCLONES.

	WARNING			24 HOUR			48 HOUR			72 HOUR		
CYCLONE	POSIT ERROR	RT ANGLE ERROR	# WRNGS	FCST ERROR	RT ANGLE ERROR	# WRNGS	FCST ERROR	RT ANGLE ERROR	# WRNGS	FCST ERROR	RT ANGLE ERROR	# WRNGS
1. TS NADINE	23	15	20	185	109	16	568	381	12	980	708	8
2. TY OLIVE	14	10	36	100	62	32	224	129	28	328	215	20
3. TS POLLY	16	10	16	93	50	12	139	93	8	208	97	?
4. TS ROSE	37	21	7	235	142	3						
5. TS SHIRLEY	24	15	3									
6. TY TRIX	21	17	38	174	122	35	425	298	30	657	531	24
7. TY VIRGINIA	20	12	43	112	63	39	231	127	35	399	283	31
8. TY WENDY	21	12	40	112	75	36	235	188	30	328	188	30
9. TS AGNES	10	7	22	97	59	19	243	191	12	410	309	3
10. TS BONNIE	31	20	8	121	36	4						
11. TY CARMEN	19	10	36	124	56	30	250	129	19	429	266	12
12. TS DELLA	29	20	10	116	73	6	217	131	2			
13. TD-14	25	23	6	169	127	2						
14. TY ELAINE	22	15	20	132	77	16	278	157	12	263	174	8
15. TY FAYE	15	12	44	158	113	40	360	285	36	514	396	29
16. TS GLORIA	21	13	11	138	79	7	496	331	3			
17. TS HESTER	34	17	9	198	28	5	300	52	1			
18. TY IRMA	14	12	15	92	44	12	134	31	8	154	67	4
19. TY JUDY	19	12	18	127	51	14	242	131	10	346	185	6
20. TS KIT	32	16	21	165	84	18	231	134	10	295	210	7
21. TY LOLA	13	9	34	54	40	30	112	79	26	134	88	17
22. TY MAMIE	25	14	18	182	68	14	386	143	10	722	327	6
23. TS NINA	19	16	35	120	94	31	240	212	27	382	340	22
24. TY ORA	19	14	21	124	99	17	314	239	11	460	391	5
25. TD-26	40	10	7	218	22	4						
26. TD-27	38	30	6	175	168	3						
27. TY PHYLLIS	22	13	28	132	86	24	263	198	20	436	377	15
28. ST RITA	15	10	51	107	60	47	214	114	43	301	157	39
29. TS TESS	29	21	20	108	53	16	194	127	12	367	237	8
30. TD-32	50	33	12	133	108	9	401	349	5	973	871	1
31. TY VIOLA	19	10	29	96	51	25	269	172	21	434	338	17
32. TS WINNIE	34	16	12	238	81	8	614	274	4			
ALL FORECASTS	21	13	696	127	75	574	271	179	435	410	297	304

JTWC

TABLE 4-2. ANNUAL MEAN FORECAST ERRORS FOR THE WESTERN NORTH PACIFIC.

	24-HR		48-HR		72-HR	
YEAR	VECTOR	RIGHT ANGLE	VECTOR	RIGHT ANGLE	VECTOR	RIGHT ANGLE
1970	104	-	190	-	279	-
1971	111	64	212	118	317	177
1972	117	72	245	146	381	210
1973	108	74	197	134	253	162
1974	120	78	226	157	348	245
1975	138	84	288	181	450	290
1976	117	71	230	132	338	202
1977	148	83	283	157	407	228
1978	127	75	271	179	410	297

JTWC

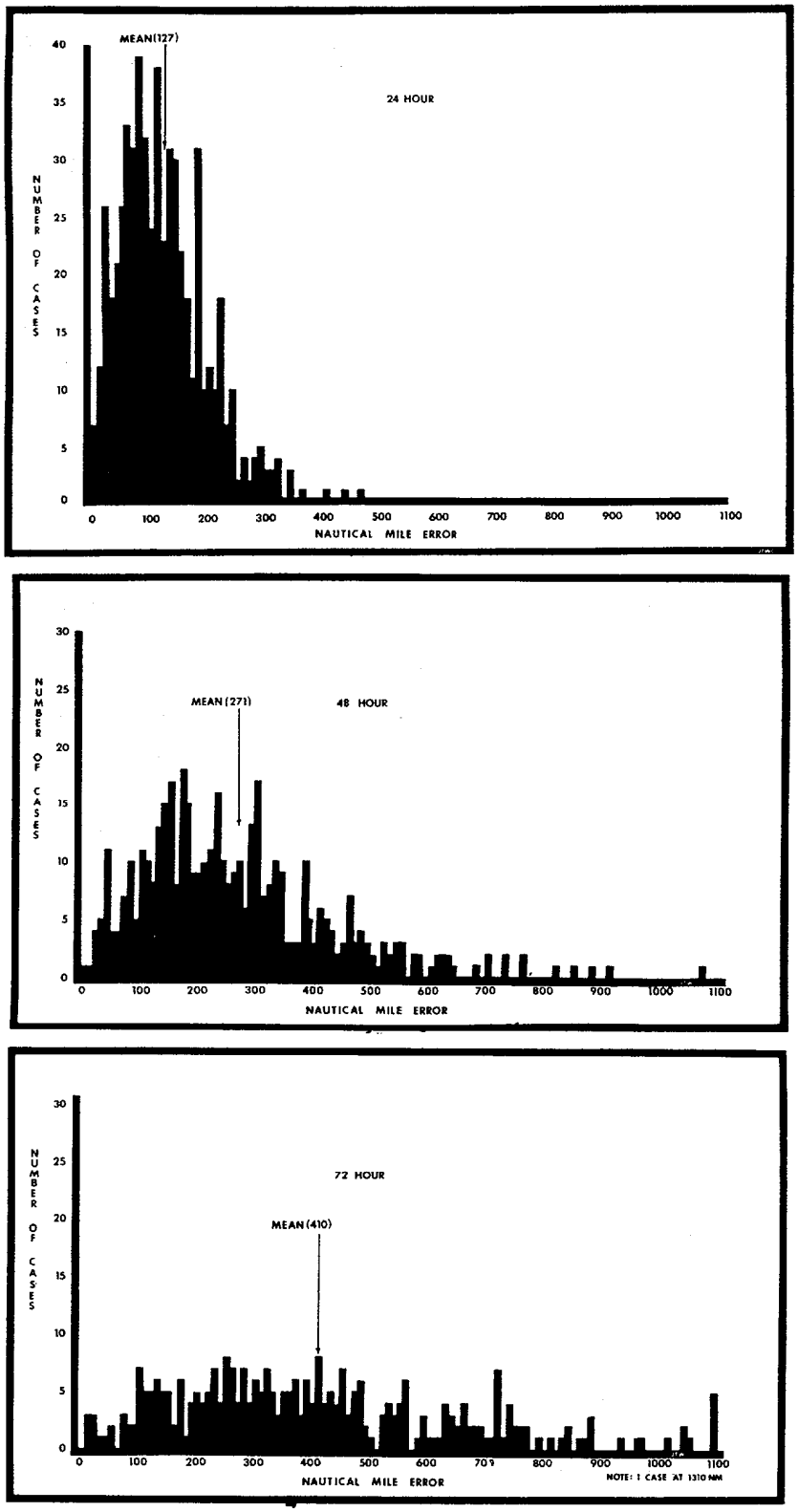


FIGURE 4-1. *Frequency distribution of 1978 24-, 48-, and 72-hour forecast vector errors for all significant tropical cyclones in the western North Pacific.*

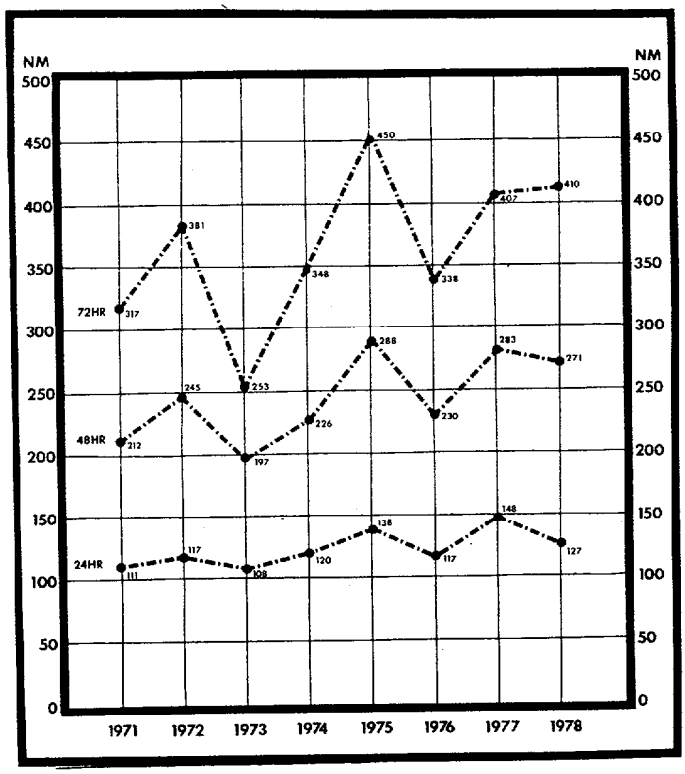


FIGURE 4-2. Annual mean vector errors (nm) for all cyclones in the western North Pacific.

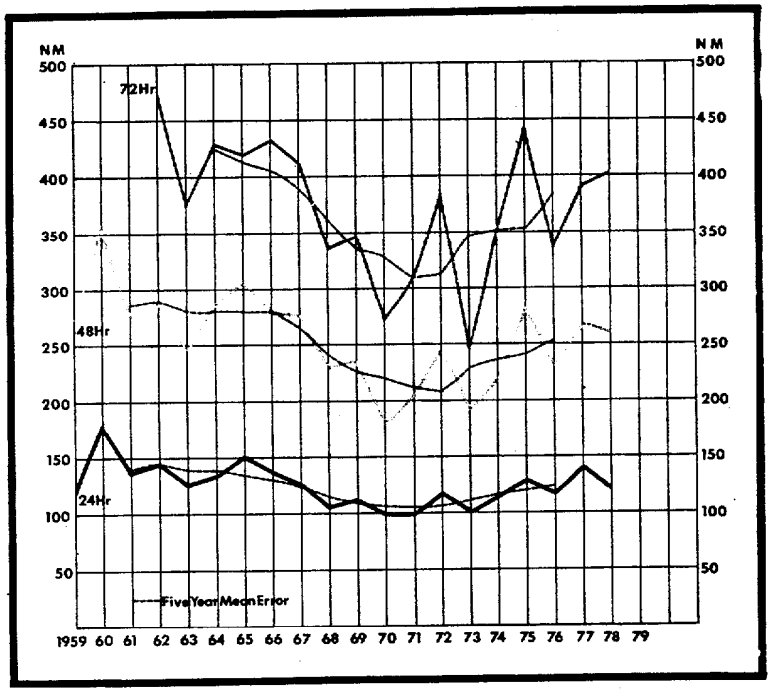


FIGURE 4-3. Annual mean vector errors (nm) for western North Pacific typhoons only when best track intensities were greater than 34 knots at time of verification.

Intensity verification statistics for all significant, tropical cyclones in the western North Pacific area are depicted in Figures 4-4 and 4-5. The average absolute magnitude of the intensity error as well as the intensity bias (algebraic average) are graphically depicted. An analysis of the errors indicates that JTWC intensity forecasts often lag the true intensity; in an intensifying situation, JTWC underforecasts, and in a weakening situation, JTWC overforecasts thereby causing large average magnitude error but small average bias. Objective intensity forecasting aids verification is also depicted in Figures 4-4 and 4-5. (An explanation of the objective forecasting aids can be found in this chapter, Section 2 - Comparison Of Objective Techniques.) It is interesting to note that the objective intensity forecasting aids consistently overforecast by approximately 10 knots.

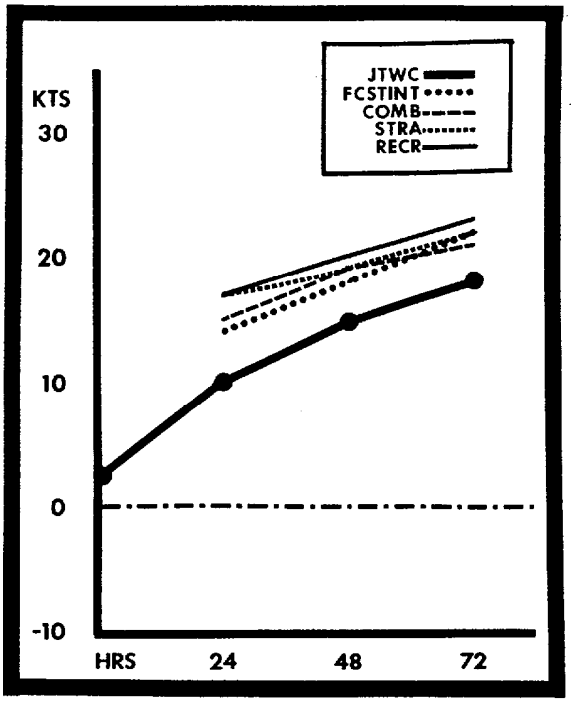


FIGURE 4-4. Comparison of average intensity errors (magnitude) for all cyclones in the western North Pacific.

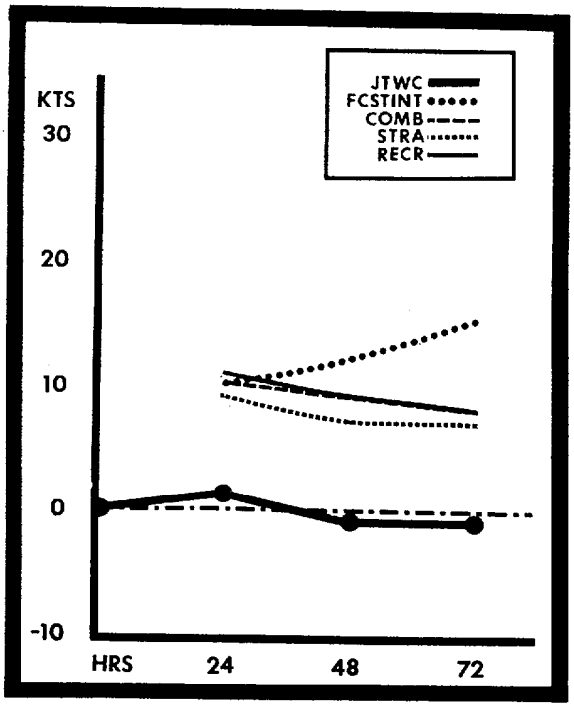


FIGURE 4-5. Comparison of average intensity errors (biases) for all cyclones in the western North Pacific.

b. North Indian Ocean Area

Forecast postions at warning times and 24- and 48-hour valid times were verified by the same methods used for the western North Pacific area verification. Table 4-3 is the forecast error summary for the four significant tropical cyclones in the North Indian Ocean area. Table 4-4 contains the annual average of forecast errors back through 1971. Vector errors are plotted in Figure 4-6.

Forecast intensities were not verified.

TABLE 4-3. FORECAST ERROR SUMMARY FOR THE 1978 NORTH INDIAN OCEAN SIGNIFICANT TROPICAL CYCLONES.

	WARNING			24 HOUR			48 HOUR		
CYCLONE	POSIT ERROR	RT ANGLE ERROR	# WRNGS	FCST ERROR	RT ANGLE ERROR	# WRNGS	FCST ERROR	RT ANGLE ERROR	# WRNGS
18-78	55	51	4	88	41	3	78	45	1
19-78	35	25	7	203	183	3			
20-78	54	25	12	165	101	9	205	102	5
21-78	31	18	16	104	62	13	213	147	11
ALL FORECASTS	41	25	39	133	86	28	202	128	17

JTWC

TABLE 4-4. ANNUAL MEAN FORECAST ERRORS FOR THE NORTH INDIAN OCEAN (THE ARABIAN SEA WAS NOT INCLUDED PRIOR TO 1975).

	24-HR		48-HR	
YEAR	VECTOR	RIGHT ANGLE	VECTOR	RIGHT ANGLE
1971	232	-	410	-
1972	224	101	292	112
1973	182	99	299	160
1974	137	81	238	146
1975	145	99	228	144
1976	138	108	204	159
1977	122	94	292	214
1978	133	86	202	128

JTWC

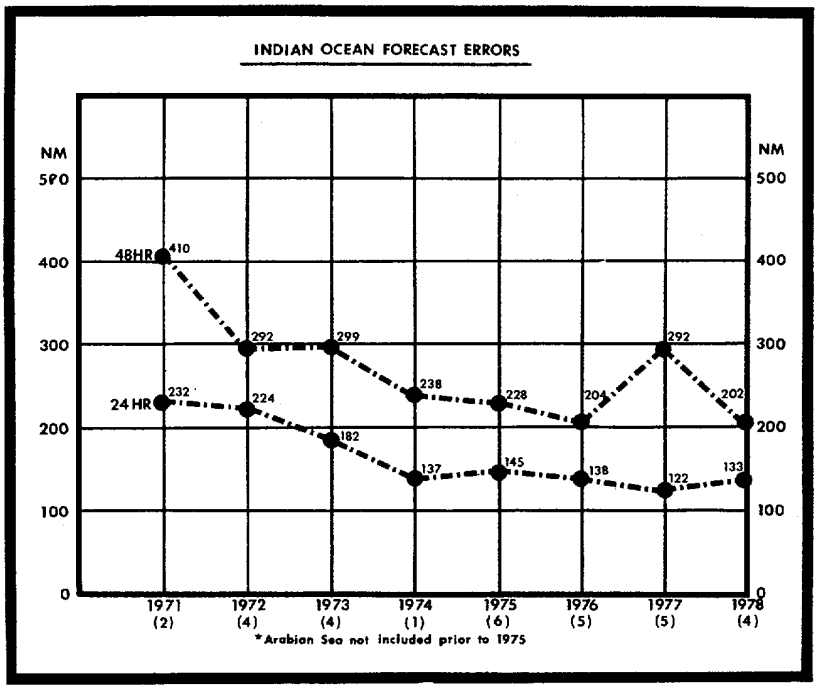


FIGURE 4-6. Annual mean vector errors (nm) for all cyclones in the North Indian Ocean.

2. COMPARISON OF OBJECTIVE TECHNIQUES

a. General

Objective techniques employed by JTWC are divided into four main categories: (1) climatological and analog techniques; (2) extrapolation; (3) steering techniques; and, (4) a dynamical model. The analog technique provides three movement forecasts, one for straight moving cyclones, one for recurving cyclones and one combining the tracks of straight, recurving and cyclones that do not meet the criteria of straight or recurving analogs. All techniques were executed using the operational data available at the warning time.

b. Description of Objective Techniques

(1) TYFN75 - Analog program which scans history tapes for cyclones similar (within a specified acceptance envelope) to the current cyclone. Three 24-, 48-, and 72-hour position and intensity forecasts are provided.

(2) MOHATT 700/500 - Steering program which advects a point vortex on a preselected analysis and smoothed prognostic fields at designated levels in 6-hour time steps through 72 hours. Utilizing the previous 12-hour history position, MOHATT computes the 12-hour forecast error and applies a bias correction to the forecast position.

(3) TCM - Tropical Cyclone Forecast Model is a coarse mesh (220 km) PE Model, with the digitized storm warning position bogused at the 850 mb level of the FNWC Global Band Analysis utilizing wind and temperature fields. Boundary conditions permit no mass transfer across north or south walls, and east/west boundaries are cyclical.

(4) FCSTINT - Intensity forecast program which utilizes statistical regression equations to provide 24-, 48-, and 72-hour forecast intensities.

(5) 12-HR EXTRAPOLATION - A track through current warning position and 12-hour old preliminary best track position is linearly extrapolated to 24 and 48 hours.

(6) HPAC - Mean 24 and 48 hour forecast positions are derived by averaging the 24 and 48 hour positions from the 12-HR EXTRAPOLATION track and a track based on climatology.

(7) INJAH74 - Analog program for North Indian Ocean. Similar to TYFN75, except tracks are not segregated.

(8) TYAN - An updated analog program which combines TYFN75, INJAH74, and other analog programs for the remaining northern/southern Pacific Ocean areas and the South Indian Ocean.

(9) CYCLOPS - An updated version of MOHATT program which has the capability to select steering forecasts at the 1000, 850, 700, 500, 400, 300 and 200 mb levels.

c. Testing and Results

A comparison of selected techniques is included in Table 4-5 for all western Pacific cyclones and Table 4-6 for Indian Ocean cyclones. In Tables 4-5 and 4-6 "X-AXIS" refers to techniques listed horizontally across the top, while "Y-AXIS" refers to techniques listed vertically. The example in Table 4-5 compares COMB to MH70. In the 407 cases available for comparison the average 24-hour vector error for COMB was 139 nm, while that for MH70 was 140 nm. The difference of 1 nm is shown in the lower right. (Differences are not always exact due to computational round off.)

TABLE 4-5.

24-HOUR

	JTWC	STRA	RECR	COMB	MH70	MH50	TCMW	TCMD	XTRP	HPAC
JTWC	574 127 127 0									
STRA	462 120 147 27	465 147 147 0								
RECR	509 126 140 14	442 148 138 -10	511 141 141 0							
COMB	516 125 136 11	445 147 134 -12	496 140 137 -2	519 137 137 0						
MH70	440 126 140 14	373 150 134 -15	402 143 141 -1	407 139 140 1	442 140 140 0					
MH50	374 125 145 20	318 148 140 -7	341 143 147 3	347 139 145 7	375 135 145 10	375 145 145 0				
TCMW	128 122 175 53	111 150 156 6	120 135 172 37	116 137 175 38	99 138 180 42	97 147 182 35	128 175 175 0			
TCMD	117 121 237 116	102 149 213 64	110 135 235 100	111 141 236 96	92 136 251 115	89 142 253 111	82 172 251 79	117 237 237 0		
XTRP	564 127 137 11	458 147 128 -17	506 140 137 -2	513 137 137 0	435 140 137 -2	371 146 134 -11	126 173 129 -43	117 237 130 -106	567 137 137 0	
HPAC	538 127 137 9	444 147 128 -18	486 141 136 -4	492 137 136 -1	423 139 135 -3	360 143 133 -9	123 170 127 -42	115 231 129 -100	541 138 137 0	541 137 137 0

NUMBER OF CASES | X-AXIS TECHNIQUE ERROR | Y-AXIS TECHNIQUE ERROR | ERROR DIFFERENCE Y-X

48-HOUR

	JTWC	STRA	RECR	COMB	MH70	MH50	TCMW	TCMD	XTRP	HPAC
JTWC	435 271 271 0									
STRA	368 262 301 39	388 304 304 0								
RECR	389 264 262 -1	368 310 267 -42	405 268 268 0							
COMB	390 263 251 -11	369 303 252 -50	394 265 256 -8	410 254 254 0						
MH70	325 270 289 18	307 316 284 -31	314 281 293 12	316 264 291 27	343 293 293 0					
MH50	278 269 288 19	264 313 290 -23	267 283 293 10	271 265 289 24	294 290 288 -1	294 288 288 0				
TCMW	89 262 284 22	85 295 275 -19	86 256 287 31	81 243 284 41	71 269 302 32	69 270 304 35	92 284 284 0			
TCMD	84 266 362 96	80 308 354 47	83 260 364 104	82 251 362 111	69 260 385 125	67 263 385 122	56 298 370 72	87 363 363 0		
XTRP	425 270 291 21	374 302 289 -12	393 264 293 29	397 253 291 39	329 291 301 10	285 288 297 8	88 281 286 5	85 362 303 -59	438 294 294 0	
HPAC	394 276 262 -13	354 305 247 -57	367 266 258 -6	368 257 256 0	314 290 260 -29	271 287 257 -29	86 283 245 -37	82 364 257 -106	406 298 263 -34	407 263 263 0

JTWC - OFFICIAL JTWC FORECAST
STRA - STRAIGHT (TYFN 75)
RECR - RECURVE (TYFN 75)
COMB - COMBINED (TYFN 75)
MH70 - MOHATT 700-MB PROG
MH50 - MOHATT 500-MN PROG
TCMW - TROPICAL CYCLONE MODEL (SAME WARNING)
TCMD - TROPICAL CYCLONE MODEL (SAME DATA)
XTRP - 12-HOUR EXTRAPOLATION
HPAC - MEAN OF XTRP AND CLIMATOLOGY

72-HOUR

	JTWC	STRA	RECR	COMB	MH70	MH50	TCMW	TCMD
JTWC	304 410 410 0							
STRA	258 391 412 21	306 422 422 0						
RECR	275 403 341 -61	288 429 350 -79	320 359 359 0					
COMB	276 400 325 -74	292 421 325 -95	313 358 336 -21	324 334 334 0				
MH70	211 412 446 34	229 431 442 11	458 373 233 85	235 342 454 112	255 449 449 0			
MH50	183 407 438 32	200 433 430 -1	203 378 433 55	204 341 427 86	220 434 429 -4	221 430 430 0		
TCMW	60 414 452 38	62 402 447 45	63 356 466 110	60 339 452 113	51 414 495 81	49 430 490 59	68 458 458 0	
TCMD	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0

24-HOUR

	JTWC	INJA	MH7Ø	MH5Ø	XTRP	HPAC
JTWC	28 133 133 0					
INJA	20 136 117 -18	23 132 132 0				
MH7Ø	9 128 222 95	8 122 245 123	10 219 219 0			
MH5Ø	7 131 251 120	6 117 282 165	7 236 251 15	7 251 251 0		
XTRP	25 119 137 18	22 128 159 31	9 203 133 -69	6 231 109 -123	28 151 151 0	
HPAC	22 117 114 -1	18 119 124 5	6 246 134 -111	3 331 105 -225	24 144 123 -20	24 123 123 0

NUMBER OF CASES	X-AXIS TECHNIQUE ERROR
Y-AXIS TECHNIQUE ERROR	ERROR DIFFERENCE Y-X

48-HOUR

	JTWC	INJA	MH7Ø	MH5Ø	XTRP	HPAC
JTWC	17 202 202 0					
INJA	11 194 202 8	14 231 231 0				
MH7Ø	3 99 149 49	3 270 263 -6	4 224 224 0			
MH5Ø	3 168 246 78	3 310 270 -39	3 279 186 -93	4 243 243 0		
XTRP	16 200 244 44	13 214 298 85	3 149 304 155	3 246 330 84	19 286 286 0	
HPAC	15 205 191 -13	12 211 225 13	2 82 88 6	2 287 201 -85	18 276 221 -54	18 221 221 0

JTWC - OFFICIAL JTWC FORECAST
INJA - ANALOG
MH7Ø - MOHATT 700-MB PROG
MH5Ø - MOHATT 500-MB PROG
XTRP - 12-HOUR EXTRAPOLATION
HPAC - MEAN OF XTRP AND CLIMATOLOGY

TABLE 4-6.

CHAPTER V – RESEARCH & DEVELOPMENT SUMMARY

1. GENERAL

Part of the mission of the Joint Typhoon Warning Center is to conduct applied tropical cyclone research as time and resources permit; the objective of this research being the improvement of operational forecasts. This year, due to the installation of the Naval Environmental Display Station (NEDS), the JTWC staff devoted considerable time and effort in converting and updating operational programs and streamlining operational procedures for compatibility with the NEDS. The following abstracts summarize the year's research and development projects completed or still in progress.

2. TROPICAL CYCLONE MINIMUM SEA LEVEL PRESSURE - MAXIMUM SUSTAINED WIND RELATIONSHIP

(Shewchuk, J. D and Lubeck, O. M., FLEWEACEN/JTWC)

The pressure-wind relationship developed by Atkinson and Holliday, Tropical Cyclone Minimum Sea Level Pressure - Maximum Sustained Wind Relationship for Western North Pacific (FLEWEACEN TECH NOTE: JTWC 75-1), is a primary tropical cyclone intensity determination tool used for JTWC operations. The current research is an attempt to update and refine the Atkinson and Holliday study using the original data plus new data from 1975 to present. The current regression equation will be re-evaluated using new cases as an independent data set.

3. EQUIVALENT POTENTIAL TEMPERATURE/MINIMUM SEA LEVEL PRESSURE RELATIONSHIPS TO FORECASTING TROPICAL CYCLONE INTENSIFICATION

(Hassebrock, A. W. and Dunnavan, G., FLEWEACEN/JTWC)

The relationship between equivalent potential temperature at 700 mb in the center of developing tropical cyclones and associated intensity changes was first explored by Sikora (ATR 1975) with a follow-on study by Milwer (ATR 1976). These two studies produced conflicting results, but a subsequent study by Hassebrock (ATR 1977) showed that there was a relationship between changes in equivalent potential temperature and subsequent changes in tropical cyclone intensity. The tropical cyclones of 1976-78 have been used to evaluate the relationship and there is evidence that the techniques developed by Hassebrock have some merit. In order to widen the data base, the techniques will be evaluated for the 1979 tropical cyclone season, and also for tropical cyclones occurring prior to 1976.

4. OBJECTIVE TROPICAL CYCLONE INITIAL POSITIONING WITH A WEIGHTED LEAST SQUARES ALGORITHM

(Lubeck, O. M. and Shewchuk, J. D., FLEWEACEN/JTWC)

Recent studies indicate tropical cyclone forecast errors through 72 hours can be reduced by more accurate initial warning position estimates. This study is an attempt to develop an objective and standardized method of determining initial position based on all available fix information and their respective accuracies. The method employed is a least squares fit to the available fix data with a weighting scheme which is inversely proportional to the stated fix accuracies. This method can also be extended to objectively determine tropical cyclone best tracks.

5. ESTABLISHMENT OF THE JTWC TROPICAL CYCLONE DATA BASE

(Curry, W. T., FLEWEACEN/JTWC)

A data base of climatological data related to each tropical cyclone in the western North Pacific, Arabian Sea and Bay of Bengal from 1966 through 1978 is being established on FNWC computer mass storage systems. Included are 6-hour best track positions (intensities, direction and speed of movement); 24-, 48-, 72-hour objective technique forecasts and official forecasts of JTWC; and tropical cyclone fix data (position, intensities, platform, etc.). This data will be maintained on disk and tape files at FNWC Monterey, California and updated annually.

6. NEDS/COMPUTER APPLICATIONS

(Staff, FLEWEACEN/JTWC)

The advent of the Naval Environmental Display Station (NEDS) at FLEWEACEN Guam has provided the JTWC access to the large general purpose computer system at FNWC. Impact of the NEDS on operations at the JTWC has been studied and a NEDS implementation plan has been drawn up which includes existing operational requirements as well as future capabilities allowed by the NEDS.

Considerable automation of time consuming computational tasks has been accomplished with computer programs written to execute at FNWC. Existing post-analysis programs originally coded to execute on FWC Guam's CDC 3100 computer have been converted to execute at FNWC. In addition, numerous new features have been added to the programs.

NEDS graphics capability is being developed to depict forecast tracks from objective techniques. Establishment of a tropical cyclone data base on FNWC mass storage devices has been initiated and contract work has resulted in conversion of JTWC's objective techniques to execute on FNWC computers. Considerable effort has been expended to evaluate and monitor the program conversions.

7. BASIC STREAMLINE ANALYSIS AND TROPICAL CYCLONE FORECASTING TECHNIQUES GUIDE

(Guay, G., FLEWEACEN/JTWC)

A case study taken from an active tropical cyclone period has been initiated. The study will be worked into a guide to train new assignees in streamline analysis and the use of all available tropical cyclone forecasting techniques. The guide will also be used in STORMEX training (training scenarios for Det 4 HQAWS, 54 WRS, JTWC and AJTWC personnel).

8. STATISTICAL EVALUATION OF JTWC OBJECTIVE TECHNIQUES

(Lubeck, O. M., FLEWEACEN/JTWC)

Present forecast aids used by the typhoon duty officer include many objective techniques. Little information beyond annual average errors, however, is known about the techniques. A statistical evaluation is being accomplished in hopes of finding systematic biases and confirming/denying previous subjective determinations.

9. JTWC FORECAST CONFIDENCE STATEMENTS

(Hassebrock, A. W., Ihli, C. B., Jr. and Lubeck, O. M., FLEWEACEN/JTWC)

JTWC developed and implemented procedures for computing objective, probability confidence statements as a result of requirements stated at the 1978 Tropical Cyclone Conference. Forecast error probabilities were appended to Prognostic Reasoning Messages during the 1978 season. An evaluation of these confidence statements and Strike Probability Program (STRIKP) information (provided by NEPRF and FNWC Monterey) was performed and published in the 1979 Pacific Command Tropical Cyclone Conference Proceedings Report.

10. THE TRANSITIONING OF TROPICAL CYCLONES TO EXTRATROPICAL CYCLONES

(Guard, C. P., FLEWEACEN/JTWC and Brand, Samson, NEPRF)

Results of the examination of the post-recurvature transition of tropical cyclones to extratropical cyclones were published as NAVENVPREDRSCHFAC Technical Report TR 78-02, Extratropical Storm Evolution from Tropical Cyclones in the Western North Pacific Ocean in July 1978. Capt. Guard, now of AFGWC, Offutt AFB, NE, presented further results at the 12th Technical Conference on Hurricanes and Tropical Meteorology in April 1979 at New Orleans, LA. His report was entitled The Intensity of Recurving Western North Pacific Tropical Cyclones: A New Look. During 1979, the JTWC staff will be evaluating the rules-of-thumb generated from the research results.

ANNEX A – TROPICAL CYCLONE TRACK DATA

1. WESTERN NORTH PACIFIC CYCLONE TRACK DATA

TROPICAL STORM NADINE

(January)

	BEST TRACK			WARNING		ERRORS			24 HOUR FORECAST			ERRORS			48 HOUR FORECAST			ERRORS			72 HOUR FORECAST			ERRORS		
	POSIT		WIND	POSIT		WIND	DST	WIND	POSIT		WIND	DST	WIND		POSIT		WIND	DST	WIND		POSIT		WIND	DST	WIND	
106182	7.5	164.6	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.		0.0	0.0	0.	-0.	0.		0.0	0.0	0.	-0.	0.	
107002	7.6	164.0	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.		0.0	0.0	0.	-0.	0.		0.0	0.0	0.	-0.	0.	
107062	7.6	163.5	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.		0.0	0.0	0.	-0.	0.		0.0	0.0	0.	-0.	0.	
107122	8.0	163.0	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.		0.0	0.0	0.	-0.	0.		0.0	0.0	0.	-0.	0.	
107182	8.5	162.5	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.		0.0	0.0	0.	-0.	0.		0.0	0.0	0.	-0.	0.	
108002	9.0	162.0	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.		0.0	0.0	0.	-0.	0.		0.0	0.0	0.	-0.	0.	
108062	9.2	162.0	30	9.3	161.7	25.	19.	-5.	10.4	159.7	30.	129.	0.		4.3	155.9	35.	342.	-5.		8.4	150.8	40.	702.	-5.	
108122	9.5	162.4	30	9.3	161.7	25.	43.	-5.	10.1	161.2	30.	19.	0.		10.2	158.7	35.	186.	-5.		9.0	154.8	40.	564.	-10.	
108182	9.8	162.9	30	9.3	161.7	25.	77.	-5.	10.4	160.7	30.	23.	-5.		10.0	158.3	35.	239.	-10.		8.9	154.5	40.	649.	-15.	
109002	10.2	162.8	30	10.2	163.1	25.	18.	-5.	11.3	161.3	30.	21.	-5.		10.0	157.3	35.	280.	-10.		9.5	153.4	40.	779.	-15.	
109062	10.3	161.9	30	10.8	161.7	25.	32.	-5.	10.3	157.6	30.	220.	-10.		4.8	153.5	35.	525.	-10.		9.7	149.4	40.	1042.	-15.	
109122	10.2	161.5	30	10.3	161.3	30.	13.	0.	10.4	157.1	35.	247.	-5.		10.3	153.0	40.	585.	-10.		10.7	149.0	45.	1230.	-15.	
109182	10.1	161.0	35	10.0	160.7	30.	19.	-5.	9.6	156.7	40.	311.	-5.		10.2	152.4	45.	707.	-10.		10.8	148.1	45.	1420.	-15.	
110002	11.0	161.1	35	11.1	161.5	35.	24.	0.	12.0	158.8	40.	186.	-5.		12.9	154.8	45.	603.	-10.		12.2	150.8	50.	1396.	0.	
110062	11.9	161.1	40	11.6	161.2	35.	19.	-5.	12.2	157.9	45.	238.	0.		12.8	154.0	50.	769.	-5.		0.0	0.0	0.	-0.	0.	
110122	12.7	160.6	40	12.3	160.7	40.	25.	0.	14.3	157.9	45.	223.	-5.		13.2	153.7	50.	918.	-10.		0.0	0.0	0.	-0.	0.	
110182	13.0	160.1	45	13.5	159.9	45.	13.	0.	15.2	156.9	50.	342.	-5.		13.6	153.2	50.	1079.	-10.		0.0	0.0	0.	-0.	0.	
111002	14.4	160.1	45	14.2	160.1	45.	12.	0.	17.2	160.2	40.	234.	-15.		20.5	162.7	35.	589.	-15.		0.0	0.0	0.	-0.	0.	
111062	15.2	160.6	45	15.1	161.0	45.	24.	0.	18.3	164.0	35.	134.	-20.		0.0	0.0	0.	-0.	0.		0.0	0.0	0.	-0.	0.	
111122	15.9	161.4	50	16.0	161.4	45.	6.	-5.	19.1	164.4	45.	238.	-15.		0.0	0.0	0.	-0.	0.		0.0	0.0	0.	-0.	0.	
111182	16.5	162.7	55	16.6	162.7	55.	6.	0.	18.9	167.1	45.	222.	-15.		0.0	0.0	0.	-0.	0.		0.0	0.0	0.	-0.	0.	
112002	17.1	164.3	55	17.4	164.2	55.	19.	0.	19.6	170.5	45.	192.	-5.		0.0	0.0	0.	-0.	0.		0.0	0.0	0.	-0.	0.	
112062	17.8	166.3	55	17.7	166.1	55.	13.	0.	0.0	0.0	0.	-0.	0.		0.0	0.0	0.	-0.	0.		0.0	0.0	0.	-0.	0.	
112122	18.8	168.6	60	18.6	168.6	55.	59.	-5.	0.0	0.0	0.	-0.	0.		0.0	0.0	0.	-0.	0.		0.0	0.0	0.	-0.	0.	
112182	20.2	170.8	60	20.3	170.7	60.	8.	0.	0.0	0.0	0.	-0.	0.		0.0	0.0	0.	-0.	0.		0.0	0.0	0.	-0.	0.	
113002	21.6	173.2	50	21.6	173.0	50.	11.	0.	0.0	0.0	0.	-0.	0.		0.0	0.0	0.	-0.	0.		0.0	0.0	0.	-0.	0.	

	ALL FORECASTS			
	WRNG	24-HR	48-HR	72-HR
AVG FORECAST POSIT ERROR	23.	185.	568.	980.
AVG RIGHT ANGLE ERROR	15.	109.	381.	768.
AVG INTENSITY MAGNITUDE ERROR	2.	7.	9.	11.
AVG INTENSITY BIAS	-2.	-7.	-9.	-11.
NUMBER OF FORECASTS	20	16	12	8
		3	1	0

TYPHOON OLIVE

(April)

	BEST TRACK			WARNING		ERRORS			24 HOUR FORECAST			ERRORS			48 HOUR FORECAST			ERRORS			72 HOUR FORECAST			ERRORS		
	POSIT		WIND	POSIT		WIND	DST	WIND	POSIT		WIND	DST	WIND		POSIT		WIND	DST	WIND		POSIT		WIND	DST	WIND	
413002	3.5	149.0	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.		0.0	0.0	0.	-0.	0.		0.0	0.0	0.	-0.	0.	
413062	3.8	147.6	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.		0.0	0.0	0.	-0.	0.		0.0	0.0	0.	-0.	0.	
413122	4.3	146.2	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.		0.0	0.0	0.	-0.	0.		0.0	0.0	0.	-0.	0.	
413182	4.7	144.8	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.		0.0	0.0	0.	-0.	0.		0.0	0.0	0.	-0.	0.	
414002	5.0	143.5	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.		0.0	0.0	0.	-0.	0.		0.0	0.0	0.	-0.	0.	
414062	5.3	142.8	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.		0.0	0.0	0.	-0.	0.		0.0	0.0	0.	-0.	0.	
414122	5.6	142.3	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.		0.0	0.0	0.	-0.	0.		0.0	0.0	0.	-0.	0.	
414182	5.8	141.5	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.		0.0	0.0	0.	-0.	0.		0.0	0.0	0.	-0.	0.	
415002	6.2	140.8	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.		0.0	0.0	0.	-0.	0.		0.0	0.0	0.	-0.	0.	
415062	6.8	139.3	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.		0.0	0.0	0.	-0.	0.		0.0	0.0	0.	-0.	0.	
415122	7.4	137.7	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.		0.0	0.0	0.	-0.	0.		0.0	0.0	0.	-0.	0.	
415182	7.9	136.5	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.		0.0	0.0	0.	-0.	0.		0.0	0.0	0.	-0.	0.	
416002	8.4	135.2	30	8.5	135.0	30.	13.	0.	10.5	130.3	40.	59.	0.		12.4	125.6	55.	88.	-5.		13.0	121.5	45.	105.	0.	
416062	8.7	133.9	30	8.9	134.0	30.	13.	0.	11.4	129.4	45.	90.	0.		13.5	125.1	55.	138.	5.		14.0	121.3	50.	151.	5.	
416122	9.0	132.6	30	9.2	132.9	30.	21.	0.	11.2	128.4	45.	76.	-5.		12.9	124.4	55.	137.	10.		14.2	120.5	50.	156.	0.	
416182	9.4	131.2	35	9.2	131.5	35.	21.	0.	10.6	126.5	50.	32.	-5.		12.7	122.6	55.	99.	10.		14.3	118.9	55.	112.	0.	
417002	9.6	129.9	40	9.7	129.5	35.	24.	-5.	11.4	126.5	40.	8.	-20.		12.5	120.7	40.	72.	-5.		14.0	116.8	50.	26.	-10.	
417062	10.0	128.6	45	10.1	128.4	45.	13.	0.	11.8	123.2	45.	12.	-5.		12.8	119.3	40.	42.	-5.		14.5	115.6	50.	12.	-15.	
417122	10.4	127.4	50	10.4	127.3	50.	6.	0.	12.0	122.4	45.	30.	0.		13.2	118.5	40.	39.	-10.		15.0	114.9	50.	12.	-20.	
417182	10.8	126.0	55	10.9	126.2	50.	13.	-5.	12.3	122.0	40.	74.	-5.		13.5	118.4	45.	76.	-10.		15.1	115.6	50.	76.	-30.	
418002	11.3	124.6	60	11.3	124.8	60.	12.	0.	12.2	121.4	40.	116.	-5.		13.9	117.6	45.	70.	-15.		16.0	114.1	50.	29.	-35.	
418062	11.9	123.4	60	11.5	123.2	50.	27.	0.	12.8	118.9	45.	30.	0.		14.2	115.0	50.	35.	-15.		15.6	111.2	55.	124.	-30.	
418122	12.4	122.1	45	12.3	122.2	45.	8.	0.	13.4	117.7	45.	13.	-5.		14.6	113.8	50.	65.	-20.		16.1	110.1	55.	180.	-30.	
418182	12.8	120.9	45	12.9	121.0	45.	8.	0.	14.4	116.4	50.	63.	-5.		15.7	112.8	55.	90.	-25.		17.1	109.3	60.	225.	-25.	
419002	13.2	119.7	45	13.2	119.6	45.	6.	0.	14.8	114.7	55.	115.	-5.		16.2	110.8	60.	162.	-25.		17.4	107.3	60.	357.	-25.	
419062	13.3	118.8	45	13.1	118.8	50.	12.	5.	13.5	114.5	60.	80.	-5.		15.4	110.3	65.	177.	-20.		18.0	107.2	65.	419.	-20.	
419122	13.5	117.9	50	13.5	117.8	55.	6.	5.	14.3	113.9	65.	62.	-5.		14.6	109.5	65.	252.	-20.		0.0	0.0	0.	-0.	0.	
419182	13.6	117.1	55	13.5	116.9	55.	13.	0.	14.4	112.6	65.	112.	-15.		14.8	108.1	40.	340.	-45.		0.0	0.0	0.	-0.	0.	
420002	13.8	116.4	60	13.9	116.4	60.	6.	0.	15.1	113.3	65.	51.	-20.		16.4	110.1	70.	228.	-15.		17.8	107.5	70.	665.	-5.	
420062	14.3	115.6	65	14.2	115.5	65.	8.	0.	15.5	112.5	75.	67.	-10.		16.8	110.1	80.	285.	-5.		18.3	107.9	80.	745.	10.	

422122	14.6	114.9	70	14.8	114.7	70.	12.	0.	16.5	111.8	75.	80.	*10.	18.2	109.4	80.	383.	-5.	20.1	107.4	80.	886.	15.
422182	15.3	114.3	80	15.5	114.2	80.	13.	0.	18.0	111.7	80.	87.	-5.	20.6	110.2	60.	398.	-20.	0.0	0.0	0.	-0.	0.
423002	15.9	113.6	85	16.0	113.5	85.	8.	0.	18.4	111.3	85.	125.	0.	21.0	110.4	65.	464.	*10.	23.4	112.1	40.	847.	-15.
423062	16.4	113.2	85	16.7	113.0	85.	21.	0.	19.1	111.2	85.	180.	0.	21.7	111.1	60.	540.	*10.	0.0	0.0	0.	-0.	0.
423122	17.0	113.1	85	17.0	112.8	85.	17.	0.	19.2	111.4	85.	201.	0.	21.7	114.1	75.	505.	10.	24.1	118.3	65.	726.	20.
423182	17.7	113.2	85	17.4	113.2	85.	18.	0.	19.7	113.5	80.	215.	0.	22.3	116.1	75.	516.	15.	25.0	120.2	65.	721.	25.
424002	18.4	113.5	85	18.5	113.4	85.	8.	0.	21.7	116.1	80.	157.	5.	24.5	120.3	70.	417.	15.	0.0	0.0	0.	-0.	0.
424062	19.1	114.5	85	19.1	114.5	85.	0.	0.	21.4	119.0	80.	101.	10.	23.3	125.0	65.	252.	15.	0.0	0.0	0.	-0.	0.
424122	19.7	116.0	85	19.7	115.7	85.	17.	0.	21.9	120.8	75.	135.	10.	23.9	127.2	65.	243.	20.	0.0	0.0	0.	-0.	0.
424182	20.2	117.3	80	20.2	117.3	80.	0.	0.	22.4	123.2	65.	129.	5.	24.5	130.5	55.	169.	15.	0.0	0.0	0.	-0.	0.
425002	20.7	118.7	75	20.9	118.7	75.	12.	0.	23.1	125.7	60.	115.	5.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
425062	21.2	120.8	70	21.4	120.2	70.	35.	0.	23.8	127.0	50.	158.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
425122	21.5	123.2	65	21.5	123.7	65.	28.	0.	23.6	134.0	45.	143.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
425182	21.7	125.4	60	21.8	125.9	60.	28.	0.	23.8	137.0	45.	205.	5.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
426002	22.0	127.4	55	22.0	127.5	55.	6.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
426062	22.5	129.5	50	22.2	129.3	50.	21.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
426122	22.9	131.5	45	22.6	131.3	45.	13.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
426182	23.3	133.3	40	23.3	133.8	40.	27.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.

	ALL FORECASTS				TYPHOONS WHILE OVER 35 KTS			
	WRNG	24-HR	48-HR	72-HR	WRNG	24-HR	48-HR	72-HR
AVG FORECAST POSIT ERROR	14.	100.	224.	328.	14.	100.	224.	328.
AVG RIGHT ANGLE ERROR	10.	62.	129.	215.	9.	62.	129.	215.
AVG INTENSITY MAGNITUDE ERROR	1.	5.	14.	17.	1.	5.	14.	17.
AVG INTENSITY BIAS	0.	-3.	-6.	-9.	0.	-3.	-6.	-9.
NUMBER OF FORECASTS	36	32	28	20	33	32	28	20
		17	15	12				

TROPICAL STORM POLLY

(June)

	BEST TRACK			WARNING		ERRORS		24 HOUR FORECAST		ERRORS		48 HOUR FORECAST		ERRORS		72 HOUR FORECAST		ERRORS	
	POSIT	WIND	POSIT	WIND	DST	WIND	POSIT	WIND	DST	WIND	POSIT	WIND	DST	WIND	POSIT	WIND	DST	WIND
613122	20.3	138.3	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
613182	21.2	137.3	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
614002	22.2	136.3	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
614062	23.0	135.5	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
614122	23.8	134.5	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
614182	24.3	133.8	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
615002	24.1	133.1	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
615062	23.7	132.7	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
615122	23.3	132.3	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
615182	22.8	132.0	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
616002	22.4	132.4	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
616062	23.0	132.4	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
616122	23.5	131.0	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
616182	23.9	129.7	30	23.7	129.4	30.	20.	0.	25.5	124.7	40.	124.	15.	28.3	123.5	45.	161.	5.	30.9	126.7	35.	37.	-15.
617002	24.4	128.9	30	24.3	128.3	30.	33.	0.	28.0	124.0	40.	167.	10.	32.2	127.0	40.	285.	0.	35.7	133.0	35.	378.	-10.
617062	24.6	128.2	30	25.0	128.2	30.	24.	0.	27.4	126.0	30.	90.	-5.	29.6	124.7	30.	111.	-15.	0.0	0.0	0.	-0.	0.
617122	25.0	127.4	25	24.9	127.6	30.	12.	5.	27.1	125.1	30.	64.	-5.	29.2	124.0	30.	125.	-20.	0.0	0.0	0.	-0.	0.
617182	25.4	127.0	25	25.4	126.8	30.	11.	5.	28.0	124.7	30.	99.	*10.	30.8	125.1	25.	78.	-25.	0.0	0.0	0.	-0.	0.
618002	26.1	126.3	30	26.5	125.8	30.	36.	0.	29.7	124.4	30.	150.	*10.	31.6	125.1	25.	112.	-20.	0.0	0.0	0.	-0.	0.
618062	25.9	126.1	35	25.6	126.0	35.	8.	0.	28.8	124.9	45.	72.	0.	32.3	126.4	35.	127.	-5.	0.0	0.0	0.	-0.	0.
618122	26.5	126.1	35	26.6	126.0	35.	8.	0.	29.3	125.7	45.	38.	-5.	32.9	128.2	40.	114.	10.	0.0	0.0	0.	-0.	0.
618182	26.9	126.1	40	27.0	126.1	40.	6.	0.	30.5	126.6	50.	13.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
619002	27.5	126.0	40	27.4	126.0	40.	6.	0.	29.8	126.3	50.	114.	5.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
619062	28.2	126.1	45	27.9	126.1	45.	18.	0.	31.7	127.4	50.	90.	10.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
619122	29.1	126.4	50	29.1	126.5	50.	5.	0.	33.0	128.7	45.	88.	15.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
619182	30.3	126.5	50	30.1	126.6	50.	13.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
620002	31.5	127.3	45	31.7	127.2	45.	13.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
620062	32.5	128.9	40	32.5	128.4	45.	25.	5.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
620122	33.4	130.4	30	33.2	130.5	30.	13.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.

	ALL FORECASTS			
	WRNG	24-HR	48-HR	72-HR
AVG FORECAST POSIT ERROR	16.	93.	139.	208.
AVG RIGHT ANGLE ERROR	10.	50.	93.	97.
AVG INTENSITY MAGNITUDE ERROR	1.	8.	13.	13.
AVG INTENSITY BIAS	1.	2.	-9.	-13.
NUMBER OF FORECASTS	16	12	8	2
		8	7	1

TROPICAL STORM ROSE

(June)

	BEST TRACK			WARNING		ERRORS			24 HOUR FORECAST		ERRORS			48 HOUR FORECAST		ERRORS			72 HOUR FORECAST		ERRORS		
	POSIT		WIND	POSIT		WIND	DST	WIND	POSIT		WIND	DST	WIND	POSIT		WIND	DST	WIND	POSIT		WIND	DST	WIND
021000Z	10.0	130.4	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
021006Z	10.1	129.7	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
021012Z	10.3	129.0	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
021018Z	10.0	128.3	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
022000Z	10.1	127.8	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
022006Z	10.0	127.0	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
022012Z	10.0	126.4	30	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
022018Z	10.0	125.6	30	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
023000Z	10.0	124.8	35	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
023006Z	10.1	124.0	40	10.8	124.1	35.	10.	-5.	10.2	121.6	65.	10/	30.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
023012Z	10.0	123.4	40	10.8	123.5	40.	0.	0.	10.5	120.5	65.	220.	25.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
023018Z	20.5	122.9	40	10.7	123.0	40.	10R.	0.	10.5	120.1	60.	292.	40.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
024000Z	21.4	122.5	35	21.3	122.5	35.	6.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
024006Z	22.3	122.0	35	22.8	122.2	35.	32.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
024012Z	23.2	121.5	30	22.9	121.7	35.	21.	5.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
024018Z	24.3	121.1	20	24.1	121.4	25.	16.	5.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.

	ALL FORECASTS			
	WRNG	24-HR	48-HR	72-HR
AVG FORECAST POSIT ERROR	47.	235.	0.	0.
AVG RIGHT ANGLE ERROR	21.	142.	0.	0.
AVG INTENSITY MAGNITUDE ERROR	2.	35.	0.	0.
AVG INTENSITY BIAS	1.	35.	0.	0.
NUMBER OF FORECASTS	7	3	0	0
		0		

TROPICAL STORM SHIRLEY

(June)

	BEST TRACK			WARNING		ERRORS			24 HOUR FORECAST		ERRORS			48 HOUR FORECAST		ERRORS			72 HOUR FORECAST		ERRORS		
	POSIT		WIND	POSIT		WIND	DST	WIND	POSIT		WIND	DST	WIND	POSIT		WIND	DST	WIND	POSIT		WIND	DST	WIND
026000Z	11.1	129.5	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
026006Z	11.2	128.7	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
026012Z	11.3	127.5	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
026018Z	11.3	126.5	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
027000Z	11.3	125.6	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
027006Z	11.3	124.1	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
027012Z	11.3	122.8	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
027018Z	11.1	121.0	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
028000Z	10.7	119.2	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
028006Z	10.4	117.8	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
028012Z	10.3	117.0	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
028018Z	10.8	117.3	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
029000Z	10.5	117.4	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
029006Z	10.8	116.6	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
029012Z	11.4	115.2	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
029018Z	12.1	113.6	30	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
030000Z	12.8	112.2	35	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
030006Z	13.3	110.7	35	13.4	111.3	35.	35.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
030012Z	13.5	109.3	35	13.4	109.5	35.	13.	10.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
030018Z	14.1	108.1	30	13.7	108.1	30.	24.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.

	ALL FORECASTS			
	WRNG	24-HR	48-HR	72-HR
AVG FORECAST POSIT ERROR	24.	0.	0.	0.
AVG RIGHT ANGLE ERROR	15.	0.	0.	0.
AVG INTENSITY MAGNITUDE ERROR	3.	0.	0.	0.
AVG INTENSITY BIAS	3.	0.	0.	0.
NUMBER OF FORECASTS	3	0	0	0

TYPHOON TRIX

(July)

	BEST TRACK			WARNING		ERRORS		24 HOUR FORECAST			ERRORS		48 HOUR FORECAST			ERRORS		72 HOUR FORECAST			ERRORS	
	POSIT		WIND	POSIT		WIND	DST	WIND	POSIT		WIND	DST	WIND	POSIT		WIND	DST	WIND	POSIT		WIND	DST	WIND
71100Z	18.8	153.8	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
71106Z	18.9	153.2	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
71112Z	19.0	152.6	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
71118Z	19.3	152.1	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
72100Z	19.8	151.3	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
72106Z	20.5	150.2	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
72112Z	21.4	149.5	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
72118Z	22.3	148.6	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
73100Z	23.1	147.6	30	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
73106Z	23.5	146.5	30	23.7	146.7	25.	16.	-5.	26.8	142.7	35.	180=	0.	29.1	139.2	40.	329.	-10.	30.4	135.4	45.	488.	-20.
73112Z	23.8	145.4	30	24.5	145.5	25.	42.	-5.	27.2	141.7	35.	191=	-5.	28.7	137.4	40.	320.	-15.	30.4	133.3	45.	556.	-20.
73118Z	23.8	144.3	30	24.1	144.5	25.	21.	-5.	25.5	140.2	35.	86=	-10.	26.6	136.9	40.	228.	-20.	27.0	131.7	45.	483.	-20.
74100Z	23.6	143.3	35	24.3	143.3	25.	42.	-10.	25.5	139.0	35.	97=	-15.	26.5	134.7	40.	266.	-25.	26.8	130.1	45.	564.	-20.
74106Z	23.8	142.4	35	24.0	142.3	30.	13.	-5.	25.3	138.1	40.	110=	-10.	26.0	133.5	45.	310.	-20.	26.4	129.1	50.	629.	-20.
74112Z	24.0	141.6	40	23.9	141.7	30.	8.	-10.	24.6	137.7	40.	79=	-15.	25.2	133.2	45.	321.	-20.	25.4	128.3	50.	690.	-20.
74118Z	24.1	140.7	45	23.9	140.8	35.	13.	-10.	24.0	136.8	40.	77=	-20.	24.1	132.1	45.	381.	-20.	23.9	127.5	50.	769.	-15.
75100Z	24.0	139.7	50	24.2	140.0	35.	20.	-15.	24.6	136.5	45.	110=	-20.	24.7	132.6	50.	389.	-15.	24.7	128.1	55.	799.	-10.
75106Z	23.6	138.9	50	23.8	138.9	60.	12.	10.	24.3	135.0	65.	183=	0.	24.6	130.7	70.	515.	0.	24.7	126.3	75.	961=	15.
75112Z	23.4	138.3	55	23.5	137.9	60.	23.	5.	23.3	134.0	65.	232=	0.	23.7	129.7	70.	601.	0.	24.4	125.4	75.	1057.	20.
75118Z	23.2	137.9	60	23.3	137.6	60.	18.	0.	22.9	134.4	65.	239=	0.	23.4	130.2	70.	621.	5.	24.3	126.1	75.	1047.	20.
76000Z	22.9	137.6	65	22.8	137.1	60.	28.	-5.	22.2	134.7	65.	243=	0.	22.2	131.4	70.	627.	5.	22.2	127.8	75.	1018.	20.
76006Z	22.5	137.7	65	22.6	137.9	65.	13.	0.	22.6	137.9	75.	106=	5.	22.9	137.4	80.	372.	20.	22.3	134.6	80.	691.	25.
76012Z	22.1	138.0	65	22.1	138.2	65.	11.	0.	22.1	138.2	75.	137=	5.	22.9	136.9	80.	457.	25.	22.3	134.6	80.	667.	25.
76018Z	21.9	138.6	65	21.8	138.3	65.	18.	0.	21.8	138.3	75.	191=	10.	22.9	138.0	80.	434.	25.	22.8	136.0	80.	569.	30.
77100Z	22.1	139.1	65	22.0	138.8	65.	18.	0.	22.7	139.8	75.	166=	10.	24.7	141.2	80.	272.	25.	27.0	141.4	80.	162.	35.
77106Z	22.4	139.8	70	22.5	139.8	70.	6.	0.	24.6	141.0	90.	163=	30.	27.7	140.9	95.	300.	40.	30.7	139.8	95.	157.	55.
77112Z	22.7	140.6	70	23.2	140.3	70.	34.	0.	26.3	141.3	90.	205=	35.	29.4	140.4	95.	301.	40.	32.1	139.2	95.	164.	55.
77118Z	23.0	141.5	65	22.9	141.4	70.	8.	5.	25.5	143.4	75.	108=	20.	28.5	142.8	80.	101.	30.	31.4	141.6	80.	180.	45.
78000Z	23.5	142.7	65	23.7	142.9	70.	25.	5.	27.0	143.7	75.	134=	20.	30.0	143.2	80.	69.	35.	32.5	143.0	80.	337.	45.
78006Z	24.4	144.0	60	24.4	144.2	65.	11.	5.	27.2	147.5	60.	69=	5.	31.2	147.2	55.	280.	15.	34.0	147.6	50.	663.	15.
78012Z	25.2	144.9	55	25.6	145.1	60.	26.	5.	30.2	146.8	55.	184=	-20.	33.6	146.6	30.	392.	-10.	35.6	146.5	20.	765.	-15.
78018Z	25.6	145.4	55	26.0	146.0	55.	40.	0.	29.3	148.0	35.	105=	-15.	32.9	147.3	30.	479.	-5.	0.0	0.0	0.	-0.	0.
79100Z	26.1	146.0	55	25.5	145.9	55.	36.	0.	27.5	147.5	40.	222=	-5.	30.9	148.0	35.	560.	0.	33.8	148.7	25.	1046.	-10.
79106Z	26.6	146.4	55	26.7	146.7	55.	17.	0.	30.8	148.2	40.	320=	0.	34.1	149.1	35.	735.	0.	36.7	151.3	25.	1312.	-15.
79112Z	27.3	145.6	55	27.7	146.5	55.	53.	0.	32.2	146.6	40.	349=	0.	35.8	147.8	35.	826.	0.	0.0	0.0	0.	-0.	0.
79118Z	28.2	144.7	50	28.2	144.5	55.	11.	5.	32.3	142.2	45.	237=	10.	35.5	143.5	35.	737.	0.	0.0	0.0	0.	-0.	0.
80000Z	28.9	143.6	45	29.3	143.6	50.	24.	5.	33.8	141.5	40.	324=	5.	37.1	143.7	35.	890.	0.	0.0	0.0	0.	-0.	0.
80006Z	29.2	142.3	40	29.4	142.3	40.	12.	0.	31.8	137.6	35.	167=	0.	33.0	132.2	30.	374.	-10.	0.0	0.0	0.	-0.	0.
80012Z	29.6	140.5	40	30.2	140.6	40.	36.	0.	32.4	135.0	35.	217=	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
80018Z	29.7	138.7	35	29.7	138.8	35.	5.	0.	31.2	132.0	30.	158=	-5.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
81100Z	29.6	137.2	35	29.7	137.3	35.	8.	0.	29.7	131.4	30.	137=	-5.	29.0	126.8	30.	277.	0.	0.0	0.0	0.	-0.	0.
81106Z	29.6	135.6	35	29.8	135.8	35.	16.	0.	29.5	130.2	30.	179=	-10.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
81112Z	29.0	133.5	35	29.8	133.8	35.	50.	0.	29.3	128.2	35.	189=	-10.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
81118Z	28.6	131.4	35	28.5	131.0	30.	22.	-5.	28.4	120.7	20.	122=	-25.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
82000Z	28.6	129.1	35	28.5	128.9	30.	12.	-5.	0.0	0.0	0.	-0=	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
82006Z	28.7	126.9	40	28.8	126.9	30.	6.	-10.	0.0	0.0	0.	-0=	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
82012Z	28.5	124.7	45	28.7	124.4	30.	20.	-15.	0.0	0.0	0.	-0=	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
82018Z	28.7	123.0	45	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0=	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
83000Z	29.3	121.5	30	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0=	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.

	ALL FORECASTS			
	WRNG	24-HR	48-HR	72-HR
AVG FORECAST POSIT ERROR	21.	174.	425.	657.
AVG NIGHT ANGLE ERROR	17.	122.	298.	531.
AVG INTENSITY MAGNITUDE ERROR	4.	10.	15.	25.
AVG INTENSITY BIAS	-2.	-1.	3.	9.
NUMBER OF FORECASTS	38	35	30	24
		5	2	4

	TYPHOONS WHILE OVER 35 KTS			
	WRNG	24-HR	48-HR	72-HR
	20.	174.	431.	657.
	16.	122.	308.	531.
	4.	10.	15.	25.
	0.	-1.	3.	9.
	35	35	29	24

TYPHOON VIRGINIA

(July-August)

	BEST TRACK			WARNING		ERRORS		24 HOUR FORECAST		ERRORS		48 HOUR FORECAST		ERRORS		72 HOUR FORECAST		ERRORS	
	POSIT		WIND	POSIT	WIND	DST	WIND	POSIT	WIND	DST	WIND	POSIT	WIND	DST	WIND	POSIT	WIND	DST	WIND
22/00Z	13.7	152.0	25	0.0	0.0	0.	-0.	0.	0.0	0.	-0.	0.	0.0	0.	-0.	0.	0.0	0.	-0.
22/06Z	14.1	151.7	25	0.0	0.0	0.	-0.	0.	0.0	0.	-0.	0.	0.0	0.	-0.	0.	0.0	0.	-0.
22/12Z	14.6	151.4	30	0.0	0.0	0.	-0.	0.	0.0	0.	-0.	0.	0.0	0.	-0.	0.	0.0	0.	-0.
22/18Z	15.1	151.3	30	0.0	0.0	0.	-0.	0.	0.0	0.	-0.	0.	0.0	0.	-0.	0.	0.0	0.	-0.
23/00Z	15.5	151.1	35	0.0	0.0	0.	-0.	0.	0.0	0.	-0.	0.	0.0	0.	-0.	0.	0.0	0.	-0.
23/06Z	15.9	151.0	35	16.1	150.9	40.	13.	5.	18.2	149.2	50.	119.	5.	20.0	146.5	90.	204.	-5.	21.2	143.0	70.	295.	10.
23/12Z	16.1	151.0	40	16.5	150.7	45.	29.	5.	18.5	149.0	55.	121.	5.	20.3	146.3	80.	191.	-5.	21.3	142.6	70.	290.	10.
23/18Z	16.3	151.0	40	16.6	150.8	50.	29.	10.	18.7	149.3	60.	87.	5.	20.0	146.7	85.	151.	0.	21.3	143.0	70.	240.	10.
24/00Z	16.6	151.0	45	16.6	151.0	50.	0.	5.	17.5	150.9	60.	87.	0.	19.3	149.3	85.	98.	5.	19.6	146.9	70.	126.	10.
24/06Z	17.2	151.0	45	17.1	151.0	55.	6.	10.	18.5	150.5	65.	69.	0.	19.9	148.2	70.	120.	10.	19.5	145.7	70.	143.	10.
24/12Z	17.8	151.0	50	17.5	151.0	55.	18.	5.	19.2	150.3	65.	63.	0.	20.1	148.0	70.	90.	10.	20.3	145.5	70.	115.	5.
24/18Z	18.4	150.8	55	18.4	150.8	55.	0.	0.	19.9	148.9	65.	45.	0.	20.2	146.0	70.	115.	10.	20.4	143.0	75.	251.	10.
25/00Z	18.9	150.5	60	19.0	150.8	55.	8.	-5.	20.5	148.8	65.	25.	5.	21.2	146.0	70.	83.	10.	21.7	143.1	75.	247.	10.
25/06Z	19.6	150.1	65	19.4	150.0	55.	13.	0.	21.2	148.0	70.	21.	10.	22.4	145.2	75.	118.	15.	23.2	142.0	75.	336.	10.
25/12Z	20.1	149.7	65	20.3	149.3	55.	25.	0.	22.8	146.1	75.	115.	15.	24.0	142.5	80.	302.	15.	24.5	138.8	80.	498.	15.
25/18Z	20.5	149.4	65	20.7	149.2	55.	16.	0.	22.4	147.2	75.	42.	15.	23.9	144.1	80.	239.	15.	24.7	140.8	80.	376.	10.
26/00Z	20.9	148.9	60	21.2	149.0	55.	19.	5.	23.0	147.7	75.	87.	15.	24.5	145.1	80.	239.	15.	25.0	140.2	80.	401.	10.
26/06Z	21.4	148.3	60	21.4	148.5	55.	11.	5.	23.3	147.0	65.	106.	5.	24.0	144.4	70.	263.	5.	25.0	139.7	65.	465.	-5.
26/12Z	21.7	147.8	60	22.0	147.9	55.	19.	5.	23.8	145.1	65.	184.	0.	24.8	142.0	70.	342.	5.	24.9	137.8	65.	448.	0.
26/18Z	21.7	147.3	60	21.9	147.2	55.	13.	5.	23.1	144.8	65.	189.	0.	24.0	141.3	60.	336.	-10.	24.3	137.0	55.	448.	-10.
27/00Z	21.7	147.0	60	22.3	146.8	55.	42.	5.	23.3	144.3	65.	223.	0.	24.0	141.3	60.	337.	-10.	25.0	137.0	55.	443.	-10.
27/06Z	21.5	147.1	60	22.1	147.2	55.	36.	5.	23.7	145.5	65.	183.	0.	25.0	142.8	60.	259.	-10.	26.8	138.7	55.	396.	-5.
27/12Z	21.4	147.2	65	22.0	146.9	55.	40.	0.	23.3	145.3	65.	150.	0.	25.4	142.9	60.	205.	-5.	26.8	139.0	55.	298.	-5.
27/18Z	21.3	147.4	65	22.0	146.9	55.	50.	0.	23.5	145.6	65.	113.	-5.	25.7	143.1	60.	150.	-5.	26.9	138.8	55.	252.	-5.
28/00Z	21.3	147.7	65	21.6	147.5	55.	21.	0.	22.5	147.0	65.	13.	-5.	24.6	145.1	60.	48.	-5.	26.5	142.3	60.	140.	0.
28/06Z	21.5	147.8	65	21.5	147.5	55.	17.	0.	22.4	147.8	65.	73.	-5.	24.5	146.5	60.	158.	0.	26.6	143.9	60.	244.	5.
28/12Z	21.6	147.3	65	22.1	147.1	55.	32.	0.	23.6	145.4	65.	92.	0.	25.3	143.5	60.	126.	0.	26.7	141.5	60.	299.	5.
28/18Z	22.2	147.1	70	22.2	147.0	55.	6.	-5.	23.4	145.4	65.	73.	0.	24.5	143.7	60.	240.	0.	25.8	141.6	60.	412.	5.
29/00Z	22.7	147.1	70	22.3	146.8	70.	24.	0.	23.2	145.6	75.	135.	10.	24.6	143.6	75.	298.	15.	26.0	141.5	75.	454.	20.
29/06Z	23.3	146.9	70	22.9	146.9	70.	24.	0.	24.2	145.9	70.	149.	10.	25.8	144.1	75.	313.	20.	27.0	141.9	75.	472.	20.
29/12Z	23.9	146.3	65	24.0	146.5	70.	12.	5.	26.2	145.1	75.	100.	15.	27.0	142.7	75.	284.	20.	27.2	140.1	75.	551.	25.
29/18Z	24.6	145.6	65	24.7	145.8	70.	12.	5.	26.5	143.9	75.	123.	15.	27.1	141.6	75.	335.	20.	27.4	139.3	75.	649.	30.
30/00Z	25.4	145.0	65	25.4	145.0	70.	0.	5.	27.5	142.1	75.	121.	15.	29.1	139.4	75.	284.	20.	29.9	136.1	75.	649.	35.
30/06Z	26.3	144.4	60	26.0	144.4	70.	18.	10.	28.2	142.0	75.	149.	20.	29.7	139.5	75.	333.	20.	30.6	136.6	75.	748.	35.
30/12Z	27.4	143.8	60	26.9	143.9	70.	30.	10.	29.3	141.0	70.	151.	15.	30.7	138.3	75.	389.	25.	31.7	135.5	75.	842.	35.
30/18Z	28.5	143.2	60	28.0	143.2	65.	30.	5.	30.4	140.7	65.	142.	10.	32.0	138.1	65.	428.	20.	33.5	135.5	65.	883.	30.
31/00Z	29.5	142.5	60	29.1	142.7	65.	26.	5.	30.6	140.9	65.	180.	10.	37.3	140.9	55.	218.	15.	0.0	0.0	0.	-0.	0.
31/06Z	30.7	142.0	55	30.8	141.8	65.	12.	10.	35.7	140.6	65.	79.	10.	39.1	142.8	50.	195.	10.	0.0	0.0	0.	-0.	0.
31/12Z	31.7	141.9	55	31.9	141.4	65.	28.	10.	35.8	140.7	65.	90.	15.	39.1	142.9	50.	295.	10.	0.0	0.0	0.	-0.	0.
31/18Z	32.7	141.4	55	32.9	141.4	65.	12.	10.	36.8	141.6	60.	101.	15.	39.7	144.7	50.	311.	15.	0.0	0.0	0.	-0.	0.
01/00Z	33.6	141.2	55	33.8	140.9	65.	19.	10.	37.5	141.4	60.	190.	20.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
01/06Z	34.9	141.9	55	34.7	141.6	65.	19.	10.	38.1	144.3	55.	162.	15.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
01/12Z	36.2	142.5	50	35.8	142.7	65.	26.	15.	38.8	148.0	55.	122.	15.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
01/18Z	37.7	143.4	45	37.4	143.3	65.	19.	20.	39.8	149.8	50.	131.	15.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
02/00Z	39.1	144.9	40	39.1	144.4	60.	23.	20.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
02/06Z	39.9	146.9	40	40.1	147.1	55.	15.	15.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
02/12Z	40.7	149.0	40	40.5	148.9	55.	13.	15.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
02/18Z	41.6	151.0	35	41.2	151.4	50.	40.	15.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.

ALL FORECASTS	WRNG	24-HR	48-HR	72-HR
AVG FORECAST POSIT ERROR	20.	112.	231.	399.
AVG HIGH ANGLE ERROR	12.	63.	127.	283.
AVG INTENSITY MAGNITUDE ERROR	6.	8.	11.	13.
AVG INTENSITY BIAS	6.	7.	8.	10.
NUMBER OF FORECASTS	43	39	35	31
		16	13	13

TYPHOONS WHILE OVER 35 KTS	WRNG	24-HR	48-HR	72-HR
	20.	112.	231.	399.
	12.	63.	127.	283.
	6.	8.	11.	13.
	6.	7.	8.	10.
	43	39	35	31

TYPHOON WENDY

(July-August)

	BEST TRACK			WARNING				24 HOUR FORECAST					48 HOUR FORECAST					72 HOUR FORECAST				
						ERRORS				ERRORS					ERRORS					ERRORS		
	POSIT		WIND	POSIT		WIND	DST	WIND	POSIT		WIND	DST	WIND	POSIT		WIND	DST	WIND	POSIT		WIND	DST	WIND
72200Z	18.4	139.2	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
72206Z	19.0	138.7	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
72212Z	19.8	138.2	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
72218Z	20.5	137.7	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
73000Z	20.9	137.2	30	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
73006Z	21.2	136.7	35	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
73012Z	21.4	136.2	35	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
73018Z	21.5	135.4	35	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
74000Z	21.2	134.4	40	21.4	133.5	30.	51.	-10.	21.7	129.7	45.	228.	-5.	23.2	125.6	55.	443.	-15.	25.2	123.0	70.	530.	-5.
74006Z	20.8	134.1	40	20.8	134.1	35.	0.	-5.	20.9	131.4	45.	116.	-10.	21.8	127.7	55.	311.	-15.	23.8	124.6	70.	404.	-5.
74012Z	20.7	134.0	40	20.8	133.5	40.	29.	0.	21.0	130.5	50.	106.	-10.	22.3	126.8	60.	349.	-10.	24.4	123.9	70.	413.	-10.
74018Z	20.8	133.9	45	20.5	134.4	45.	33.	0.	20.9	133.5	55.	25.	-10.	21.0	130.3	60.	108.	-15.	22.3	126.8	70.	291.	-10.
75000Z	20.9	133.7	50	20.9	133.4	50.	6.	0.	21.0	132.0	60.	83.	-10.	21.3	128.7	70.	242.	-5.	22.8	125.2	75.	338.	-5.
75006Z	20.9	133.4	55	20.9	133.3	55.	6.	0.	21.0	131.8	65.	90.	-5.	21.4	128.6	75.	243.	0.	22.8	125.1	80.	327.	0.
75012Z	21.1	133.4	60	20.9	133.1	60.	21.	0.	21.1	131.8	70.	87.	0.	21.7	128.4	75.	243.	-5.	23.2	124.9	80.	293.	5.
75018Z	21.3	133.4	65	21.0	133.7	65.	25.	0.	21.1	132.7	70.	90.	-5.	21.8	130.1	75.	215.	-5.	22.4	127.2	80.	331.	10.
76000Z	21.5	133.4	70	21.6	134.0	65.	34.	-5.	22.8	132.8	75.	34.	0.	22.9	130.5	75.	211.	-5.	22.9	128.2	85.	334.	15.
76006Z	21.6	133.3	70	21.7	133.1	70.	13.	0.	21.9	130.9	80.	139.	5.	22.1	129.1	85.	305.	5.	22.4	126.6	90.	373.	15.
76012Z	21.9	133.1	70	22.0	132.8	70.	18.	0.	22.4	130.5	80.	142.	0.	22.7	128.2	85.	297.	10.	23.0	125.5	90.	382.	15.
76018Z	22.6	132.8	75	22.3	132.3	75.	33.	0.	22.7	130.2	80.	101.	0.	23.1	128.1	85.	301.	15.	23.5	125.5	90.	365.	15.
77000Z	23.3	132.5	75	23.3	132.3	75.	11.	0.	25.0	130.5	80.	88.	0.	26.5	128.3	85.	151.	15.	27.7	125.5	90.	133.	15.
77006Z	24.0	132.0	75	24.0	132.2	75.	11.	0.	26.0	130.2	80.	107.	0.	27.4	128.0	85.	136.	10.	29.0	125.5	90.	75.	20.
77012Z	24.6	131.5	80	24.4	131.8	75.	20.	-5.	26.5	129.6	80.	139.	5.	27.8	127.2	85.	131.	10.	29.4	125.0	90.	58.	20.
77018Z	25.3	131.0	80	25.3	130.9	80.	5.	0.	27.3	128.2	85.	102.	15.	28.8	124.6	85.	80.	10.	29.0	120.5	70.	251.	0.
78000Z	26.4	130.0	80	26.2	130.1	80.	13.	0.	28.8	126.8	85.	46.	15.	30.2	122.5	85.	136.	10.	30.4	118.0	50.	366.	-20.
78006Z	27.2	128.7	80	27.1	128.8	75.	8.	-5.	29.4	124.3	75.	96.	0.	30.5	120.2	50.	238.	-20.	0.0	0.0	0.	-0.	0.
78012Z	27.6	127.3	75	27.7	127.5	75.	12.	0.	30.0	123.1	75.	130.	0.	30.7	118.6	20.	310.	-50.	0.0	0.0	0.	-0.	0.
78018Z	27.9	126.4	70	28.1	126.1	70.	20.	0.	30.0	121.6	90.	193.	-25.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
79000Z	28.2	126.2	70	28.3	125.7	70.	27.	0.	30.0	121.6	90.	181.	-25.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
79006Z	28.6	125.8	75	28.7	125.6	70.	12.	-5.	30.4	123.7	70.	60.	0.	31.4	121.6	50.	185.	-20.	0.0	0.0	0.	-0.	0.
79012Z	29.4	125.5	75	29.1	125.9	70.	27.	-5.	31.0	125.2	70.	52.	0.	32.4	122.9	70.	144.	0.	32.8	120.1	50.	375.	-10.
79018Z	29.6	125.3	75	29.8	125.6	70.	20.	-5.	31.7	124.1	70.	98.	0.	32.6	121.6	70.	214.	5.	0.0	0.0	0.	-0.	0.
80000Z	29.9	125.1	75	30.2	125.1	70.	18.	-5.	31.8	123.0	70.	132.	0.	32.6	120.3	50.	293.	-15.	0.0	0.0	0.	-0.	0.
80006Z	30.1	124.8	70	30.4	124.8	70.	18.	0.	31.4	122.8	70.	127.	0.	32.1	120.3	50.	307.	-10.	0.0	0.0	0.	-0.	0.
80012Z	30.3	124.6	70	30.4	124.8	70.	12.	0.	31.4	123.7	70.	74.	0.	32.4	121.0	50.	325.	-10.	0.0	0.0	0.	-0.	0.
80018Z	30.3	125.1	70	30.3	124.9	70.	10.	0.	31.0	124.3	65.	47.	0.	32.1	122.5	50.	294.	-5.	32.9	119.9	30.	590.	-5.
81000Z	30.5	125.1	70	30.3	124.9	70.	16.	0.	31.7	125.2	65.	73.	0.	33.4	120.3	60.	182.	10.	0.0	0.0	0.	-0.	0.
81006Z	30.6	125.1	70	30.3	124.7	70.	27.	0.	31.7	125.6	60.	65.	0.	33.4	120.6	60.	145.	15.	0.0	0.0	0.	-0.	0.
81012Z	30.7	124.9	70	30.9	125.2	70.	19.	0.	32.3	125.7	60.	114.	0.	34.5	127.6	60.	156.	20.	0.0	0.0	0.	-0.	0.
81018Z	30.5	125.0	65	30.5	125.0	65.	0.	0.	31.1	125.2	60.	149.	5.	32.6	125.9	60.	308.	25.	0.0	0.0	0.	-0.	0.
82100Z	30.5	125.5	65	30.5	125.2	65.	15.	0.	31.1	125.3	60.	179.	10.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
82106Z	30.7	126.1	60	30.7	125.9	65.	16.	5.	32.3	127.2	60.	96.	15.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
82112Z	30.8	127.1	60	30.8	126.3	60.	41.	0.	32.1	127.8	60.	159.	20.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
82118Z	30.9	128.1	55	31.1	127.2	60.	48.	5.	33.3	128.9	55.	155.	20.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
83000Z	31.2	128.8	50	31.5	128.5	50.	24.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
83006Z	32.2	129.1	45	32.3	129.0	45.	8.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
83012Z	33.5	130.5	40	32.8	129.8	45.	55.	5.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
83018Z	34.6	131.6	35	33.8	131.4	40.	49.	5.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.

ALL FORECASTS

	WRNG	24-HR	48-HR	72-HR
AVG FORECAST POSIT ERROR	21.	112.	235.	328.
AVG RIGHT ANGLE ERROR	12.	75.	188.	269.
AVG INTENSITY MAGNITUDE ERROR	2.	6.	12.	11.
AVG INTENSITY BIAS	-1.	0.	-2.	3.
NUMBER OF FORECASTS	40	36	30	19
		17	11	5

TYPHOONS WHILE OVER 35 KTS

WRNG	24-HR	48-HR	72-HR
21.	112.	235.	328.
12.	75.	188.	269.
2.	6.	12.	11.
0.	0.	-2.	3.
40	36	30	19

TROPICAL STORM AGNES

(July)

	BEST TRACK			WARNING		ERRORS		24 HOUR FORECAST		ERRORS		48 HOUR FORECAST		ERRORS		72 HOUR FORECAST			
	POSIT	WIND		POSIT	WIND	DST	WIND	POSIT	WIND	DST	WIND	POSIT	WIND	DST	WIND	POSIT	WIND	DST	WIND
16Z09JUL	10.5	114.7	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	-0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
22Z09JUL	11.3	115.2	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	-0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
04Z12JUL	10.0	115.6	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	-0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
16Z18JUL	10.6	115.6	30	10.6	115.4	30.	23.	0.	20.8	113.8	40.	101.	0.	21.8	111.2	30.	142.	-20.	0.0	0.0	0.	-0.	0.
22Z09JUL	19.3	115.9	30	19.4	115.9	30.	36.	0.	21.8	113.8	40.	56.	-5.	22.4	111.1	25.	139.	-20.	0.0	0.0	0.	-0.	0.
04Z10JUL	20.1	115.8	35	20.4	115.8	30.	18.	-5.	22.4	115.7	35.	90.	-10.	25.0	114.1	20.	234.	-25.	0.0	0.0	0.	-0.	0.
10Z10JUL	21.2	115.7	35	21.0	115.7	30.	12.	-5.	23.4	114.9	20.	135.	-30.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
16Z10JUL	21.4	115.5	40	21.5	115.4	35.	6.	-5.	23.9	114.9	20.	137.	-30.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
22Z10JUL	21.5	114.8	45	21.6	114.9	45.	8.	0.	22.7	113.8	35.	83.	-10.	23.7	111.9	20.	174.	-25.	0.0	0.0	0.	-0.	0.
04Z11JUL	21.5	114.4	45	21.7	114.5	45.	13.	0.	22.7	112.4	30.	83.	-15.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
10Z11JUL	21.3	114.0	50	21.5	113.4	50.	14.	0.	21.1	111.2	55.	96.	10.	20.8	109.0	45.	169.	0.	20.4	107.0	45.	416.	0.
16Z11JUL	21.3	113.7	50	21.4	113.7	55.	6.	5.	21.2	112.0	50.	21.	5.	21.0	110.0	45.	139.	-5.	20.6	107.9	45.	343.	0.
22Z11JUL	21.3	113.3	45	21.3	113.3	55.	0.	10.	21.2	111.8	45.	17.	0.	21.0	109.6	40.	187.	-5.	20.8	107.5	35.	627.	-5.
04Z12JUL	21.3	112.7	45	21.3	112.8	50.	6.	5.	21.5	110.8	40.	70.	-5.	22.1	108.6	30.	294.	-15.	0.0	0.0	0.	-0.	0.
10Z12JUL	21.2	112.3	45	21.3	112.3	50.	6.	5.	21.6	110.3	40.	119.	-5.	22.2	108.4	30.	335.	-15.	0.0	0.0	0.	-0.	0.
16Z18JUL	20.9	111.8	45	21.1	111.7	50.	13.	5.	21.2	109.3	40.	180.	-10.	21.8	106.8	20.	432.	-25.	0.0	0.0	0.	-0.	0.
22Z18JUL	20.9	111.9	45	20.9	111.9	50.	0.	5.	21.0	110.3	40.	140.	-5.	21.5	107.9	30.	395.	-10.	0.0	0.0	0.	-0.	0.
04Z09JUL	20.8	111.8	45	20.8	111.8	50.	0.	5.	20.8	111.8	45.	100.	0.	21.3	110.5	40.	271.	10.	0.0	0.0	0.	-0.	0.
10Z09JUL	20.4	112.0	45	20.7	112.0	50.	14.	5.	20.7	112.0	45.	142.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
16Z09JUL	20.4	112.4	50	20.4	112.4	50.	0.	0.	20.4	112.4	45.	139.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
22Z09JUL	20.5	112.9	45	20.6	112.9	45.	6.	0.	22.0	114.0	35.	89.	-5.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
04Z10JUL	20.6	113.7	45	20.8	113.7	45.	0.	0.	22.8	116.0	45.	81.	15.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
10Z12JUL	21.5	114.4	45	21.5	114.4	45.	0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
16Z18JUL	22.1	114.6	45	22.1	114.9	45.	17.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
13Z00JUL	22.6	114.9	40	22.8	114.6	40.	17.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
13Z00JUL	23.4	115.1	30	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.

	ALL FORECASTS			
	WARNG	24-HR	48-HR	72-HR
AVG FORECAST POSIT ERROR	10.	97.	243.	410.
AVG RIGHT ANGLE ERROR	7.	59.	191.	309.
AVG INTENSITY MAGNITUDE ERROR	3.	8.	15.	2.
AVG INTENSITY BIAS	1.	-5.	-13.	-2.
NUMBER OF FORECASTS	22	19	12	3
		16	6	0

TROPICAL STORM BONNIE

(August)

	BEST TRACK			WARNING		ERRORS		24 HOUR FORECAST		ERRORS		48 HOUR FORECAST		ERRORS		72 HOUR FORECAST			
	POSIT	WIND		POSIT	WIND	DST	WIND	POSIT	WIND	DST	WIND	POSIT	WIND	DST	WIND	POSIT	WIND	DST	WIND
06Z06JUL	22.5	122.0	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	-0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
06Z06JUL	22.2	120.5	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	-0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
06Z12JUL	21.8	119.3	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	-0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
06Z18JUL	21.5	118.4	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	-0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
00Z07JUL	21.2	117.6	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	-0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
06Z06JUL	20.8	116.7	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	-0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
06Z12JUL	20.2	115.9	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	-0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
06Z18JUL	19.5	115.1	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	-0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
01W00Z	18.9	114.5	30	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	-0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
01W06Z	18.4	113.4	30	18.3	113.6	30.	13.	0.	18.2	112.8	35.	235.	-5.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
01W12Z	18.2	112.3	30	18.3	112.2	30.	8.	0.	18.1	109.0	40.	99.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
01W18Z	18.0	111.2	35	18.2	111.3	35.	13.	0.	18.4	107.9	40.	100.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
01100Z	17.8	110.0	35	18.3	109.4	35.	41.	0.	18.5	105.3	30.	56.	5.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
01106Z	17.7	108.7	40	18.1	109.0	40.	29.	0.	0.0	0.0	0.	-0.	-0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
01112Z	17.7	107.4	40	18.0	107.9	40.	34.	0.	0.0	0.0	0.	-0.	-0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
01118Z	17.7	106.3	40	18.1	106.9	40.	42.	0.	0.0	0.0	0.	-0.	-0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
02100Z	17.6	105.0	25	18.1	106.0	35.	64.	10.	0.0	0.0	0.	-0.	-0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.

	ALL FORECASTS			
	WARNG	24-HR	48-HR	72-HR
AVG FORECAST POSIT ERROR	31.	121.	0.	0.
AVG RIGHT ANGLE ERROR	20.	36.	0.	0.
AVG INTENSITY MAGNITUDE ERROR	1.	3.	0.	0.
AVG INTENSITY BIAS	1.	0.	0.	0.
NUMBER OF FORECASTS	8	4	0	0
		2		

TYPHOON CARMEN

(August)

	BEST TRACK		WARNING				24 HOUR FORECAST				48 HOUR FORECAST				72 HOUR FORECAST			
					ERRORS				ERRORS				ERRORS				ERRORS	
	POSIT	WIND	POSIT	WIND	DST	WIND	POSIT	WIND	DST	WIND	POSIT	WIND	DST	WIND	POSIT	WIND	DST	WIND
810122	16.0	145.5	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
810182	16.4	145.1	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
811002	16.2	144.9	35	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
811062	15.9	144.6	40	15.5	144.3	40.	29.	0.	15.5	142.3	55.	110.	-5.	14.7	139.7	95.	263.	0.	14.4	136.9	70.	392.	0.
811122	15.6	144.4	45	15.7	144.0	45.	24.	0.	15.9	141.7	60.	120.	0.	17.0	139.0	70.	305.	5.	18.5	136.1	75.	453.	5.
811182	15.8	144.4	50	15.8	144.2	45.	11.	-5.	15.8	143.6	60.	192.	5.	16.0	141.4	70.	484.	5.	16.9	139.2	75.	734.	0.
812002	16.1	144.4	55	15.9	144.3	55.	13.	0.	15.8	143.6	65.	288.	5.	16.0	141.4	70.	573.	0.	16.9	139.2	75.	817.	-5.
812062	16.7	143.9	60	16.5	144.0	55.	13.	-5.	18.1	142.6	65.	250.	0.	19.8	140.3	70.	460.	0.	20.7	137.6	75.	680.	-5.
812122	17.4	143.3	60	17.8	143.6	55.	29.	-5.	20.4	141.4	65.	217.	0.	22.0	138.2	70.	389.	0.	22.5	134.7	75.	562.	-5.
812182	18.8	142.4	55	18.5	142.6	55.	21.	0.	20.8	139.5	65.	203.	0.	21.9	136.2	70.	405.	-5.	22.7	132.8	75.	544.	0.
813002	20.0	141.1	60	19.8	141.2	55.	13.	-5.	22.6	138.9	65.	120.	-5.	23.8	132.9	70.	278.	-10.	24.2	128.7	75.	359.	0.
813062	21.1	139.5	65	20.9	139.7	65.	16.	0.	23.5	134.6	70.	75.	0.	24.4	129.6	75.	203.	-5.	25.2	124.6	75.	207.	0.
813122	22.0	137.9	65	22.0	138.0	65.	6.	0.	23.9	132.6	70.	70.	0.	24.8	127.0	75.	172.	-5.	26.5	122.2	75.	142.	0.
813182	22.0	136.4	65	22.8	136.5	65.	13.	0.	24.2	130.8	70.	107.	-5.	25.1	125.2	75.	176.	0.	27.4	120.7	75.	131.	5.
814002	23.4	134.9	70	23.2	134.6	70.	20.	0.	24.7	127.4	70.	128.	-10.	26.8	121.5	75.	151.	0.	0.0	0.0	0.	-0.	0.
814062	24.1	133.4	70	24.2	133.4	70.	6.	0.	26.7	126.4	75.	94.	-5.	30.3	121.2	50.	157.	-25.	0.0	0.0	0.	-0.	0.
814122	25.0	131.9	70	24.9	131.7	70.	12.	0.	27.3	124.9	75.	54.	-5.	31.4	120.1	30.	227.	-45.	0.0	0.0	0.	-0.	0.
814182	25.9	130.2	75	25.8	130.1	70.	8.	-5.	29.0	124.0	75.	66.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
815002	26.5	128.7	80	26.6	128.6	75.	8.	-5.	29.8	122.5	75.	112.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
815062	27.1	127.3	80	27.2	127.2	75.	8.	-5.	29.8	121.6	60.	122.	-15.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
815122	27.5	125.9	80	27.6	125.8	75.	8.	-5.	29.6	120.4	30.	150.	-45.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
815182	28.0	124.6	75	28.0	124.6	75.	0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
816002	28.3	123.8	75	28.3	123.6	75.	11.	0.	29.7	120.3	70.	150.	5.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
816062	28.5	123.4	75	28.5	122.9	75.	26.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
816122	28.7	123.2	75	28.5	122.8	75.	24.	0.	29.7	120.5	50.	140.	-25.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
816182	28.7	122.7	70	28.9	122.8	65.	13.	-5.	29.9	121.0	40.	137.	-15.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
817002	28.2	122.6	65	28.7	122.5	65.	30.	0.	29.4	123.5	60.	30.	10.	32.0	126.0	50.	184.	5.	34.8	129.5	40.	132.	10.
817062	28.3	122.8	60	28.5	122.7	60.	13.	0.	29.5	123.5	55.	84.	5.	32.0	126.0	50.	128.	5.	0.0	0.0	0.	-0.	0.
817122	28.6	123.0	55	28.5	122.8	55.	12.	0.	29.4	123.5	50.	84.	5.	32.1	126.1	45.	49.	0.	0.0	0.0	0.	-0.	0.
817182	28.8	123.3	55	28.6	123.0	55.	20.	0.	29.8	123.9	50.	60.	5.	32.7	126.8	45.	52.	5.	0.0	0.0	0.	-0.	0.
818002	28.8	123.5	50	29.2	123.5	50.	24.	0.	30.6	124.6	45.	84.	0.	33.5	127.7	40.	89.	10.	0.0	0.0	0.	-0.	0.
818062	28.1	123.7	50	28.7	123.6	50.	36.	0.	30.6	124.6	45.	44.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
818122	28.1	124.1	45	28.3	124.0	45.	13.	0.	30.1	125.1	45.	82.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
818182	28.7	124.0	45	28.4	124.1	45.	19.	0.	30.3	125.2	40.	150.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
819002	29.2	124.5	45	29.2	124.2	45.	16.	0.	31.5	125.8	40.	203.	10.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
819062	30.0	125.1	45	29.6	124.7	45.	32.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
819122	31.4	125.6	45	30.6	125.5	45.	48.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
819182	32.9	125.8	40	31.8	126.0	40.	66.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
820002	34.8	126.8	30	34.7	126.4	35.	21.	5.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.

	ALL FORECASTS				TYPHOONS WHILE OVER 35 KTS			
	WARNG	24-HR	48-HR	72-HR	WARNG	24-HR	48-HR	72-HR
AVG FORECAST POSIT ERROR	19.	124.	250.	429.	19.	122.	259.	456.
AVG RIGHT ANGLE ERROR	10.	56.	129.	266.	10.	58.	131.	278.
AVG INTENSITY MAGNITUDE ERROR	1.	6.	7.	3.	1.	6.	7.	2.
AVG INTENSITY BIAS	-1.	-3.	-3.	0.	0.	-3.	-4.	-0.
NUMBER OF FORECASTS	36	30	19	12	35	29	18	11
		12	9	4				

TROPICAL STORM DELLA

(August)

	BEST TRACK		WARNING				24 HOUR FORECAST				48 HOUR FORECAST				72 HOUR FORECAST			
					ERRORS				ERRORS				ERRORS				ERRORS	
	POSIT	WIND	POSIT	WIND	DST	WIND	POSIT	WIND	DST	WIND	POSIT	WIND	DST	WIND	POSIT	WIND	DST	WIND
810002	12.7	128.8	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
810062	13.8	129.5	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
810122	14.8	129.7	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
810182	15.5	129.4	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
811002	16.3	128.7	30	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
811062	17.2	127.8	30	17.1	127.9	30.	8.	0.	19.4	125.2	40.	143.	0.	21.3	122.4	55.	248.	25.	0.0	0.0	0.	-0.	0.
811122	18.3	126.9	30	18.4	127.0	30.	8.	0.	20.8	123.3	50.	96.	5.	22.2	119.1	60.	186.	35.	0.0	0.0	0.	-0.	0.
811182	19.4	126.0	30	19.2	126.2	30.	16.	0.	21.6	122.8	50.	115.	5.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
812002	20.7	125.2	35	20.0	125.2	30.	42.	-5.	22.4	121.0	45.	115.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
812062	21.7	124.5	40	21.9	124.6	40.	13.	0.	26.0	121.0	80.	58.	50.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
812122	22.4	123.4	45	23.4	123.7	45.	62.	0.	27.7	120.4	90.	167.	35.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
812182	23.1	121.5	45	23.1	122.6	45.	60.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
813002	24.1	122.0	45	23.8	121.8	45.	21.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
813062	25.1	120.6	30	25.4	120.5	30.	19.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
813122	25.3	118.8	25	25.5	119.5	25.	40.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.

	ALL FORECASTS			
	WARNG	24-HR	48-HR	72-HR
AVG FORECAST POSIT ERROR	29.	116.	217.	0.
AVG RIGHT ANGLE ERROR	20.	73.	131.	0.
AVG INTENSITY MAGNITUDE ERROR	1.	16.	30.	0.
AVG INTENSITY BIAS	-1.	16.	30.	0.
NUMBER OF FORECASTS	10	6	2	0
		2	1	

TROPICAL DEPRESSION 14

(August)

	BEST TRACK			WARNING		ERRORS		24 HOUR FORECAST		ERRORS		48 HOUR FORECAST		ERRORS		72 HOUR FORECAST		ERRORS	
	POSIT		WIND	POSIT		WIND	DST	WIND	POSIT		WIND	DST	WIND	POSIT		WIND	DST	WIND	POSIT		WIND	DST	WIND
814U0Z	9.0	162.2	10	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
814U6Z	9.8	161.0	10	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
81412Z	10.8	159.6	10	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
814182	11.6	158.6	10	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
815U0Z	12.7	157.5	10	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
815U6Z	13.6	156.7	10	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
815122	14.5	155.8	10	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
815182	15.4	155.0	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
816U0Z	16.1	154.0	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
816U6Z	17.0	153.0	10	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
816122	17.8	152.2	10	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
816182	18.7	151.3	10	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
817U0Z	19.4	150.7	10	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
817U6Z	20.0	150.4	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
817122	20.6	149.9	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
817182	21.3	149.4	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
818U0Z	21.9	148.9	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
818U6Z	23.0	147.5	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
818122	23.9	145.4	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
818182	24.7	143.2	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
819U0Z	25.6	141.1	30	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
819U6Z	26.7	139.1	30	26.7	139.0	30.	5.	0.	30.9	132.4	35.	14?.	10.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
819122	28.0	137.5	30	27.8	137.4	30.	13.	0.	32.2	132.0	35.	190.	15.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
819182	29.4	136.1	30	28.4	135.2	30.	76.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
820U0Z	30.9	135.0	30	31.0	135.1	30.	8.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
820U6Z	32.6	134.5	25	32.3	134.5	25.	18.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
820122	34.6	134.5	20	34.5	133.9	25.	30.	5.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.

	ALL FORECASTS			
	WRNG	24-HR	48-HR	72-HR
AVG FORECAST POSIT ERROR	25.	169.	0.	0.
AVG RIGHT ANGLE ERROR	23.	127.	0.	0.
AVG INTENSITY MAGNITUDE ERROR	1.	13.	0.	0.
AVG INTENSITY BIAS	1.	13.	0.	0.
NUMBER OF FORECASTS	6	2	0	0

0

TYPHOON ELAINE

(August)

	BEST TRACK			WARNING		ERRORS			24 HOUR FORECAST			ERRORS			48 HOUR FORECAST			ERRORS			72 HOUR FORECAST					
	POSIT		WIND	POSIT		WIND	DST	WIND	POSIT		WIND	DST	WIND	POSIT		WIND	DST	WIND	POSIT		WIND	DST	WIND			
818006Z	9.0	135.5	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.			
818006Z	9.5	135.2	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.			
818012Z	10.0	135.0	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.			
818018Z	10.5	134.9	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.			
819006Z	11.0	134.7	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.			
819006Z	11.2	134.4	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.			
819012Z	11.3	134.0	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.			
819018Z	11.5	133.6	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.			
820006Z	11.8	133.0	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.			
820006Z	12.6	132.3	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.			
820012Z	13.4	131.8	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.			
820018Z	14.1	130.9	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.			
821006Z	14.9	130.1	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.			
821006Z	15.7	129.2	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.			
821122Z	16.1	128.2	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.			
821182Z	16.6	127.3	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.			
822006Z	16.9	126.5	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.			
822006Z	17.4	125.8	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.			
822122Z	17.7	125.2	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.			
822182Z	17.9	124.6	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.			
823006Z	18.0	123.8	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.			
823006Z	18.1	123.1	25	18.2	123.2	25.	8.	0.	19.5	120.1	30.	132.	-10.	20.6	117.0	40.	204.	-5.	21.0	113.6	45.	281.	-10.			
823122Z	18.0	122.4	25	18.3	122.3	25.	19.	0.	19.3	119.1	30.	138.	-10.	20.1	115.8	40.	221.	-5.	20.8	112.6	45.	176.	-15.			
823182Z	17.6	121.5	30	18.4	121.4	30.	48.	0.	19.3	118.3	35.	139.	-5.	19.9	115.0	40.	214.	-10.	20.5	111.9	45.	141.	-15.			
824006Z	17.4	120.7	35	17.6	120.3	35.	26.	0.	18.1	117.0	40.	93.	0.	18.8	113.7	45.	195.	-10.	19.4	110.4	50.	141.	-10.			
824006Z	17.3	120.0	40	17.1	119.7	40.	21.	0.	16.8	115.9	45.	118.	0.	16.8	112.6	50.	242.	-5.	17.2	109.4	55.	259.	-10.			
824122Z	17.0	119.3	40	16.9	119.2	40.	8.	0.	16.5	115.4	45.	158.	0.	16.6	111.7	50.	260.	-10.	17.3	108.0	55.	285.	-10.			
824182Z	17.1	119.1	40	16.6	118.8	40.	36.	0.	15.4	116.4	45.	149.	-5.	15.0	112.7	50.	301.	-10.	15.4	109.0	55.	365.	-5.			
825006Z	17.5	118.5	40	17.1	118.8	40.	29.	0.	17.1	118.8	50.	114.	-5.	17.2	117.2	50.	303.	-10.	17.2	115.4	55.	533.	-25.			
825006Z	17.3	117.9	45	17.4	118.1	45.	13.	0.	17.5	117.6	50.	107.	-5.	17.4	115.7	55.	303.	-10.	0.0	0.0	0.	-0.	0.			
825122Z	17.1	118.1	45	17.2	118.1	45.	6.	0.	17.5	117.4	50.	160.	-10.	17.4	115.8	55.	390.	-10.	0.0	0.0	0.	-0.	0.			
825182Z	17.5	117.8	50	17.2	118.1	50.	25.	0.	17.7	117.2	55.	206.	-5.	17.9	115.2	60.	424.	10.	0.0	0.0	0.	-0.	0.			
826006Z	18.1	117.1	55	18.3	116.8	55.	21.	0.	17.9	112.9	65.	136.	5.	17.5	109.5	65.	274.	35.	0.0	0.0	0.	-0.	0.			
826006Z	18.8	116.3	55	18.5	115.7	55.	38.	0.	18.4	111.4	65.	151.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.			
826012Z	19.3	115.3	60	19.3	115.2	60.	6.	0.	21.3	111.6	65.	68.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.			
826018Z	19.8	114.3	60	20.2	114.2	60.	25.	0.	21.6	112.0	65.	183.	15.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.			
827006Z	20.1	112.8	60	20.2	112.9	60.	8.	0.	21.0	108.1	50.	63.	20.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.			
827006Z	20.9	111.6	65	20.7	111.8	65.	12.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.			
827122Z	21.5	110.4	65	21.6	110.8	65.	23.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.			
827182Z	21.5	108.7	50	21.8	109.5	50.	48.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.			
828006Z	21.5	107.1	30	21.7	106.7	30.	25.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.			

	ALL FORECASTS				TYPHOONS WHILE OVER 35 KTS			
	WRNG	24-HR	48-HR	72-HR	WRNG	24-HR	48-HR	72-HR
AVG FORECAST POSIT ERROR	22.	132.	278.	263.	21.	137.	278.	224.
AVG RIGHT ANGLE ERROR	15.	77.	157.	174.	12.	80.	149.	156.
AVG INTENSITY MAGNITUDE ERROR	0.	6.	11.	13.	0.	5.	9.	11.
AVG INTENSITY BIAS	0.	-1.	-3.	-5.	0.	-2.	-7.	-9.
NUMBER OF FORECASTS	20	16	12	8	16	15	11	7
		3	1	6				

TYPHOON FAYE

(August-September)

	BEST TRACK		WARNING				24 HOUR FORECAST				48 HOUR FORECAST				72 HOUR FORECAST			
					ERRORS				ERRORS				ERRORS				ERRORS	
	POSIT	WIND	POSIT	WIND	DST	WIND	POSIT	WIND	DST	WIND	POSIT	WIND	DST	WIND	POSIT	WIND	DST	WIND
825000Z	5.7 160.1	20	0.0 0.0	0.	-0.	0.	0.0 0.0	0.	-0.	0.	0.0 0.0	0.	-0.	0.	0.0 0.0	0.	-0.	0.
825006Z	6.1 158.8	20	0.0 0.0	0.	-0.	0.	0.0 0.0	0.	-0.	0.	0.0 0.0	0.	-0.	0.	0.0 0.0	0.	-0.	0.
825012Z	6.3 157.5	20	0.0 0.0	0.	-0.	0.	0.0 0.0	0.	-0.	0.	0.0 0.0	0.	-0.	0.	0.0 0.0	0.	-0.	0.
825018Z	6.5 156.3	20	0.0 0.0	0.	-0.	0.	0.0 0.0	0.	-0.	0.	0.0 0.0	0.	-0.	0.	0.0 0.0	0.	-0.	0.
826000Z	7.0 155.0	20	0.0 0.0	0.	-0.	0.	0.0 0.0	0.	-0.	0.	0.0 0.0	0.	-0.	0.	0.0 0.0	0.	-0.	0.
826006Z	7.4 153.8	25	0.0 0.0	0.	-0.	0.	0.0 0.0	0.	-0.	0.	0.0 0.0	0.	-0.	0.	0.0 0.0	0.	-0.	0.
826012Z	7.9 152.6	25	0.0 0.0	0.	-0.	0.	0.0 0.0	0.	-0.	0.	0.0 0.0	0.	-0.	0.	0.0 0.0	0.	-0.	0.
826018Z	8.5 151.4	25	0.0 0.0	0.	-0.	0.	0.0 0.0	0.	-0.	0.	0.0 0.0	0.	-0.	0.	0.0 0.0	0.	-0.	0.
827000Z	9.1 150.3	25	0.0 0.0	0.	-0.	0.	0.0 0.0	0.	-0.	0.	0.0 0.0	0.	-0.	0.	0.0 0.0	0.	-0.	0.
827006Z	9.9 149.1	25	0.0 0.0	0.	-0.	0.	0.0 0.0	0.	-0.	0.	0.0 0.0	0.	-0.	0.	0.0 0.0	0.	-0.	0.
827012Z	10.8 148.0	25	0.0 0.0	0.	-0.	0.	0.0 0.0	0.	-0.	0.	0.0 0.0	0.	-0.	0.	0.0 0.0	0.	-0.	0.
827018Z	11.9 147.0	30	0.0 0.0	0.	-0.	0.	0.0 0.0	0.	-0.	0.	0.0 0.0	0.	-0.	0.	0.0 0.0	0.	-0.	0.
828000Z	13.0 146.0	30	12.9 145.9	30.	8.	0.	16.0 143.0	45.	129.	5.	18.4 139.7	55.	410.	10.	21.2 137.2	65.	680.	15.
828006Z	14.0 145.5	30	14.1 145.4	30.	8.	0.	18.3 143.5	45.	100.	5.	22.0 141.8	55.	360.	5.	25.5 140.2	65.	667.	15.
828012Z	15.0 145.2	35	15.0 145.1	35.	6.	0.	17.9 144.0	45.	85.	0.	21.2 142.5	50.	330.	0.	24.6 141.1	55.	600.	5.
828018Z	15.9 145.0	35	16.0 144.8	35.	13.	0.	19.6 142.8	45.	194.	0.	22.4 140.5	50.	499.	0.	25.0 138.1	55.	725.	0.
829000Z	16.8 145.1	40	16.7 144.9	45.	13.	5.	20.3 143.9	55.	181.	10.	23.7 141.7	60.	522.	10.	26.2 138.2	60.	754.	0.
829006Z	17.6 145.1	40	17.7 145.0	45.	8.	5.	21.0 144.0	55.	224.	5.	24.1 141.6	60.	555.	10.	26.3 138.1	60.	727.	-5.
829012Z	18.4 145.4	45	18.3 145.0	45.	23.	0.	21.4 144.3	55.	248.	5.	24.3 142.2	60.	546.	10.	26.7 138.7	60.	682.	-5.
829018Z	19.1 146.2	45	19.0 146.0	45.	32.	0.	23.5 146.5	55.	308.	5.	27.4 145.6	60.	634.	5.	31.4 145.5	60.	777.	-10.
830000Z	19.2 146.9	45	19.9 146.4	45.	50.	0.	23.4 147.8	55.	320.	5.	27.3 147.2	55.	615.	-5.	30.8 147.9	60.	723.	-10.
830006Z	19.2 147.5	50	19.2 147.2	55.	17.	5.	20.4 149.6	65.	172.	15.	23.8 151.0	65.	467.	0.	27.3 150.8	70.	566.	-25.
830012Z	19.0 147.9	50	19.3 148.0	55.	19.	5.	19.9 150.6	65.	196.	15.	21.9 153.6	65.	511.	0.	25.0 155.7	70.	719.	-30.
830018Z	18.7 148.5	50	18.7 148.7	55.	11.	5.	17.8 151.0	65.	183.	10.	17.5 153.1	65.	441.	-5.	17.8 155.1	70.	742.	-30.
831000Z	18.0 148.8	50	17.7 149.2	55.	29.	5.	16.1 150.9	65.	206.	5.	15.8 153.0	65.	500.	-5.	16.7 154.9	70.	831.	-35.
831006Z	17.6 148.7	50	17.7 148.9	55.	13.	5.	15.8 149.7	65.	189.	0.	15.1 151.5	65.	508.	-30.	15.8 153.6	70.	870.	-30.
831012Z	17.3 148.5	50	17.2 148.8	55.	18.	5.	15.3 149.3	65.	230.	0.	14.8 150.0	65.	511.	-35.	14.7 150.8	70.	874.	-25.
831018Z	17.0 147.9	55	17.2 148.1	55.	17.	0.	17.1 146.2	55.	90.	-15.	19.3 144.6	60.	225.	-40.	19.8 143.2	65.	447.	-30.
901000Z	17.0 147.5	60	16.8 147.4	55.	13.	-5.	16.3 145.0	60.	101.	-10.	17.4 142.8	65.	293.	-40.	19.0 141.0	70.	483.	-10.
901006Z	17.1 146.7	65	17.1 146.7	65.	0.	0.	18.0 144.4	70.	120.	-25.	19.2 142.2	75.	250.	-25.	20.7 139.8	80.	438.	-15.
901012Z	17.5 146.0	65	17.5 146.1	65.	4.	0.	18.8 143.6	70.	114.	-30.	20.5 140.7	75.	234.	-20.	21.7 137.6	80.	391.	-15.
901018Z	18.4 145.4	70	18.3 145.2	65.	13.	-5.	20.7 142.2	70.	51.	-30.	22.8 138.1	75.	146.	-20.	24.6 133.9	80.	231.	-25.
902000Z	19.0 144.9	70	19.0 144.8	70.	6.	0.	22.0 142.6	85.	72.	-20.	24.9 141.0	90.	237.	10.	27.5 140.8	95.	325.	-40.
902006Z	20.0 144.2	95	19.8 144.3	95.	13.	0.	22.8 142.1	130.	110.	30.	26.7 140.8	130.	284.	65.	28.5 140.8	130.	249.	-75.
902012Z	20.7 143.5	100	20.8 143.4	100.	8.	0.	24.2 141.2	130.	131.	35.	27.7 140.8	130.	307.	65.	31.0 141.2	130.	249.	-70.
902018Z	21.5 142.5	100	21.5 142.8	105.	17.	5.	25.2 140.4	130.	151.	35.	28.7 140.2	130.	289.	75.	31.9 141.7	130.	245.	-65.
903000Z	22.1 141.3	105	22.2 141.2	110.	8.	5.	25.7 138.5	125.	94.	45.	28.7 138.2	115.	174.	60.	31.4 139.7	105.	105.	-35.
903006Z	22.9 140.1	100	22.8 140.1	110.	6.	10.	26.1 136.8	115.	80.	50.	29.1 136.0	105.	43.	50.	31.7 137.7	95.	112.	-30.
903012Z	24.0 138.8	95	23.6 139.1	110.	29.	15.	27.2 136.2	105.	73.	40.	30.3 136.4	100.	19.	40.	32.4 139.1	95.	127.	-40.
903018Z	25.2 137.6	95	25.1 137.8	100.	12.	5.	29.5 135.7	90.	84.	35.	32.6 137.3	90.	149.	25.	34.4 140.8	85.	236.	-35.
904000Z	26.1 136.8	80	26.1 136.8	80.	0.	0.	30.2 135.2	70.	88.	15.	33.1 137.5	85.	177.	-5.	35.1 142.5	80.	281.	-15.
904006Z	27.0 135.7	65	27.0 135.7	65.	0.	0.	30.6 132.6	60.	157.	5.	34.1 134.4	40.	329.	-25.	0.0 0.0	0.	-0.	0.
904012Z	27.8 135.0	65	28.0 135.1	55.	13.	-10.	32.3 133.9	45.	191.	-15.	36.3 137.5	35.	315.	-20.	0.0 0.0	0.	-0.	0.
904018Z	28.4 134.7	55	28.7 134.5	55.	21.	0.	32.3 133.2	45.	252.	-20.	36.3 137.8	25.	307.	-25.	0.0 0.0	0.	-0.	0.
905000Z	29.1 134.9	55	29.4 134.7	50.	21.	-5.	33.0 134.6	40.	166.	-30.	36.8 146.4	35.	424.	-10.	0.0 0.0	0.	-0.	0.
905006Z	29.6 135.4	55	30.0 135.4	50.	24.	-5.	33.0 140.0	40.	175.	-25.	36.0 147.8	35.	480.	-5.	0.0 0.0	0.	-0.	0.
905012Z	30.0 136.5	60	30.3 135.8	45.	40.	-15.	32.6 140.0	35.	140.	-20.	36.4 147.5	30.	412.	-5.	0.0 0.0	0.	-0.	0.
905018Z	30.1 137.4	65	30.2 137.3	60.	8.	-5.	31.2 142.7	50.	145.	0.	32.8 151.2	40.	485.	5.	0.0 0.0	0.	-0.	0.
906000Z	30.2 138.2	70	30.2 138.2	65.	0.	-5.	31.3 143.2	80.	143.	15.	0.0 0.0	0.	-0.	0.	0.0 0.0	0.	-0.	0.
906006Z	30.2 139.0	65	30.2 139.0	70.	0.	5.	31.0 144.6	55.	180.	15.	0.0 0.0	0.	-0.	0.	0.0 0.0	0.	-0.	0.
906012Z	30.3 139.5	55	30.2 139.8	70.	17.	15.	31.3 145.5	50.	204.	15.	0.0 0.0	0.	-0.	0.	0.0 0.0	0.	-0.	0.
906018Z	30.5 140.0	50	30.2 140.5	65.	31.	15.	31.0 146.1	45.	216.	10.	0.0 0.0	0.	-0.	0.	0.0 0.0	0.	-0.	0.
907000Z	30.7 140.5	45	30.4 140.7	55.	21.	10.	0.0 0.0	0.	-0.	0.	0.0 0.0	0.	-0.	0.	0.0 0.0	0.	-0.	0.
907006Z	30.7 141.1	40	30.8 140.9	45.	12.	5.	0.0 0.0	0.	-0.	0.	0.0 0.0	0.	-0.	0.	0.0 0.0	0.	-0.	0.
907012Z	30.6 141.6	35	30.8 141.5	40.	13.	5.	0.0 0.0	0.	-0.	0.	0.0 0.0	0.	-0.	0.	0.0 0.0	0.	-0.	0.
907018Z	30.6 142.0	35	30.7 142.2	40.	12.	5.	0.0 0.0	0.	-0.	0.	0.0 0.0	0.	-0.	0.	0.0 0.0	0.	-0.	0.

	ALL FORECASTS				TYPHOONS WHILE OVER 35 KTS			
	WRNG	24-HR	48-HR	72-HR	WRNG	24-HR	48-HR	72-HR
AVG FORECAST POSIT ERROR	15.	158.	360.	514.	15.	158.	360.	514.
AVG RIGHT ANGLE ERROR	12.	113.	285.	396.	12.	113.	285.	396.
AVG INTENSITY MAGNITUDE ERROR	4.	17.	21.	26.	5.	17.	21.	26.
AVG INTENSITY BIAS	2.	5.	3.	9.	0.	5.	3.	9.
NUMBER OF FORECASTS	44	40	36	29	42	40	36	29
		10	6	9				

TROPICAL STORM GLORIA

(August-September)

	BEST TRACK			WARNING		ERRORS		24 HOUR FORECAST			ERRORS		48 HOUR FORECAST			ERRORS		72 HOUR FORECAST			ERRORS	
	POSIT		WIND	POSIT		WIND	DST	WIND	POSIT		WIND	DST	WIND	POSIT		WIND	DST	WIND	POSIT		WIND	DST	WIND
826122	20.9	130.4	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
826182	20.9	129.8	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
829002	21.0	129.3	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
829062	21.5	128.5	25	21.3	128.7	30.	16.	5.	22.1	126.9	40.	200.	0.	23.5	122.8	55.	480.	25.	0.0	0.0	0.	-0.	0.
829122	22.2	128.0	30	21.6	128.2	30.	38.	0.	22.3	126.5	40.	210.	0.	23.5	123.8	55.	499.	25.	0.0	0.0	0.	-0.	0.
829182	23.1	128.0	35	22.5	127.4	35.	49.	0.	23.8	125.8	45.	221.	10.	25.1	123.5	55.	510.	30.	0.0	0.0	0.	-0.	0.
830002	23.6	128.3	40	24.2	128.8	40.	36.	0.	27.7	130.7	45.	75.	15.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
830062	24.6	128.5	40	24.6	128.5	40.	0.	0.	27.8	129.8	45.	24.	15.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
830122	25.4	128.6	40	25.2	128.9	40.	20.	0.	28.1	129.9	40.	71.	10.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
830182	26.3	128.8	35	26.4	128.5	35.	17.	0.	30.3	128.8	35.	149.	10.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
831002	27.2	129.4	30	27.5	129.2	30.	21.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
831062	28.0	130.2	30	28.0	130.1	30.	5.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
831122	28.8	131.0	30	28.7	130.8	30.	12.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
831182	29.7	131.6	25	29.5	131.3	30.	20.	5.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.

	ALL FORECASTS			
	WRNG	24-HR	48-HR	72-HR
AVG FORECAST POSIT ERROR	21.	138.	496.	0.
AVG RIGHT ANGLE ERROR	13.	79.	331.	0.
AVG INTENSITY MAGNITUDE ERROR	1.	9.	27.	0.
AVG INTENSITY BIAS	1.	9.	27.	0.
NUMBER OF FORECASTS	11	7	3	0

3 0

TROPICAL STORM HESTER

(August-September)

	BEST TRACK			WARNING		ERRORS		24 HOUR FORECAST			ERRORS		48 HOUR FORECAST			ERRORS		72 HOUR FORECAST			ERRORS	
	POSIT		WIND	POSIT		WIND	DST	WIND	POSIT		WIND	DST	WIND	POSIT		WIND	DST	WIND	POSIT		WIND	DST	WIND
826062	26.8	150.8	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
826122	27.7	150.2	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
826182	28.2	149.8	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
829002	28.9	149.2	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
829062	29.6	149.0	30	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
829122	30.1	149.1	30	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
829182	30.6	149.4	35	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
830002	31.4	149.8	40	31.3	150.3	40.	26.	0.	34.1	153.8	45.	89.	-5.	37.2	158.3	45.	300.	5.	0.0	0.0	0.	-0.	0.
830062	32.2	150.2	45	32.4	150.5	40.	19.	-5.	35.6	154.3	45.	23.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
830122	33.0	150.7	45	33.0	150.8	45.	5.	0.	35.7	153.2	40.	156.	-5.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
830182	33.8	151.4	50	33.6	151.2	45.	16.	-5.	36.0	153.5	45.	315.	5.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
831002	34.6	152.1	50	34.4	152.3	45.	15.	-5.	37.1	155.5	40.	405.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
831062	35.8	153.7	45	35.7	152.9	45.	39.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
831122	37.1	156.0	45	36.6	156.0	45.	30.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
831182	38.7	159.2	40	38.0	158.1	45.	66.	5.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
901002	40.8	162.8	40	39.7	161.6	40.	85.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.

	ALL FORECASTS			
	WRNG	24-HR	48-HR	72-HR
AVG FORECAST POSIT ERROR	34.	198.	300.	0.
AVG RIGHT ANGLE ERROR	17.	28.	52.	0.
AVG INTENSITY MAGNITUDE ERROR	2.	3.	5.	0.
AVG INTENSITY BIAS	-1.	-1.	5.	0.
NUMBER OF FORECASTS	9	5	1	0

2 0

TYPHOON IRMA

(September)

	BEST TRACK		WARNING				24 HOUR FORECAST				48 HOUR FORECAST				72 HOUR FORECAST			
					ERRORS				ERRORS				ERRORS				ERRORS	
	POSIT	WIND	POSIT	WIND	DST	WIND	POSIT	WIND	DST	WIND	POSIT	WIND	DST	WIND	POSIT	WIND	DST	WIND
909122	21.0	123.8	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
909182	21.4	123.3	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
910002	21.4	122.8	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
910062	21.4	122.5	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
910122	21.5	122.2	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
910182	21.6	121.9	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
911002	21.8	121.8	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
911062	22.5	121.8	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
911122	23.2	122.3	30	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
911182	24.1	122.7	30	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
912002	24.9	122.6	35	25.0	122.9	30.	17.	-5.	28.4	124.7	40.	95.	-10.	32.1	127.9	45.	206.	-15.	36.2	133.0	35.	277.	-15.
912062	25.4	123.0	40	25.6	122.8	30.	26.	-10.	28.1	125.4	55.	83.	0.	31.4	127.5	60.	113.	0.	34.9	130.7	50.	43.	10.
912122	25.9	123.5	50	25.8	124.0	45.	28.	-5.	28.7	126.7	55.	92.	0.	31.9	127.8	60.	90.	-5.	35.3	131.3	50.	91.	20.
912182	26.6	123.4	50	26.4	123.4	45.	29.	-5.	29.2	128.2	55.	42.	-5.	32.4	127.3	60.	6.	-5.	35.7	130.9	45.	205.	25.
913002	27.3	123.4	50	27.2	123.2	45.	12.	-5.	30.0	124.1	55.	31.	-5.	33.0	127.2	55.	80.	5.	0.0	0.0	0.	-0.	0.
913062	27.7	123.9	55	27.6	124.0	50.	8.	-5.	30.4	125.4	60.	24.	0.	33.5	128.0	55.	150.	15.	0.0	0.0	0.	-0.	0.
913122	28.3	124.0	55	28.4	124.2	50.	12.	-5.	31.0	126.1	60.	30.	-5.	33.8	129.3	50.	190.	20.	0.0	0.0	0.	-0.	0.
913182	29.1	124.4	60	29.2	124.5	55.	8.	-5.	32.2	126.6	60.	38.	-5.	34.3	130.3	45.	234.	25.	0.0	0.0	0.	-0.	0.
914002	30.0	124.7	60	29.9	124.7	55.	6.	-5.	32.8	126.2	60.	132.	10.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
914062	30.6	125.4	60	30.6	125.2	60.	10.	0.	33.8	127.9	65.	150.	25.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
914122	31.5	126.1	65	31.6	126.0	65.	19.	0.	34.6	129.3	65.	182.	35.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
914182	32.3	127.3	65	32.2	127.0	65.	16.	0.	35.2	130.9	60.	201.	40.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
915002	33.1	128.8	50	33.0	128.7	65.	8.	15.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
915062	34.2	130.9	40	34.2	130.7	50.	10.	10.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
915122	34.7	133.0	30	34.7	133.0	30.	0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
915182	34.9	135.0	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.

	ALL FORECASTS				TYPHOONS WHILE OVER 35 KTS			
	WRNG	24-HR	48-HR	72-HR	WRNG	24-HR	48-HR	72-HR
AVG FORECAST POSIT ERROR	14.	92.	134.	154.	15.	71.	108.	160.
AVG RIGHT ANGLE ERROR	12.	44.	31.	67.	13.	42.	34.	66.
AVG INTENSITY MAGNITUDE ERROR	5.	12.	11.	18.	5.	7.	8.	13.
AVG INTENSITY BIAS	-2.	7.	5.	10.	0.	1.	-1.	-3.
NUMBER OF FORECASTS	15	12	8	4	14	10	6	2
		8	6	4				

TYPHOON JUDY

(September)

	BEST TRACK		WARNING				24 HOUR FORECAST				48 HOUR FORECAST				72 HOUR FORECAST			
					ERRORS				ERRORS				ERRORS				ERRORS	
	POSIT	WIND	POSIT	WIND	DST	WIND	POSIT	WIND	DST	WIND	POSIT	WIND	DST	WIND	POSIT	WIND	DST	WIND
909062	19.5	164.7	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
909122	19.6	163.1	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
909182	19.7	161.5	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
910002	20.0	160.3	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
910062	20.6	159.3	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
910122	21.5	158.3	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
910182	22.2	157.4	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
911002	22.7	155.8	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
911062	23.1	154.3	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
911122	23.3	152.7	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
911182	23.2	151.2	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
912002	23.1	149.9	30	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
912062	23.3	148.9	30	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
912122	23.6	148.0	35	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
912182	24.0	147.4	40	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
913002	24.6	146.7	40	24.6	146.6	50.	5.	10.	26.4	144.3	65.	89.	5.	27.6	141.7	70.	186.	-5.	28.8	139.3	70.	454.	-20.
913062	25.4	146.3	45	25.2	146.2	50.	13.	5.	27.5	144.4	65.	57.	5.	29.6	143.3	70.	79.	-10.	32.2	144.1	70.	234.	-20.
913122	26.3	146.0	50	26.6	146.2	50.	21.	0.	30.0	146.0	70.	102.	5.	32.2	147.6	65.	160.	-20.	33.7	151.7	55.	267.	-35.
913182	27.0	145.5	55	27.2	145.7	55.	16.	0.	30.3	145.0	70.	65.	0.	32.6	147.2	65.	101.	-25.	33.8	150.3	50.	267.	-20.
914002	27.6	145.3	60	27.8	145.4	60.	13.	0.	30.3	145.0	65.	51.	-10.	32.7	147.5	60.	92.	-30.	33.9	153.0	50.	371.	0.
914062	28.3	145.0	60	28.6	145.1	60.	19.	0.	30.5	144.2	65.	8.	-15.	32.7	145.9	55.	156.	-35.	33.9	151.3	40.	544.	0.
914122	28.8	144.6	65	28.4	145.0	65.	32.	0.	30.7	145.4	65.	59.	-20.	31.6	148.8	55.	293.	-35.	0.0	0.0	0.	-0.	0.
914182	29.4	144.3	70	29.3	144.3	65.	6.	-5.	31.4	144.7	65.	65.	-25.	32.7	148.4	50.	357.	-20.	0.0	0.0	0.	-0.	0.
915002	29.8	144.2	75	29.8	144.2	70.	0.	-5.	32.1	145.9	65.	90.	-25.	33.0	151.3	50.	436.	0.	0.0	0.0	0.	-0.	0.
915062	30.6	144.3	80	30.6	144.1	75.	10.	-5.	32.3	147.0	60.	166.	-30.	33.2	152.4	45.	562.	5.	0.0	0.0	0.	-0.	0.
915122	31.4	144.6	85	31.1	144.8	75.	21.	-10.	32.7	148.5	60.	230.	-30.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
915182	32.4	145.2	90	32.3	144.9	90.	16.	0.	35.4	148.3	75.	220.	5.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
916002	33.7	146.1	90	33.4	145.6	90.	31.	0.	36.2	149.2	65.	305.	15.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
916062	35.0	147.4	90	34.9	147.2	90.	11.	0.	38.3	153.4	65.	265.	45.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
916122	36.5	149.2	90	36.6	149.5	90.	16.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
916182	38.2	151.3	70	37.7	150.7	70.	41.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
917002	40.1	153.4	50	40.0	154.0	50.	28.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
917062	42.0	156.6	40	41.9	155.5	40.	49.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.

	ALL FORECASTS				TYPHOONS WHILE OVER 35 KTS			
	WRNG	24-HR	48-HR	72-HR	WRNG	24-HR	48-HR	72-HR
AVG FORECAST POSIT ERROR	19.	127.	242.	346.	19.	127.	242.	346.
AVG RIGHT ANGLE ERROR	12.	51.	131.	185.	12.	51.	131.	185.
AVG INTENSITY MAGNITUDE ERROR	2.	17.	19.	16.	2.	17.	19.	16.
AVG INTENSITY BIAS	-1.	-5.	-18.	-16.	0.	-5.	-18.	-16.
NUMBER OF FORECASTS	18	14	10	6	18	14	10	6
		8	6	3				

TROPICAL STORM KIT

(September)

	BEST TRACK			WARNING		ERRORS			24 HOUR FORECAST			ERRORS			48 HOUR FORECAST			ERRORS			72 HOUR FORECAST				
	POSIT		WIND	POSIT		WIND	DST	WIND	POSIT		WIND	DST	WIND		POSIT		WIND	DST	WIND		POSIT		WIND	DST	WIND
920002	13.6	133.6	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.		0.0	0.0	0.	-0.	0.		0.0	0.0	0.	-0.	0.
920062	13.5	132.5	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.		0.0	0.0	0.	-0.	0.		0.0	0.0	0.	-0.	0.
920122	13.4	131.2	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.		0.0	0.0	0.	-0.	0.		0.0	0.0	0.	-0.	0.
920182	13.4	130.0	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.		0.0	0.0	0.	-0.	0.		0.0	0.0	0.	-0.	0.
921002	13.4	129.0	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.		0.0	0.0	0.	-0.	0.		0.0	0.0	0.	-0.	0.
921062	13.6	128.0	20	13.5	128.6	20.	35.	0.	14.2	126.7	30.	187.	5.		15.0	124.3	40.	497.	10.		15.7	121.1	45.	478.	5.
921122	14.0	127.0	25	13.6	128.1	25.	68.	0.	14.3	126.1	35.	225.	10.		15.2	123.4	40.	461.	5.		15.8	120.3	40.	476.	0.
921182	14.4	125.9	25	13.8	127.6	25.	105.	0.	14.6	125.5	35.	438.	5.		15.4	122.6	40.	461.	5.		16.0	119.4	40.	462.	-10.
922002	14.7	124.9	25	14.8	125.1	25.	13.	0.	16.1	120.9	30.	272.	0.		16.9	117.3	40.	224.	5.		17.4	113.1	45.	136.	-5.
922062	15.1	123.6	25	14.8	123.6	25.	18.	0.	15.8	118.5	30.	177.	0.		15.5	113.8	40.	75.	0.		14.9	109.2	45.	213.	0.
922122	15.5	122.4	25	15.2	122.1	25.	25.	0.	15.8	117.1	40.	102.	5.		15.4	112.8	50.	109.	10.		15.1	108.2	40.	202.	0.
922182	16.3	118.1	30	16.5	119.0	30.	53.	0.	16.7	114.7	40.	84.	5.		16.4	110.1	50.	107.	0.		0.0	0.0	0.	-0.	0.
923002	15.6	116.2	30	17.0	117.3	30.	105.	0.	17.4	113.1	40.	105.	5.		17.4	109.4	50.	87.	0.		17.0	106.1	40.	100.	0.
923062	14.6	115.7	30	14.4	115.0	30.	42.	0.	14.0	110.0	40.	214.	0.		0.0	0.0	0.	-0.	0.		0.0	0.0	0.	-0.	0.
923122	15.3	115.4	35	15.2	115.3	35.	8.	0.	15.3	110.8	50.	131.	10.		0.0	0.0	0.	-0.	0.		0.0	0.0	0.	-0.	0.
923182	15.3	114.6	35	15.3	114.7	35.	6.	0.	15.7	110.6	50.	125.	0.		16.8	106.7	30.	136.	-10.		0.0	0.0	0.	-0.	0.
924002	15.7	113.6	35	15.4	113.5	35.	19.	0.	16.3	109.1	50.	140.	0.		0.0	0.0	0.	-0.	0.		0.0	0.0	0.	-0.	0.
924062	16.3	112.8	40	16.2	112.8	40.	6.	0.	18.1	109.1	50.	49.	5.		19.4	104.7	30.	153.	-10.		0.0	0.0	0.	-0.	0.
924122	17.1	112.1	40	17.1	111.9	40.	11.	0.	19.8	108.7	35.	85.	-5.		0.0	0.0	0.	-0.	0.		0.0	0.0	0.	-0.	0.
924182	17.6	111.5	50	17.8	111.5	50.	12.	0.	20.5	108.9	35.	136.	-5.		0.0	0.0	0.	-0.	0.		0.0	0.0	0.	-0.	0.
925002	18.0	110.8	50	18.1	111.1	50.	18.	0.	20.7	109.3	35.	191.	-5.		0.0	0.0	0.	-0.	0.		0.0	0.0	0.	-0.	0.
925062	18.4	109.9	45	18.4	110.2	45.	17.	0.	20.5	107.0	35.	162.	-5.		0.0	0.0	0.	-0.	0.		0.0	0.0	0.	-0.	0.
925122	18.4	109.0	40	18.3	108.8	40.	13.	0.	19.9	106.8	30.	148.	-5.		0.0	0.0	0.	-0.	0.		0.0	0.0	0.	-0.	0.
925182	18.3	108.3	40	18.8	107.8	40.	41.	0.	0.0	0.0	0.	-0.	0.		0.0	0.0	0.	-0.	0.		0.0	0.0	0.	-0.	0.
926002	18.0	107.5	40	18.3	107.4	40.	19.	0.	0.0	0.0	0.	-0.	0.		0.0	0.0	0.	-0.	0.		0.0	0.0	0.	-0.	0.
926062	17.8	106.8	40	18.3	106.6	40.	32.	0.	0.0	0.0	0.	-0.	0.		0.0	0.0	0.	-0.	0.		0.0	0.0	0.	-0.	0.
926122	17.7	106.0	35	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.		0.0	0.0	0.	-0.	0.		0.0	0.0	0.	-0.	0.

ALL FORECASTS

	WRNG	24-HR	48-HR	72-HR
AVG FORECAST POSIT ERROR	32.	165.	231.	295.
AVG RIGHT ANGLE ERROR	16.	84.	134.	210.
AVG INTENSITY MAGNITUDE ERROR	0.	4.	6.	3.
AVG INTENSITY BIAS	0.	1.	2.	-1.
NUMBER OF FORECASTS	21	18	10	7
		3	6	4

TYPHOON LOLA

(September-October)

	BEST TRACK			WARNING				24 HOUR FORECAST					48 HOUR FORECAST					72 HOUR FORECAST				
						ERRORS					ERRORS					ERRORS					ERRORS	
	POSIT		WIND	POSIT		WIND	DST	WIND	POSIT		WIND	DST	WIND	POSIT		WIND	DST	WIND	POSIT		WIND	DST	WIND
920122	7.6	147.0	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
920218Z	8.5	146.9	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
920300Z	9.2	146.5	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
920306Z	9.8	146.0	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
920312Z	10.0	145.3	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
920318Z	10.1	144.6	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
920400Z	10.3	143.7	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
920406Z	10.4	142.9	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
920412Z	10.5	142.0	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
920418Z	10.7	140.9	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
920500Z	11.0	139.9	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
920506Z	11.4	138.9	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
920512Z	11.7	137.8	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
920518Z	11.9	136.7	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
920600Z	12.1	135.6	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
920606Z	12.2	134.6	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
920612Z	12.3	133.7	25	12.3	133.7	25.	0.	0.	13.8	129.9	35.	115.	5.	15.2	125.6	40.	153.	-5.	16.5	120.9	45.	195.	-5.
920618Z	12.4	132.3	30	12.6	132.6	30.	21.	0.	13.9	128.9	40.	120.	10.	15.4	124.7	45.	148.	0.	16.5	120.0	50.	115.	0.
920700Z	12.3	131.0	30	12.8	131.3	30.	35.	0.	14.0	126.6	40.	100.	5.	15.6	121.0	50.	136.	0.	16.0	116.7	50.	102.	-5.
920706Z	12.2	129.8	30	12.2	129.8	30.	0.	0.	13.2	125.0	45.	83.	5.	14.5	119.8	40.	102.	-10.	14.7	114.8	50.	145.	-5.
920712Z	12.2	128.8	30	12.2	128.9	30.	6.	0.	13.0	125.0	40.	21.	-5.	14.0	121.2	35.	50.	-15.	14.6	117.2	45.	88.	-15.
920718Z	12.1	127.7	30	12.2	127.7	30.	6.	0.	12.7	123.7	35.	30.	-10.	13.5	119.7	40.	75.	-10.	14.9	116.0	50.	84.	-15.
920800Z	12.2	126.8	35	12.2	126.7	35.	6.	0.	13.1	122.6	40.	25.	-10.	14.3	118.3	50.	48.	-5.	16.4	114.5	60.	24.	-5.
920806Z	12.5	125.8	40	12.4	125.8	40.	6.	0.	13.5	121.8	45.	29.	-5.	14.6	117.5	60.	51.	5.	16.7	113.8	70.	18.	5.
920812Z	12.8	124.7	45	12.7	124.6	45.	8.	0.	13.7	120.5	45.	30.	-5.	15.3	116.2	60.	40.	0.	17.6	112.8	70.	54.	0.
920818Z	13.2	123.6	45	13.4	123.4	45.	17.	0.	14.7	119.3	50.	0.	0.	16.5	115.3	65.	31.	0.	19.1	112.1	70.	130.	0.
920900Z	13.5	122.5	50	13.6	122.3	50.	13.	0.	15.1	118.3	65.	0.	10.	17.1	114.4	75.	40.	10.	20.1	111.7	80.	173.	10.
920906Z	13.8	121.4	50	13.8	121.5	50.	13.	0.	14.9	117.6	65.	30.	10.	17.2	114.3	75.	28.	10.	20.1	111.7	80.	152.	5.
920912Z	14.3	120.4	50	14.1	120.4	55.	12.	5.	15.8	116.5	70.	0.	10.	17.7	113.5	75.	42.	5.	20.3	111.6	80.	131.	5.
920918Z	14.7	119.3	50	14.5	119.0	55.	21.	5.	16.9	114.9	70.	63.	5.	19.2	112.1	75.	135.	5.	22.2	111.2	80.	225.	-15.
921000Z	15.1	118.2	55	15.0	117.9	55.	18.	0.	16.9	114.8	70.	25.	5.	19.0	112.2	75.	101.	5.	21.9	111.0	80.	143.	-10.
921006Z	15.4	117.2	55	15.6	117.1	55.	13.	0.	17.4	114.0	70.	30.	5.	19.7	111.7	75.	130.	0.	22.7	110.8	80.	198.	-30.
921012Z	15.9	116.5	60	15.9	116.4	60.	6.	0.	18.2	113.8	75.	74.	5.	20.8	111.9	80.	157.	5.	0.0	0.0	0.	-0.	0.
921018Z	16.3	115.8	65	16.4	115.8	65.	6.	0.	18.7	113.2	75.	90.	5.	21.6	111.9	75.	185.	0.	0.0	0.0	0.	-0.	0.
921100Z	16.5	114.9	65	16.6	114.8	65.	8.	0.	18.3	111.1	75.	111.	5.	19.0	107.0	65.	266.	-5.	0.0	0.0	0.	-0.	0.
921106Z	16.8	114.1	65	16.7	114.4	70.	18.	5.	17.7	111.7	80.	91.	5.	18.7	107.8	65.	191.	-5.	18.8	103.7	30.	323.	-20.
921112Z	17.0	113.5	70	17.2	113.7	75.	17.	5.	18.7	111.0	85.	79.	10.	19.6	107.3	65.	180.	5.	0.0	0.0	0.	-0.	0.
921118Z	17.2	113.2	70	17.2	112.8	75.	34.	5.	18.1	109.0	75.	17.	0.	18.6	105.4	65.	280.	5.	0.0	0.0	0.	-0.	0.
921200Z	17.4	112.8	70	17.2	112.8	75.	17.	5.	17.8	110.7	70.	8.	0.	18.4	108.0	65.	150.	5.	0.0	0.0	0.	-0.	0.
921206Z	17.7	112.6	75	17.6	112.4	75.	13.	0.	18.5	110.4	65.	0.	-5.	19.0	107.5	55.	141.	5.	0.0	0.0	0.	-0.	0.
921212Z	18.2	112.3	75	18.3	112.2	75.	8.	0.	19.5	110.4	65.	13.	5.	21.6	107.9	65.	29.	20.	0.0	0.0	0.	-0.	0.
921218Z	18.5	112.0	75	18.6	112.0	75.	6.	0.	20.2	110.8	65.	40.	5.	21.7	108.0	55.	30.	15.	0.0	0.0	0.	-0.	0.
921300Z	18.9	111.7	70	18.9	111.6	70.	6.	0.	20.5	110.4	65.	45.	5.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
921306Z	19.4	111.1	70	19.2	111.2	70.	13.	0.	21.0	109.4	50.	29.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
921312Z	19.7	110.5	60	19.7	110.4	65.	6.	5.	21.4	108.3	50.	0.	5.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
921318Z	20.1	110.1	60	20.0	110.0	65.	8.	5.	21.8	107.7	45.	21.	5.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
921400Z	20.4	109.6	60	20.2	109.6	60.	12.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
921406Z	20.9	109.0	50	20.7	109.2	55.	16.	5.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
921412Z	21.3	108.3	45	21.6	108.4	50.	19.	5.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
921418Z	21.5	107.5	40	21.7	107.2	40.	21.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.

ALL FORECASTS	WRNG	24-HR	48-HR	72-HR
AVG FORECAST POSIT ERROR	13.	54.	112.	134.
AVG RIGHT ANGLE ERROR	9.	40.	79.	88.
AVG INTENSITY MAGNITUDE ERROR	1.	6.	6.	9.
AVG INTENSITY BIAS	1.	3.	2.	-6.
NUMBER OF FORECASTS	34	30	26	17
		25	24	16

TYPHOONS WHILE OVER 35 KTS	WRNG	24-HR	48-HR	72-HR
	13.	49.	112.	134.
	9.	36.	79.	88.
	2.	5.	8.	9.
	0.	3.	2.	-6.
	28	28	20	17

TYPHOON MAMIE

(September-October)

	BEST TRACK			WARNING		ERRORS			24 HOUR FORECAST		ERRORS			48 HOUR FORECAST		ERRORS			72 HOUR FORECAST		ERRORS		
	POSIT		WIND	POSIT		WIND	DST	WIND	POSIT		WIND	DST	WIND	POSIT		WIND	DST	WIND	POSIT		WIND	DST	WIND
929062	19.1	154.2	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
929062	19.6	153.9	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
929122	19.9	153.3	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
929182	19.8	152.8	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
930002	19.4	152.6	30	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
930062	19.2	153.3	35	19.3	152.4	30.	51.	-5.	19.6	150.9	45.	185.	0.	20.6	147.7	50.	341.	-5.	21.8	144.5	55.	647.	-15.
930122	20.2	153.2	35	19.5	153.0	35.	43.	0.	19.6	152.1	50.	229.	0.	20.0	149.6	60.	413.	0.	20.6	147.4	65.	758.	-5.
930182	20.9	152.9	35	19.6	152.8	35.	78.	0.	19.7	151.9	50.	271.	0.	20.1	149.5	60.	474.	-5.	20.7	147.3	65.	932.	0.
1001002	21.6	152.8	40	21.1	153.1	35.	34.	-5.	23.7	151.9	50.	117.	0.	26.3	150.5	60.	162.	-10.	28.6	148.6	65.	661.	5.
1001062	22.4	152.3	45	22.4	152.3	35.	0.	-10.	26.0	150.7	50.	38.	-5.	29.3	149.4	55.	139.	-15.	32.4	150.4	60.	614.	5.
1001122	23.4	151.5	50	23.5	151.9	40.	23.	-10.	26.9	150.2	50.	5.	-10.	30.0	149.2	60.	234.	-10.	33.3	151.3	60.	722.	15.
1001182	24.1	150.7	50	24.3	150.7	45.	12.	-5.	27.5	148.1	60.	120.	-5.	30.5	148.6	60.	412.	-5.	0.0	0.0	0.	-0.	0.
1002002	24.9	150.2	50	24.7	150.0	50.	16.	0.	27.4	147.8	60.	188.	-10.	30.9	148.4	65.	573.	5.	0.0	0.0	0.	-0.	0.
1002062	25.9	150.0	55	25.8	149.8	50.	12.	-5.	29.2	148.8	60.	169.	-10.	32.5	151.1	60.	584.	5.	0.0	0.0	0.	-0.	0.
1002122	26.9	150.1	60	26.8	150.3	50.	12.	-10.	30.8	151.8	60.	100.	-10.	34.4	155.4	60.	931.	15.	0.0	0.0	0.	-0.	0.
1002182	28.0	150.3	65	27.8	150.7	50.	24.	-15.	31.7	152.8	60.	214.	-5.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1003002	29.0	150.8	70	28.7	150.8	60.	18.	-10.	32.4	153.4	60.	328.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1003062	30.5	151.7	70	30.1	151.6	70.	24.	0.	34.5	156.0	60.	328.	5.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1003122	32.3	152.9	70	31.7	153.0	65.	36.	-5.	36.9	161.0	45.	254.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1003182	34.7	155.1	65	34.7	155.0	65.	5.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1004002	36.6	157.7	60	36.4	157.8	60.	13.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1004062	38.7	160.4	55	38.6	160.2	55.	11.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1004122	40.8	163.2	45	40.2	163.1	40.	36.	-5.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.

	ALL FORECASTS				TYPHOONS WHILE OVER 35 KTS			
	WRNG	24-HR	48-HR	72-HR	WRNG	24-HR	48-HR	72-HR
AVG FORECAST POSIT ERROR	25.	182.	386.	722.	25.	182.	386.	722.
AVG RIGHT ANGLE ERROR	14.	68.	143.	327.	14.	68.	143.	327.
AVG INTENSITY MAGNITUDE ERROR	5.	4.	8.	8.	5.	4.	8.	8.
AVG INTENSITY BIAS	-5.	-4.	-3.	1.	0.	-4.	-3.	1.
NUMBER OF FORECASTS	18	14	10	6	18	14	10	6
		2	2	0				

TROPICAL STORM NINA

(October)

	BEST TRACK			WARNING			24 HOUR FORECAST				48 HOUR FORECAST				72 HOUR FORECAST			
					ERRORS				ERRORS				ERRORS				ERRORS	
	POSIT	VIL		POSIT	WIND	DST	WIND	POSIT	WIND	DST	WIND	POSIT	WIND	DST	WIND	POSIT	WIND	DST	WIND
10060UZ	14.6	141.0	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
10060GZ	15.4	139.4	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
10061ZZ	15.7	137.6	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
10061GZ	16.0	135.9	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
10070UZ	16.0	134.0	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
10070GZ	15.9	132.8	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
10071ZZ	15.7	131.6	30	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
10071GZ	15.4	130.4	30	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
10080UZ	15.2	129.1	30	15.2	129.1	30.	0.	0.	15.4	124.7	45.	70.	0.	16.2	118.4	50.	153.	5.	18.7	115.2	50.	265.	-5.
10080GZ	15.1	128.0	35	15.2	127.9	35.	8.	0.	15.4	123.1	45.	42.	0.	16.2	119.0	40.	106.	-5.	18.2	115.5	50.	199.	-10.
10081ZZ	14.9	126.9	40	15.2	127.0	40.	19.	0.	15.5	122.8	55.	69.	5.	17.2	118.7	50.	159.	0.	19.7	116.4	60.	266.	0.
10081GZ	14.5	125.7	45	15.1	126.0	45.	35.	0.	15.6	121.9	55.	93.	5.	17.5	118.3	50.	188.	-5.	19.9	116.2	60.	273.	0.
10090UZ	14.8	124.7	45	14.8	124.7	45.	0.	0.	16.7	120.9	50.	108.	5.	19.0	117.7	50.	233.	-5.	21.3	114.7	60.	312.	0.
10090GZ	15.2	123.8	45	15.1	123.7	45.	8.	0.	17.1	120.0	45.	143.	0.	19.0	116.9	50.	252.	-10.	20.6	113.7	60.	346.	5.
10091ZZ	15.1	122.7	50	15.3	122.8	50.	13.	0.	17.1	119.2	50.	149.	0.	19.0	116.7	55.	250.	5.	20.7	113.7	70.	342.	15.
10091GZ	15.0	121.5	50	15.2	121.5	50.	12.	0.	17.8	118.7	60.	183.	5.	19.8	116.1	70.	268.	10.	20.6	112.9	75.	369.	20.
10100UZ	14.9	120.7	45	14.7	120.2	50.	31.	5.	14.5	116.2	60.	103.	5.	14.8	112.9	65.	216.	5.	15.6	109.5	75.	397.	20.
10100GZ	14.7	120.0	45	14.7	120.0	50.	0.	5.	14.5	116.2	60.	80.	0.	14.8	112.9	65.	205.	10.	15.6	109.5	75.	397.	20.
10101ZZ	14.6	119.3	50	14.5	119.3	50.	6.	0.	14.4	115.4	60.	140.	0.	15.1	111.3	65.	294.	10.	15.8	107.3	75.	524.	20.
10101GZ	14.7	118.6	55	14.6	118.6	55.	6.	0.	14.8	115.1	65.	115.	5.	15.1	111.1	70.	300.	15.	15.8	107.3	50.	471.	0.
10110UZ	15.1	117.9	55	14.8	117.1	55.	50.	0.	15.8	113.1	65.	203.	5.	16.5	109.0	70.	430.	15.	17.3	105.0	40.	541.	-10.
10110GZ	15.4	117.4	60	15.4	117.2	60.	12.	0.	16.3	114.0	70.	140.	15.	17.3	109.9	75.	389.	20.	18.1	105.8	50.	539.	0.
10111ZZ	15.4	117.6	60	15.4	117.8	55.	12.	-5.	16.2	115.8	70.	59.	15.	17.2	112.7	75.	238.	20.	17.9	109.5	75.	313.	25.
10111GZ	15.4	117.0	60	15.5	117.0	55.	6.	-5.	16.1	114.0	65.	144.	10.	16.8	110.8	70.	270.	20.	17.4	106.8	70.	417.	20.
10120UZ	15.4	116.6	60	15.5	116.5	60.	8.	0.	15.7	113.5	65.	100.	10.	15.8	109.9	65.	312.	15.	16.0	106.2	35.	426.	-15.
10120GZ	15.4	116.4	55	15.3	115.4	60.	56.	5.	15.3	112.5	65.	269.	10.	15.3	108.8	65.	381.	15.	0.0	0.0	0.	-0.	0.
10121ZZ	15.4	116.4	55	15.3	115.9	60.	29.	5.	15.7	114.5	65.	111.	10.	15.9	110.8	65.	261.	15.	16.3	106.9	35.	348.	-10.
10121GZ	15.4	116.4	55	15.3	115.9	60.	29.	5.	15.7	114.2	65.	79.	15.	16.0	110.5	65.	238.	15.	16.3	106.8	35.	357.	-10.
10130UZ	15.4	116.4	55	15.5	116.0	60.	24.	5.	15.6	114.7	50.	59.	0.	16.0	111.0	45.	190.	-5.	16.3	107.3	35.	370.	-5.
10130GZ	15.4	116.4	55	15.5	116.0	55.	24.	0.	15.6	114.7	45.	80.	-5.	16.0	111.0	40.	188.	-10.	16.3	107.3	30.	415.	-5.
10131ZZ	15.4	116.4	55	15.5	116.0	45.	24.	-10.	15.6	114.9	40.	120.	-10.	16.0	111.1	35.	201.	-10.	16.3	107.3	30.	451.	0.
10131GZ	15.5	115.5	50	15.5	115.7	45.	21.	-5.	15.7	114.7	35.	142.	-15.	16.0	110.9	30.	186.	-10.	0.0	0.0	0.	-0.	0.
10140UZ	16.4	115.3	50	16.1	115.0	45.	25.	-5.	16.7	113.5	40.	90.	-10.	17.5	111.5	35.	178.	-5.	0.0	0.0	0.	-0.	0.
10140GZ	17.0	115.2	50	16.8	114.5	45.	42.	-5.	19.1	111.5	45.	59.	-5.	21.7	108.2	35.	247.	0.	0.0	0.0	0.	-0.	0.
10141ZZ	17.6	115.0	50	17.7	115.2	45.	13.	-5.	20.1	113.8	45.	103.	0.	22.8	110.7	30.	140.	0.	0.0	0.0	0.	-0.	0.
10141GZ	18.0	114.1	50	18.1	114.8	45.	40.	-5.	20.1	112.7	45.	49.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
10150UZ	18.3	113.3	50	18.2	113.1	50.	13.	0.	19.3	109.6	40.	100.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
10150GZ	18.8	112.5	50	18.6	112.1	50.	26.	0.	19.8	108.1	35.	209.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
10151ZZ	19.2	112.2	45	19.1	111.9	45.	18.	0.	20.5	108.8	35.	243.	5.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
10151GZ	19.5	112.1	45	19.4	111.6	45.	24.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
10160UZ	20.4	112.2	40	20.3	112.2	35.	6.	-5.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
10160GZ	21.1	112.6	35	21.5	112.6	35.	24.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
10161ZZ	21.6	113.0	30	21.7	113.0	35.	6.	5.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.

	ALL FORECASTS			
	WRNG	24-HR	48-HR	72-HR
AVG FORECAST POSIT ERROR	19.	120.	240.	342.
AVG RIGHT ANGLE ERROR	16.	94.	212.	340.
AVG INTENSITY MAGNITUDE ERROR	2.	5.	10.	10.
AVG INTENSITY BIAS	-0.	3.	5.	3.
NUMBER OF FORECASTS	35	31	27	22
		12	9	4

TYPHOON ORA

(October)

	BEST TRACK			WARNING			24 HOUR FORECAST			48 HOUR FORECAST			72 HOUR FORECAST		
					ERRORS			ERRORS			ERRORS			ERRORS	
	POSIT	WIND	POSIT	WIND	DST	WIND	POSIT	WIND	DST WIND	POSIT	WIND	DST WIND	POSIT	WIND	DST WIND
1008002	11.3 138.6	20	0.0 0.0	0.	-0.	0.	0.0 0.0	0.	-0. 0.	0.0 0.0	0.	-0. 0.	0.0 0.0	0.	-0. 0.
1008062	12.1 138.4	20	0.0 0.0	0.	-0.	0.	0.0 0.0	0.	-0. 0.	0.0 0.0	0.	-0. 0.	0.0 0.0	0.	-0. 0.
1008122	12.9 138.7	20	0.0 0.0	0.	-0.	0.	0.0 0.0	0.	-0. 0.	0.0 0.0	0.	-0. 0.	0.0 0.0	0.	-0. 0.
1008182	13.8 138.6	20	0.0 0.0	0.	-0.	0.	0.0 0.0	0.	-0. 0.	0.0 0.0	0.	-0. 0.	0.0 0.0	0.	-0. 0.
1009002	14.4 137.9	25	0.0 0.0	0.	-0.	0.	0.0 0.0	0.	-0. 0.	0.0 0.0	0.	-0. 0.	0.0 0.0	0.	-0. 0.
1009062	14.4 136.6	25	0.0 0.0	0.	-0.	0.	0.0 0.0	0.	-0. 0.	0.0 0.0	0.	-0. 0.	0.0 0.0	0.	-0. 0.
1009122	14.5 135.4	30	0.0 0.0	0.	-0.	0.	0.0 0.0	0.	-0. 0.	0.0 0.0	0.	-0. 0.	0.0 0.0	0.	-0. 0.
1009182	15.9 134.7	30	0.0 0.0	0.	-0.	0.	0.0 0.0	0.	-0. 0.	0.0 0.0	0.	-0. 0.	0.0 0.0	0.	-0. 0.
1010002	17.2 133.9	35	17.2 133.9	35.	0.	0.	20.7 131.2	30.	115. 0.	24.5 130.1	65.	347. 0.	27.9 132.3	75.	591. -5.
1010062	17.6 132.9	40	17.7 133.8	40.	8.	0.	21.0 130.2	30.	100. 0.	24.9 129.4	65.	369. -5.	28.3 131.9	75.	549. -10.
1010122	17.7 131.5	45	18.9 132.1	40.	74.	0.	22.4 129.0	60.	120. 5.	25.9 128.0	65.	394. -5.	28.9 131.5	75.	507. -5.
1010182	18.8 130.5	45	18.5 130.3	40.	21.	-5.	21.5 126.4	60.	33. 0.	24.3 122.1	65.	123. -10.	26.6 117.6	30.	396. -35.
1011002	19.5 129.6	50	19.3 129.3	40.	21.	-10.	22.0 125.4	60.	51. -5.	24.9 120.9	50.	146. -30.	26.8 116.5	25.	343. -30.
1011062	20.1 128.7	50	20.1 128.8	50.	0.	0.	22.5 125.0	65.	92. -5.	24.8 121.3	45.	102. -40.	26.0 117.0	25.	414. -20.
1011122	20.9 127.4	55	21.0 127.5	50.	8.	-5.	23.5 123.7	65.	100. -5.	25.2 120.7	45.	131. -35.	0.0 0.0	0.	-0. 0.
1011182	21.5 125.8	60	21.3 125.8	55.	12.	-5.	22.8 120.7	60.	107. -15.	23.4 115.9	45.	416. -20.	0.0 0.0	0.	-0. 0.
1012002	21.8 124.5	65	22.0 124.2	60.	20.	-5.	23.2 118.6	50.	225. -30.	23.5 113.6	25.	573. -30.	0.0 0.0	0.	-0. 0.
1012062	22.1 123.4	70	22.3 123.3	65.	13.	-5.	23.5 118.0	50.	209. -35.	0.0 0.0	0.	-0. 0.	0.0 0.0	0.	-0. 0.
1012122	22.1 122.7	70	22.5 122.4	70.	29.	0.	23.3 118.0	50.	294. -30.	0.0 0.0	0.	-0. 0.	0.0 0.0	0.	-0. 0.
1012182	22.3 122.6	75	22.1 122.0	70.	34.	-5.	22.7 119.0	55.	284. -10.	23.5 114.7	65.	767. -10.	0.0 0.0	0.	-0. 0.
1013002	23.1 122.7	80	23.0 123.0	70.	14.	-10.	26.0 125.0	70.	64. 15.	28.8 128.9	55.	84. 20.	0.0 0.0	0.	-0. 0.
1013062	23.9 122.9	85	23.8 122.7	80.	12.	-5.	27.2 124.3	75.	42. 30.	0.0 0.0	0.	-0. 0.	0.0 0.0	0.	-0. 0.
1013122	24.9 123.1	80	24.6 123.1	80.	18.	0.	27.7 125.9	75.	24. 35.	0.0 0.0	0.	-0. 0.	0.0 0.0	0.	-0. 0.
1013182	25.5 123.2	65	25.5 123.2	80.	0.	15.	28.2 127.0	70.	53. 35.	0.0 0.0	0.	-0. 0.	0.0 0.0	0.	-0. 0.
1014002	26.0 123.8	55	26.2 123.7	60.	13.	5.	28.9 127.9	40.	130. 5.	0.0 0.0	0.	-0. 0.	0.0 0.0	0.	-0. 0.
1014062	26.6 124.7	45	26.5 124.4	45.	17.	0.	0.0 0.0	0.	-0. 0.	0.0 0.0	0.	-0. 0.	0.0 0.0	0.	-0. 0.
1014122	27.3 126.0	40	27.1 126.0	40.	12.	0.	0.0 0.0	0.	-0. 0.	0.0 0.0	0.	-0. 0.	0.0 0.0	0.	-0. 0.
1014182	28.2 128.0	35	28.0 127.5	40.	29.	5.	0.0 0.0	0.	-0. 0.	0.0 0.0	0.	-0. 0.	0.0 0.0	0.	-0. 0.
1015002	29.5 130.3	35	29.3 129.8	35.	29.	0.	0.0 0.0	0.	-0. 0.	0.0 0.0	0.	-0. 0.	0.0 0.0	0.	-0. 0.

ALL FORECASTS	WRNG	24-HR	48-HR	72-HR
AVG FORECAST POSIT ERROR	19.	124.	314.	460.
AVG RIGHT ANGLE ERROR	14.	99.	239.	391.
AVG INTENSITY MAGNITUDE ERROR	4.	15.	19.	18.
AVG INTENSITY BIAS	-1.	-1.	-15.	-18.
NUMBER OF FORECASTS	21	17	11	6
		9	5	0

TYPHOONS WHILE OVER 35 KTS	WRNG	24-HR	48-HR	72-HR
	19.	124.	314.	460.
	14.	99.	239.	391.
	4.	15.	19.	18.
	0.	-1.	-15.	-18.
	21	17	11	6

TROPICAL DEPRESSION 26

(October)

	BEST TRACK			WARNING			24 HOUR FORECAST			48 HOUR FORECAST			72 HOUR FORECAST		
					ERRORS			ERRORS			ERRORS			ERRORS	
	POSIT	WIND	POSIT	WIND	DST	WIND	POSIT	WIND	DST WIND	POSIT	WIND	DST WIND	POSIT	WIND	DST WIND
1008182	19.3 163.7	20	0.0 0.0	0.	-0.	0.	0.0 0.0	0.	-0. 0.	0.0 0.0	0.	-0. 0.	0.0 0.0	0.	-0. 0.
1009002	19.9 163.0	20	0.0 0.0	0.	-0.	0.	0.0 0.0	0.	-0. 0.	0.0 0.0	0.	-0. 0.	0.0 0.0	0.	-0. 0.
1009062	20.5 162.6	20	0.0 0.0	0.	-0.	0.	0.0 0.0	0.	-0. 0.	0.0 0.0	0.	-0. 0.	0.0 0.0	0.	-0. 0.
1009122	21.1 162.3	20	0.0 0.0	0.	-0.	0.	0.0 0.0	0.	-0. 0.	0.0 0.0	0.	-0. 0.	0.0 0.0	0.	-0. 0.
1009182	21.5 162.0	25	0.0 0.0	0.	-0.	0.	0.0 0.0	0.	-0. 0.	0.0 0.0	0.	-0. 0.	0.0 0.0	0.	-0. 0.
1010002	21.9 161.6	25	0.0 0.0	0.	-0.	0.	0.0 0.0	0.	-0. 0.	0.0 0.0	0.	-0. 0.	0.0 0.0	0.	-0. 0.
1010062	22.1 161.2	25	0.0 0.0	0.	-0.	0.	0.0 0.0	0.	-0. 0.	0.0 0.0	0.	-0. 0.	0.0 0.0	0.	-0. 0.
1010122	22.1 160.7	25	0.0 0.0	0.	-0.	0.	0.0 0.0	0.	-0. 0.	0.0 0.0	0.	-0. 0.	0.0 0.0	0.	-0. 0.
1010182	22.1 159.9	25	0.0 0.0	0.	-0.	0.	0.0 0.0	0.	-0. 0.	0.0 0.0	0.	-0. 0.	0.0 0.0	0.	-0. 0.
1011002	22.0 158.8	25	22.2 158.4	25.	25.	0.	22.9 156.6	35.	114. 5.	0.0 0.0	0.	-0. 0.	0.0 0.0	0.	-0. 0.
1011062	22.0 157.6	25	22.0 159.0	25.	78.	0.	22.5 156.5	35.	305. 5.	0.0 0.0	0.	-0. 0.	0.0 0.0	0.	-0. 0.
1011122	22.1 156.1	25	22.0 157.8	25.	94.	0.	22.5 154.9	35.	298. 10.	0.0 0.0	0.	-0. 0.	0.0 0.0	0.	-0. 0.
1011182	22.0 154.4	25	22.2 155.1	25.	45.	0.	23.6 151.2	35.	154. 15.	0.0 0.0	0.	-0. 0.	0.0 0.0	0.	-0. 0.
1012002	23.4 152.6	30	23.5 152.5	30.	8.	0.	0.0 0.0	0.	-0. 0.	0.0 0.0	0.	-0. 0.	0.0 0.0	0.	-0. 0.
1012062	23.7 151.1	30	24.1 151.0	30.	25.	0.	0.0 0.0	0.	-0. 0.	0.0 0.0	0.	-0. 0.	0.0 0.0	0.	-0. 0.
1012122	24.2 149.8	25	24.1 149.8	25.	6.	0.	0.0 0.0	0.	-0. 0.	0.0 0.0	0.	-0. 0.	0.0 0.0	0.	-0. 0.
1012182	24.8 148.7	20	0.0 0.0	0.	-0.	0.	0.0 0.0	0.	-0. 0.	0.0 0.0	0.	-0. 0.	0.0 0.0	0.	-0. 0.

ALL FORECASTS	WRNG	24-HR	48-HR	72-HR
AVG FORECAST POSIT ERROR	40.	218.	0.	0.
AVG RIGHT ANGLE ERROR	10.	22.	0.	0.
AVG INTENSITY MAGNITUDE ERROR	0.	9.	0.	0.
AVG INTENSITY BIAS	0.	9.	0.	0.
NUMBER OF FORECASTS	7	4	0	0
		0		

TROPICAL DEPRESSION 27

(October)

	BEST TRACK			WARNING		ERRORS		24 HOUR FORECAST		ERRORS		48 HOUR FORECAST		ERRORS		72 HOUR FORECAST		ERRORS	
	POSIT		WIND	POSIT		WIND	DST	WIND	POSIT		WIND	DST	WIND	POSIT		WIND	DST	WIND	POSIT		WIND	DST	WIND
1010002	5.6	153.4	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1010062	6.0	152.7	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1010122	6.4	151.8	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1010182	6.8	150.9	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1011002	7.3	149.9	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1011062	7.8	149.0	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1011122	8.2	147.9	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1011182	8.5	146.8	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1012002	8.7	145.7	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1012062	9.0	144.6	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1012122	9.6	142.6	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1012182	9.7	140.7	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1013002	10.0	139.1	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1013062	10.4	137.7	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1013122	11.0	136.4	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1013182	11.5	135.3	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1014002	12.1	134.5	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1014062	12.6	133.5	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1014122	13.2	132.6	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1014182	13.7	131.8	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1015002	14.1	131.1	20	14.3	131.0	20.	13.	0.	16.5	127.8	30.	137.	10.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1015062	14.6	130.4	20	14.8	130.2	20.	17.	0.	17.1	127.0	30.	184.	15.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1015122	15.0	130.2	20	15.3	129.3	20.	55.	0.	17.5	126.5	30.	205.	15.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1015182	15.5	130.1	20	15.9	128.7	20.	84.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1016002	15.9	130.1	20	16.3	129.4	20.	47.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1016062	16.3	130.1	15	16.5	130.0	15.	13.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1016122	16.7	130.0	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.

ALL FORECASTS	WRNG	24-HR	48-HR	72-HR
AVG FORECAST POSIT ERROR	38.	175.	0.	0.
AVG RIGHT ANGLE ERROR	30.	168.	0.	0.
AVG INTENSITY MAGNITUDE ERROR	0.	13.	0.	0.
AVG INTENSITY BIAS	0.	13.	0.	0.
NUMBER OF FORECASTS	6	3	0	0

TYPHOON PHYLLIS

(October) LINE FOR 33⅓% REDUCTION

	BEST TRACK			WARNING		ERRORS			24 HOUR FORECAST		ERRORS			48 HOUR FORECAST		ERRORS			72 HOUR FORECAST				
	POSIT		WIND	POSIT		WIND	DST	WIND	POSIT		WIND	DST	WIND	POSIT		WIND	DST	WIND	POSIT		WIND	DST	WIND
1013122	7.6	165.5	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1013182	8.6	165.6	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1014002	9.5	164.5	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1014062	10.5	164.1	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1014122	11.6	163.7	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1014182	12.6	163.2	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1015002	13.6	162.6	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1015062	14.6	162.2	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1015122	14.5	161.6	25	14.7	161.5	25.	13.	0.	17.2	158.4	30.	95.	-10.	18.8	154.5	40.	157.	-15.	19.8	150.5	45.	277.	-45.
1015182	15.0	161.2	25	14.9	161.1	25.	8.	0.	17.1	158.3	30.	62.	-15.	18.8	154.9	40.	87.	-25.	19.8	150.5	45.	287.	-45.
1016002	15.6	160.7	30	15.6	160.6	30.	6.	0.	17.5	158.2	35.	40.	-15.	19.4	154.8	40.	47.	-30.	20.2	150.7	45.	285.	-50.
1016062	16.0	160.2	40	16.2	160.2	40.	12.	0.	18.3	157.9	50.	48.	-5.	20.1	154.6	55.	41.	-30.	20.6	150.3	60.	312.	-35.
1016122	16.2	159.7	40	15.7	159.5	40.	32.	0.	17.8	156.5	50.	46.	-5.	19.0	153.0	55.	172.	-35.	19.1	148.7	60.	448.	-35.
1016182	16.4	159.1	45	16.4	159.2	45.	6.	0.	17.5	156.5	60.	90.	-5.	18.7	153.5	65.	195.	-25.	19.1	149.3	70.	428.	-25.
1017002	16.9	158.5	50	16.8	158.5	50.	6.	0.	17.9	156.0	60.	104.	-10.	19.0	152.8	65.	235.	-30.	19.6	148.6	70.	441.	-20.
1017062	17.5	157.9	55	17.3	157.9	55.	12.	0.	18.8	155.5	65.	90.	-20.	20.1	152.0	65.	245.	-30.	20.7	147.8	70.	437.	-15.
1017122	18.2	157.2	55	18.0	156.8	55.	26.	0.	19.7	153.6	65.	119.	-25.	20.6	149.5	65.	365.	-30.	20.7	145.2	70.	569.	-10.
1017182	19.1	156.4	65	18.8	156.3	65.	19.	0.	20.5	152.4	80.	172.	-10.	20.6	148.2	80.	432.	-15.	20.6	143.9	80.	639.	0.
1018002	19.6	155.6	70	19.7	155.6	70.	6.	0.	21.5	152.2	80.	181.	-15.	21.9	147.8	85.	412.	-5.	22.0	143.2	85.	637.	5.
1018062	20.3	155.3	85	20.3	155.3	85.	0.	0.	23.6	154.9	95.	66.	0.	26.6	156.9	95.	176.	10.	29.3	161.2	85.	406.	10.
1018122	20.9	155.3	90	21.1	155.3	90.	12.	0.	24.7	155.9	95.	98.	0.	28.0	159.6	85.	327.	5.	30.4	165.5	75.	554.	5.
1018182	21.5	155.3	90	21.6	155.3	90.	6.	0.	25.0	156.0	90.	92.	-5.	28.2	159.9	80.	343.	0.	30.5	166.0	70.	452.	5.
1019002	22.1	155.4	95	22.1	155.4	95.	0.	0.	25.1	156.7	85.	115.	-5.	27.8	160.5	70.	373.	-10.	29.4	166.6	50.	375.	-10.
1019062	22.6	155.5	95	22.7	155.5	95.	6.	0.	25.5	157.0	85.	140.	0.	28.0	160.9	70.	385.	-5.	0.0	0.0	0.	-0.	0.
1019122	23.1	155.6	95	23.1	155.7	95.	11.	0.	25.7	157.3	85.	160.	5.	28.2	161.2	70.	335.	0.	0.0	0.0	0.	-0.	0.
1019182	23.6	155.3	95	23.7	155.9	95.	33.	0.	26.4	158.1	85.	220.	5.	28.7	163.0	65.	324.	0.	0.0	0.0	0.	-0.	0.
1020002	24.1	154.9	90	24.3	155.5	90.	35.	0.	27.6	156.4	75.	157.	-5.	29.8	161.2	50.	189.	-10.	0.0	0.0	0.	-0.	0.
1020062	24.6	154.5	85	24.6	154.4	85.	5.	0.	27.6	152.9	75.	44.	0.	31.0	157.4	50.	422.	0.	0.0	0.0	0.	-0.	0.
1020122	25.4	154.2	80	25.5	154.2	80.	6.	0.	29.3	154.4	70.	27.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1020182	26.1	153.9	80	26.0	154.0	80.	8.	0.	29.8	154.4	65.	154.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1021002	27.1	153.5	80	27.0	153.5	80.	6.	0.	31.0	154.0	60.	348.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1021062	28.0	153.6	75	28.4	152.6	75.	58.	0.	33.9	154.8	55.	461.	5.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1021122	29.2	154.9	70	28.8	153.8	70.	62.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1021182	30.7	157.2	65	29.6	155.8	65.	98.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1022002	32.9	160.5	60	31.4	158.8	60.	124.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1022062	35.4	164.0	50	35.5	164.1	50.	8.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.

	ALL FORECASTS				TYPHOONS WHILE OVER 35 KTS			
	WRNG	24-HR	48-HR	72-HR	WRNG	24-HR	48-HR	72-HR
AVG FORECAST POSIT ERROR	22.	132.	263.	436.	24.	132.	264.	436.
AVG RIGHT ANGLE ERROR	13.	86.	198.	377.	14.	86.	198.	377.
AVG INTENSITY MAGNITUDE ERROR	0.	7.	16.	21.	0.	7.	16.	21.
AVG INTENSITY BIAS	0.	-6.	-14.	-18.	0.	-6.	-14.	-18.
NUMBER OF FORECASTS	28	24	20	15	25	24	20	15
		12	8	3				

SUPER TYPHOON RITA

(October)

	BEST TRACK			WARNING			ERRORS		24 HOUR FORECAST			ERRORS		48 HOUR FORECAST			ERRORS		72 HOUR FORECAST			
	POSIT		WIND	POSIT		WIND	DST	WIND	POSIT		WIND	DST	WIND	POSIT		WIND	DST	WIND	POSIT		WIND	DST	WIND
101500Z	10.0	185.4	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
101506Z	9.7	184.4	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
101512Z	9.5	183.4	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
101518Z	9.3	182.5	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
101600Z	9.1	181.6	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
101606Z	8.9	180.6	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
101612Z	9.0	179.7	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
101618Z	9.1	179.1	30	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
101700Z	9.3	178.5	30	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
101706Z	9.7	177.5	30	9.8	177.3	30.	13.	0.	10.0	173.8	40.	31.	5.	10.3	170.2	50.	100.	10.	10.6	166.7	60.	230.	-15.
101712Z	10.0	176.5	30	10.1	176.8	30.	19.	0.	11.0	173.8	45.	96.	10.	11.8	170.2	50.	172.	5.	12.0	166.5	60.	310.	-20.
101718Z	10.3	175.4	30	10.2	175.4	30.	6.	0.	11.0	171.8	45.	41.	10.	11.8	167.8	55.	113.	-5.	12.6	163.3	65.	231.	-25.
101800Z	10.5	174.3	30	10.4	174.8	30.	30.	0.	11.1	171.4	45.	82.	5.	12.0	167.4	55.	171.	-20.	12.8	163.5	65.	326.	-40.
101806Z	10.7	173.3	35	10.7	173.3	35.	0.	0.	11.6	169.3	50.	39.	10.	12.5	165.3	60.	150.	-15.	12.7	161.3	70.	241.	-35.
101812Z	10.7	172.2	35	10.9	172.3	35.	13.	0.	11.8	168.4	50.	71.	5.	12.5	164.4	60.	193.	-20.	13.0	160.5	70.	311.	-35.
101818Z	10.9	171.1	35	11.0	171.1	35.	6.	0.	11.9	167.1	55.	74.	-5.	12.8	163.2	65.	226.	-25.	13.1	159.3	70.	305.	-40.
101900Z	11.1	170.0	40	11.0	170.0	40.	6.	0.	11.9	166.0	50.	91.	-25.	11.7	162.1	55.	235.	-50.	12.5	158.1	70.	280.	-45.
101906Z	11.3	168.7	40	11.3	168.8	40.	6.	0.	11.9	164.3	50.	90.	-25.	12.7	160.0	55.	210.	-50.	13.6	156.0	70.	253.	-55.
101912Z	11.3	167.3	45	11.2	167.8	40.	19.	-5.	12.1	163.2	55.	117.	-25.	13.0	158.9	60.	226.	-45.	13.7	154.5	70.	230.	-60.
101918Z	11.5	165.9	60	11.5	166.1	45.	12.	-15.	12.3	161.3	55.	116.	-35.	13.4	156.6	65.	184.	-45.	14.6	152.0	70.	214.	-70.
102000Z	11.6	164.5	75	11.7	164.3	70.	13.	-5.	12.5	158.7	65.	74.	-20.	14.2	153.3	95.	180.	-20.	15.6	147.9	100.	242.	-45.
102006Z	11.6	162.8	75	11.7	162.8	75.	6.	0.	12.4	157.3	65.	74.	-20.	13.8	151.5	95.	139.	-30.	14.8	146.2	100.	192.	-50.
102012Z	11.7	161.2	80	11.8	161.3	75.	8.	-5.	12.8	155.2	85.	97.	-20.	14.1	149.0	95.	176.	-35.	15.5	144.0	100.	219.	-50.
102018Z	11.5	159.5	90	11.6	159.4	80.	8.	-10.	12.7	153.2	90.	122.	-20.	13.9	147.2	95.	213.	-45.	15.3	141.5	100.	232.	-45.
102100Z	11.4	158.1	105	11.4	158.2	95.	6.	-10.	11.7	152.5	115.	66.	0.	13.4	147.0	125.	142.	-20.	14.1	141.3	135.	128.	-5.
102106Z	11.3	156.7	105	11.4	156.8	100.	8.	-5.	12.0	151.2	120.	74.	-5.	13.7	145.7	125.	145.	-25.	14.1	140.1	135.	102.	-10.
102112Z	11.2	155.5	105	11.2	155.4	105.	6.	0.	12.3	149.9	120.	87.	-10.	13.8	144.5	125.	114.	-25.	14.2	138.9	135.	118.	-10.
102118Z	11.1	154.5	110	11.1	154.5	105.	0.	-5.	12.4	149.0	115.	93.	-25.	13.7	144.4	120.	112.	-25.	14.2	138.9	130.	222.	-15.
102200Z	11.2	153.5	115	11.1	153.3	110.	13.	-5.	11.9	148.9	115.	25.	-30.	12.8	144.0	120.	176.	-20.	13.2	140.1	125.	397.	-25.
102206Z	11.4	152.3	125	11.3	152.3	120.	6.	-5.	12.1	147.9	135.	53.	-15.	12.9	143.5	140.	212.	-5.	13.3	139.0	145.	460.	-10.
102212Z	11.6	151.2	130	11.5	151.0	125.	13.	-5.	12.4	146.2	135.	50.	-15.	13.1	141.5	140.	223.	-5.	13.6	136.7	145.	447.	-5.
102218Z	11.6	150.0	140	11.7	150.3	130.	19.	-10.	12.4	144.1	135.	148.	-10.	13.2	141.2	140.	339.	-5.	13.7	136.2	145.	540.	0.
102300Z	11.6	148.6	145	11.6	148.5	135.	6.	-10.	12.2	143.3	145.	94.	5.	12.9	138.1	150.	280.	0.	13.6	132.9	150.	453.	10.
102306Z	11.7	147.1	150	11.9	147.1	140.	12.	-10.	12.5	142.1	150.	120.	5.	13.2	137.0	155.	344.	0.	13.9	131.9	160.	482.	25.
102312Z	12.1	145.4	150	12.0	145.7	145.	19.	-5.	12.8	140.0	150.	135.	5.	13.6	134.0	160.	291.	10.	14.8	128.0	160.	323.	35.
102318Z	12.0	143.6	145	12.3	143.7	140.	19.	-5.	13.1	138.8	135.	85.	-10.	13.4	130.3	135.	198.	-10.	14.0	124.4	130.	198.	15.
102400Z	12.0	141.7	140	11.8	141.9	140.	17.	0.	11.5	134.9	135.	110.	-15.	11.7	128.4	135.	240.	-5.	13.0	122.4	130.	261.	55.
102406Z	12.4	139.9	145	12.1	140.1	140.	21.	-5.	12.0	133.2	135.	134.	-20.	12.0	126.7	135.	216.	0.	13.5	120.5	120.	226.	55.
102412Z	12.6	137.7	145	12.4	137.8	140.	13.	-5.	12.5	129.5	135.	91.	-15.	13.2	121.8	120.	102.	-5.	14.9	115.2	120.	178.	65.
102418Z	12.7	135.4	145	12.5	135.1	140.	21.	-5.	12.5	126.8	135.	72.	-10.	13.8	119.3	120.	150.	5.	15.3	112.5	120.	251.	65.
102500Z	12.7	133.3	150	13.0	133.0	145.	25.	-5.	13.8	124.3	145.	50.	5.	15.0	117.1	100.	174.	25.	17.1	111.7	100.	218.	50.
102506Z	12.9	131.1	155	12.9	131.0	145.	6.	-10.	13.9	122.6	100.	71.	-35.	14.8	115.7	100.	192.	35.	17.7	110.7	100.	268.	50.
102512Z	13.4	129.0	150	13.1	129.1	145.	19.	-5.	13.9	120.7	100.	116.	-25.	15.1	114.0	100.	226.	45.	17.4	108.7	100.	354.	50.
102518Z	13.7	126.9	145	13.6	126.7	140.	13.	-5.	14.1	118.4	100.	105.	-15.	15.2	111.5	100.	305.	45.	15.3	105.8	35.	490.	-10.
102600Z	14.1	125.1	140	13.8	125.1	140.	18.	0.	14.3	118.0	90.	104.	15.	15.2	111.9	100.	225.	50.	15.5	105.7	40.	435.	0.
102606Z	14.6	123.6	135	14.7	123.3	135.	18.	0.	16.1	116.3	110.	120.	45.	17.3	110.2	100.	293.	50.	19.4	104.4	40.	539.	5.
102612Z	14.8	122.4	125	14.7	122.2	135.	13.	10.	15.4	116.3	110.	91.	55.	16.8	110.3	110.	259.	60.	18.4	104.2	40.	471.	10.
102618Z	15.4	121.3	115	15.3	121.5	120.	13.	5.	15.9	117.5	110.	100.	55.	16.3	112.0	110.	104.	65.	17.1	106.9	60.	310.	35.
102700Z	16.5	119.7	75	16.4	119.8	95.	8.	20.	17.0	112.9	100.	150.	50.	17.4	108.0	100.	339.	60.	0.0	0.0	0.	-0.	0.
102706Z	16.7	118.4	65	16.8	118.0	90.	24.	25.	17.0	111.3	100.	229.	50.	18.1	106.4	70.	401.	35.	0.0	0.0	0.	-0.	0.
102712Z	17.0	117.4	55	16.9	117.0	75.	24.	20.	17.0	111.0	100.	187.	50.	18.0	106.7	80.	348.	35.	0.0	0.0	0.	-0.	0.
102718Z	17.2	116.4	55	17.1	116.5	65.	8.	10.	18.0	112.0	85.	190.	20.	18.2	107.0	90.	367.	25.	0.0	0.0	0.	-0.	0.
102800Z	16.7	115.5	50	17.2	115.2	65.	34.	15.	17.9	110.5	55.	240.	15.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
102806Z	16.8	115.3	50	16.8	115.8	50.	29.	0.	16.3	114.5	45.	187.	10.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
102812Z	16.4	114.8	50	16.4	114.9	50.	6.	0.	15.6	112.6	45.	154.	15.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
102818Z	15.7	114.3	45	16.1	114.3	45.	24.	0.	15.1	111.1	40.	184.	15.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
102900Z	14.7	113.2	40	15.3	114.0	40.	58.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
102906Z	14.2	112.1	35	14.5	112.7	35.	39.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
102912Z	13.7	110.8	30	13.8	111.2	30.	24.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
102918Z	12.5	109.4	25	12.8	109.4	25.	18.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.

	ALL FORECASTS			
	WRNG	24-HR	48-HR	72-HR
AVG FORECAST POSIT ERROR	15.	107.	214.	301.
AVG RIGHT ANGLE ERROR	10.	60.	114.	157.
AVG INTENSITY MAGNITUDE ERROR	5.	19.	26.	32.
AVG INTENSITY BIAS	-1.	0.	0.	-5.
NUMBER OF FORECASTS	51	47	43	39
		27	21	22

	TYPHOONS WHILE OVER 35 KTS			
	WRNG	24-HR	48-HR	72-HR
	15.	106.	207.	296.
	10.	60.	103.	145.
	6.	20.	29.	32.
	0.	-0.	-1.	-6.
	45	45	41	37

TROPICAL STORM TESS

(November)

	BEST TRACK			WARNING		ERRORS		24 HOUR FORECAST		ERRORS		48 HOUR FORECAST		ERRORS		72 HOUR FORECAST			
	POSIT		WIND	POSIT		WIND	DST	WIND	POSIT		WIND	DST	WIND	POSIT		WIND	DST	WIND	POSIT		WIND	DST	WIND
1031002	13.8	147.5	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1031062	13.9	146.8	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1031122	14.0	146.4	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1031182	14.1	146.0	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1101002	14.4	145.6	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1101062	14.6	145.2	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1101122	14.8	144.9	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1101182	15.2	144.5	25	15.4	142.7	25.	104.	0.	15.9	140.7	40.	287.	5.	17.3	138.2	50.	497.	0.	19.8	135.5	60.	725.	0.
1102002	15.9	144.2	30	15.5	144.2	30.	24.	0.	16.0	143.3	40.	191.	0.	17.3	140.8	50.	397.	-5.	19.2	138.7	60.	638.	0.
1102062	16.8	144.4	30	16.4	144.0	30.	33.	0.	18.4	143.7	40.	132.	-5.	21.1	143.4	50.	203.	-5.	23.8	143.8	60.	324.	0.
1102122	17.6	144.6	30	17.4	144.1	30.	31.	0.	19.8	144.1	40.	123.	-5.	22.5	144.2	50.	174.	-10.	25.8	145.7	60.	262.	0.
1102182	18.4	145.0	35	18.6	145.0	30.	12.	-5.	21.3	145.8	40.	68.	-10.	24.5	148.0	50.	24.	-10.	27.7	151.7	60.	106.	0.
1103002	18.4	145.5	40	18.8	145.1	35.	33.	-5.	21.0	146.2	45.	21.	-10.	24.0	148.1	50.	84.	-10.	26.8	151.0	55.	241.	-5.
1103062	18.8	146.0	45	19.0	145.8	45.	16.	0.	21.3	146.5	55.	33.	0.	24.2	148.3	65.	158.	5.	27.0	151.2	75.	325.	15.
1103122	19.5	146.3	45	19.6	146.3	45.	6.	0.	22.3	148.2	55.	69.	-5.	25.3	150.9	65.	176.	5.	28.3	154.3	70.	316.	15.
1103182	20.3	146.4	50	19.9	146.8	50.	33.	0.	21.7	148.5	65.	156.	5.	24.3	150.5	70.	306.	10.	0.0	0.0	0.	-0.	0.
1104002	21.2	146.5	55	21.3	146.8	55.	18.	0.	25.5	148.8	65.	38.	5.	30.0	152.6	70.	47.	10.	0.0	0.0	0.	-0.	0.
1104062	22.1	146.9	55	22.0	147.9	55.	56.	0.	26.1	148.9	65.	42.	5.	30.4	153.2	70.	98.	10.	0.0	0.0	0.	-0.	0.
1104122	23.1	147.3	60	23.0	147.8	55.	18.	-5.	27.1	149.6	65.	62.	5.	31.4	154.3	70.	166.	15.	0.0	0.0	0.	-0.	0.
1104182	24.2	147.7	60	24.2	147.7	60.	0.	0.	28.4	150.9	60.	61.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1105002	25.4	148.1	60	25.4	148.4	60.	16.	0.	29.3	151.7	60.	88.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1105062	26.8	148.8	60	26.7	148.7	60.	8.	0.	31.0	151.8	55.	120.	-5.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1105122	28.1	149.9	60	27.9	149.2	60.	39.	0.	31.7	153.0	55.	214.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1105182	29.4	151.1	60	28.8	150.7	60.	41.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1106002	30.7	152.2	60	30.3	152.5	55.	28.	-5.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1106062	31.9	153.9	60	32.3	154.4	55.	35.	-5.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1106122	33.1	156.9	55	33.5	157.1	50.	26.	-5.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.

	ALL FORECASTS			
	WRNG	24-HR	48-HR	72-HR
AVG FORECAST POSIT ERROR	29.	108.	194.	367.
AVG RIGHT ANGLE ERROR	21.	53.	127.	237.
AVG INTENSITY MAGNITUDE ERROR	2.	4.	8.	4.
AVG INTENSITY BIAS	-2.	-1.	1.	3.
NUMBER OF FORECASTS	20	16	12	8
		9	8	3

TROPICAL DEPRESSION 32

(November)

	BEST TRACK			WARNING		ERRORS		24 HOUR FORECAST		ERRORS		48 HOUR FORECAST		ERRORS		72 HOUR FORECAST			
	POSIT		WIND	POSIT		WIND	DST	WIND	POSIT		WIND	DST	WIND	POSIT		WIND	DST	WIND	POSIT		WIND	DST	WIND
1115182	15.3	130.1	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1116002	15.3	129.8	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1116062	15.3	129.5	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1116122	15.3	129.2	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1116182	15.3	128.9	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1117002	15.3	128.5	25	16.0	130.0	25.	96.	0.	17.3	130.2	30.	210.	5.	19.5	132.9	35.	530.	10.	21.4	138.2	35.	973.	20.
1117062	15.3	128.2	25	16.3	130.0	25.	119.	0.	17.3	130.2	30.	249.	5.	19.5	132.8	35.	556.	15.	0.0	0.0	0.	-0.	0.
1117122	15.2	128.0	25	17.0	128.9	25.	119.	0.	18.5	127.2	30.	248.	5.	20.0	125.2	35.	390.	15.	0.0	0.0	0.	-0.	0.
1117182	15.1	127.6	25	17.4	128.6	25.	149.	0.	19.1	126.9	30.	296.	5.	21.1	126.9	35.	491.	15.	0.0	0.0	0.	-0.	0.
1118002	15.0	127.3	25	14.6	126.8	25.	37.	0.	14.5	125.5	20.	38.	-5.	14.0	123.5	15.	38.	0.	0.0	0.0	0.	-0.	0.
1118062	14.7	126.8	25	14.6	126.8	25.	6.	0.	14.4	125.2	20.	42.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1118122	14.4	126.5	25	14.6	126.8	25.	21.	0.	14.3	124.6	20.	48.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1118182	14.2	126.1	25	14.4	126.4	25.	21.	0.	14.0	124.2	20.	40.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1119002	13.9	125.7	25	14.3	125.8	25.	25.	0.	13.8	123.4	20.	25.	5.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1119062	13.7	125.2	20	13.8	125.2	25.	6.	5.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1119122	13.5	124.6	20	13.5	124.6	25.	0.	5.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1119182	13.4	123.9	20	13.5	123.9	20.	6.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1120002	13.4	123.3	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.

	ALL FORECASTS			
	WRNG	24-HR	48-HR	72-HR
AVG FORECAST POSIT ERROR	50.	133.	401.	973.
AVG RIGHT ANGLE ERROR	33.	108.	349.	871.
AVG INTENSITY MAGNITUDE ERROR	1.	3.	11.	20.
AVG INTENSITY BIAS	1.	2.	11.	20.
NUMBER OF FORECASTS	12	9	5	1
		5	1	0

TYPHOON VIOLA

(November)

	BEST TRACK			WARNING				24 HOUR FORECAST				48 HOUR FORECAST				72 HOUR FORECAST			
						ERRORS				ERRORS				ERRORS				ERRORS	
	POSIT		WIND	POSIT		WIND	DST	WIND	POSIT		WIND	DST	WIND	POSIT		WIND	DST	WIND	POSIT		WIND	DST	WIND
1110Z00	3.6	155.0	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1110Z06	4.9	154.3	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1110Z12	5.6	153.3	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1110Z18	6.0	152.0	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1111Z00	6.6	151.8	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1111Z06	8.0	149.9	30	8.1	149.9	30.	6.	0.	10.7	147.4	40.	0[illegible]	-5.	12.3	140.3	50.	82.	0.	12.8	135.1	60.	10[illegible]	-15.
1111Z12	8.7	148.5	35	8.5	148.8	30.	21.	-5.	10.8	144.5	45.	8[illegible]	0.	12.1	139.9	50.	121.	-5.	12.5	135.1	60.	15[illegible]	-25.
1111Z18	9.1	147.1	40	9.1	147.1	35.	0.	-5.	11.5	141.9	45.	13[illegible]	-5.	12.5	137.2	55.	60.	-5.	14.3	133.7	65.	74.	-35.
1112Z00	9.4	145.6	40	9.5	145.7	40.	8.	0.	11.7	140.2	45.	12[illegible]	-5.	13.2	135.2	55.	84.	-10.	16.6	131.8	65.	101.	-50.
1112Z06	10.0	144.5	45	9.5	144.8	45.	42.	0.	11.2	138.2	60.	7[illegible]	10.	13.0	132.5	65.	190.	-10.	13.9	128.4	70.	385.	-50.
1112Z12	10.9	143.1	45	10.7	143.8	45.	13.	0.	12.6	137.4	60.	39[illegible]	5.	14.2	131.7	65.	187.	-20.	15.1	126.0	70.	343.	-55.
1112Z18	11.3	141.8	50	11.5	141.4	50.	26.	0.	13.1	135.6	60.	102[illegible]	0.	14.5	129.7	65.	255.	-35.	15.4	123.7	70.	424.	-55.
1113Z00	11.7	140.4	50	11.7	140.4	50.	0.	0.	13.3	135.0	60.	92[illegible]	-5.	14.7	129.0	70.	263.	-45.	15.6	122.8	75.	436.	-65.
1113Z06	12.2	138.9	50	12.2	139.0	50.	6.	0.	13.8	133.1	60.	145[illegible]	-15.	15.0	127.2	70.	320.	-50.	16.1	121.2	80.	482.	-55.
1113Z12	12.9	138.0	55	12.5	137.9	50.	25.	-5.	14.4	132.3	60.	150[illegible]	-25.	15.3	126.1	70.	334.	-55.	16.2	120.5	80.	500.	-50.
1113Z18	13.5	137.3	60	13.7	136.8	60.	31.	0.	16.0	131.9	75.	124[illegible]	-25.	16.3	126.5	80.	254.	-45.	16.3	120.0	80.	557.	-40.
1114Z00	13.8	136.5	65	14.5	135.9	60.	54.	-5.	16.7	131.2	75.	132[illegible]	-40.	17.1	125.4	80.	266.	-40.	17.6	119.3	90.	603.	-35.
1114Z06	14.5	135.5	75	14.6	135.6	70.	8.	-5.	16.1	132.7	90.	13[illegible]	-30.	16.9	124.5	100.	127.	-15.	17.2	115.4	100.	418.	20.
1114Z12	15.1	134.8	85	15.2	134.6	70.	13.	-15.	16.8	131.5	90.	11[illegible]	-35.	17.5	128.4	100.	155.	-10.	17.6	124.2	100.	526.	30.
1114Z18	15.5	134.0	100	15.5	134.0	85.	0.	-15.	17.1	130.7	95.	17[illegible]	-30.	17.5	127.4	105.	218.	5.	17.5	123.3	105.	640.	45.
1115Z00	15.9	133.4	115	16.1	133.1	100.	21.	-15.	17.8	129.9	120.	30[illegible]	0.	18.4	126.6	120.	242.	30.	18.7	122.4	130.	741.	80.
1115Z06	16.3	132.6	120	16.4	132.4	115.	13.	-5.	18.0	129.1	130.	60[illegible]	15.	18.5	125.8	135.	344.	55.	18.8	121.6	135.	883.	95.
1115Z12	16.8	131.7	125	16.6	131.6	120.	13.	-5.	17.9	127.8	130.	139[illegible]	20.	18.6	123.9	135.	499.	65.	0.0	0.0	0.	-0.	0.
1115Z18	17.4	130.8	125	17.2	130.7	120.	13.	-5.	18.3	126.7	130.	190[illegible]	30.	18.8	122.8	135.	612.	75.	0.0	0.0	0.	-0.	0.
1116Z00	18.3	129.9	120	18.3	129.7	120.	11.	5.	19.5	125.8	130.	227[illegible]	35.	19.7	122.5	135.	705.	85.	0.0	0.0	0.	-0.	0.
1116Z06	19.0	129.1	115	19.1	129.3	115.	13.	0.	21.4	127.8	95.	144[illegible]	15.	23.3	130.4	75.	324.	35.	0.0	0.0	0.	-0.	0.
1116Z12	20.1	128.3	110	19.9	128.2	110.	13.	0.	22.6	128.6	90.	167[illegible]	20.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1116Z18	21.0	128.5	100	21.2	128.4	105.	13.	5.	23.6	131.3	90.	58[illegible]	30.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1117Z00	21.7	129.1	95	21.7	128.9	100.	11.	5.	24.3	131.5	90.	130[illegible]	40.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1117Z06	22.7	130.0	80	22.3	129.7	95.	29.	15.	24.8	132.6	80.	186[illegible]	40.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1117Z12	23.7	131.0	70	23.9	131.3	90.	20.	20.	0.0	0.0	0.	-0[illegible]	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1117Z18	24.6	131.9	60	24.7	132.7	75.	44.	15.	0.0	0.0	0.	-0[illegible]	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1118Z00	25.2	133.8	50	25.5	133.5	50.	24.	0.	0.0	0.0	0.	-0[illegible]	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1118Z06	25.4	135.9	40	25.4	135.0	40.	49.	0.	0.0	0.0	0.	-0[illegible]	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.

	ALL FORECASTS			
	WRNG	24-HR	48-HR	72-HR
AVG FORECAST POSIT ERROR	19.	96.	269.	434.
AVG RIGHT ANGLE ERROR	10.	51.	172.	338.
AVG INTENSITY MAGNITUDE ERROR	5.	19.	33.	46.
AVG INTENSITY BIAS	-1.	2.	0.	-14.
NUMBER OF FORECASTS	29	25	21	17
		13	8	4

	TYPHOONS WHILE OVER 35 KTS			
	WRNG	24-HR	48-HR	72-HR
	19.	96.	269.	434.
	10.	51.	172.	338.
	5.	19.	33.	46.
	0.	2.	0.	-14.
	28	25	21	17

TROPICAL STORM WINNIE

(November)

	BEST TRACK			WARNING				24 HOUR FORECAST				48 HOUR FORECAST				72 HOUR FORECAST			
						ERRORS				ERRORS				ERRORS				ERRORS	
	POSIT		WIND	POSIT		WIND	DST	WIND	POSIT		WIND	DST	WIND	POSIT		WIND	DST	WIND	POSIT		WIND	DST	WIND
1125Z12	9.4	147.7	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0[illegible]	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1125Z18	9.7	147.7	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0[illegible]	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1126Z00	10.0	147.8	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0[illegible]	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1126Z06	10.4	147.9	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0[illegible]	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1126Z12	10.6	148.3	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0[illegible]	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1126Z18	10.8	148.7	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0[illegible]	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1127Z00	10.9	149.2	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0[illegible]	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1127Z06	11.6	149.5	30	11.7	149.5	30.	6.	0.	12.5	147.2	45.	21[illegible]	10.	13.4	144.9	55.	562.	0.	0.0	0.0	0.	-0.	0.
1127Z12	12.6	149.0	30	12.0	149.1	30.	36.	0.	12.9	146.9	45.	287[illegible]	5.	13.6	144.5	55.	688.	0.	0.0	0.0	0.	-0.	0.
1127Z18	13.7	148.4	30	12.6	148.7	30.	68.	0.	13.4	146.4	45.	364[illegible]	0.	14.1	144.0	55.	851.	5.	0.0	0.0	0.	-0.	0.
1128Z00	14.7	147.8	35	14.9	147.7	35.	13.	0.	20.2	147.3	50.	80[illegible]	-5.	24.8	150.5	90.	355.	20.	0.0	0.0	0.	-0.	0.
1128Z06	16.0	147.5	35	15.7	147.4	35.	19.	0.	19.4	147.1	50.	180[illegible]	-5.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1128Z12	17.7	146.8	40	16.8	147.3	40.	61.	0.	20.5	147.4	50.	244[illegible]	-5.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1128Z18	19.5	146.4	45	19.1	145.9	45.	37.	0.	24.7	147.5	50.	240[illegible]	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1129Z00	20.7	146.2	55	21.2	146.3	55.	30.	0.	27.6	150.3	45.	294[illegible]	5.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1129Z06	22.5	147.4	55	22.4	146.6	55.	45.	0.	0.0	0.0	0.	-0[illegible]	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1129Z12	24.3	149.0	55	24.0	148.2	50.	47.	-5.	0.0	0.0	0.	-0[illegible]	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1129Z18	26.4	151.7	50	26.5	151.5	50.	12.	0.	0.0	0.0	0.	-0[illegible]	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1130Z00	28.4	155.8	40	28.2	155.3	45.	29.	5.	0.0	0.0	0.	-0[illegible]	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.

	ALL FORECASTS			
	WRNG	24-HR	48-HR	72-HR
AVG FORECAST POSIT ERROR	34.	238.	614.	0.
AVG RIGHT ANGLE ERROR	16.	81.	274.	0.
AVG INTENSITY MAGNITUDE ERROR	1.	4.	6.	0.
AVG INTENSITY BIAS	0.	1.	6.	0.
NUMBER OF FORECASTS	12	8	4	0
		1	0	

2. NORTH INDIAN OCEAN CYCLONE TRACK DATA

TC18-78

(MAY)

	BEST TRACK			WARNING		ERRORS		24 HOUR FORECAST			ERRORS		48 HOUR FORECAST			ERRORS		72 HOUR FORECAST			ERRORS	
	POSIT		WIND	POSIT		WIND	DST	WIND	POSIT		WIND	DST	WIND	POSIT		WIND	DST	WIND	POSIT		WIND	DST	WIND
513Z	10.5	88.9	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
518Z	10.8	89.1	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
600Z	11.1	89.2	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
606Z	11.4	89.4	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
612Z	11.6	89.5	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
618Z	12.0	89.6	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
700Z	12.3	89.6	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
706Z	12.5	89.7	30	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
712Z	12.7	89.8	30	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
718Z	13.2	90.1	30	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
800Z	14.1	90.1	35	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
806Z	14.9	90.0	35	15.7	92.6	35.	157.	0.	17.7	93.4	40.	120.	-5.	19.2	94.4	45.	78.	5.	0.0	0.0	0.	-0.	0.
812Z	16.9	89.8	35	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
818Z	16.8	90.2	40	16.5	90.0	35.	21.	-5.	18.7	91.1	40.	108.	-20.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
900Z	17.7	90.6	40	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
906Z	18.4	91.3	45	18.4	91.4	35.	6.	-10.	21.0	94.4	40.	30.	10.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
912Z	18.5	92.1	50	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
918Z	18.9	93.0	60	19.5	92.8	35.	38.	-25.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1000Z	19.7	93.8	45	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1006Z	20.5	94.5	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.

ALL FORECASTS

	WRNG	24-HR	48-HR	72-HR
AVG FORECAST POSIT ERROR	55.	88.	78.	0.
AVG RIGHT ANGLE ERROR	51.	41.	45.	0.
AVG INTENSITY MAGNITUDE ERROR	10.	12.	5.	0.
AVG INTENSITY BIAS	-10.	-5.	5.	0.
NUMBER OF FORECASTS	4	3	1	0

TC19-78

(OCTOBER)

	BEST TRACK			WARNING		ERRORS		24 HOUR FORECAST			ERRORS		48 HOUR FORECAST			ERRORS		72 HOUR FORECAST			ERRORS	
	POSIT		WIND	POSIT		WIND	DST	WIND	POSIT		WIND	DST	WIND	POSIT		WIND	DST	WIND	POSIT		WIND	DST	WIND
1024Z	8.5	96.9	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1030Z	9.6	95.4	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1036Z	10.7	93.8	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1042Z	11.8	92.2	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1048Z	12.8	91.0	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1054Z	13.5	90.0	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1100Z	14.2	89.1	30	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1106Z	15.0	88.5	30	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1112Z	15.6	87.9	35	15.7	87.3	35.	35.	0.	18.4	84.0	35.	193.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1118Z	16.5	87.4	35	16.7	87.2	35.	17.	0.	19.7	83.9	40.	237.	-15.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1200Z	17.2	87.1	35	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1206Z	17.9	87.0	35	17.8	86.0	35.	57.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1212Z	18.6	87.4	35	18.5	86.9	35.	29.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1218Z	19.4	88.1	35	19.4	88.7	35.	34.	0.	21.1	93.4	40.	170.	-5.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1300Z	20.0	89.0	40	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1306Z	20.8	89.8	40	21.0	90.6	40.	46.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1312Z	21.8	90.3	35	22.2	90.4	25.	25.	-10.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1318Z	22.7	90.7	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.

ALL FORECASTS

	WRNG	24-HR	48-HR	72-HR
AVG FORECAST POSIT ERROR	35.	203.	0.	0.
AVG RIGHT ANGLE ERROR	25.	183.	0.	0.
AVG INTENSITY MAGNITUDE ERROR	1.	7.	0.	0.
AVG INTENSITY BIAS	-1.	-7.	0.	0.
NUMBER OF FORECASTS	7	3	0	0

TC20-78

(NOVEMBER)

	BEST TRACK			WARNING		ERRORS		24 HOUR FORECAST		ERRORS		48 HOUR FORECAST		ERRORS		72 HOUR FORECAST		ERRORS	
	POSIT		WIND	POSIT		WIND	DST	WIND	POSIT		WIND	DST	WIND	POSIT		WIND	DST	WIND	POSIT		WIND	DST	WIND
1103082	9.5	80.8	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1103142	9.8	79.9	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1103202	10.1	78.8	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1104022	10.2	77.9	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1104082	10.4	76.9	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1104142	10.5	76.0	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1104202	10.6	75.0	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1105022	10.6	74.3	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1105082	10.6	73.5	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1105142	10.7	72.9	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1105202	10.9	72.3	30	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1106022	11.3	71.9	30	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1106082	11.9	71.3	35	11.0	72.0	35.	68.	0.	11.6	69.6	45.	213.	-5.	12.4	67.2	95.	334.	-20.	0.0	0.0	0.	-0.	0.
1106142	12.5	70.3	35	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1106202	13.0	69.3	40	12.1	70.3	40.	79.	0.	13.4	67.4	50.	183.	-10.	14.5	64.8	90.	249.	-20.	0.0	0.0	0.	-0.	0.
1107022	13.6	68.3	45	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1107082	14.2	67.1	50	13.5	67.3	50.	43.	0.	15.3	64.2	70.	93.	-5.	16.0	62.1	70.	221.	-10.	0.0	0.0	0.	-0.	0.
1107142	14.7	66.1	55	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1107202	15.4	65.0	60	15.2	65.5	60.	31.	0.	18.2	62.8	70.	13.	+10.	20.9	60.9	70.	100.	-5.	0.0	0.0	0.	-0.	0.
1108022	16.0	64.2	70	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1108082	16.7	63.5	75	16.9	62.8	75.	42.	0.	19.0	57.7	70.	263.	+10.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1108142	17.4	62.9	75	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1108202	18.1	62.6	80	17.5	61.5	90.	72.	10.	19.0	57.5	70.	313.	-5.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1109022	18.9	62.4	80	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1109082	19.7	62.3	80	19.2	62.0	90.	34.	10.	21.8	62.4	80.	67.	20.	23.9	65.6	75.	120.	35.	0.0	0.0	0.	-0.	0.
1109142	20.3	62.4	75	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1109202	20.9	62.7	75	21.7	63.2	85.	55.	10.	24.2	67.7	60.	175.	10.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1110022	21.5	63.1	65	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1110082	21.9	63.6	60	22.3	64.1	75.	37.	15.	24.9	69.5	30.	162.	+10.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1110142	22.3	64.4	55	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1110202	22.5	65.1	50	23.5	66.8	65.	78.	15.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1111022	22.7	66.3	45	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1111082	22.9	67.5	40	22.6	66.5	40.	58.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1111142	23.0	68.4	35	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
1111202	23.0	69.3	20	23.1	70.2	25.	50.	5.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.

ALL FORECASTS

	WRNG	24-HR	48-HR	72-HR
AVG FORECAST POSIT ERROR	54.	165.	205.	0.
AVG RIGHT ANGLE ERROR	25.	101.	102.	0.
AVG INTENSITY MAGNITUDE ERROR	5.	9.	18.	0.
AVG INTENSITY BIAS	5.	-3.	-4.	0.
NUMBER OF FORECASTS	12	9	5	0

	BEST TRACK			WARNING					24 HOUR FORECAST					48 HOUR FORECAST					72 HOUR FORECAST				
						ERRORS					ERRORS					ERRORS					ERRORS		
	POSIT		WIND	POSIT		WIND	DST	WIND	POSIT		WIND	DST	WIND	POSIT		WIND	DST	WIND	POSIT		WIND	DST	WIND
111920Z	8.0	90.9	30	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
112000Z	7.9	90.3	35	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
112006Z	7.8	89.8	40	8.0	90.5	40.	43.	0.	8.2	88.5	60.	67.	10.	8.9	85.3	70.	120.	0.	0.0	0.0	0.	-0.	0.
112012Z	7.8	89.4	40	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
112018Z	7.5	88.9	40	8.5	88.8	40.	6n.	0.	9.3	85.5	60.	150.	5.	9.8	81.5	75.	232.	-5.	0.0	0.0	0.	-0.	0.
112100Z	7.5	88.4	45	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
112106Z	7.4	87.7	50	7.7	88.0	50.	25.	0.	7.8	84.7	60.	51.	-10.	7.2	79.9	50.	160.	-40.	0.0	0.0	0.	-0.	0.
112112Z	7.2	87.1	50	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
112118Z	7.0	86.5	55	7.3	86.7	55.	21.	0.	7.0	83.5	65.	30.	-15.	6.7	78.7	50.	158.	-20.	0.0	0.0	0.	-0.	0.
112200Z	7.0	85.9	60	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
112206Z	6.9	85.2	70	6.7	85.0	60.	17.	-10.	6.2	81.8	70.	76.	+20.	5.5	77.1	65.	251.	15.	0.0	0.0	0.	-0.	0.
112212Z	6.8	84.7	75	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
112218Z	6.9	84.1	80	6.7	84.1	65.	12.	-15.	6.4	81.4	70.	116.	0.	6.0	76.6	65.	253.	35.	0.0	0.0	0.	-0.	0.
112300Z	7.0	83.5	85	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
112306Z	7.2	82.6	90	7.6	83.0	75.	27.	-15.	6.3	80.4	65.	179.	15.	6.0	76.6	80.	344.	50.	0.0	0.0	0.	-0.	0.
112312Z	7.5	81.8	80	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
112318Z	8.2	80.9	70	7.6	81.1	70.	38.	0.	7.9	78.3	60.	152.	30.	8.6	75.5	60.	283.	25.	0.0	0.0	0.	-0.	0.
112400Z	8.8	80.2	55	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
112406Z	9.1	79.3	50	8.5	79.0	65.	5n.	15.	8.8	77.1	60.	226.	30.	9.0	74.0	70.	400.	35.	0.0	0.0	0.	-0.	0.
112412Z	9.4	78.3	40	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
112418Z	10.2	77.2	30	9.4	77.8	35.	59.	5.	10.7	74.4	45.	147.	-10.	13.0	71.3	35.	105.	10.	0.0	0.0	0.	-0.	0.
112500Z	10.8	75.6	30	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
112506Z	11.3	74.3	30	11.7	74.5	40.	27.	10.	14.2	71.4	50.	61.	15.	16.5	69.9	60.	133.	40.	0.0	0.0	0.	-0.	0.
112512Z	11.8	73.4	30	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
112518Z	12.3	72.5	35	11.7	72.3	45.	38.	10.	13.4	69.2	60.	58.	35.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
112600Z	12.7	71.8	35	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
112606Z	13.2	71.2	35	13.0	70.7	55.	31.	20.	15.5	68.1	60.	45.	40.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
112612Z	13.6	70.5	30	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
112618Z	14.1	69.9	25	14.1	70.2	55.	17.	30.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
112700Z	14.5	69.1	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
112706Z	14.8	68.4	20	14.6	68.6	35.	17.	15.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
112712Z	15.0	67.8	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.

	ALL FORECASTS			
	WRNG	24-HR	48-HR	72-HR
AVG FORECAST POSIT ERROR	31.	104.	213.	0.
AVG RIGHT ANGLE ERROR	18.	62.	147.	0.
AVG INTENSITY MAGNITUDE ERROR	10.	18.	25.	0.
AVG INTENSITY BIAS	5.	10.	13.	0.
NUMBER OF FORECASTS	16	13	11	0

ANNEX B — TROPICAL CYCLONE FIX DATA

1. WESTERN NORTH PACIFIC CYCLONE FIX DATA

NOTE 1: FIXES PRECEDED BY AN ASTERISK (*) WERE NOT CONSIDERED REPRESENTATIVE AND WERE NOT USED IN DETERMINING BEST TRACK.

NOTE 2: UNDER "SITE" COLUMN, ICAO IDENTIFIER IS INDICATED WITH THE EXCEPTION OF FLEET WEATHER FACILITY, SUITLAND WHICH IS ENCODED "FWFS".

TROPICAL STORM NADINE

SATELLITE FIXES

FIX NO.	TIME (Z)	FIX POSITION	ACCRY	DVORAK CODE	SAT	COMMENTS	SITE
* 1	052019	5.0N 170.0E		T1.0	GOES2	INITIAL OBS	PHNL
2	061239	7.7N 164.9E	PCN 6		DMSP36		PGTW
3	062043	8.5N 165.9E	PCN 6	T2.0/2.0-	DMSP36	INITIAL OBS	PGTW
4	062133	8.6N 165.3E	PCN 5		NOAA6		PGTW
5	071009	8.5N 162.9E	PCN 6		NOAA6	POORLY DEFINED	PGTW
6	071221	9.5N 163.2E	PCN 6		DMSP35		PGTW
7	071221	9.3N 163.5E	PCN 6		DMSP35		KGWC
8	072026	10.2N 159.0E	PCN 6	T1.0/1.0 /W1.0/24HRS	DMSP36		PGTW
9	072245	9.9N 160.5E	PCN 5		NOAA6		PGTW
10	080103	10.1N 158.4E	PCN 6		DMSP35		PGTW
11	080908	9.0N 161.7E	PCN 6		DMSP36	CI SAME	PGTW
12	080925	9.0N 161.6E	PCN 6		NOAA6		PGTW
13	081204	9.5N 161.3E	PCN 6		DMSP35		KGWC
14	082008	9.9N 163.1E	PCN 6	T1.0/1.0 /S0.0/24HRS	DMSP36		PGTW
15	082157	10.1N 162.9E	CONF 1	T1.5/1.5 /D1.5/24HRS	NOAA6	INITIAL OBS	FWFS
16	082201	10.1N 163.0E	PCN 5		NOAA6		PGTW
17	090046	11.1N 162.7E	PCN 5		DMSP36		PGTW
18	090345	10.6N 161.1E	CONF 2		NOAA6		FWFS
19	090850	10.1N 161.5E	PCN 6		DMSP36		KGWC
20	090851	10.6N 161.7E	PCN 6		DMSP36	CI SAME	PGTW
21	091038	10.3N 161.5E	PCN 5		NOAA6		PGTW
22	091328	10.6N 161.5E	PCN 6		DMSP36		PGTW
23	091951	11.0N 161.3E	PCN 6	T1.0/1.0	DMSP36	INITIAL OBS	KGWC
24	091951	10.6N 161.9E	PCN 6		DMSP36	EDGE OF DATA	PGTW
25	092117	10.8N 161.0E	PCN 5	T1.0/1.0 /S0.0/25HRS	NOAA6	INITIAL OBS	PGTW
26	092309	11.1N 161.8E	CONF 1	T2.5/2.5 /D1.0/23HRS	NOAA6		FWFS
27	100028	11.2N 161.6E	PCN 6		DMSP35		PGTW
28	100933	12.6N 160.7E	PCN 6		DMSP36		KGWC
29	100834	12.2N 160.8E	PCN 6		DMSP36	CI UP	PGTW
30	100954	12.5N 160.9E	PCN 5		NOAA6		PGTW
31	101310	13.2N 160.5E	PCN 4		DMSP35		PGTW
32	102115	13.8N 160.1E	PCN 6	T1.0/1.0	DMSP36	INITIAL OBS	KGWC
33	102116	13.8N 160.2E	PCN 5		DMSP36		PGTW
34	102225	14.0N 160.4E	CONF 1	T3.5/3.5 /D1.0/24HRS	NOAA6		FWFS
35	102230	14.0N 160.2E	PCN 5	T2.0/2.0 /S1.0/25HRS	NOAA6		PGTW
36	110010	14.4N 160.4E	PCN 5		DMSP35		PGTW
37	110816	15.5N 160.8E	PCN 6		DMSP35		KGWC
38	110817	15.4N 160.9E	PCN 6		DMSP36	CI UP	PGTW
39	110910	15.9N 161.7E	PCN 4		NOAA6		PHIK
40	110910	15.4N 161.0E	PCN 6		NOAA6		PGTW
41	110915	15.0N 161.0E	CONF 1	T4.0/4.0 /D1.0/24HRS	NOAA6		FWFS
42	111252	15.8N 160.9E	PCN 6		DMSP35		PGTW
43	112145	16.4N 163.8E	PCN 4	T4.0/4.0	NOAA6	INITIAL OBS	PHIK
44	112146	17.1N 163.7E	PCN 2	T3.5/3.5-/D1.5/23HRS	NOAA6		PGTW
45	112336	16.8N 164.9E	CONF 3	T4.5/4.5 /D1.0/24HRS	NOAA6		FWFS
46	112353	17.0N 164.2E	PCN 2		DMSP35		PGTW
47	120754	18.1N 167.0E	PCN 4	T3.5/3.5	DMSP36		KGWC
48	120759	17.9N 166.8E	PCN 6		DMSP36		PHIK
49	120926	17.9N 167.1E	PCN 6		NOAA6		PGTW
50	120926	17.9N 167.3E	PCN 4		NOAA6	POORLY DEFINED	PHIK
51	121416	18.9N 168.9E	PCN 6		DMSP35		PGTW
52	122054	20.0N 170.9E	CONF 1	T3.0/3.0 /S0.0/12HRS	NOAA6		FWFS
53	122102	20.9N 171.8E	PCN 4	T2.0/3.0-/W1.5/24HRS	NOAA6		PGTW
54	122102	20.0N 171.3E	PCN 6	T3.0/4.0-/W1.0/24HRS	NOAA6		PHIK
55	122249	21.3N 171.8E		T3.0	GOES2	INITIAL OBS	PHNL
56	130349	22.5N 173.5E			GOES2		PHNL

AIRCRAFT FIXES

FIX NO.	TIME (Z)	FIX POSITION	FLT LVL	MIN HGT	OBS MSLP	MAX-SFC-WND VEL/BRG/RNG	MAX-FLT-LVL-WND DIR/VEL/BRG/RNG	ACCRY NAV/MET	EYE SHAPE	EYE ORIEN- TATION	EYE DIAM	EYE TEMP (C) OUT/ IN/ DP/SST	MSN NO.
1	080248	9.1N 161.9E	1500FT	0381	996	035 290 090	330 033 290 140	10 15				+24 +24 +24 29	03
2	090615	10.2N 161.9E	700MB	3056	996	030 180 042	260 036 180 042	04 07				+11 +12 +10	04
3	091534	10.0N 161.1E	700MB	3026	995		180 030 270 060	15 45				+12 +12 +12	05
4	100315	11.2N 161.3E	700MB	3031		030 230 100		04 08				+11 +10 +10	06
5	101504	13.2N 160.2E	700MB	2955	985		310 038 220 015	10 05				+11 +13 +12	07
6	110325	14.9N 160.7E	700MB	2941	981	040 290 050	350 060 290 050	05 05				+12 +14 +11	08
7	111447	16.1N 162.1E	700MB	2882	976		350 063 270 021	10 10	ELLIPTICAL	70 50 150	25	+13 +15 +11	09
8	120304	17.4N 165.3E	700MB	2870	973	050 160 012	320 070 270 040	04 10				+11 +20 +08	10
9	121613	19.9N 170.1E	700MB	2852	972		030 058 260 020	10 03	CIRCULAR	20		+13 +14 +11	11

TYPHOON OLIVE

SATELLITE FIXES

FIX NO.	TIME (Z)	FIX POSITION	ACCRY	DVORAK CODE	SAT	COMMENTS	SITE
1	142325	8.4N 149.3E	PCN 5	T0.0/0.0	NOAA5		PGTW
2	151005	8.1N 147.0E	PCN 6		NOAA5		PGTW
3	152241	8.1N 143.8E	PCN 5	T1.0/1.0 /D1.0/24HRS	NOAA5		PGTW
4	160451	8.5N 141.3E	PCN 5		DMSP36	CI SAME	PGTW
5	161117	8.4N 141.1E	PCN 5		NOAA5		PGTW
6	161340	8.7N 140.8E	PCN 5		DMSP35		PGTW
* 7	162234	7.3N 139.6E	PCN 5	T1.0/1.0 /S0.0/24HRS	DMSP36		PGTW
* 8	162353	7.3N 139.4E	PCN 5		NOAA5		PGTW
9	170222	8.3N 139.6E	PCN 5		DMSP35		PGTW
10	171033	7.2N 137.1E	PCN 6		NOAA5	CI SAME	PGTW
11	171116	7.3N 137.3E	PCN 5		DMSP36		PGTW
12	172215	8.3N 135.0E	PCN 5	T0.0/0.0	DMSP36		RPMK
13	172217	8.4N 135.7E	PCN 6	T1.0/1.0 /S0.0/24HRS	DMSP36		PGTW
14	172309	8.6N 135.4E	PCN 5		NOAA5		PGTW
15	180204	8.3N 134.8E	PCN 5		DMSP35		PGTW
16	180204	8.3N 134.8E	PCN 5		DMSP35		RPMK
17	181055	9.1N 133.1E	PCN 5		DMSP36	CI UP	PGTW
18	181055	8.7N 133.1E	PCN 5		DMSP36		RPMK
19	181146	9.0N 132.9E	PCN 6		NOAA5		PGTW
20	181445	9.3N 132.3E	PCN 5		DMSP35		PGTW
21	182159	9.6N 130.2E	PCN 5		DMSP36		PGTW
22	182159	9.3N 130.0E	PCN 5	T2.0/2.0 /D2.0/24HRS	DMSP36		RPMK
23	182159	9.7N 130.0E	PCN 5		DMSP36		RODN
24	190022	9.8N 129.3E	PCN 5	T3.0/3.0-/D2.0/24HRS	NOAA5		PGTW
25	190304	9.8N 129.6E	CONF 2	T3.5/3.5 /D0.5/24HRS	DMSP		FWFS
26	191329	9.6N 128.8E	PCN 5		DMSP35	GOOD OUTFLOW	RPMK
27	191041	10.3N 127.7E	PCN 3		DMSP36	CI UP	RPMK
28	191041	10.3N 127.6E	PCN 1		DMSP36	CI UP	PGTW
29	191102	10.3N 127.7E	PCN 4		NOAA5		PGTW
30	191428	10.7N 126.9E	PCN 4		DMSP36		PGTW
31	192324	11.5N 124.6E	PCN 5	T4.0/4.0-/D1.0/23HRS	DMSP36		PGTW
32	192324	11.3N 124.7E	PCN 5	T4.0/4.0-	DMSP36		RODN
33	192338	11.5N 124.6E	PCN 5		NOAA5		PGTW
34	200136	11.5N 124.4E	PCN 5		NOAA5		PGTW
35	200315	11.6N 124.0E	CONF 1	T4.5/4.5 /D1.0/24HRS	DMSP		FWFS
36	201205	12.4N 122.1E	PCN 1		DMSP36		RPMK
37	201214	12.5N 122.0E	PCN 1		NOAA5	CI UP	PGTW
38	202305	13.0N 119.6E	PCN 3	T3.5/3.5+/W0.5/24HRS	DMSP36		PGTW
39	202305	13.0N 119.5E	PCN 3	T3.5/3.5	DMSP36		RKSO
40	210050	13.2N 119.5E	PCN 4		NOAA5		PGTW
41	210252	13.1N 119.2E	PCN 3		DMSP35		PGTW
42	210252	13.0N 119.3E	PCN 3		DMSP35		RKSO
43	211148	13.3N 117.9E	PCN 1		DMSP36	CI DOWN	PGTW
44	212249	13.5N 116.6E	PCN 5		DMSP36		PGTW
45	212249	13.4N 116.6E	PCN 5	T4.0/4.0	DMSP36		RODN
46	220006	13.5N 116.4E	PCN 5		NOAA5		PGTW
47	220031	14.0N 116.4E	PCN 3		DMSP36		RPMK
48	220235	14.0N 116.0E	PCN 3		DMSP35		RPMK
49	220235	13.9N 116.0E	PCN 5		DMSP35		PGTW
50	221131	14.6N 115.3E	PCN 3		DMSP36		RPMK
51	221131	14.8N 114.8E	PCN 1		DMSP36		PGTW
52	221242	14.7N 114.8E	PCN 1		NOAA5		PGTW
53	221517	15.4N 114.6E	PCN 1		DMSP35		PGTW
54	230013	15.9N 113.7E	PCN 2	T5.0/5.0	DMSP36		KGWC
55	230014	16.0N 113.5E	PCN 1	T5.0/5.0	DMSP36		RPMK
56	230119	16.0N 113.4E	PCN 1	T5.0/5.0	NOAA5		PGTW
57	230359	16.3N 113.4E	PCN 1		DMSP35		RODN
58	230359	16.4N 113.2E	PCN 1		DMSP35		RPMK
59	231159	16.8N 112.8E	PCN 3		NOAA5	CI UP WELL DEFINED EYE	PGTW
60	231256	17.3N 112.9E	PCN 4		DMSP36		RODN
61	231540	17.2N 113.3E	PCN 4		DMSP35		RODN
62	231540	17.3N 113.3E	PCN 1		DMSP35		RPMK
63	232356	18.4N 113.9E	PCN 1	T5.0/5.0	DMSP36		RODN
64	232356	18.5N 113.9E	PCN 1	T5.0/5.0-/S0.0/24HRS	DMSP36		RPMK
65	240035	18.5N 113.5E	PCN 1	T5.0/5.0-/S0.0/23HRS	NOAA5		PGTW
66	240304	18.9N 114.2E	PCN 1		DMSP35		RODN
67	240341	19.0N 114.1E	PCN 1		DMSP35		RPMK
68	240345	18.9N 114.5E	CONF 1		DMSP		FWFS
69	241238	19.6N 115.9E	PCN 1		DMSP36		RODN
70	241523	19.9N 117.6E	PCN 5		DMSP35		RODN
71	241523	20.0N 117.9E	PCN 5		DMSP35	CI DOWN	RPMK
72	242339	21.0N 118.7E	PCN 3	T4.0/4.0	DMSP36		RKSO
73	242339	20.9N 118.9E	PCN 3	T3.0/4.0 /W2.0/24HRS	DMSP36		RPMK
74	250323	21.0N 119.7E	PCN 3		DMSP35		RPMK
75	250329	21.0N 119.9E	CONF 2		DMSP		FWFS
76	251221	21.5N 124.5E	PCN 5		DMSP36		RKSO
77	251221	21.5N 123.9E	PCN 5		DMSP36		RPMK
78	251227	21.5N 124.0E	PCN 5		NOAA5		PGTW
79	251605	22.3N 126.0E	PCN 5		DMSP36		RKSO
80	252322	22.1N 127.2E	PCN 3	T3.0/3.0-/S0.0/24HRS	DMSP36		RPMK
81	252322	22.4N 129.3E	PCN 5		DMSP36		RODN
82	260103	22.1N 127.5E	PCN 3	T3.0/4.0 /W2.0/25HRS	NOAA5		PGTW
83	260305	22.6N 128.3E	PCN 3	T3.0/4.0 /W1.0/27HRS	DMSP35		RKSO
84	261022	22.7N 131.5E	PCN 5		DMSP36		RKSO
85	261022	22.9N 131.0E	PCN 5		DMSP36		PGTW
86	261143	22.9N 131.3E	PCN 5		NOAA5		PGTW
87	261406	22.9N 132.2E	PCN 5		DMSP35		PGTW
88	262305	23.6N 135.0E	PCN 4		DMSP36		PGTW
89	270019	23.3N 136.0E	PCN 4		NOAA5		PGTW

AIRCRAFT FIXES

FIX NO.	TIME (Z)	FIX POSITION	FLT LVL	MIN HGT	OBS MSLP	MAX-SFC-WND VEL/BRG/RNG	MAX-FLT-LVL-WND DIR/VEL/BRG/RNG	ACCRY NAV/MET	EYE SHAPE	EYE DIAM	ORIENTATION	EYE TEMP (C) CNT/ IN/ OB/SST	MSW NO.
1	170023	6.3N 141.1E	1500FL		1005	025 030 050	090 021 020 050	05 10				+22 +22 28	01
2	180212	8.5N 134.9E	1500FL		1003	035 030 030	060 038 030 030	04 02				+27 +23	02
3	180252	8.5N 134.6E	700MB	3093	1003			06 05				+11 +11	02
4	181553	9.2N 131.8E	700MB	3057	997		110 038 060 126	05 05	ELLIPTICAL	20 10	110	+12 +11	03
5	190114	10.0N 129.9E	700MB										04
6	190322	9.3N 129.1E	700MB	3009	992	080 020 010	150 060 030 020	05 05	CIRCULAR	12		+12 +15 +10	04
7	191435	10.7N 127.4E	700MB	2986	989		030 055 030 040	15 20				+18 +14 +11	05
8	192030	11.1N 125.5E	700MB	2881			160 077 060 040	03 10	CIRCULAR	25		+14 +14 +11	05
9	200915	12.1N 122.8E	619MB		982		210 065 120 025	05 05	CIRCULAR	25		+04 +07	06
10	202104	13.0N 120.0E	700MB	3013	995		260 049 240 012	05 05	CIRCULAR	06		+10 +13 +12	07
11	202316	13.0N 119.7E	700MB										07
12	210233	13.0N 119.3E	700MB	3013	995		300 065 050 050	05 05	ELLIPTICAL	30 10	090	+12 +13 +11	07
13	210945	13.3N 118.4E	700MB	2945	985	080 290 020	080 040 290 030	05 08				+13 +16 +10	08
14	220155	13.9N 116.2E	700MB										09
15	220442	14.1N 115.8E	700MB	2834		060 230 012	240 077 240 025	04 03	ELLIPTICAL	35 30	160	+10 +18 +12	09
16	221235	14.8N 115.0E	700MB										10
17	221530	15.2N 114.4E	700MB	2740	958			05 05	CIRCULAR	30		+13 +18	10
18	240350	18.8N 114.2E	700MB	2692	956	090 150 018	240 090 170 043	04 08	CIRCULAR	20		+13 +20	12
19	240837	19.3N 115.1E	700MB	2682		090 200 019	200 090 120 022	04 04	CIRCULAR	30		+11 +16	12
20	242103	20.4N 118.0E	700MB	2823	970		230 110 150 035	05 05	ELLIPTICAL	60 20	200	+12 +17 +12	13
21	250233	21.2N 119.4E	700MB	2849	974		210 110 120 030	05 05				+12 +15 +13	13
22	250330	21.2N 119.4E	700MB										13
23	251530	21.4N 124.6E	700MB	2920	983		300 065 210 040	03 08				+13 +15 +14	14
24	251749	21.7N 125.1E	700MB										14
25	260350	21.8N 128.3E	700MB	2926	979	090 260 012	260 085 090 040	15 03				+15 +17	15

RADAR FIXES

FIX NO.	TIME (Z)	FIX POSITION	RADAR	ACCRY	EYE SHAPE	EYE DIAM	RADOB-CODE ASWAM TDDFF	COMMENTS	RADAR POSITION	SITE WMO NO.
1	192220	11.2N 124.3E	LAND						11.0N 125.7E	98558
2	192300	11.2N 124.2E	LAND	GOOD		011			11.0N 125.7E	98558
3	200000	11.0N 123.8E	LAND	GOOD		017			11.0N 125.7E	98558
4	200100	11.2N 123.8E	LAND	GOOD		012			11.0N 125.7E	98558
5	200200	11.2N 123.5E	LAND	GOOD		012			11.0N 125.7E	98558
6	240400	19.9N 114.0E	LAND				20902 /////		22.3N 114.2E	45005
7	240500	19.9N 114.4E	LAND				20912 /////		22.3N 114.2E	45005
8	240900	19.2N 114.8E	LAND				20912 /////		22.3N 114.2E	45005
9	241200	19.4N 115.4E	LAND				30912 /////		22.3N 114.2E	45005
10	241500	19.9N 116.3E	LAND				35/// 70719		22.3N 114.2E	45005
11	250000	20.7N 118.9E	LAND				25/// 50523		22.6N 120.3E	46744
12	250100	20.7N 119.0E	LAND				25/// 50907		22.6N 120.3E	46744
13	250200	20.7N 119.2E	LAND				25/// 50808		22.6N 120.3E	46744
14	250300	20.9N 119.4E	LAND				25/// 08016		22.6N 120.3E	46744
15	250400	20.9N 119.6E	LAND				25/// /0809		22.6N 120.3E	46744
16	250500	20.9N 120.1E	LAND				25/// /0926		22.6N 120.3E	46744
17	250500	21.1N 120.6E	LAND				25/// /0626		22.6N 120.3E	46744

SATELLITE FIXES

FIX NO.	TIME (Z)	FIX POSITION	ACCRY	DVORAK CODE	SAT	COMMENTS	SITE
* 1	131325	20.4N 138.1E	CONF 2		DMSP		FWFS
2	132245	21.4N 136.8E	PCN 3	T1.0/1.0	DMSP36	INIT DHS	PGTW
3	140003	23.3N 136.4E	PCN 4		NOAA5		PGTW
4	140203	22.5N 136.0E	PCN 3		DMSP35	SECONDARY AT 19.2N 136.9E	PGTW
* 5	140214	20.9N 135.7E	CONF 2	T1.5/1.5 /00.5/12HRS	DMSP		FWFS
6	141042	23.4N 134.6E	PCN 4		NOAA5	CI SAME EXPOSED LOW LVL CIRC	PGTW
7	141130	24.7N 134.0E	PCN 3		DMSP36		RKSO
8	141130	24.4N 134.4E	PCN 4		DMSP36	CI SAME EXPOSED LOW LVL CIRC	PGTW
* 9	141444	17.9N 135.0E	CONF 2	T1.5/1.5 /00.5/24HRS	DMSP		FWFS
10	141450	24.1N 134.4E	PCN 3		DMSP35	CI SAME	PGTW
11	142231	24.9N 133.3E	PCN 3	T1.0/1.0	DMSP36	INIT DHS	RKSO
12	142251	24.4N 133.3E	PCN 3	T1.0/1.0 /S0.0/24HRS	DMSP36		PGTW
13	142319	24.3N 133.4E	PCN 4		NOAA5		PGTW
14	150151	24.4N 133.0E	PCN 3		DMSP35		RKSO
* 15	150157	20.0N 136.0E	CONF 2	T1.5/1.5 /S0.0/24HRS	DMSP		FWFS
* 16	150900	18.0N 135.5E			DMSP		FWFS
17	152214	22.4N 132.2E	PCN 5	T1.5/1.5 /00.5/24HRS	DMSP36		PGTW
18	160001	22.4N 132.5E	PCN 5		NOAA5		PGTW
19	160133	22.5N 132.1E	PCN 5		DMSP35		PGTW
* 20	160944	20.2N 132.5E	CONF 3		DMSP		FWFS
* 21	161007	24.7N 127.2E	PCN 6		DMSP37		RODN
22	161055	23.1N 132.1E	PCN 6		DMSP36		PGTW
23	161111	23.0N 132.0E	PCN 6		NOAA5		PGTW
24	161414	23.7N 131.4E	PCN 6		DMSP35		PGTW
25	162035	24.1N 129.0E	CONF 2		DMSP		FWFS
26	162125	24.1N 129.0E	PCN 3	T2.0/2.0-/00.5/24HRS	DMSP37		PGTW
27	162347	24.1N 129.2E	PCN 3		NOAA5		PGTW
28	170115	25.9N 128.0E	CONF 2	T2.0/2.0 /S0.0/24HRS	DMSP		FWFS
29	171007	25.3N 127.1E	PCN 6		DMSP37	CI DOWN	PGTW
30	171223	25.9N 127.2E	PCN 5		NOAA5		PGTW
31	171538	25.4N 127.1E	PCN 3		DMSP35		PGTW
32	172105	25.9N 126.1E	PCN 5	T2.0/2.0	DMSP37	INIT DHS	RPMK
33	172105	26.2N 126.1E	PCN 3	T2.0/2.0 /S0.0/24HRS	DMSP37		PGTW
34	172321	26.9N 126.1E	PCN 3	T2.0/2.0	DMSP36	INIT DHS	RKSO
35	172321	26.1N 126.1E	PCN 3		DMSP36		PGTW
36	180100	26.9N 126.4E	PCN 5		NOAA5		PGTW
* 37	180239	26.1N 126.3E	PCN 5		DMSP35		PGTW
38	181139	26.5N 126.1E	PCN 4		NOAA5		PGTW
39	181203	26.4N 126.0E	PCN 3		DMSP36	CI UP	PGTW
40	181203	26.4N 125.9E	PCN 3		DMSP36		RKSO
41	181435	26.5N 126.0E	CONF 2		DMSP		FWFS
42	181521	26.9N 126.2E	PCN 4		DMSP35		PGTW
43	182229	27.2N 126.0E	PCN 6		DMSP37		RODN
44	182229	27.1N 126.0E	PCN 3		DMSP37		RPMK
45	182303	27.5N 125.7E	PCN 3	T3.0/3.0-/01.0/24HRS	DMSP36		RKSO
46	182304	27.3N 126.1E	PCN 3	T3.0/3.0-/01.0/24HRS	DMSP36		RPMK
47	182304	27.4N 126.1E	PCN 5	T2.0/2.0	DMSP36	INIT DHS	RODN
48	182304	27.3N 126.0E	PCN 3	T3.0/3.0 /01.0/24HRS	DMSP36		PGTW
49	190016	27.4N 125.6E	PCN 3		NOAA5		PGTW
50	190221	27.7N 126.0E	PCN 1		DMSP35		RODN
51	190221	27.9N 126.0E	PCN 1		DMSP35		RKSO
52	190221	27.7N 126.0E	PCN 3		DMSP35		RPMK
53	190221	27.9N 126.0E	PCN 1		DMSP35		PGTW
54	190239	27.9N 126.1E	CONF 1		DMSP		FWFS
55	191055	24.9N 126.3E	PCN 2		NOAA5		PGTW
56	191109	28.9N 126.6E	PCN 2		DMSP37		RODN
57	191145	28.9N 126.3E	PCN 2		DMSP36		RODN
58	191145	28.9N 126.4E	PCN 1		DMSP36	CI SAME	PGTW
59	191145	29.0N 126.4E	PCN 3		DMSP36		RKSO
60	191503	29.4N 126.5E	PCN 5		DMSP35		PGTW
61	191523	27.7N 126.0E	CONF 1	T4.0/4.5 /01.0/12HRS	DMSP		FWFS
62	192209	31.2N 127.5E	PCN 5	T3.0/3.0-/S0.0/23HRS	DMSP37		RPMK
63	192245	31.1N 126.5E	PCN 3	T3.0/3.0-/S0.0/24HRS	DMSP36	APPRNT LOW LVL CIRC	RKSO
64	192246	31.5N 127.1E	PCN 5		DMSP36		PGTW
65	200128	31.7N 127.3E	PCN 5		NOAA5		PGTW
66	200203	32.2N 128.0E	PCN 3		DMSP35		RKSO
67	200203	32.2N 127.6E	PCN 6		DMSP35		PGTW
68	201129	32.8N 129.8E	PCN 5		DMSP36		RKSO
69	201129	33.1N 129.7E	PCN 6		DMSP36		PGTW
70	201445	33.6N 132.3E	PCN 6		DMSP35		PGTW

AIRCRAFT FIXES

FIX NO.	TIME (Z)	FIX POSITION	FLT -LVL	MIN HGT	OBS MSLP	MAX-SFC-WND VEL/RRG/RNG	MAX-FLT-LVL-WND DIR/VEL/RNG/RNG	ACCRY NAV/MET	EYE SHAPE	EYE ORIEN- DIAM/TATION	EYE TEMP (C) OUT/ IN/ OB/SST	MSN NO.
1	160516	23.1N 132.4E	1500FT		999	035 130 075	160 045 130 075	05 05			+26 +25	04
2	161558	23.7N 129.9E	700MB	3085	1000		190 040 120 140	04 10			+09 +11 +10	05
3	161720	23.7N 129.9E	700MB									05
4	161935	23.9N 129.5E	700MB									05
5	170235	24.4N 128.9E	700MB	3073	997	030 110 120	260 020 180 020	03 10			+12 +13 +10	06
6	170934	24.7N 128.0E	700MB	3063	997	020 350 025	100 032 350 020	02 04			+13 +13 +12	07
7	171047	24.7N 127.8E	700MB	3064	997		040 025 270 030	02 04			+12 +13 +13	07
8	180322	25.8N 125.7E	700MB	3026	993	035 070 060	130 034 060 140	04 07			+13 +12	08
9	181657	26.7N 126.1E	700MB	3005	988		300 035 230 070	02 10			+12 +14 +11	09
10	190241	27.4N 126.1E	700MB	2955	984	040 170 030	270 050 170 030	05 01	CIRCULAR	30	+10 +13	10
11	191305	29.0N 126.3E	700MB									11
12	191521	29.6N 126.5E	700MB	2974	987		210 062 120 090	04 05			+14 +16 +11	11
13	191635	29.6N 126.5E	700MB									11
* 14	200330	32.4N 128.4E	700MB	3007	992		250 030 190 030	02 10			+18 +13 +13	12
15	200434	32.2N 128.5E	1500FT		989		000 000 0	02 10			+23 +23	12

FIX NO.	TIME (Z)	FIX POSITION	RADAR	ACCRY	EYE SHAPE	EYE DIAM	RADAR-CODE ASWAH	RADAR-CODE TDUFF	COMMENTS	RADAR POSITION	SITE WWD NO.
1	170400	24.5N 127.8E	LAND	GOOD	CIRCULAR	010				26.4N 127.8EI	47991
2	170930	24.6N 127.6E	LAND	GOOD	CIRCULAR	009			MAX TOP 200	26.4N 127.8EI	47991
3	171000	24.6N 124.6E	LAND	POOR	CIRCULAR	008				26.4N 127.8EI	47991
4	171030	27.4N 127.6E	LAND	POOR	CIRCULAR	018			MAX TOP 320	26.4N 127.8EI	47991
5	171100	24.6N 127.4E	LAND	GOOD	CIRCULAR	027				26.4N 127.8EI	47991
6	171200	25.0N 127.3E	LAND	POOR	ELLIPTICA	004				26.4N 127.8EI	47991
7	171535	24.9N 127.6E	LAND	POOR	CIRCULAR	015			MAX TOP 150	26.4N 127.8EI	47991
8	171500	25.0N 127.4E	LAND	POOR	CIRCULAR	015				26.4N 127.8EI	47991
9	171500	25.2N 126.7E	LAND				6//// /////			26.2N 127.8EI	47997
10	171530	25.1N 127.5E	LAND	POOR	CIRCULAR	012			MAX TOP 200	26.4N 127.8EI	47991
11	171700	25.2N 127.6E	LAND	POOR	CIRCULAR	007				26.4N 127.8EI	47991
12	171700	25.2N 127.3E	LAND				35/// 53216			26.2N 127.8EI	47997
13	171730	25.3N 127.1E	LAND	POOR	CIRCULAR	007			MAX TOP 200	26.4N 127.8EI	47991
14	171810	25.3N 127.9E	LAND	POOR	CIRCULAR	030				26.4N 127.8EI	47991
15	171935	25.4N 127.1E	LAND	POOR	CIRCULAR	015			MAX TOP 200	26.4N 127.8EI	47991
16	171900	25.5N 127.1E	LAND				6//// 73212			26.2N 127.8EI	47997
17	171930	25.4N 126.8E	LAND	POOR	CIRCULAR	015			MAX TOP 280	26.4N 127.8EI	47991
18	172000	25.4N 126.9E	LAND				6//// 73211			26.2N 127.8EI	47997
19	172010	25.7N 126.8E	LAND	POOR	CIRCULAR	015				26.4N 127.8EI	47991
20	172030	25.7N 126.9E	LAND	POOR	CIRCULAR	015			MAX TOP 340	26.4N 127.8EI	47991
21	172100	25.3N 126.7E	LAND				6//// 73111			26.2N 127.8EI	47999
22	172110	25.3N 126.6E	LAND	FAIR	CIRCULAR	010				26.4N 127.8EI	47991
23	172200	25.3N 126.5E	LAND				6//// 73113			26.2N 127.8EI	47997
24	172210	25.3N 126.4E	LAND	POOR	CIRCULAR	018				26.4N 127.8EI	47991
25	172235	25.3N 126.2E	LAND	POOR	CIRCULAR	010				26.4N 127.8EI	47991
26	172300	25.8N 126.2E	LAND				35//3 5////			24.8N 125.3EI	47997
27	172300	26.0N 126.3E	LAND				6//// 73012			26.2N 127.8EI	47997
28	172310	25.9N 126.1E	LAND	POOR	CIRCULAR	012				26.4N 127.8EI	47991
29	172330	25.9N 126.1E	LAND	POOR	CIRCULAR	015			MAX TOP 300	26.4N 127.8EI	47991
30	180005	25.9N 126.0E	LAND	POOR					SYSTEM APPEARS LESS ORGANIZED	26.4N 127.8EI	47991
31	180035	26.1N 126.0E	LAND	POOR	CIRCULAR	015			SYSTEM APPEARS LESS ORGANIZED	26.4N 127.8EI	47991
32	180100	25.6N 125.9E	LAND				65//3 52608			24.8N 125.3EI	47997
33	180110	26.2N 126.8E	LAND	POOR	CIRCULAR	019				26.4N 127.8EI	47991
34	180200	25.7N 125.8E	LAND				22573 52308			24.8N 125.3EI	47997
35	180200	25.6N 125.9E	LAND				6//// 72212			26.2N 127.8EI	47997
36	180300	25.6N 125.8E	LAND				22413 51904			24.8N 125.3EI	47997
37	180300	25.5N 125.9E	LAND				6//// 72008			26.2N 127.8EI	47997
38	180400	25.7N 125.9E	LAND				65/42 50708			24.8N 125.3EI	47997
39	180400	25.6N 125.8E	LAND				///// 72405			26.2N 127.8EI	47997
40	180500	25.7N 126.1E	LAND				6///3 50812			24.8N 125.3EI	47997
41	180500	25.6N 126.0E	LAND				///// 70000			26.2N 127.8EI	47997
42	180545	25.9N 125.6E	LAND	FAIR	CIRCULAR	017				26.4N 127.8EI	47991
43	180700	26.0N 126.2E	LAND				6//// 53619			24.8N 125.3EI	47997
44	180700	25.8N 126.3E	LAND				35/11 70514			26.2N 127.8EI	47997
45	180900	26.1N 126.2E	LAND				65//2 70107			24.8N 125.3EI	47997
46	180800	26.0N 126.2E	LAND				///// 70208			26.2N 127.8EI	47997
47	180830	25.9N 125.6E	LAND	GOOD	CIRCULAR	012				26.4N 127.8EI	47991
48	180900	26.2N 126.1E	LAND				65//2 53211			24.8N 125.3EI	47997
49	180900	26.0N 125.7E	LAND	GOOD	CIRCULAR	012				26.4N 127.8EI	47991
50	180930	26.0N 125.8E	LAND	GOOD	CIRCULAR	018				26.4N 127.8EI	47991
51	181000	26.3N 126.1E	LAND				65//2 50211			24.8N 125.3EI	47997
52	181000	26.2N 125.5E	LAND	FAIR	CIRCULAR	014				26.4N 127.8EI	47991
53	181000	26.3N 126.2E	LAND				6//// 73507			26.2N 127.8EI	47997
54	181030	26.1N 125.5E	LAND	GOOD	CIRCULAR	020				26.4N 127.8EI	47991
55	181100	26.1N 125.5E	LAND	FAIR	CIRCULAR	020				26.4N 127.8EI	47991
56	181100	26.6N 126.0E	LAND				35//2 73422			24.8N 125.3EI	47997
57	181100	26.3N 126.1E	LAND				6//// 73605			26.2N 127.8EI	47997
58	181133	26.2N 125.3E	LAND	POOR	CIRCULAR	024			MAX TOP 400	26.4N 127.8EI	47991
59	181200	26.5N 126.0E	LAND				35//2 73236			24.8N 125.3EI	47997
60	181200	26.5N 125.2E	LAND	POOR	CIRCULAR	008				26.4N 127.8EI	47991
61	181200	26.6N 126.1E	LAND				6//// 70000			26.2N 127.8EI	47997
62	181300	26.6N 125.9E	LAND				35//2 73322			24.8N 125.3EI	47997
63	181300	26.5N 126.1E	LAND				///// 73503			26.2N 127.8EI	47997
64	181400	26.5N 125.9E	LAND				6//// 73307			26.2N 127.8EI	47997
65	181435	26.6N 125.9E	LAND	POOR	CIRCULAR	015			MAX TOP 410	26.4N 127.8EI	47991
66	181500	26.7N 125.8E	LAND				65//3 73316			24.8N 125.3EI	47997
67	181500	26.7N 125.9E	LAND				6//// 73307			26.2N 127.8EI	47997
68	181505	26.7N 125.9E	LAND	POOR	CIRCULAR	020				26.4N 127.8EI	47991
69	181530	26.7N 125.9E	LAND	GOOD	CIRCULAR	015			MAX TOP 340	26.4N 127.8EI	47991
70	181500	26.9N 125.9E	LAND				65//2 73412			24.8N 125.3EI	47997
71	181500	26.9N 125.8E	LAND				6//// 73208			26.2N 127.8EI	47997
72	181505	26.9N 125.8E	LAND	GOOD	CIRCULAR	015				26.4N 127.8EI	47991
73	181530	27.0N 125.9E	LAND	FAIR		070			MOV 3620	26.2N 127.8EI	47997
74	181532	26.9N 126.0E	LAND	GOOD	CIRCULAR	015			MAX TOP 330	26.4N 127.8EI	47991
75	181700	27.1N 125.8E	LAND				65//3 63624			24.8N 125.3EI	47997
76	181700	26.9N 125.8E	LAND				6//// 73611			26.2N 127.8EI	47997
77	181705	27.1N 125.9E	LAND	FAIR	CIRCULAR	020				26.4N 127.8EI	47991
78	181730	27.2N 125.8E	LAND	FAIR	CIRCULAR	025			MAX TOP 400	26.4N 127.8EI	47991
79	181808	27.3N 125.8E	LAND				35//3 73532			24.8N 125.3EI	47997
80	181800	27.1N 125.8E	LAND	FAIR		070			MOV 3620	26.2N 127.8EI	47997
81	181800	27.2N 125.9E	LAND				6//// 73611			26.2N 127.8EI	47997
82	181810	27.2N 125.8E	LAND	FAIR	CIRCULAR	020				26.4N 127.8EI	47991
83	181830	27.2N 125.6E	LAND	FAIR	CIRCULAR	020			MAX TOP 310	26.4N 127.8EI	47991
84	181900	27.3N 125.8E	LAND				55//3 50000			24.8N 125.3EI	47997
85	181900	27.1N 125.7E	LAND				6//// 73506			26.2N 127.8EI	47997
86	181910	27.2N 125.7E	LAND	FAIR	CIRCULAR	020				26.4N 127.8EI	47991
87	181930	27.2N 125.6E	LAND	FAIR	CIRCULAR	015			MAX TO 300	26.4N 127.8EI	47991
88	182000	27.2N 125.7E	LAND				55//4 52208			24.8N 125.3EI	47997
89	182000	27.1N 125.7E	LAND				6//// 73504			26.2N 127.8EI	47997
90	182010	27.2N 125.8E	LAND	GOOD	CIRCULAR	015				26.4N 127.8EI	47991
91	182030	27.2N 125.8E	LAND	GOOD	CIRCULAR	020			MAX TOP 310	26.4N 127.8EI	47991
92	182100	27.1N 125.9E	LAND				25//4 71504			24.8N 125.3EI	47997
93	182100	27.1N 125.9E	LAND				6//// 70000			26.2N 127.8EI	47997
94	182110	27.1N 126.0E	LAND	FAIR	CIRCULAR	020				26.4N 127.8EI	47991
95	182130	27.2N 126.0E	LAND	FAIR	CIRCULAR	020			MAX TOP 270	26.4N 127.8EI	47991
96	182200	27.1N 125.9E	LAND				6//// 70000			26.2N 127.8EI	47997
97	182210	27.2N 126.0E	LAND	POOR	CIRCULAR	020				26.4N 127.8EI	47991

98	182230	27.2N	126.0E	LAND	POOR	CIRCULAR	020				26.4N	127.8E	47991
99	182230	27.3N	126.0E	LAND	POOR				MAX TOP 280		26.4N	127.8E	47991
100	182300	27.4N	126.2E	LAND				62/// 70612			26.2N	127.8E	47997
101	182330	27.2N	126.2E	LAND	POOR	CIRCULAR	015		EYE VERY DFUS APPRS TO BE FILNG		26.4N	127.8E	47991
102	190000	27.5N	126.3E	LAND				62/// 70512			26.2N	127.8E	47997
103	190015	27.4N	126.1E	LAND	POOR				SPRL FEATURES BCMG ILL DEFINED		26.4N	127.8E	47991
104	190030	27.4N	126.2E	LAND	POOR				MAX TOP 280		26.4N	127.8E	47991
105	190100	27.5N	126.2E	LAND				62/// 73508			26.2N	127.8E	47997
106	190130	27.6N	126.0E	LAND	POOR				MAX TOP 360		26.4N	127.8E	47991
107	190200	27.7N	126.3E	LAND				62/// 70119			26.2N	127.8E	47997
108	190210	27.6N	126.0E	LAND	POOR						26.4N	127.8E	47991
109	190230	27.7N	126.1E	LAND					MAX TOP 270		26.4N	127.8E	47991
110	190300	27.9N	126.2E	LAND				62/// 70114			26.2N	127.8E	47997
111	190400	27.9N	126.1E	LAND				62/// 73509			26.2N	127.8E	47997
112	190500	28.1N	126.1E	LAND				62/// 57///			28.4N	129.5E	47909
113	190500	28.1N	126.1E	LAND				62/// 73409			26.2N	127.8E	47997
114	190500	28.2N	126.2E	LAND				65/// 50211			28.4N	129.5E	47909
115	190600	28.4N	126.1E	LAND				62/// 73311			26.2N	127.8E	47997
116	190700	28.3N	126.4E	LAND				65/12 50316			28.4N	129.5E	47909
117	190800	28.7N	126.4E	LAND				65/// 53519			28.4N	129.5E	47909
118	190900	28.9N	126.4E	LAND				65/// 53610			28.4N	129.5E	47909
119	191000	28.9N	126.4E	LAND				65/// 53605			28.4N	129.5E	47909
120	191300	29.0N	126.5E	LAND				62/// 53605			28.4N	129.5E	47909
121	191400	29.2N	126.5E	LAND				62/// 53611			28.4N	129.5E	47909
122	191500	29.4N	126.4E	LAND				62/// 53311			28.4N	129.5E	47909
123	191700	29.6N	126.4E	LAND				62/// 50108			28.4N	129.5E	47909
124	192050	30.1N	126.8E	LAND	POOR				MOV 0230	SHIMONOSHIKI			47762

TROPICAL STORM ROSE

SATELLITE FIXES

FIX NO.	TIME (Z)	FIX POSITION	ACCRY	DVORAK CODE	SAT	COMMENTS	SITE
1	201445	17.8N 132.0E	PCN 6		DMSP35		PGTW
2	202229	16.6N 130.7E	PCN 5	T1.0/1.0	DMSP36	INIT OBS	RPMK
3	210044	16.3N 130.2E	PCN 5	T1.0/1.0	NOAA5	INIT OBS	PGTW
4	210145	16.3N 129.8E	PCN 6		DMSP35		PGTW
5	210146	16.6N 129.8E	PCN 5		DMSP35		RPMK
6	211124	17.1N 129.2E	PCN 6		NOAA5	CI OVCN	PGTW
7	220000	18.7N 128.2E	PCN 5	T1.0/1.0 /S0.0/23HRS	NOAA5		PGTW
8	220309	19.6N 126.8E	PCN 3		DMSP35	DUAL LOW LVL CIRCULATION EXPOSED	PGTW
9	220309	17.8N 128.1E	PCN 5	T1.0/1.0 /S0.0/29HRS	DMSP35	NO LOW LVL CIRCULATION	RPMK
10	221236	19.5N 126.9E	PCN 6		NOAA5		PGTW
11	221551	16.9N 125.1E	PCN 5		DMSP35		RODN
12	222335	18.6N 124.8E	PCN 5	T2.0/2.0 /D1.0/21HRS	DMSP36		RPMK
13	222336	18.8N 124.8E	PCN 5	T2.0/2.0 /D1.0/24HRS	DMSP36	SECONDARY 20.5N 125.3E	PGTW
14	230112	18.7N 124.6E	PCN 5		NOAA5		PGTW
15	230252	18.7N 124.5E	PCN 5		DMSP35		PGTW
16	230252	18.6N 123.9E	PCN 5	T2.0/2.0	DMSP35	INIT OBS	RODN
17	230252	18.5N 124.7E	PCN 5		DMSP35		RPMK
18	231133	18.5N 124.1E	PCN 6		DMSP37		RODN
19	231133	19.0N 124.5E	PCN 5		DMSP37		RPMK
20	231152	18.5N 123.7E	PCN 6		NOAA5		PGTW
21	231218	18.5N 124.3E	PCN 6		DMSP36		RODN
22	231218	18.8N 124.2E	PCN 5		DMSP36		RPMK
23	231533	18.7N 123.1E	PCN 5		DMSP35		PGTW
24	232233	21.0N 122.6E	PCN 3		DMSP37		RPMK
25	232319	21.3N 122.6E	PCN 3	T2.5/2.5-/D0.5/24HRS	DMSP36		PGTW
26	232319	21.2N 122.5E	PCN 3	T2.0/2.0	DMSP36	INIT OBS	RKSO
27	232319	21.2N 122.5E	PCN 3	T2.0/2.0 /S0.0/24HRS	DMSP36		RPMK
28	240028	21.4N 122.5E	PCN 3		NOAA5		PGTW
29	241114	22.7N 122.0E	PCN 5		DMSP37	NO LOW LVL CIRCULATION	RODN
30	241201	22.7N 121.5E	PCN 6		DMSP36		PGTW
31	241515	24.6N 121.8E	PCN 5		DMSP35	NO APPRNT LOW LVL CIRCULATION	PGTW
32	241516	24.6N 121.9E	PCN 5		DMSP35	NO APPRNT LOW LVL CIRCULATION	RKSO

AIRCRAFT FIXES

FIX NO.	TIME (Z)	FIX POSITION	FLT LVL	MIN HGT	OBS MSLP	MAX-SFC-WND VEL/BRG/RNG	MAX-FLT-LVL-WND DIR/VEL/BRG/RNG	ACCRY NAV/MET	EYE SHAPE	EYE ORIEN-TATION	EYE DIAM	EYE TEMPS (C) UNIT/ IN/ OP/SST	MSN NO.
1	220154	18.6N 127.2E	1500FT		1003	30 070 070	140 032 080 080	04 02				+25 +26 +24	01
2	230112	18.7N 124.6E	1500FT		989	65 070 50	150 55 070 30					+26	02
3	230305	18.8N 124.5E	700MB	3039	993	030 090 010	080 045 350 020	05 05	CIRCULAR	10		+18 +15	02
* 4	231600	18.7N 123.5E	700MB	3096	1004		250 035 190 040	20 20				+10 +10	03
5	232142	20.9N 122.6E	700MB	3068	995	035 310 015	230 030 170 110	02 03				+14 +16	04
6	240959	22.6N 121.8E	700MB	3082	1002	030 160 040	210 040 210 040	02 10			29	+14 +14 +13	05
7	241140	22.5N 121.8E	700MB	3082			260 31 150 31					+13 +13	05

TROPICAL STORM SHIRLEY

SATELLITE FIXES

FIX NO.	TIME (Z)	FIX POSITION	ACCRY	DVORAK CODE	SAT	COMMENTS	SITE
1	271249	11.3N 122.6E	PCN 5		NOAA6	UPPER LVL	PGTW
2	272256	11.2N 117.8E	PCN 5		DMSP37		RPMK
3	272351	10.8N 118.0E	PCN 5	T1.0/1.0	DMSP36	INIT OBS	RPMK
4	280125	9.4N 119.5E	PCN 5	T1.0/1.0	NOAA6	INIT OBS	PGTW
5	280304	10.1N 119.3E	PCN 5		DMSP35		RPMK
6	281137	10.4N 116.8E	PCN 6		DMSP37	CI DOWN	RPMK
7	281205	10.4N 117.1E	PCN 6		NOAA6	CI DOWN UPPER LVL	PGTW
8	281546	10.4N 116.0E	PCN 6		DMSP35		RPMK
9	282237	10.3N 118.4E	PCN 5	T1.0/1.0	DMSP37	INIT OBS SECONDARY 12.2N 115.0E	RODN
10	282333	10.9N 117.7E	PCN 5	T1.0/1.0 /S0.0/22HRS	DMSP36		PGTW
11	282334	10.2N 117.4E	PCN 5		DMSP36		RODN
12	290041	10.8N 117.6E	PCN 5		NOAA6		PGTW
13	291118	11.3N 115.3E	PCN 6		DMSP37		RODN
14	291216	11.2N 115.4E	PCN 5		DMSP35	CI SAME	RPMK
15	291528	12.1N 113.4E	PCN 5		DMSP36		PGTW
16	292217	13.2N 111.8E	PCN 3	T2.0/2.0	DMSP37	INIT OBS	RPMK
17	292218	13.2N 112.5E	PCN 5	T2.0/2.0 /D1.0/23HRS	DMSP37		PGTW
18	300410	13.2N 111.6E	PCN 3		DMSP35	BANDING TYPE EYE EST T3.0	RPMK
19	301058	13.6N 109.6E	PCN 3		DMSP37	CI UP	RPMK
20	301059	13.7N 109.4E	PCN 6		DMSP37		RODN
21	301158	13.7N 109.6E	PCN 3		DMSP36		RPMK
22	301159	13.4N 109.5E	PCN 3		DMSP36	CI UP	PGTW
23	301233	13.4N 109.2E	PCN 4		NOAA6		PGTW
24	301652	13.7N 108.4E	PCN 5		DMSP35		RPMK
25	302340	14.4N 107.0E	PCN 5	T1.0/2.0-/W1.0/25HRS	DMSP37		RPMK
26	010110	14.6N 106.4E	PCN 5	T1.0/2.0-/W1.0/26HRS	NOAA6		PGTW
27	010353	14.6N 106.2E	PCN 5		DMSP35	EST T1.0/2.0 LOST IN DROP-OUT	RODN

RADAR FIXES

FIX NO.	TIME (Z)	FIX POSITION	RADAR	ACCRY	EYE SHAPE	EYE DIAM	RADOB-CODE ASWAN TDOFF	COMMENTS	RADAR POSITION	SITE WMO NO.
1	300050	12.3N 112.2E	ACFT					54 WRS		

SATELLITE FIXES

FIX NO.	TIME (Z)	FIX POSITION	ACCRY	DVORAK CODE	SAT	COMMENTS	SITE
1	110055	19.0N 153.6E	PCN 6	T0.0/0.0	DMSP35	INIT OBS	PGTW
2	111019	17.8N 154.3E	PCN 6		NOAA5		PGTW
3	112130	19.6N 151.7E	PCN 5	T1.0/1.0 /D1.0/21HRS	DMSP36		PGTW
4	112255	19.5N 151.3E	PCN 6		NOAA5		PGTW
5	120934	20.8N 149.5E	PCN 6		NOAA5		PGTW
6	121012	21.9N 149.7E	PCN 5		DMSP36		PGTW
* 7	121318	22.3N 149.8E	PCN 6		DMSP35		PGTW
8	122113	23.6N 148.2E	PCN 5	T1.0/1.0 /S0.0/24HRS	DMSP36		PGTW
9	130008	23.3N 147.8E	PCN 5		NOAA5		PGTW
10	130201	23.5N 147.8E	PCN 6		DMSP35		PGTW
* 11	130955	22.4N 150.4E	PCN 6		DMSP36		PGTW
* 12	131047	21.4N 150.0E	PCN 6		NOAA5	SECONDARY 23.0N 146.4E	PGTW
13	131442	24.0N 145.4E	PCN 6		DMSP35	NO APPRNT CC PSBL SECONDARY CC	PGTW
14	132109	24.2N 143.9E	PCN 5		DMSP37		RKSO
* 15	132109	23.8N 146.5E	PCN 5		DMSP37		PGTW
16	132237	24.2N 143.9E	PCN 5	T2.0/2.0 /D1.0/25HRS	DMSP36		PGTW
17	132237	24.0N 143.5E	PCN 5	T2.0/2.0	DMSP36		RKSO
18	132324	23.3N 143.4E	PCN 5		NOAA5		PGTW
19	140143	24.0N 143.2E	PCN 5		DMSP35		PGTW
20	140143	24.5N 143.2E	PCN 5		DMSP35		RKSO
21	140950	24.6N 142.2E	PCN 6		DMSP37		RODN
22	140950	23.7N 142.3E	PCN 6		DMSP37	CI UP	PGTW
23	141003	23.9N 142.2E	PCN 6		NOAA5		PGTW
24	141119	23.8N 142.2E	PCN 5		DMSP36		PGTW
25	141119	24.0N 142.2E	PCN 5		DMSP36		RKSO
26	141425	23.8N 141.2E	PCN 5		DMSP35		PGTW
27	142049	24.1N 140.5E	PCN 3	T3.0/3.0 /D1.0/23HRS	DMSP37		PGTW
28	142049	24.1N 140.4E	PCN 3	T3.0/3.0 /D1.0/23HRS	DMSP37		RKSO
29	142220	24.0N 139.8E	PCN 3		DMSP36		RKSO
30	142222	24.1N 140.0E	PCN 3		DMSP36		PGTW
31	150125	24.0N 139.0E	PCN 3		DMSP35		PGTW
32	150930	23.6N 138.3E	PCN 6		DMSP37	CI UP	PGTW
33	150930	23.6N 138.2E	PCN 4		DMSP37		RKSO
34	151102	23.5N 138.2E	PCN 3		DMSP36		PGTW
35	151407	23.4N 138.0E	PCN 5		DMSP35		PGTW
36	152030	22.7N 137.2E	PCN 3		DMSP37		RODN
37	152030	22.9N 137.3E	PCN 1	T4.0/4.0 /D1.0/24HRS	DMSP37		PGTW
38	152203	22.5N 137.2E	PCN 3	T4.0/4.0	DMSP36	INIT OBS	RODN
39	160107	22.8N 137.7E	PCN 3	T4.0/4.0 /D1.0/24HRS	DMSP37		RKSO
40	161044	22.4N 137.8E	PCN 4		DMSP36		RODN
41	162145	22.2N 138.7E	PCN 3		DMSP36		PGTW
42	162152	22.2N 138.4E	PCN 1	T4.0/4.0	DMSP37	INIT OBS	RPMK
43	162152	22.0N 138.5E	PCN 3	T4.0/4.0 /S0.0/25HRS	DMSP37		PGTW
44	162307	22.0N 138.8E	PCN 4		NOAA5		PGTW
45	171027	22.7N 139.9E	PCN 6		DMSP37		RODN
46	171027	23.2N 140.2E	PCN 6		DMSP36		PGTW
47	171144	23.2N 140.7E	PCN 6		NOAA5		PGTW
48	172128	23.5N 142.2E	PCN 3	T4.5/4.5 /D0.5/24HRS	DMSP36		PGTW
49	172128	23.2N 142.0E	PCN 5	T4.0/4.0	DMSP36	INIT OBS	RODN
50	172132	23.4N 142.2E	PCN 1	T5.0/5.0	DMSP37	INIT OBS RAGGED EYE	RKSO
51	180213	24.6N 143.3E	PCN 3		DMSP35	CI DOWN	RKSO
52	180213	24.5N 143.5E	PCN 3		DMSP35		PGTW
53	180213	24.5N 143.4E	PCN 5		DMSP35		RODN
54	181010	25.6N 143.9E	PCN 6		DMSP36		RODN
55	181013	25.3N 144.6E	PCN 5		DMSP37		RPMK
56	181013	25.3N 144.8E	PCN 5		DMSP37	CI DOWN	PGTW
57	181100	25.7N 141.5E	PCN 5		NOAA5		PGTW
58	181314	25.6N 145.2E	PCN 5		DMSP35		PGTW
59	181455	25.5N 145.7E	PCN 5		DMSP35		RPMK
60	182110	25.2N 145.5E	PCN 3	T5.0/5.0 /D0.5/24HRS	DMSP36		PGTW
61	182111	25.7N 145.9E	PCN 6	T5.0/5.0 /D1.0/24HRS	DMSP36		RODN
62	182112	25.4N 145.7E	PCN 3	T5.0/5.0 /S0.0/24HRS	DMSP37		RKSO
63	182336	25.6N 146.2E	PCN 3		NOAA5		PGTW
64	190156	26.0N 145.6E	PCN 3		DMSP35		RKSO
65	190158	26.5N 146.1E	PCN 3		DMSP35		PGTW
* 66	190954	27.5N 144.8E	PCN 6		DMSP37		RODN
67	190954	27.0N 145.0E	PCN 3		DMSP37		RKSO
68	191016	27.0N 145.5E	PCN 5		NOAA5		PGTW
69	191437	27.7N 145.2E	PCN 3		DMSP35	CI UP	PGTW
70	192053	28.9N 144.0E	PCN 3	T3.5/4.5 /W1.5/24HRS	DMSP37		PGTW
71	192053	29.0N 143.8E	PCN 3	T4.0/4.0 /W1.0/24HRS	DMSP37		RKSO
72	192235	29.0N 143.8E	PCN 3		DMSP36	UPR LVL 29.5N 143.3E	RKSO
73	192252	29.2N 143.6E	PCN 6		NOAA5		PGTW
74	200138	29.2N 143.2E	PCN 3		DMSP35		PGTW
75	200934	29.9N 141.0E	PCN 6		DMSP37		PGTW
* 76	200934	30.6N 140.9E	PCN 6		DMSP37	LOW LVL CIRC ON CU LINE	RODN
77	201117	30.1N 139.8E	PCN 5		DMSP36		PGTW
78	201128	29.5N 140.0E	PCN 6		NOAA5		PGTW
79	201419	29.5N 139.2E	PCN 6		DMSP35		PGTW
80	202034	29.7N 138.0E	PCN 5		DMSP37		PGTW
81	202218	28.8N 136.7E	PCN 5	T2.5/2.5	DMSP36	INIT OBS	RODN
82	202218	30.2N 137.9E	PCN 5	T3.0/4.0 /W1.0/24HRS	DMSP36		RKSO
83	202218	30.1N 137.9E	PCN 5	T2.0/3.0 /W1.5/24HRS	DMSP36		PGTW
84	210005	30.5N 137.6E	PCN 3		NOAA5		PGTW
* 85	210120	30.8N 137.2E	PCN 5		DMSP35	EXPOSED LOW LVL CIRC	RKSO

86	211059	30.2N 134.1E	PCN 5		DMSP36		PGTW	
87	211100	30.4N 135.7E	PCN 5		DMSP36		RKSO	
88	211401	28.7N 132.9E	PCN 5		DMSP35		PGTW	
89	211534	29.4N 133.2E	PCN 5		DMSP35		RODN	
90	212156	29.1N 129.5E	PCN 5	T2.0/2.0 /S0.0/24HRS	DMSP37		PGTW	
91	212201	29.2N 130.8E	PCN 5	T2.0/3.0 /W1.0/24HRS	DMSP36		RKSO	
92	220117	28.8N 128.4E	PCN 5		NOAA5		PGTW	
93	220244	28.5N 128.5E	PCN 5	T2.0/2.5 /W0.5/28HRS	DMSP35		RODN	
94	220244	28.5N 127.2E	PCN 5		DMSP35		RKSO	
95	221035	29.5N 125.6E	PCN 5		DMSP37		PGTW	
96	221037	29.9N 125.0E	PCN 5		DMSP37		RKSO	
97	221156	28.1N 124.7E	PCN 5		NOAA5		PGTW	
98	221224	27.4N 124.8E	PCN 5		DMSP36	BASED ON CI BANDING	RODN	
99	221525	28.4N 124.1E	PCN 5		DMSP35		PGTW	
100	222137	29.2N 121.8E	PCN 3	T1.0/2.0-/W1.0/24HRS	DMSP37		PGTW	
101	222137	28.6N 121.6E	PCN 5	T1.0/2.0 /W1.0/19HRS	DMSP37		RODN	
102	230033	29.2N 121.3E	PCN 5		NOAA5		PGTW	

AIRCRAFT FIXES

FIX NO.	TIME (Z)	FIX POSITION	FLT LVL	MIN HGT	OBS MSLP	MAX-SFC-WND VEL/ARG/RNG	MAX-FLT-LVL-WND DIR/VEL/BRG/ANG	ACCRY NAV/MET	EYE SHAPE	EYE ORIEN- DIAM/TATION	EYE TEMP (C) OUT/ IN/ DP/SST	MSG NO.
1	131549	23.9N 144.8E	700MB	3089	1003		090 029 360 090	04 05			+10 +10	2
2	140105	23.6N 143.1E	700MB			35 330 50	070 27 330 90					3
3	140338	23.9N 142.8E	700MB	3041	995	035 340 045	070 027 340 045	04 02			+14 +15	3
4	141443	23.9N 141.2E	700MB	3009	992		200 038 160 810	02 05			+11 +13 +12	4
5	150309	23.8N 139.6E	700MB	2946		100 050 10	230 65 050 30				+17	5
6	150345	23.9N 139.3E	700MB	2927	980	090 140 010	090 064 360 040	10 05	CIRCULAR	15	+10 +17	5
* 7	150540	23.9N 139.3E	700MB	2927		90 140 10	230 57 140 15				+17	5
8	151159	23.6N 138.1E	700MB	2936			060 58 340 30				+20	6
9	151506	23.2N 138.0E	700MB	2966	980		040 045 290 075	05 05			+13 +20	6
10	160030	22.9N 137.8E	700MB	2867	973	090 120 010	230 071 140 818	01 03	CIRCULAR	15	+12 +17 09	7
11	160326	22.7N 137.7E	700MB	2852	970	090 120 020	040 065 360 025	03 03	CIRCULAR	18	+10 +16 09	7
12	161221	22.1N 138.1E	700MB	2881			200 75 100 10				+18	8
13	161505	22.0N 138.1E	700MB	2876	974		200 070 110 020	05 02	CIRCULAR	20	+12 +18	8
14	170132	22.0N 139.3E	700MB	2838		70 180 25	270 75 180 25				+17 +12	9
15	170436	22.4N 139.6E	700MB	2828	967	055 170 025	270 072 170 025	03 00	CIRCULAR	25	+15 +21 +13	9
16	171410	22.6N 140.8E	700MB	2942			200 50 090 30				+20	10
17	171530	22.9N 141.3E	700MB	2939	980		200 050 120 025	04 04			+11 +17 +17	10
18	180317	24.1N 143.7E	700MB	2913							+16 +11	11
19	180436	24.2N 143.9E	700MB	2909	980	045 180 030	250 050 180 030	02 10			+14 +16 +10	11
20	190330	26.4N 146.1E	700MB	3001	988	050 270 030	240 040 160 045	03 05			+11 +17	12
21	190506	26.6N 146.4E	700MB		984	055 250 010	180 060 080 030	02 01			+21 +25 27	12
22	191305	27.4N 145.3E	700MB	3012			140 53 090 50				+14 +13	13
23	191342	28.0N 144.8E	700MB	2974			110 050 020 040	03 04			+16 +17 +15	13
24	200254	29.1N 143.0E	700MB	3049	996	035 070 040	140 040 070 035	03 05			+14 +14 26	14
25	201520	29.6N 139.3E	700MB	3070	1000		050 039 290 042	10 05			+16 +16 +11	15
26	210305	29.8N 136.5E	700MB		1000	025 360 025	100 025 360 025	03 10			+24 +25 +24 29	16
* 27	211529	27.1N 131.4E	700MB	3108	1003		360 025 280 010	02 15				17
28	220000	28.0N 129.1E	1500FT		1000							18
29	220350	28.7N 127.7E	1500FT		997	055 100 015	140 035 080 080	05 05	CIRCULAR	08	+26 +26 27	18

SATELLITE FIXES

FIX NO.	TIME (Z)	FIX POSITION	ACCRY	DVORAK CODE	SAT	COMMENTS	SITE
1	222237	15.9N 151.0E	PCN 5	T0.0/0.0	NOAA5	INIT OBS	PGTW
2	230044	16.2N 151.3E	PCN 5		DMSP35		PGTW
3	231025	16.1N 150.7E	PCN 5		DMSP36	CI UP	PGTW
* 4	231025	14.4N 148.5E	PCN 4		DMSP36		RODN
5	231325	16.1N 151.1E	PCN 6		DMSP35		PGTW
* 6	231326	13.9N 150.0E	PCN 6		DMSP35	SECONDARY 15.4N 152.1E	RODN
7	232126	16.9N 151.9E	PCN 5	T2.0/2.0 /D2.0/23HRS	DMSP36		PGTW
8	240027	16.9N 151.5E	PCN 5		DMSP35		PGTW
9	241008	17.3N 151.2E	PCN 6		DMSP36	CI SAME	PGTW
10	241308	18.1N 151.2E	PCN 6		DMSP35		PGTW
11	242109	18.5N 150.5E	PCN 5	T3.0/3.0 /D1.0/24HRS	DMSP36		PGTW
12	242308	18.7N 150.4E	PCN 5		NOAA5		PGTW
13	250150	18.9N 150.3E	PCN 5		DMSP35		PGTW
14	250940	20.0N 149.6E	PCN 5		DMSP37		PGTW
15	250940	19.5N 150.7E	PCN 5		DMSP37		RODN
16	251251	20.4N 149.5E	PCN 6		DMSP35		PGTW
17	252038	20.4N 149.2E	PCN 5	T4.0/4.0 /D1.0/24HRS	DMSP37		PGTW
18	252038	20.9N 149.4E	PCN 5	T4.0/4.0	DMSP37	INIT OBS	RODN
19	260132	21.2N 148.9E	PCN 6		DMSP35		PGTW
20	260919	21.8N 147.9E	PCN 5		DMSP37		PGTW
21	260919	21.3N 148.9E	PCN 6		DMSP37	UPR LVL CDO	RODN
22	261614	21.8N 147.8E	PCN 5		DMSP35	CI DOWN	PGTW
23	262018	21.5N 148.1E	PCN 5		DMSP37		PGTW
24	262215	21.9N 148.0E	PCN 3		DMSP36		RPMK
25	270114	21.5N 147.0E	PCN 5		DMSP35		PGTW
26	270115	21.5N 147.8E	PCN 5	T3.0/4.0	DMSP35		RODN
27	270900	21.8N 147.4E	PCN 4		DMSP35		RODN
28	270900	21.5N 147.4E	PCN 4		DMSP37		PGTW
29	271057	21.8N 146.9E	PCN 4		DMSP36		PGTW
30	271357	21.7N 147.2E	PCN 5		DMSP35		PGTW
31	271959	21.2N 147.2E	PCN 5	T5.0/5.0 /D1.0/24HRS	DMSP37		PGTW
32	272158	21.7N 147.4E	PCN 5	T3.5/3.5	DMSP34	INIT OBS	RKSO
33	272158	21.3N 147.5E	PCN 5		DMSP36		PGTW
34	280056	21.6N 147.7E	PCN 5		DMSP35		PGTW
35	280840	22.2N 147.4E	PCN 6		DMSP37	CI DOWN	PGTW
36	281040	22.2N 147.2E	PCN 4		DMSP36		RODN
37	281040	22.1N 147.2E	PCN 5		DMSP36	UPR LVL	PGTW
38	281339	22.0N 146.6E	PCN 6		DMSP35		PGTW
39	281357	21.7N 147.9E	PCN 5		DMSP35		RODN
40	282121	22.3N 146.9E	PCN 3		DMSP37		RPMK
41	282121	22.7N 147.0E	PCN 3		DMSP37		RKSO
42	282141	22.2N 146.7E	PCN 3	T4.0/4.0	DMSP36	INIT OBS	RODN
43	282141	22.3N 147.2E	PCN 3	T4.5/5.0-/W0.5/26HRS	DMSP36		PGTW
44	290039	22.3N 147.3E	PCN 4		DMSP35		PGTW
45	291002	24.0N 147.3E	PCN 4		DMSP37		RKSO
46	291002	23.8N 146.8E	PCN 4		DMSP37		PGTW
47	291022	23.9N 146.6E	PCN 4		DMSP36		PGTW
48	291023	24.1N 146.6E	PCN 6		DMSP36		RODN
49	291320	24.0N 146.5E	PCN 4		DMSP35		PGTW
50	292102	25.0N 145.0E	PCN 3		DMSP37		RKSO
51	292102	25.3N 145.6E	PCN 5	T4.0/4.0 /S0.0/24HRS	DMSP37		RODN
52	292124	25.0N 145.1E	PCN 3	T4.5/4.5 /S0.0/24HRS	DMSP36		PGTW
53	300203	25.4N 145.0E	PCN 3		DMSP35		RPMK
54	300203	25.3N 144.7E	PCN 3	T4.0/4.0	DMSP35		RKSO
55	300203	25.8N 144.9E	PCN 4		DMSP35		PGTW
56	300943	27.3N 143.9E	PCN 6		DMSP37		RODN
57	300943	27.3N 143.9E	PCN 4		DMSP37		PGTW
58	301005	27.3N 143.7E	PCN 4		DMSP36		PGTW
59	301444	27.4N 143.6E	PCN 4		DMSP35		PGTW
60	301445	27.5N 143.6E	PCN 5		DMSP35		RKSO
61	302043	28.7N 143.0E	PCN 3	T3.0/4.0 /W1.0/24HRS	DMSP37		RODN
62	302043	28.9N 142.8E	PCN 1	T3.5/4.5 /W1.0/24HRS	DMSP37		PGTW
63	302106	28.9N 142.9E	PCN 3		DMSP36		PGTW
64	310145	30.2N 142.8E	PCN 3	T3.5/4.0 /W0.5/24HRS	DMSP35		RKSO
65	310145	30.3N 142.8E	PCN 3		DMSP35		PGTW
66	310923	31.3N 141.9E	PCN 6		DMSP37		RODN
67	310923	31.5N 141.8E	PCN 4		DMSP37		PGTW
68	311129	31.9N 141.8E	PCN 4		DMSP36		PGTW
69	311426	32.3N 141.6E	PCN 3		DMSP35		PGTW
70	311427	32.5N 141.7E	PCN 3		DMSP35		RPMK
71	311427	32.4N 142.0E	PCN 3		DMSP35		RKSO
72	312023	33.3N 141.5E	PCN 1	T3.0/4.0-/W0.5/24HRS	DMSP37		PGTW
73	312231	33.3N 141.5E	PCN 3		DMSP36		PGTW
74	312346	33.4N 141.1E	PCN 3		NOAA5		PGTW
75	010127	34.1N 141.6E	PCN 3	T3.0/3.5-/W0.5/24HRS	DMSP35		RKSO
76	010127	34.1N 141.6E	PCN 3		DMSP35		PGTW
77	010904	35.4N 142.0E	PCN 6		DMSP37		RODN
78	010904	35.2N 141.8E	PCN 3		DMSP37	CI SAME	PGTW
* 79	011045	30.5N 142.3E	PCN 4		DMSP37		RKSO
80	011112	35.8N 142.5E	PCN 3		DMSP36		PGTW
81	011140	36.4N 143.0E	PCN 3		DMSP35		PGTW
82	012004	38.6N 144.0E	PCN 5	T2.0/2.0	DMSP37		RODN
83	012004	37.7N 143.9E	PCN 5		DMSP37		PGTW
84	012213	38.7N 144.1E	PCN 5	T3.0/4.0-/S0.0/24HRS	DMSP36		PGTW
85	012213	38.8N 144.3E	PCN 5	T2.0/3.0-/W1.0/24HRS	DMSP36		RKSO
86	012302	38.9N 144.3E	PCN 5		NOAA5		PGTW
87	020942	40.1N 147.9E	PCN 6		NOAA5	CI DOWN	PGTW
88	021026	40.5N 148.2E	PCN 5		DMSP37		RKSO
89	021026	40.6N 148.6E	PCN 6		DMSP37		RODN
90	021055	40.6N 148.6E	PCN 5		DMSP36		RKSO
91	030015	43.5N 150.4E	PCN 5		NOAA5		PGTW

AIRCRAFT FIXES

FIX NO.	TIME (Z)	FIX POSITION	FLT LVL	MIN HGT	OBS MSLP	MAX-SFC-WND VEL/BRG/RNG	MAX-FLT-LVL-WND DIR/VEL/BRG/RNG	ACCRY NAV/MET	EYE SHAPE	EYE ORIEN-TATION	EYE DIAM	EYE TEMP (C) OUT/ IN/ DP/SST	MSN NO.
1	230315	15.9N 151.0E	15000FT		984	55 290 45	350 45 290 45	3 5	CIRCULAR	40		+26 +26 +26 25	1
2	232205	16.5N 151.1E	700MB	3027	993	75 240 5	310 65 340 20	4 5				+13 +21 +11	2
3	240135	16.7N 151.0E	700MB	3056		100 050 20	150 50 050 20					+18 + 9	2
4	240355	16.9N 151.0E	700MB	3026	987	55 260 10	140 70 120 15	4 6				+15 +15 + 9	2
5	241333	16.7N 151.8E	700MB										3
6	241550	16.3N 150.8E	700MB	2964	982		140 50 050 30	7 2				+ 9 +19	3
7	250130	19.0N 150.2E	700MB	2935		30 700 30	160 63 700 60					+18 +11	4
8	250425	19.4N 150.2E	700MB	2880	974	70 130 10	220 60 130 10	5 5	CIRCULAR	40		+15 +21 +12	4
9	251345	20.1N 149.5E	700MB	2892			120 65 400 30					+19	5
10	251500	20.4N 149.3E	700MB	2898	977		200 90 180 24	4 4	ELLIPTICAL	40 25 140		+12 +16	5
11	260307	21.1N 148.6E	700MB	2919	981	35 210 22	300 55 250 40	7 5				+10 +17 +13	5
12	260945	21.4N 148.3E	700MB	2921		90 340 45	060 75 340 50					+17 +13	6
13	261250	21.3N 147.7E	700MB	2968			090 65 050 30					+19 +10	7
14	261512	21.7N 147.6E	700MB	2942	982		360 70 270 30	3 5				+15 +18 +11	7
15	270040	21.5N 147.1E	700MB	2997		90 020 70	110 65 020 30					+16 +12	8
16	270235	21.8N 147.3E	700MB	2996	987	100 340 30	060 55 340 30	4 4				+13 +17 +13	8
17	280221	21.3N 147.6E	700MB	2919		40 030 120	090 30 030 120					+16 +13	9
18	280439	21.4N 147.9E	700MB	2911	979	30 280 120	010 40 260 40	3 5				+15 +17 +11	9
19	281550	21.9N 147.1E	700MB	2985	980		270 66 210 36	5 3				+12 +15 +13	10
20	281902	22.2N 147.1E	700MB	2988	977		020 52 110 95	5 3				+13 +14 +13	10
21	290215	22.7N 147.1E	700MB	2929		50 320 40	060 50 320 70					+15 +13	11
22	290411	22.8N 146.9E	700MB	2915	982	40 090 50	350 45 090 60	4 10				+13 +15 +12 21	11
23	291413	24.2N 145.8E	700MB	2938			130 55 030 80					+14 +12	12
24	291550	24.5N 145.9E	700MB	2930	983		090 50 360 100	3 5				+13 +14 +12	12
25	300119	25.5N 144.8E	700MB	2944		60 140 58	200 55 140 68	6 4				+13 +12 +12	13
26	300342	25.9N 144.7E	700MB	2938	985	45 100 58	340 40 100 68	5 5				+12 +13 +12	13
27	301715	23.4N 143.3E	700MB	2959	984		260 48 180 60	25 5				+12 +12	14
28	310230	30.0N 142.2E	700MB	2930	978	55 210 40	320 40 220 72	3 1				+13 +14 +13	15
29	310523	30.5N 142.0E	700MB	2925		55 060 120	140 63 060 77					+13 +12	15
30	311514	32.4N 141.5E	700MB	2944	983		180 57 100 66	5 5				+13 +13 +12	16
31	311823	32.9N 141.6E	700MB	2932			160 75 090 80					+12 +12	16
32	312042	33.1N 141.2E	700MB	2934	982	45 170 35	260 47 170 65	5 5				+12 +13 +11	15
33	010030	33.4N 141.2E	700MB	2900	978	50 200 25	280 50 190 70	5 2				+14 +15 +12	17
34	010235	34.0N 141.4E	700MB	2905	978		160 55 060 60	5 3				+13 +15 +11	17
35	011515	36.9N 142.9E	700MB	2930	981		320 60 240 40	2 5	ELLIPTICAL	45 20 030		+13 +14	18
36	011731	37.9N 143.3E	700MB	2926			280 55 200 120					+14	18

RADAR FIXES

FIX NO.	TIME (Z)	FIX POSITION	RADAR	ACCRY	EYE SHAPE	EYE DIAM	RADOB-CODE ASWAN TDOFF	COMMENTS	RADAR POSITION	SITE WMO NO.
1	312130	33.4N 141.3E	LAND	GOOD		25		MOV 3620 MINEOKA	35.2N 140.1E	
2	312230	33.5N 141.4E	LAND	GOOD		25		MOV 3620 MINEOKA	35.2N 140.1E	
3	312300	33.6N 141.5E	LAND	GOOD		25		MOV 3615 MINEOKA	35.2N 140.1E	
4	010000	33.6N 141.6E	LAND	GOOD		25		MOV 3620 MINEOKA	35.2N 140.1E	
5	010100	33.9N 141.5E	LAND	GOOD		25		MOV 3615 MINEOKA	35.2N 140.1E	
6	010230	34.0N 141.5E	LAND	GOOD		30		MOV 3615 MINEOKA	35.2N 140.1E	
7	010300	34.2N 141.6E	LAND	GOOD		25		MOV 0310 MINEOKA	35.2N 140.1E	
8	010300	34.1N 141.6E	LAND				21901 /////		35.8N 139.8E	47662
9	010335	34.1N 141.4E	LAND	POOR					35.7N 139.3E	47642
10	010400	34.3N 141.6E	LAND	GOOD		25		MOV 3615 MINEOKA	35.2N 140.1E	
11	010410	34.1N 141.4E	LAND	POOR					35.7N 139.3E	47642
12	010445	34.2N 141.5E	LAND	POOR					35.7N 139.3E	47642
13	010500	34.5N 141.8E	LAND	GOOD		25		MOV 0430 MINEOKA	35.2N 140.1E	
14	010510	34.2N 141.5E	LAND	POOR					35.7N 139.3E	47642
15	010535	34.3N 141.6E	LAND	POOR					35.7N 139.3E	47642
16	010500	34.8N 141.9E	LAND	GOOD		30		MOV 0440 MINEOKA	35.2N 140.1E	
17	010510	34.5N 141.6E	LAND	POOR					35.7N 139.3E	47642
18	010535	34.6N 141.0E	LAND	POOR					35.7N 139.3E	47642
19	010700	34.9N 141.9E	LAND	GOOD		45		MOV 3620 MINEOKA	35.2N 140.1E	
20	010700	35.0N 141.8E	LAND				21942 70120		35.8N 139.8E	47662
21	010710	34.7N 141.8E	LAND	POOR					35.7N 139.3E	47642
22	010735	34.8N 141.8E	LAND	POOR					35.7N 139.3E	47642
23	010835	35.2N 142.1E	LAND	POOR					35.7N 139.3E	47642
24	010900	35.5N 142.2E	LAND				21922 70319		35.8N 139.8E	47662
25	010910	35.4N 142.3E	LAND	POOR					35.7N 139.3E	47642
26	010935	35.3N 142.4E	LAND	POOR					35.7N 139.3E	47642
27	011000	35.4N 142.3E	LAND				21922 70314		35.8N 139.8E	47662
28	011010	35.6N 142.6E	LAND	POOR					35.7N 139.3E	47642
29	011030	36.0N 142.6E	LAND	POOR					35.7N 139.3E	47642
30	011100	35.9N 142.4E	LAND				21912 70216		35.8N 139.8E	47662
31	011110	34.4N 142.3E	LAND	POOR					35.7N 139.3E	47642
32	011200	36.1N 142.4E	LAND				21912 70214		35.8N 139.8E	47662
33	011210	36.5N 142.5E	LAND	POOR					35.7N 139.3E	47642
34	011230	36.4N 142.5E	LAND	POOR					35.7N 139.3E	47642
35	011300	36.3N 142.6E	LAND				22912 70315		35.8N 139.8E	47662
36	011500	36.4N 142.6E	LAND				65/41 70110		35.8N 139.8E	47662
37	011500	36.7N 142.5E	LAND				55//1 50111		38.3N 140.9E	47590
38	011600	37.0N 142.7E	LAND				65/// 50216		38.3N 140.9E	47590
39	011700	37.4N 143.2E	LAND				65/// 50432		38.3N 140.9E	47590
40	011800	37.7N 143.3E	LAND				65/// 50322		38.3N 140.9E	47590
41	011900	38.1N 143.7E	LAND				6//// 50327		38.3N 140.9E	47590
42	012000	38.4N 144.1E	LAND				6//// 50327		38.3N 140.9E	47590

SATELLITE FIXES

FIX NO.	TIME (Z)	FIX POSITION	ACCRY	DVORAK CODE	SAT	COMMENTS	SITE
1	222137	21.1N 137.4E	PCN 3	T1.0/1.0	DMSP37		
2	231018	21.6N 137.1E	PCN 5		DMSP37	CI UP	PGTW
3	231508	22.0N 137.0E	PCN 6		DMSP35		PGTW
4	231508	21.4N 136.6E	PCN 3		DMSP35		PGTW
5	232117	21.4N 134.1E	PCN 5	T3.0/3.0 /02.0/24HRS	DMSP37		RODN
6	232308	21.6N 134.5E	PCN 5		DMSP36		PGTW
7	232349	21.3N 134.1E	PCN 5		NOAA5		PGTW
8	240209	21.1N 134.0E	PCN 3		DMSP35		PGTW
9	240958	21.1N 133.9E	PCN 5		DMSP37	CI UP	PGTW
10	240958	20.5N 134.0E	PCN 5		DMSP37		RKSO
11	241149	20.9N 133.6E	PCN 5		DMSP36		PGTW
12	241149	20.5N 134.6E	PCN 5		DMSP36		RKSO
13	241450	20.7N 134.0E	PCN 5		DMSP35		PGTW
14	241450	20.0N 134.5E	PCN 5		DMSP35		RKSO
15	242056	21.7N 134.8E	PCN 1	T5.0/5.0	DMSP37	INIT OBS	RODN
16	242058	21.7N 133.8E	PCN 1	T4.5/4.5 /01.5/24HRS	DMSP37		PGTW
17	242250	20.9N 133.9E	PCN 3	T4.0/4.0	DMSP36	INIT OBS	RPMK
18	242250	21.9N 134.4E	PCN 5	T4.5/4.5	DMSP36	INIT OBS	RKSO
19	242305	20.8N 133.8E	PCN 3		NOAA5		PGTW
20	250150	20.8N 133.7E	PCN 5		DMSP35		PGTW
21	250150	20.4N 134.2E	PCN 5		DMSP35		RKSO
22	250938	21.1N 133.3E	PCN 5		DMSP37		RKSO
23	250939	21.3N 133.3E	PCN 3		DMSP37	CI SAME	RODN
24	250939	21.1N 133.3E	PCN 5		DMSP37	CI SAME	PGTW
25	251132	21.0N 133.4E	PCN 4		DMSP36		PGTW
26	251132	21.1N 134.0E	PCN 3		DMSP36		RKSO
27	251432	21.0N 133.4E	PCN 5		DMSP35		PGTW
28	252232	21.5N 134.0E	PCN 5	T5.0/5.0 /D0.5/26HRS	DMSP36		PGTW
29	252232	21.5N 134.0E	PCN 5	T5.0/5.0 /D0.5/26HRS	DMSP36		PGTW
30	252233	21.6N 134.1E	PCN 3	T5.0/5.0 /D0.5/24HRS	DMSP36		RKSO
31	252233	21.0N 134.2E	PCN 3	T4.0/4.0 /S0.0/24HRS	DMSP36		RPMK
32	260017	21.6N 133.8E	PCN 5		NOAA5	BASED ON EXTRAP CB BAND	PGTW
33	260132	21.7N 133.3E	PCN 5		DMSP35	BANDING TYPE EYE	RKSO
34	260132	21.5N 133.4E	PCN 5		DMSP35		PGTW
35	260919	22.2N 133.0E	PCN 6		DMSP37		RODN
36	260919	22.3N 132.9E	PCN 4		DMSP37		PGTW
37	261101	22.3N 132.9E	PCN 4		DMSP37		PGTW
38	261101	22.4N 133.2E	PCN 2		DMSP37		RKSO
39	261115	22.4N 132.9E	PCN 2		DMSP36		RODN
40	261115	22.3N 132.8E	PCN 4		DMSP36		PGTW
41	261414	22.4N 132.6E	PCN 3		DMSP35		PGTW
42	262200	23.1N 132.9E	PCN 1	T5.0/5.0+/S0.0/24HRS	DMSP37		RKSO
43	262200	23.2N 132.5E	PCN 1	T5.0/5.0+/S0.0/24HRS	DMSP37		PGTW
44	262215	23.3N 132.4E	PCN 1		DMSP36		PGTW
45	262215	23.2N 132.4E	PCN 1	T4.0/4.0+/S0.0/24HRS	DMSP36		RPMK
46	270115	23.2N 132.6E	PCN 5		DMSP35		RKSO
47	270115	23.0N 132.4E	PCN 5		DMSP35		RODN
48	271041	24.3N 131.8E	PCN 2		DMSP37		PGTW
49	271041	24.4N 131.9E	PCN 1		DMSP37		RPMK
50	271057	24.4N 131.8E	PCN 4		DMSP36		RODN
51	271057	24.3N 131.6E	PCN 2		DMSP36		PGTW
52	271530	24.6N 131.1E	PCN 4		DMSP35		PGTW
53	271538	24.7N 131.1E	PCN 4		DMSP35		RPMK
54	272140	25.7N 130.3E	PCN 3	T5.0/5.0 /S0.0/24HRS	DMSP37		PGTW
55	272158	25.7N 130.6E	PCN 3	T5.0/5.0+/S0.0/24HRS	DMSP36		RKSO
56	272340	26.2N 129.9E	PCN 3		DMSP36		RKSO
57	280045	26.7N 129.8E	PCN 3		NOAA5		PGTW
58	280238	26.8N 128.9E	PCN 4		DMSP35		PGTW
59	280239	26.9N 129.4E	PCN 1		DMSP35		RKSO
60	280239	26.8N 129.3E	PCN 3	T5.5/5.5	DMSP35	INIT OBS	RODN
61	280239	26.9N 129.1E	PCN 3	T3.0/4.0 /W1.0/28HRS	DMSP35		RPMK
62	281022	27.3N 127.6E	PCN 4		DMSP37	CI SAME	PGTW
63	281022	27.8N 127.7E	PCN 2		DMSP37	CI SAME	RKSO
64	281222	27.7N 127.3E	PCN 4		DMSP36		RODN
65	281222	28.0N 127.2E	PCN 2		DMSP36		RKSO
66	281222	27.8N 127.8E	PCN 4		DMSP36		RPMK
67	281520	27.8N 126.7E	PCN 4		DMSP35		PGTW
68	282121	28.2N 126.2E	PCN 1	T4.0/5.0-/W1.0/24HRS	DMSP37		PGTW
69	282121	28.1N 126.2E	PCN 1	T4.0/5.0-/W1.0/24HRS	DMSP37		RKSO
70	282121	28.1N 126.2E	PCN 1	T3.5/3.5 /D0.5/19HRS	DMSP37		RPMK
71	282323	28.3N 126.1E	PCN 1		DMSP36		PGTW
72	282323	28.1N 126.0E	PCN 1		DMSP36		RPMK
73	291002	28.7N 126.0E	PCN 4		DMSP37		PGTW
74	291002	29.1N 125.8E	PCN 3		DMSP37		RKSO
75	291144	29.3N 125.5E	PCN 6		DMSP37		RPMK
76	291204	29.2N 125.6E	PCN 2		DMSP36		RKSO
77	291204	29.2N 125.7E	PCN 4		DMSP36		PGTW
78	291502	29.5N 125.4E	PCN 4		DMSP35		PGTW
79	292102	29.9N 125.0E	PCN 5		DMSP37		PGTW
80	292102	29.8N 125.3E	PCN 2	T4.0/4.0-/S0.0/24HRS	DMSP37		RKSO
81	292102	29.8N 125.1E	PCN 3		DMSP37		RODN
82	292243	29.8N 125.3E	PCN 3		DMSP37		RKSO
83	292243	29.8N 125.2E	PCN 3		DMSP37		RPMK
84	292305	29.9N 125.3E	PCN 3	T4.5/4.5-/D0.5/26HRS	DMSP36		PGTW
85	292305	29.9N 125.1E	PCN 3	T4.5/4.5-/D1.0/26HRS	DMSP36		RPMK
86	300202	29.9N 125.1E	PCN 3		DMSP35		RPMK
87	300203	30.0N 125.3E	PCN 1		DMSP35		RKSO
88	300203	30.1N 125.0E	PCN 2		DMSP35		PGTW
89	301124	30.9N 125.5E	PCN 4		DMSP37		RODN
90	301147	30.5N 124.8E	PCN 4		DMSP36		PGTW
91	301147	30.6N 125.0E	PCN 3		DMSP36		RKSO
92	301444	30.4N 124.7E	PCN 3		DMSP35		PGTW
93	301445	30.3N 124.5E	PCN 3		DMSP35		RKSO
94	301626	30.3N 124.9E	PCN 3		DMSP35		RKSO

95	301626	30.3N 125.1E	PCN 3			DMSP35			RPMK
96	302224	30.4N 125.0E	PCN 4			DMSP36			RPMK
97	302249	30.3N 124.7E	PCN 3	T3.0/4.0 /W1.5/24HRS		DMSP36			PGTW
98	302248	30.1N 124.9E	PCN 3	T3.0/3.0		DMSP36	INIT OBS		RODN
99	310145	30.5N 124.6E	PCN 3	T3.0/4.0 /W1.0/24HRS		DMSP35			RKSO
100	310145	30.3N 124.5E	PCN 4			DMSP35			PGTW
101	310327	30.5N 124.6E	PCN 3			DMSP35			RKSO
102	311105	30.4N 124.9E	PCN 4			DMSP37			RKSO
103	311105	30.6N 124.8E	PCN 4			DMSP37			RODN
104	311105	30.7N 124.8E	PCN 3			DMSP37			RPMK
105	311129	30.6N 124.7E	PCN 4			DMSP36			PGTW
106	311205	30.2N 125.4E	PCN 3	T3.5/3.5		DMSP37	INIT OBS		RPMK
107	311609	30.4N 125.0E	PCN 3			DMSP35			RPMK
108	311609	30.3N 124.7E	PCN 5			DMSP35	CI DOWN		RKSO
109	312205	30.4N 125.2E	PCN 3	T2.0/3.0 /W1.0/24HRS		DMSP37			RODN
110	312231	30.5N 125.2E	PCN 3	T2.5/3.5 /W0.5/24HRS		DMSP36			PGTW
111	312346	30.6N 125.6E	PCN 5			NOAA5			PGTW
112	011045	30.3N 125.8E	PCN 3			DMSP37			RPMK
113	011045	30.6N 126.5E	PCN 6			DMSP37			RKSO
114	011046	30.7N 126.8E	PCN 6			DMSP37			RODN
115	011112	30.8N 126.5E	PCN 5			DMSP36	CI DOWN		PGTW
116	011550	30.3N 127.7E	PCN 3			DMSP35			RPMK
117	011651	30.9N 127.2E	PCN 6			DMSP35			RKSO
118	012145	31.1N 128.6E	PCN 3	T1.0/2.0 /W1.0/24HRS		DMSP37			RODN
119	012145	31.1N 128.8E	PCN 3	T2.5/3.5 /W1.0/24HRS		DMSP37			RPMK
120	012145	31.0N 128.8E	PCN 4	T2.0/2.5 /W0.5/23HRS		DMSP37			PGTW
121	012213	31.1N 128.6E	PCN 3			DMSP36			PGTW
122	012213	31.3N 128.7E	PCN 3	T2.0/2.0-		DMSP36	INIT OBS		RKSO
123	020058	31.2N 128.9E	PCN 3			NOAA5			PGTW
124	021026	33.1N 130.8E	PCN 6			DMSP37			RODN
125	021026	32.6N 130.2E	PCN 6			DMSP37	CI DOWN		PGTW
126	021026	32.6N 131.4E	PCN 6			DMSP37			RKSO
127	021055	32.6N 130.3E	PCN 5			DMSP36			PGTW
128	021237	33.3N 131.1E	PCN 5			DMSP36			RODN
129	021532	33.3N 130.0E	PCN 5			DMSP35			RPMK
130	021533	32.5N 131.7E	PCN 5			DMSP35			RODN
131	022126	35.5N 131.6E	PCN 5	T1.0/2.0 /W1.0/24HRS		DMSP37			PGTW
*132	022126	30.8N 131.4E	PCN 5			DMSP37			RODN
133	022126	37.0N 133.7E	PCN 5	T1.0/2.0-/W1.5/24HRS		DMSP37			RPMK
134	022155	35.6N 131.5E	PCN 5			DMSP36			PGTW
135	030015	36.5N 132.2E	PCN 5			NOAA5			PGTW
136	030233	37.7N 133.3E	PCN 5			DMSP35	SECONDARY CENTER 36.7N 133.1E		RODN
137	030233	36.7N 133.2E	PCN 5			DMSP35			RKSO

AIRCRAFT FIXES

FIX NO.	TIME (Z)	FIX POSITION	FLT LVL	MIN MGT	OBS MSLP	MAX-SFC-WND VEL/BRG/RNG	MAX-FLT-LVL-WND DIR/VEL/BRG/RNG	ACCRY NAV/MET	EYE SHAPE	EYE ORIEN- DIAM/TATION	EYE TEMP. (C) OUT/ IN/ DP/SST	MSN NO.
1	240546	20.8N 134.1E	1500FT		994	40 350 130	060 35 350 130	5 1			+25 +26 28	2
2	242130	20.9N 133.8E	700MB	2984	988	55 030 35	040 45 310 120	5 5			+12 +12	3
3	250106	20.9N 133.7E	700MB	2963		60 350 120	070 40 350 120				+14	3
4	250345	20.8N 133.5E	700MB	2954	983	55 320 35	040 50 320 65	5 2			+14 +15	3
5	251335	20.9N 133.8E	700MB	2872			270 62 170 90				+15	4
6	251553	21.0N 133.6E	700MB	2866	978		340 55 260 120	20 10			+13 +15	4
7	260334	21.5N 133.7E	700MB	2836	968	50 320 70	050 50 320 50	3 5			+13 +15	5
8	261540	22.2N 132.5E	700MB	2768	963		040 57 310 140	5 5			+14 +17	6
9	261820	22.7N 132.8E	700MB	2761			050 46 300 120				+16	6
10	270340	23.9N 132.3E	700MB	2786	963	50 250 50		10 10			+14 +15	7
11	271543	25.2N 131.1E	700MB	2767	961		500 58 310 100	5 5			+16 +18 +14	8
12	271846	25.3N 130.8E	700MB	2762			320 56 350 100				+17 +14	8
13	272141	25.0N 130.4E	700MB	2760	962		260 55 190 25	2 10	CIRCULAR	40	+15 +17 +14	9
14	280330	26.8N 129.1E	700MB	2774	963	50 170 150	250 50 170 130	5 10			+15 +16	9
15	280630	27.2N 128.6E	700MB	2771			330 41 200 120				+16	9
16	281333	27.6N 127.0E	700MB	2836			150 66 180 90				+14	10
17	281538	27.8N 126.5E	700MB	2837	971		050 55 320 75	5 5	ELLIPTICAL	30 20 120	+12 +13	10
18	290035	28.2N 126.2E	700MB	2793	966	65 150 120	290 54 150 120				+16 +14	11
19	290240	28.4N 126.0E	700MB	2767	961	65 300 20	140 68 060 85	3 1	CIRCULAR	20	+14 +16 +16	11
20	291335	29.3N 125.4E	700MB	2778			190 64 090 90				+16 + 8	12
21	291534	29.5N 125.7E	700MB	2767	961		160 57 030 90	10 5	CIRCULAR	30	+15 +16 +16	12
22	310658	30.6N 125.1E	700MB	2829	970		240 50 150 45	5 8			+13 +15 +15	14
23	310859	30.8N 125.0E	700MB	2837		35 060 90	100 40 060 90				+14 +14	14
24	010250	30.6N 125.9E	700MB	2897		35 080 120	240 45 140 120				+13 +13	15
25	010444	30.7N 125.8E	700MB	2897	980		280 44 190 90	10 10			+12 +13 +13	15
26	020336	31.8N 128.8E	700MB	2926	983	35 180 24	310 28 220 40	0 10			+13 +14 +13	15

RADAR FIXES

FIX NO.	TIME (Z)	FIX POSITION	RADAR	ACCRY	EYE SHAPE	EYE DIAM	RADOB-CODE ASWAN TDOFF	COMMENTS	RADAR POSITION	SITE WMO NO.
1	271430	25.3N 131.1E	LAND	POOR	CIRCULAR			EYE	27.4N 128.7E	47942
2	271600	25.2N 131.2E	LAND	POOR	CIRCULAR			EYE	27.4N 128.7E	47942
3	271700	25.3N 131.1E	LAND	POOR	CIRCULAR			EYE	27.4N 128.7E	47942
4	271900	25.2N 131.0E	LAND	GOOD	CIRCULAR	40		EYE	27.4N 128.7E	47942
5	280000	26.5N 130.0E	LAND				6//// 53016		28.4N 129.5E	47909
6	280100	26.7N 129.8E	LAND				6//// 53216		28.4N 129.5E	47909
7	280100	26.6N 129.9E	LAND				3//// 5////		26.2N 127.8E	47937
8	280200	26.7N 129.5E	LAND				6//// 52716		28.4N 129.5E	47909
9	280200	26.5N 129.5E	LAND	POOR	CIRCULAR	90		EYE	27.4N 128.7E	47942
10	280200	26.7N 129.6E	LAND				6//11 52919		26.2N 127.8E	47937
11	280300	26.7N 129.2E	LAND	FAIR	CIRCULAR	80		EYE	27.4N 128.7E	47942
12	280300	26.8N 129.3E	LAND				6//// 52813		28.4N 129.5E	47909
13	280300	26.8N 129.2E	LAND				6//12 52922		26.2N 127.8E	47937
14	280400	26.9N 129.2E	LAND				6//// 53111		28.4N 129.5E	47909
15	280400	26.9N 129.1E	LAND	FAIR	CIRCULAR	80		EYE	26.2N 127.8E	47937
16	280400	26.9N 129.1E	LAND				6//// 72916		26.2N 127.8E	47937

17	280432	27.1N	128.9E	LAND	POOR	CIRCULAR	70			PSBL CNTR	26.4N	127.8E	47991
18	280500	26.9N	129.0E	LAND				6///3	53112		28.4N	129.5E	47909
19	280500	27.0N	128.9E	LAND				6////	72913		26.2N	127.8E	47937
20	280501	27.0N	128.9E	LAND	POOR	CIRCULAR	77			PSBL CNTR	26.4N	127.8E	47991
21	280504	27.0N	128.8E	LAND	POOR	CIRCULAR	69			PSBL CNTR	26.4N	127.8E	47991
22	280500	27.0N	128.9E	LAND	FAIR	CIRCULAR	120			EYE	26.2N	127.8E	47937
23	280700	27.3N	128.6E	LAND				5////	73011		26.2N	127.8E	47937
24	280700	27.3N	128.7E	LAND				6///3	53413		28.4N	129.5E	47909
25	280701	27.4N	128.6E	LAND	FAIR	CIRCULAR	55			CNTR	26.4N	127.8E	47991
26	280500	27.4N	128.4E	LAND				6///3	52916		28.4N	129.5E	47909
27	280901	27.6N	128.5E	LAND	FAIR	CIRCULAR	34			CNTR	26.4N	127.8E	47991
28	280925	27.6N	128.1E	LAND	FAIR	CIRCULAR	35			CNTR	26.4N	127.8E	47991
29	280900	27.7N	128.2E	LAND	FAIR	CIRCULAR	70			EYE	26.2N	127.8E	47937
30	280900	27.6N	128.1E	LAND				5////	73117		26.2N	127.8E	47937
31	280900	27.7N	128.2E	LAND				6///3	53318		28.4N	128.5E	47909
32	280930	27.6N	127.8E	LAND	GOOD	CIRCULAR	35			CNTR	26.4N	127.8E	47991
33	281000	27.6N	127.8E	LAND				5////	73015		26.2N	127.8E	47937
34	281000	27.7N	127.9E	LAND				6///3	52817		28.4N	129.5E	47909
35	281001	27.7N	127.7E	LAND	GOOD	CIRCULAR	31			EYE	26.4N	127.8E	47991
36	281030	27.8N	127.7E	LAND	GOOD	CIRCULAR	33			EYE	26.4N	127.8E	47991
37	281100	27.6N	127.4E	LAND	GOOD	CIRCULAR	28			EYE	26.4N	127.8E	47991
38	281100	27.6N	127.4E	LAND				21911	72816		26.2N	127.8E	47937
39	281100	27.7N	127.7E	LAND				6///3	52712		28.4N	129.5E	47909
40	281130	27.5N	127.4E	LAND	GOOD	ELLIPTICAL	28			EYE	26.4N	127.8E	47991
41	281200	27.5N	127.3E	LAND	GOOD	ELLIPTICAL				EYE	26.4N	127.8E	47991
42	281200	27.7N	127.3E	LAND	GOOD	CIRCULAR	50			EYE	26.2N	127.8E	47937
43	281200	27.5N	127.4E	LAND				5////	72614		26.2N	127.8E	47937
44	281200	27.7N	127.5E	LAND				6///3	52711		28.4N	129.5E	47909
45	281230	27.6N	127.3E	LAND	GOOD	ELLIPTICAL				EYE	26.4N	127.8E	47991
46	281300	27.7N	127.2E	LAND	FAIR	ELLIPTICAL				EYE	26.4N	127.8E	47991
47	281300	27.6N	127.3E	LAND				5////	73208		26.2N	127.8E	47937
48	281300	27.7N	127.1E	LAND				6///3	52720		28.4N	129.5E	47909
49	281330	27.5N	127.3E	LAND	FAIR	CIRCULAR	50			CNTR	26.4N	127.8E	47991
50	281400	27.7N	126.9E	LAND				6///3	52714		28.4N	128.5E	47909
51	281400	27.7N	127.0E	LAND				32942	52916		26.2N	127.8E	47937
52	281400	27.7N	127.0E	LAND	FAIR	CIRCULAR	50			EYE	26.2N	127.8E	47937
53	281430	27.5N	127.0E	LAND	GOOD	CIRCULAR	35			EYE	26.4N	127.8E	47991
54	281500	27.5N	127.0E	LAND	GOOD	CIRCULAR	40			EYE	26.4N	127.8E	47991
55	281500	27.5N	126.8E	LAND				22917	72711		26.2N	127.8E	47937
56	281500	27.7N	126.7E	LAND				6///3	52811		28.4N	128.5E	47909
57	281530	27.5N	126.8E	LAND	FAIR	CIRCULAR	40			EYE	26.4N	127.8E	47991
58	281600	27.7N	126.6E	LAND				6///3	52508		28.4N	128.5E	47909
59	281600	27.6N	126.8E	LAND				22913	72708		26.2N	127.8E	47937
60	281600	27.5N	126.8E	LAND	FAIR	CIRCULAR	40			EYE	26.4N	127.8E	47991
61	281535	27.6N	126.8E	LAND	FAIR	CIRCULAR	35			EYE	26.4N	127.8E	47991
62	281700	27.7N	126.4E	LAND	FAIR	CIRCULAR	35			EYE	26.4N	127.8E	47991
63	281700	27.7N	126.5E	LAND				21963	72709		26.2N	127.8E	47937
64	281700	27.7N	126.6E	LAND				6///3	50000		28.4N	128.5E	47909
65	281730	27.8N	126.5E	LAND	FAIR	CIRCULAR	35			EYE	26.4N	127.8E	47991
66	281900	27.7N	126.5E	LAND				21913	72905		26.2N	127.8E	47937
67	281930	28.0N	126.3E	LAND	FAIR	CIRCULAR	30			EYE	26.4N	127.8E	47991
68	281900	27.8N	126.4E	LAND				5////	73208		26.2N	127.8E	47937
69	281900	27.8N	126.3E	LAND	FAIR	CIRCULAR	30			EYE	26.4N	127.8E	47991
70	282000	27.8N	126.3E	LAND				5////	73105		26.2N	127.8E	47937
71	282000	27.9N	126.4E	LAND	FAIR	CIRCULAR	50			EYE	26.2N	127.8E	47937
72	282100	27.9N	126.4E	LAND				5////	73406		26.2N	127.8E	47937
73	282200	28.1N	126.4E	LAND				5////	73505		26.2N	127.8E	47937
74	282200	28.1N	126.3E	LAND	FAIR	CIRCULAR	50			EYE	26.2N	127.8E	47937
75	282300	28.1N	126.1E	LAND	FAIR	CIRCULAR	50			EYE	26.2N	127.8E	47937
76	282300	28.1N	126.3E	LAND				5////	73609		26.2N	127.8E	47937
77	282300	28.2N	126.3E	LAND				6///3	53605		28.4N	129.5E	47909
78	290100	28.4N	126.3E	LAND				6///3	53408		28.4N	129.5E	47909
79	290100	28.3N	126.0E	LAND				5////	73008		26.2N	127.8E	47937
80	290100	28.4N	126.1E	LAND	FAIR	CIRCULAR	50			EYE	26.2N	127.8E	47937
81	290200	28.5N	126.0E	LAND	GOOD	CIRCULAR	40			EYE	26.3N	126.8E	47909
82	290200	28.5N	125.9E	LAND				5////	73209		26.2N	127.8E	47937
83	290200	28.5N	126.2E	LAND				6///3	53208		28.4N	128.5E	47909
84	290300	28.7N	125.9E	LAND				6////	73108		26.2N	127.8E	47937
85	290300	28.5N	126.1E	LAND				6///3	53009		28.4N	129.5E	47909
86	290400	28.7N	125.8E	LAND				6////	73408		26.2N	127.8E	47937
87	290400	28.6N	125.8E	LAND				6///3	53008		28.4N	129.5E	47909
88	290500	28.8N	125.8E	LAND				6////	73406		26.2N	127.8E	47937
89	290500	28.6N	125.7E	LAND				6///3	52708		28.4N	129.5E	47909
90	290700	28.5N	125.7E	LAND				5////	70000		26.2N	127.8E	47937
91	290700	28.8N	125.8E	LAND				6///3	50000		28.4N	129.5E	47909
92	290800	28.7N	125.8E	LAND				5////	70000		26.2N	127.8E	47937
93	290800	28.8N	125.9E	LAND				6///3	50404		28.4N	129.5E	47909
94	290900	28.7N	125.9E	LAND				5////	70000		26.2N	127.8E	47937
95	290900	28.9N	125.9E	LAND				6///3	50305		28.4N	129.5E	47909
96	291000	29.1N	126.0E	LAND				6////	70311		26.2N	127.8E	47937
97	291000	29.0N	126.0E	LAND				6///3	50408		28.4N	129.5E	47909
98	291100	29.1N	126.0E	LAND				6///3	53408		28.4N	129.5E	47909
99	291200	29.2N	125.9E	LAND				6///3	53308		28.4N	129.5E	47909
100	291300	29.3N	125.8E	LAND				6///3	53105		28.4N	129.5E	47909

TROPICAL STORM AGNES

SATELLITE FIXES

FIX NO.	TIME (Z)	FIX POSITION	ACCRY	DVORAK CODE	SAT	COMMENTS	SITE
1	240049	15.9N 114.0E	PCN 5	T1.0/1.0	DMSP36	INIT DBS	RPMK
2	240349	16.4N 115.6E	PCN 5		DMSP35		RPMK
3	241139	18.5N 115.8E	PCN 6		DMSP37	CI UP	RPMK
4	241149	17.9N 115.4E	PCN 5		DMSP36		PGTW
5	241149	18.4N 115.5E	PCN 5		DMSP36		RKSO
6	241225	18.1N 115.7E	PCN 5		NOAA5		PGTW
7	241631	19.0N 115.2E	PCN 4		DMSP35		RPMK
8	242239	19.8N 116.1E	PCN 5	T2.0/2.0	DMSP37	INIT DBS	RODN
9	250031	19.2N 115.8E	PCN 5	T3.0/3.0 /D2.0/24HRS	DMSP36		RPMK
10	250102	19.7N 115.9E	PCN 5	T3.0/3.0	NOAA5	INIT DBS	PGTW
11	250332	20.0N 115.8E	PCN 3		DMSP35	EXPOSED LOW LVL	RODN
12	250332	20.1N 115.8E	PCN 3		DMSP35	EXPOSED LOW LVL	RPMK
13	250332	20.2N 116.0E	PCN 3	T2.5/2.5	DMSP35	INIT DBS	RKSO
14	251120	20.3N 115.5E	PCN 4		DMSP37		RODN
15	251141	21.0N 115.6E	PCN 5		NOAA5		PGTW
16	251313	20.5N 115.7E	PCN 4		DMSP36		RODN
17	251613	21.1N 115.4E	PCN 3		DMSP35		RODN
18	251614	21.0N 115.9E	PCN 4		DMSP35		RPMK
19	252219	21.5N 115.0E	PCN 5	T4.0/4.0 /D1.0/27HRS	DMSP37		PGTW
20	252220	20.9N 115.1E	PCN 5	T3.0/3.0 /D1.0/24HRS	DMSP37	BASED ON U/L GRAVITY WAVES	RODN
21	260014	21.9N 115.1E	PCN 5	T3.0/3.0-/S0.0/24HRS	DMSP36		RPMK
22	260015	21.2N 115.6E	PCN 5	T3.0/3.0 /D1.0/24HRS	DMSP36		RODN
23	260314	21.8N 115.0E	PCN 3		DMSP35		RODN
24	260314	21.5N 114.6E	PCN 3		DMSP35		RPMK
25	261101	21.5N 114.1E	PCN 2		DMSP37		RKSO
26	261101	21.3N 114.0E	PCN 2		DMSP37		PGTW
27	261254	20.9N 114.0E	PCN 4		NOAA5		PGTW
28	261256	21.1N 114.0E	PCN 3		DMSP36		RPMK
29	261555	21.1N 113.3E	PCN 6		DMSP35		RPMK
30	261556	21.1N 113.9E	PCN 3		DMSP35		RODN
31	262200	21.2N 113.5E	PCN 1	T4.0/4.0	DMSP37	INIT DBS	RKSO
32	262200	21.3N 113.3E	PCN 1	T4.5/4.5 /D0.5/24HRS	DMSP37		PGTW
33	262357	21.4N 112.9E	PCN 1	T4.0/4.0 /D0.5/24HRS	DMSP36		RPMK
34	262357	21.3N 113.0E	PCN 1	T3.5/3.5 /D0.5/25HRS	DMSP36		RODN
35	271041	21.2N 112.6E	PCN 1		DMSP37		RPMK
36	271041	21.0N 112.4E	PCN 2		DMSP37		PGTW
37	271239	21.1N 112.3E	PCN 1		DMSP36		RKSO
38	271538	20.8N 112.1E	PCN 4	T4.0/4.0+/S0.0/24HRS	DMSP35		RPMK
39	271538	21.1N 111.9E	PCN 1		DMSP35	BANDING EYE	PGTW
40	272322	20.9N 111.6E	PCN 2		DMSP37		RODN
41	272339	20.9N 112.0E	PCN 1	T3.0/3.5 /W0.5/24HRS	DMSP36		RODN
42	272340	20.3N 111.7E	PCN 1	T3.0/4.0 /W1.0/24HRS	DMSP36		RKSO
43	272340	20.6N 111.8E	PCN 1	T4.0/4.0-/S0.0/24HRS	DMSP36		RPMK
44	280239	21.0N 111.8E	PCN 5		DMSP35	CI SAME	RODN
45	280420	20.6N 112.0E	PCN 1		DMSP35		RPMK
46	281203	20.4N 111.8E	PCN 4		DMSP37		RODN
47	281203	20.3N 112.2E	PCN 6		DMSP37		RPMK
48	281222	20.4N 111.6E	PCN 4		DMSP36	CI UNKN	RODN
49	281222	20.4N 111.8E	PCN 4		DMSP36	CI UNKN	RKSO
50	281222	20.5N 112.3E	PCN 4		DMSP36		RPMK
51	281520	20.3N 112.2E	PCN 6		DMSP35		PGTW
52	282323	20.5N 112.5E	PCN 3		DMSP36		PGTW
53	282323	20.6N 112.7E	PCN 3	T2.5/3.5 /W1.5/24HRS	DMSP36		RPMK
54	290402	20.8N 113.7E	PCN 1	T3.0/3.0 /S0.0/28HRS	DMSP35		RODN
55	290402	20.6N 113.4E	PCN 1		DMSP35		RPMK
56	291144	21.3N 114.7E	PCN 2		DMSP37		RODN
57	291144	21.5N 114.4E	PCN 6		DMSP37		RPMK
58	291204	21.8N 114.4E	PCN 4		DMSP36		PGTW
59	291204	21.5N 114.3E	PCN 6		DMSP36		RKSO
60	291644	21.6N 114.7E	PCN 6		DMSP35	APPEARS WEAKER	RODN
61	291644	22.0N 114.6E	PCN 4		DMSP35	CI UNKN	RPMK
62	292243	22.4N 115.0E	PCN 3	T3.0/3.0-	DMSP37	INIT DBS	RKSO
63	292243	22.7N 114.5E	PCN 3	T2.5/2.5-/S0.0/23HRS	DMSP37		RPMK
64	300114	22.5N 114.9E	PCN 5	T2.5/2.5	NOAA5	INIT DBS	PGTW
65	300344	22.8N 115.2E	PCN 3		DMSP35	CENTRAL CLOUD MASS 23.2N 114.4E	RPMK
66	300345	22.7N 115.3E	PCN 3		DMSP35		RKSO
67	300345	23.0N 114.4E	PCN 5	T2.0/2.0	DMSP35	INIT DBS	RODN
68	301124	23.9N 114.6E	PCN 6		DMSP37		RODN
69	310030	24.3N 119.1E	PCN 3	T1.0/2.0 /W1.5/23HRS	NOAA5		PGTW

RADAR FIXES

FIX NO.	TIME (Z)	FIX POSITION	RADAR	ACCRY	EYE SHAPE	EYE DIAM	RADOB-CODE ASWAN	RADOB-CODE TDOFF	COMMENTS	RADAR POSITION	SITE WMO NO.
1	250010	19.7N 115.8E	LAND				55611	50107		22.3N 114.2E	45005
2	250400	20.1N 115.7E	LAND				55711	5////		22.3N 114.2E	45005
3	250700	20.3N 115.7E	LAND				5564/	/////		22.3N 114.2E	45005
4	250900	20.9N 115.7E	LAND				3567/	/////		22.3N 114.2E	45005
5	251200	21.2N 115.7E	LAND				3564/	/////		22.3N 114.2E	45005
6	251500	21.3N 115.5E	LAND				35641	11111		22.3N 114.2E	45005
7	251758	21.4N 115.5E	LAND				2134/	73403		22.3N 114.2E	45005
8	252100	21.4N 115.2E	LAND				35/6/	/////		22.3N 114.2E	45005
9	260000	21.5N 114.8E	LAND				35/6/	72806		22.3N 114.2E	45005

10	260300	21.5N 114.6E	LAND		21971 72906		22.3N 114.2E	45005
11	260500	21.5N 114.4E	LAND		21971 52705		22.3N 114.2E	45005
12	260900	21.4N 114.1E	LAND		21941 52205		22.3N 114.2E	45005
13	261200	21.3N 114.0E	LAND		10811 52704		22.3N 114.2E	45005
14	261400	21.3N 113.9E	LAND		10811 52704		22.3N 114.2E	45005
15	261500	21.3N 113.8E	LAND		10811 52704		22.3N 114.2E	45005
16	261500	21.3N 113.8E	LAND		10811 52703		22.3N 114.2E	45005
17	261700	21.3N 113.8E	LAND		10811 52703		22.3N 114.2E	45005
18	261800	21.3N 113.7E	LAND		10811 52804		22.3N 114.2E	45005
19	261900	21.3N 113.6E	LAND		10811 52805		22.3N 114.2E	45005
20	262130	21.3N 113.5E	LAND		10912 52704		22.3N 114.2E	45005
21	270000	21.3N 113.3E	LAND		10912 52705		22.3N 114.2E	45005
22	270300	21.3N 113.0E	LAND		10962 52704		22.3N 114.2E	45005
23	270500	21.3N 112.7E	LAND		10912 82705		22.3N 114.2E	45005
24	270900	21.3N 112.5E	LAND		10813 92705		22.3N 114.2E	45005
25	271200	21.2N 112.3E	LAND		21643 52405		22.3N 114.2E	45005
26	271300	21.1N 112.2E	LAND		10843 52306		22.3N 114.2E	45005
27	271400	21.1N 112.1E	LAND		10143 52706		22.3N 114.2E	45005
28	271500	21.1N 112.0E	LAND		10813 52506		22.3N 114.2E	45005
29	271500	21.0N 111.9E	LAND		20843 52405		22.3N 114.2E	45005
30	271800	20.9N 111.8E	LAND		21/// 52204		22.3N 114.2E	45005
31	272100	20.9N 112.0E	LAND		35/// /////		22.3N 114.2E	45005
32	272200	20.9N 112.0E	LAND		20973 53602		22.3N 114.2E	45005
33	272300	20.9N 112.0E	LAND		25/43 50000		22.3N 114.2E	45005
34	280000	20.9N 111.9E	LAND		25/43 5////		22.3N 114.2E	45005
35	280200	20.9N 111.9E	LAND		25942 72103		22.3N 114.2E	45005
36	280500	20.9N 111.8E	LAND		25913 73002		22.3N 114.2E	45005
37	281200	20.4N 112.0E	LAND		25983 61205		22.3N 114.2E	45005
38	281500	20.3N 112.2E	LAND		2858/ 71306		22.3N 114.2E	45005
39	281800	20.4N 112.4E	LAND		2585/ 70404		22.3N 114.2E	45005
40	282100	20.5N 112.6E	LAND		10857 50704		22.3N 114.2E	45005
41	282200	20.5N 112.7E	LAND		20843 51107		22.3N 114.2E	45005
42	290000	20.5N 112.9E	LAND		25943 50810		22.3N 114.2E	45005
43	290200	20.5N 113.1E	LAND		10723 50907		22.3N 114.2E	45004
44	290300	20.6N 113.3E	LAND		10813 50415		22.3N 114.2E	45005
45	290400	20.7N 113.4E	LAND		10383 50705		22.3N 114.2E	45005
46	290600	20.8N 113.7E	LAND		10534 50708		22.3N 114.2E	45005
47	290900	21.2N 114.2E	LAND		10322 60710		22.3N 114.2E	45005
48	291200	21.5N 114.4E	LAND		25/72 50611		22.3N 114.2E	45005
49	292140	22.6N 114.8E	LAND		50571 /////		22.3N 114.2E	45005
50	300000	22.8N 114.7E	LAND		65/// /////		22.3N 114.2E	45005

TROPICAL STORM BONNIE

SATELLITE FIXES

FIX NO.	TIME (Z)	FIX POSITION	ACCRY	DVORAK CODE	SAT	COMMENTS	SITE
1	090140	18.9N 114.5E	PCN 5	T0.0/0.0	NOAA5	INIT OBS	PGTW
2	091219	20.0N 114.5E	PCN 6		NOAA5		PGTW
3	092318	18.5N 114.3E	PCN 3	T1.0/1.0	DMSP36	INIT OBS	RPMK
4	100056	19.0N 113.9E	PCN 3	T1.0/1.0 /D1.0/24HRS	NOAA5		PGTW
5	100352	18.3N 113.8E	PCN 5		DMSP35		RPMK
6	101113	18.3N 112.2E	PCN 6		DMSP37		RPMK
* 7	101113	16.9N 110.7E	PCN 5		DMSP37		RODN
8	101200	18.4N 112.4E	PCN 5		DMSP36	CI SAME	PGTW
9	101534	18.1N 111.6E	PCN 6		DMSP35		RPMK
* 10	102213	17.4N 110.4E	PCN 5		DMSP37		PGTW
* 11	102213	17.5N 110.7E	PCN 5		DMSP37		RPMK
12	110042	17.5N 110.4E	PCN 3	T2.5/2.5 /D1.5/25HRS	DMSP36		RPMK
13	110334	17.9N 109.4E	PCN 5		DMSP35	MID AND LOW LVL	RPMK
14	111054	17.9N 107.9E	PCN 6		DMSP37		PGTW
* 15	111324	16.2N 106.2E	PCN 6		DMSP36	UPR LVL	RPMK
* 16	111516	16.4N 106.5E	PCN 6		DMSP35	UPR LVL	RPMK
17	120021	17.4N 105.0E	PCN 3	T2.5/2.5-/S0.0/24HRS	DMSP36		RPMK
18	120125	17.5N 104.7E	PCN 6		NOAA5		PGTW
19	120316	17.7N 104.6E	PCN 5		DMSP35		RPMK

FIX NO.	TIME (Z)	FIX POSITION	ACCRY	OVERRAK CODE	SAT	COMMENTS	SITE
1	080104	16.3N 145.8E	PCN 6	T4.0/4.0	DMSP35	INIT DAS	PGTW
2	091023	16.5N 145.7E	PCN 6		NOAA5		PGTW
3	092300	16.8N 145.5E	PCN 5	T3.0/3.0	NOAA5	INIT DAS	PGTW
4	100210	17.1N 143.9E	PCN 5		DMSP35		PGTW
* 5	100932	16.0N 145.6E	PCN 6		DMSP37	CI UP	PGTW
6	101019	15.2N 145.7E	PCN 6		DMSP35		PGTW
7	101311	16.5N 145.6E	PCN 6		DMSP35		PGTW
* 8	102032	15.2N 144.6E	PCN 5	T2.0/2.0 /D1.0/22HRS	DMSP37		PGTW
* 9	102119	15.2N 144.5E	PCN 5		DMSP36		PGTW
10	110012	16.1N 144.8E	PCN 5		NOAA5		PGTW
11	110912	14.0N 144.0E			DMSP37		RODN
12	110913	15.7N 144.2E	PCN 6		DMSP37	CI SAME	PGTW
13	111434	15.7N 144.3E	PCN 4		DMSP35		PGTW
14	112012	15.7N 144.4E	PCN 3	T2.5/2.5 /D0.5/24HRS	DMSP37		PGTW
15	112243	14.9N 144.6E	PCN 3	T4.0/4.0	DMSP36	INIT DAS	RPMK
16	112243	15.8N 144.4E	PCN 3		DMSP36		PGTW
17	120135	16.1N 144.5E	PCN 3		DMSP35		PGTW
18	120853	17.9N 144.2E	PCN 6		DMSP37	CI SAME	PGTW
19	120853	19.9N 145.4E	PCN 6		DMSP37	UPR LVL	RODN
20	121125	19.0N 143.9E	PCN 5		DMSP36		PGTW
21	121417	18.1N 143.3E	PCN 6		DMSP35		PGTW
22	122134	19.5N 141.6E	PCN 6	T3.5/3.5 /D1.0/25HRS	DMSP37		PGTW
23	122134	19.9N 141.6E	PCN 4		DMSP37		RODN
24	122225	19.6N 141.4E	PCN 5		DMSP36		PGTW
25	122226	19.5N 141.3E	PCN 3	T3.0/3.0	DMSP36	INIT DAS	RODN
26	130116	20.3N 140.8E	PCN 3		DMSP35		PGTW
27	131015	21.3N 138.2E	PCN 2		DMSP37		RODN
28	131015	21.8N 138.5E	PCN 1		DMSP37	INIT DAS	RKSO
29	131015	21.5N 138.7E	PCN 2		DMSP37	CI UP	PGTW
30	131108	21.5N 138.5E	PCN 2		DMSP36		PGTW
31	131359	21.7N 137.2E	PCN 2		DMSP35		PGTW
32	132114	22.9N 136.4E	PCN 3	T3.5/3.5 /S0.0/24HRS	DMSP37		PGTW
33	132115	23.0N 136.5E	PCN 3	T4.5/4.5	DMSP37	INIT DAS	RKSO
34	132208	23.1N 136.4E	PCN 1		DMSP36		PGTW
35	132355	23.2N 136.9E	PCN 3		NOAA5		PGTW
36	140240	23.9N 136.0E	PCN 1		DMSP35		PGTW
37	140241	24.0N 136.3E	PCN 1	T4.0/4.0	DMSP35	INIT DAS	RPMK
38	140241	23.8N 136.4E	PCN 1	T4.5/4.5	DMSP35		RODN
39	140241	24.0N 136.5E	PCN 1	T4.5/4.5 24HRS	DMSP35		RKSO
* 40	140955	25.3N 130.5E	PCN 2		DMSP37		RPMK
41	141036	24.7N 132.2E	PCN 1		NOAA5		PGTW
42	141523	25.0N 130.0E	PCN 2		DMSP35		PGTW
43	142055	26.2N 129.6E	PCN 2	T4.5/4.5 /D1.0/24HRS	DMSP37		PGTW
44	142237	26.1N 129.4E	PCN 3		DMSP37	EDGE OF DATA	RPMK
45	142323	26.4N 128.7E	PCN 1	T5.0/5.0 /D0.5/24HRS	DMSP36		RKSO
46	142332	26.4N 128.9E	PCN 2		DMSP36		PGTW
47	142333	26.3N 128.8E	PCN 1	T5.0/5.0 /D0.5/21HRS	DMSP36		RODN
48	150108	26.6N 128.5E	PCN 1		NOAA5		PGTW
49	150222	26.7N 128.1E	PCN 1		DMSP35		PGTW
50	150223	26.7N 127.9E	PCN 1	T4.5/4.5 /D0.5/24HRS	DMSP35		RPMK
51	150223	26.7N 127.9E	PCN 1		DMSP35		RKSO
52	150223	26.7N 128.0E	PCN 1		DMSP35		RODN
53	151117	27.2N 125.9E	PCN 2		DMSP37		RPMK
54	151118	27.6N 126.6E	PCN 2		DMSP37		RKSO
55	151149	27.5N 125.9E	PCN 1		NOAA5		PGTW
56	151215	27.6N 126.8E	PCN 2		DMSP36		PGTW
57	151505	27.8N 125.1E	PCN 1		DMSP35		PGTW
58	152217	27.9N 124.0E	PCN 3	T5.0/5.0 /S0.0/23HRS	DMSP37		RODN
59	152217	28.0N 124.1E	PCN 1	T4.0/5.0-/W1.0/24HRS	DMSP37		RKSO
60	152315	28.1N 124.1E	PCN 1	T5.0/5.0-/D0.5/21HRS	DMSP36		RPMK
61	152315	28.3N 123.8E	PCN 1	T5.0/5.0-/D0.5/25HRS	DMSP36		PGTW
62	160205	28.1N 123.8E	PCN 1		DMSP35		RKSO
63	160205	28.3N 123.5E	PCN 1		DMSP35		PGTW
64	160205	28.3N 123.6E	PCN 5		DMSP35		RODN
* 65	161058	27.9N 123.0E	PCN 2		DMSP37		RPMK
66	161058	28.6N 123.2E	PCN 1		DMSP37	CTR IN EYE	RKSO
67	161157	28.6N 123.3E	PCN 3		DMSP36		PGTW
68	161446	28.8N 123.0E	PCN 3		DMSP35		PGTW
69	161528	28.2N 122.4E	PCN 3		DMSP35		RPMK
70	161529	28.7N 122.9E	PCN 6		DMSP35		RODN
71	162158	28.3N 122.7E	PCN 5	T3.5/4.0-/W0.5/24HRS	DMSP37		RKSO
72	162158	28.5N 122.2E	PCN 5	T3.5/4.5 /W1.5/23HRS	DMSP37		PGTW
73	162158	28.4N 122.4E	PCN 5	T3.5/4.5 /W1.5/22HRS	DMSP37		RPMK
74	162258	28.4N 122.4E	PCN 5		DMSP36		PGTW
75	170147	28.1N 122.7E	PCN 5		DMSP35		PGTW
76	170329	28.3N 122.4E	PCN 5		DMSP35		RKSO
77	170329	28.5N 122.0E	PCN 6	T3.5/4.5-/W1.5/29HRS	DMSP35		RODN
78	171038	28.5N 123.0E	PCN 6		DMSP37		PGTW
79	171039	28.3N 122.6E	PCN 6		DMSP37	UPR LVL CTR	RODN
80	171139	28.7N 123.1E	PCN 5		DMSP35		PGTW
81	171511	28.2N 123.1E	PCN 5		DMSP35		RKSO
82	171511	28.4N 123.1E	PCN 3		DMSP35		RPMK
83	172138	28.7N 123.1E	PCN 6	T2.0/3.0 /W1.5/18HRS	DMSP37		RODN
84	172138	28.6N 123.4E	PCN 5	T2.0/3.0 /W1.5/24HRS	DMSP37		PGTW
85	172241	28.9N 123.5E	PCN 5		DMSP36		RODN
86	172241	28.5N 123.3E	PCN 5		DMSP36		PGTW
87	172241	29.1N 123.4E	PCN 5		DMSP36		RKSO
88	180053	28.8N 123.3E	PCN 3		NOAA5		PGTW
89	180311	28.4N 123.6E	PCN 3	T3.0/3.5+/W0.5/29HRS	DMSP35		RPMK
90	180311	28.6N 123.9E	PCN 5		DMSP36		RODN
91	180311	28.5N 123.6E	PCN 5	T2.0/3.0-/W1.5/24HRS	DMSP35		RKSO
92	181019	28.3N 124.0E	PCN 5		DMSP37		RKSO
93	181019	27.9N 124.1E	PCN 4		DMSP37		PGTW

94	181122	27.8N 124.0E	PCN 4			DMSP36			PGTW
95	181133	27.8N 124.1E	PCN 6			NOAA5			PGTW
96	181304	29.4N 124.1E	PCN 6			DMSP36	UPR LVL		RODN
97	181353	29.3N 124.0E	PCN 3			DMSP35			RKSO
98	181553	29.5N 123.9E	PCN 3			DMSP35			RPMK
99	182119	29.1N 123.9E	PCN 6			DMSP37			RODN
100	182119	29.0N 124.0E	PCN 5			DMSP37			PGTW
101	182223	29.2N 124.2E	PCN 6			DMSP36			PGTW
102	190004	29.6N 124.6E	PCN 5	T2.0/3.0-/W1.0/21HRS		DMSP36			RPMK
103	190809	29.2N 124.5E	PCN 5	T2.0/2.0 /S0.0/27HRS		NOAA5			PGTW
104	191000	30.6N 125.2E	PCN 5			DMSP37			RKSO
105	191000	30.6N 125.2E	PCN 5			DMSP37	CI SAME		PGTW
106	191049	30.7N 125.5E	PCN 5			NOAA5			PGTW
107	191247	31.1N 125.7E	PCN 5			DMSP36			RODN
108	191535	32.5N 125.6E	PCN 3			DMSP35			RPMK
109	191535	31.5N 125.7E	PCN 5			DMSP35			RODN
110	192059	33.3N 126.3E	PCN 5			DMSP37			RODN
111	192059	34.0N 126.0E	PCN 3			DMSP37			PGTW
112	192059	33.9N 126.3E	PCN 5			DMSP37			RKSO
113	192205	34.2N 126.2E	PCN 5			DMSP36			PGTW
114	200122	35.0N 126.2E	PCN 5	T1.0/2.0 /W1.0/25HRS		NOAA5			PGTW
115	200235	35.9N 127.4E	PCN 5			DMSP35			RKSO
116	200235	35.8N 127.7E	PCN 5	T0.0/1.0 /W2.0/22HRS		DMSP35			RPMK

AIRCRAFT FIXES

FIX NO.	TIME (Z)	FIX POSITION	FLT LVL	MIN HGT	OBS MSLP	MAX-SFC-WND VEL/BRG/RNG	MAX-FLT-LVL-WND HTH/VEL/BRG/RNG	ACCRY NAV/MET	EYE SHAPE	EYE DIAM/ORIENTATION	EYE TEMP (C) OUT/ IN/ DP/SST	MSN NO.
* 1	100128	17.3N 144.0E	1500FT		1004	15 010 10		4 20			+24 29	1
* 2	100705	17.0N 143.6E	1500FT		1007	25 170 130	280 15 170 75	15 5			+26 +26 +25 29	2
3	101020	16.7N 145.7E	700MB				310 20 270 240	5 15			+12 +11	2
4	110030	16.1N 144.8E	700MB	3085		40 010 30	120 40 010 30				+10 + 9	3
5	110309	15.6N 144.5E	700MB	3014	992	70 220 15	090 40 350 60	4 5			+12 +12 +11	3
6	111100	15.6N 144.5E	700MB	3005			200 45 070 17				+14 + 8	4
7	111433	15.9N 144.3E	700MB	2989	989		320 58 190 22	4 2	ELLIPTICAL	35 22 120	+10 +14 +07	4
8	112228	15.9N 144.3E	700MB	2952	983	90 170 15	230 80 170 8	1 5	CIRCULAR	25	+13 +15 +11	5
9	120100	16.2N 144.3E	700MB	2942		100 310 10	030 65 310 15				+16	5
10	120315	16.3N 144.1E	700MB	2924	980	80 240 10	260 65 240 10	2 5	CIRCULAR	20	+12 +19	5
11	121235	17.5N 143.3E	700MB	2972			150 61 050 40				+17 + 9	6
12	121631	18.3N 142.9E	700MB	2949	983		150 61 110 40	10 10			+13 +16 +11	6
13	130338	20.6N 140.2E	700MB	2898	976	80 090 15	150 80 090 15	5 5	CIRCULAR	25	+10 +19 +11	7
14	131510	22.3N 137.1E	700MB	2864	974		180 70 120 45	5 5	ELLIPTICAL	35 20 50	+09 +16 +10	8
15	131735	22.6N 136.3E	700MB	2851			230 52 350 25				+15 +11	8
16	140150	23.5N 134.4E	700MB	2813	969	80 140 15	240 65 140 15	3 1	CIRCULAR	28	+15 +19 +13	9
17	140413	23.8N 133.8E	700MB	2816	969	80 180 20	260 70 180 20	3 3	CIRCULAR	25	+12 +18 +12	9
18	141549	25.7N 130.8E	700MB	2783	965		300 58 190 35	5 3	ELLIPTICAL	25 20 30	+11 +16 +13	10
19	141915	25.9N 129.9E	700MB	2752			110 118 360 15				+14 +14	10
20	142037	26.1N 129.5E	700MB	2765	963		030 68 320 20	5 3	CIRCULAR	28	+12 +16 +11	10
21	151231	27.5N 125.8E	700MB	2752			080 89 360 24				+18 +13	11
22	151434	27.8N 125.1E	700MB	2744			080 85 350 16	5 2	CIRCULAR	15	+16 +18 +10	11

RADAR FIXES

FIX NO.	TIME (Z)	FIX POSITION	RADAR	ACCNY	EYE SHAPE	EYE DIAM	RADOB-CODE ASWAM TUOFF	COMMENTS	RADAR POSITION	SITE WMO NO.
1	110645	15.8N 144.7E	LAND		ELLIPTICAL	12		OPEN SW	13.6N 144.9E	91218
2	110745	16.0N 144.6E	LAND	FAIR	ELLIPTICAL	14		OPEN W THRU S	13.6N 144.9E	91218
3	110845	15.9N 144.4E	LAND	GOOD	CIRCULAR	35		OPEN NW AND SE	13.6N 144.9E	91218
4	110945	15.9N 144.2E	LAND	FAIR	ELLIPTICAL	33		OPEN NW AND E THRU S	13.6N 144.9E	91218
5	111045	15.7N 144.3E	LAND	GOOD	CIRCULAR	25		OPEN E	13.6N 144.9E	91218
6	111145	15.7N 144.4E	LAND	GOOD	CIRCULAR	23		OPEN NW AND E	13.6N 144.9E	91218
7	111245	15.7N 144.5E	LAND	POOR				OPEN W THRU E	13.6N 144.9E	91218
8	111345	15.9N 144.5E	LAND	GOOD	CIRCULAR	35		OPEN NE THRU S	13.6N 144.9E	91218
9	111445	15.9N 144.4E	LAND	GOOD	CIRCULAR	40		OPEN NE	13.6N 144.9E	91218
10	111545	15.9N 144.3E	LAND	GOOD	CIRCULAR	45		OPEN NW	13.6N 144.9E	91218
11	111645	15.9N 144.4E	LAND	GOOD	CIRCULAR	30		OPEN SW	13.6N 144.9E	91218
12	111745	15.9N 144.5E	LAND	GOOD	CIRCULAR	40		OPEN NW	13.6N 144.9E	91218
13	111845	16.0N 144.1E	LAND	POOR	ELLIPTICAL	40		OPEN W THRU N THRU E	13.6N 144.9E	91218
14	111945	15.9N 144.3E	LAND	GOOD	CIRCULAR	32		OPEN NW AND SE	13.6N 144.9E	91218
15	112045	16.0N 144.3E	LAND	GOOD	CIRCULAR	30		OPEN N	13.6N 144.9E	91218
16	141400	25.1N 131.4E	LAND				6//// /////		26.1N 127.8E	47937
17	141500	25.2N 131.2E	LAND				6//// 53014		26.1N 127.8E	47937
18	141500	25.2N 131.2E	LAND				6//// 52812		28.4N 129.5E	47909
19	141600	25.5N 131.0E	LAND	GOOD		20		MOV 3125	26.1N 127.7E	47937
20	141600	25.5N 130.9E	LAND				6//// 53122		28.4N 129.5E	47909
21	141600	25.6N 130.8E	LAND				21H01 63019		26.1N 127.8E	47937
22	141700	25.6N 130.7E	LAND	GOOD		20		MOV 2930	26.1N 127.7E	47937
23	141700	25.7N 130.6E	LAND				20702 53123		28.4N 129.5E	47909
24	141700	25.6N 130.6E	LAND				11771 73019		26.1N 127.8E	47937
25	141800	25.7N 130.5E	LAND	GOOD		20		MOV 3130	26.1N 127.7E	47937
26	141800	25.8N 130.4E	LAND				10712 53016		28.4N 129.5E	47909
27	141800	25.8N 130.2E	LAND				10611 73020		26.1N 127.8E	47937
28	141900	26.0N 130.1E	LAND	GOOD		20		MOV 3130	26.1N 127.7E	47937
29	141900	26.0N 130.0E	LAND				10682 53019		28.4N 129.5E	47909
30	141900	25.9N 130.0E	LAND				10611 73018		26.1N 127.8E	47937
31	141930	25.6N 129.6E	LAND	POOR					26.3N 127.8E	47931
32	142000	26.1N 129.9E	LAND	GOOD		20		MOV 3130	26.1N 127.7E	47937
33	142000	26.0N 129.8E	LAND				10811 73016		26.1N 127.8E	47937
34	142000	26.1N 129.8E	LAND				10612 53013		28.4N 129.5E	47909
35	142005	25.7N 129.5E	LAND	POOR					26.3N 127.8E	47931
36	142030	26.0N 129.6E	LAND	GOOD					26.3N 127.8E	47931
37	142100	26.2N 129.6E	LAND	GOOD		20		MOV 3130	26.1N 127.7E	47937
38	142100	26.2N 129.5E	LAND				10612 52919		28.4N 129.5E	47909
39	142100	26.1N 129.4E	LAND				10711 72824		26.1N 127.8E	47937

40	142105	26.1N	129.4E	LAND	GOOD							26.3N	127.8E 47931
41	142130	26.1N	129.4E	LAND	GOOD							26.3N	127.8E 47931
42	142200	26.1N	129.2E	LAND	GOOD	CIRCULAR	25					26.3N	127.8E 47931
43	142200	26.2N	129.2E	LAND				10611	72915			26.1N	127.8E 47937
44	142200	26.3N	129.3E	LAND				10612	53115			28.4N	129.5E 47909
45	142200	26.3N	129.3E	LAND	GOOD		18				MOV 3230	26.1N	127.7E 47937
46	142230	26.2N	129.1E	LAND	GOOD	CIRCULAR	25					26.3N	127.8E 47931
47	142300	26.3N	128.9E	LAND				10611	72917			26.1N	127.8E 47937
48	142300	26.3N	128.9E	LAND	GOOD	ELLIPTICAL	20					26.3N	127.8E 47931
49	142300	26.4N	129.0E	LAND	GOOD		20				MOV 3130	26.1N	127.7E 47937
50	142300	26.6N	129.8E	LAND	POOR							26.2N	127.6E 47930
51	142300	26.4N	128.9E	LAND				10612	52920			28.4N	129.5E 47909
52	142330	26.3	126.3E	LAND	GOOD	ELLIPTICAL	17					26.3N	127.8E 47931
53	150000	26.5N	128.7E	LAND	GOOD		20				MOV 3130	26.1N	127.7E 47937
54	150000	26.4N	128.6E	LAND	GOOD	ELLIPTICAL	17					26.3N	127.8E 47931
55	150000	26.4N	128.7E	LAND				10612	52913			28.4N	129.5E 47909
56	150000	26.5N	129.4E	LAND	GOOD		20					26.2N	127.6E 47930
57	150030	26.6N	128.5E	LAND	GOOD	ELLIPTICAL	22					26.3N	127.8E 47931
58	150100	26.5N	128.4E	LAND				14711	72916			26.1N	129.5E 47937
59	150100	26.6N	128.4E	LAND	GOOD		18					26.2N	127.6E 47930
60	150100	26.5N	128.4E	LAND	GOOD	ELLIPTICAL	19					26.3N	127.8E 47931
61	150100	26.6N	128.5E	LAND	GOOD		20				MOV 3130	26.1N	127.7E 47937
62	150100	26.5N	128.5E	LAND				5//42	52915			28.4N	129.5R 47909
63	150135	26.6N	128.3E	LAND	GOOD	ELLIPTICAL	14					26.3N	127.8E 47931
64	150200	26.7N	128.2E	LAND	GOOD		18					26.2N	127.6E 47930
65	150200	26.6N	128.2E	LAND	GOOD	ELLIPTICAL	17					26.3N	127.8E 47931
66	150200	26.7N	128.3E	LAND	GOOD		20				MOV 3030	26.1N	127.7E 47937
67	150200	26.6N	128.2E	LAND				5//42	52919			28.4N	129.5E 47909
68	150200	26.6N	128.2E	LAND				11711	72915			26.1N	127.8E 47937
69	150300	26.8N	128.0E	LAND	GOOD	ELLIPTICAL	20					26.1N	127.8E 47931
70	150300	26.9N	127.9E	LAND				11741	73016			26.1N	127.8E 47937
71	150300	26.7N	128.0E	LAND				4//12	53113			28.4N	129.5E 47909
72	150300	26.9N	128.0E	LAND	GOOD		15				MOV 3030	26.1N	127.7E 47937
73	150300	26.8N	127.9E	LAND	POOR		20					26.2N	127.6E 47930
74	150330	26.8N	127.8E	LAND	GOOD	ELLIPTICAL	20					26.1N	127.8E 47931
75	150400	27.0N	127.6E	LAND	POOR							26.2N	127.6E 47930
76	150400	26.8N	127.6E	LAND				11811	72916			26.1N	127.8E 47937
77	150400	26.9N	127.8E	LAND				5//42	53215			28.4N	129.5E 47909
78	150400	26.9N	127.7E	LAND	GOOD	ELLIPTICAL	21					26.1N	127.8E 47931
79	150400	26.9N	127.7E	LAND	GOOD		15				MOV 3030	26.1N	127.7E 47937
80	150500	27.0N	127.6E	LAND				5//42	53013			28.4N	129.5E 47909
81	150500	27.1N	127.5E	LAND	GOOD		18				MOV 3130	26.1N	127.7E 47937
82	150500	27.0N	127.5E	LAND	GOOD	CIRCULAR	23					26.1N	127.8E 47931
83	150500	27.0N	127.4E	LAND				10711	72915			26.1N	127.8E 47937
84	150600	27.1N	127.2E	LAND				10811	73014			26.1N	127.8E 47937
85	150600	27.2N	127.6E	LAND				6//41	53019			28.4N	129.5E 47909
86	150600	27.1N	127.3E	LAND	GOOD		18				MOV 2920	26.1N	127.7E 47937
87	150700	27.1N	127.0E	LAND				3//13	53011			24.8N	125.3E 47927
88	150700	27.2N	127.0E	LAND				10812	73012			26.1N	127.8E 47937
89	150700	27.3N	127.0E	LAND	GOOD		28				MOV 3025	26.1N	127.7E 47937
90	150700	27.2N	127.2E	LAND				1//41	53015			28.4N	129.5E 47909
91	150800	27.3N	126.8E	LAND	GOOD	CIRCULAR	16					26.1N	127.8E 47931
92	150800	27.3N	126.8E	LAND				10712	72912			26.1N	127.8E 47937
93	150800	27.2N	126.9E	LAND				6//41	52716			28.4N	129.5E 47909
94	150800	27.3N	126.9E	LAND				3//12	53116			24.8N	125.3E 47927
95	150800	27.3N	126.8E	LAND	GOOD		23				MOV 3025	26.1N	127.7E 37937
96	150900	27.3N	126.5E	LAND				10731	72912			26.1N	127.8E 47937
97	150900	27.4N	126.6E	LAND				3//12	53011			24.8N	125.3E 47927
98	150900	27.3N	126.5E	LAND	GOOD		25				MOV 2930	26.1N	127.7E 47937
99	150900	27.2N	126.5E	LAND				6//41	52820			28.4N	129.5E 47909
100	151000	27.5N	126.3E	LAND				3//12	52916			24.8N	125.3E 47927
101	151000	27.3N	126.3E	LAND	GOOD		18				MOV 2930	26.3N	126.8E 47929
102	151000	27.4N	126.4E	LAND	FAIR	CIRCULAR	17					26.1N	127.8E 47931
103	151000	27.4N	126.3E	LAND				20842	72914			26.1N	127.8E 47937
104	151030	27.5N	126.2E	LAND	FAIR	CIRCULAR	16					26.1N	127.8E 47931
105	151100	27.5N	126.0E	LAND				20711	72914			26.1N	127.8E 47937
106	151100	27.5N	126.1E	LAND	POOR	CIRCULAR	16					26.1N	127.8E 47931
107	151100	27.5N	126.1E	LAND	GOOD		18				MOV 3030	26.3N	126.8E 47929
108	151100	27.5N	126.0E	LAND				3//12	52714			24.8N	125.3E 47927
109	151200	27.6N	125.9E	LAND				5//72	52908			24.8N	125.3E 47927
110	151200	27.5N	125.8E	LAND				6////	72912			26.1N	127.8E 47937
111	151200	27.6N	125.9E	LAND	GOOD		15				MOV 3020	26.3N	126.8E 47929
112	151300	27.6N	125.7E	LAND				6////	72916			26.1N	127.8E 47937
113	151300	27.7N	125.6E	LAND				5//72	53012			24.8N	125.3E 47927
114	151300	27.6N	125.7E	LAND	GOOD		13				MOV 3030	26.3N	126.8E 47929
115	151400	27.6N	125.4E	LAND				6////	72811			26.1N	127.8E 47937
116	151400	27.8N	125.3E	LAND				3//72	52915			24.8N	125.3E 47927
117	151400	27.7N	125.6E	LAND	FAIR		15				MOV 3020	26.3N	126.8E 47929
118	151500	27.8N	125.2E	LAND				3//72	52911			24.8N	125.3E 47927
119	151500	27.7N	125.2E	LAND				6////	73012			26.1N	127.8E 47937
120	151500	27.9N	125.0E	LAND	FAIR		15				MOV 3030	26.3N	126.8E 47929
121	151600	27.8N	124.9E	LAND				5//72	52715			24.8N	125.3E 47927
122	151700	27.9N	124.8E	LAND				5//71	53108			24.8N	125.3E 47927
123	151800	28.0N	124.6E	LAND				5//72	53013			24.8N	125.3E 47927
124	151900	28.0N	124.4E	LAND				5//72	52711			24.8N	125.3E 47927
125	152000	28.1N	124.3E	LAND				5//72	53308			24.8N	125.3E 47927

TROPICAL STORM DELLA

SATELLITE FIXES

FIX NO.	TIME (Z)	FIX POSITION	ACCRY	DVORAK CODE	SAT	COMMENTS	SITE
1	100210	12.5N 128.7E	PCN 5	T0.0/0.0	DMSP35	INIT DHS	PGTW
2	101200	14.8N 129.5E	PCN 5		DMSP36	CI UP	PGTW
3	102213	15.5N 129.9E	PCN 5	T0.0/0.0 /S0.0/20HRS	DMSP37		PGTW
4	111054	18.4N 126.9E	PCN 6		DMSP37	CI UP	PGTW
5	111142	18.4N 127.0E	PCN 5		DMSP36		PGTW
6	111434	18.8N 126.6E	PCN 5		DMSP35		PGTW
7	111434	18.3N 127.0E	PCN 5		DMSP35		RODN
8	112154	20.0N 125.0E	PCN 5	T1.0/1.0 /01.0/24HRS	DMSP37		PGTW
9	112243	20.7N 124.7E	PCN 5		DMSP36		PGTW
10	112243	20.1N 125.8E	PCN 5	T1.0/1.0	DMSP36	INIT DHS	RPMK
11	120125	20.9N 124.6E	PCN 5		NOAA5		PGTW
* 12	120316	22.1N 125.2E	PCN 5	T1.0/1.0	DMSP35	INIT DHS	RODN
13	120316	21.5N 125.0E	PCN 5		DMSP35		RPMK
* 14	121035	23.2N 124.7E	PCN 6		DMSP37	CI UP	PGTW
* 15	121125	23.6N 123.9E	PCN 5		DMSP36		PGTW
16	121559	24.2N 123.4E	PCN 5		DMSP35		RPMK
17	122134	23.8N 122.0E	PCN 5	T2.5/2.5+/01.5/24HRS	DMSP37		PGTW
* 18	130007	24.6N 121.6E	PCN 5	T3.5/3.5	DMSP36	INIT DHS	RKSO
19	130258	25.0N 121.1E	PCN 3	T3.0/3.0-/02.0/28HRS	DMSP35		RPMK
20	130258	24.8N 120.8E	PCN 5		DMSP35		PGTW
21	130259	25.2N 121.0E	PCN 3	T2.5/2.5-/01.5/24HRS	DMSP35		RODN
22	131120	26.5N 120.3E	PCN 6		NOAA5		PGTW
23	131249	26.5N 120.1E	PCN 6		DMSP36		RODN
24	131540	26.7N 119.5E	PCN 6		DMSP35		PGTW

AIRCRAFT FIXES

FIX NO.	TIME (Z)	FIX POSITION	FLT LVL	MLV HGT	OBS MSLP	MAX-SFC-WND VEL/RAD/RNG	MAX-FLT-LVL-WND DIR/VEL/RNG/RNG	ACCRY NAV/MET	EYE SHAPE	EYE ORIEN-DIAM/TATION	EYE TEMP (C) OUT/ IN/ DP/SST	MSN NO.
1	110429	14.9N 128.1E	1500FT		999	40 090 15	260 40 150 10	2 2				01
2	120403	21.5N 124.9E	700MB	3031								02
3	120424	21.5N 124.8E	700MB	3031		50 050 25	160 58 050 25	5 4			+12 +16 +11	02
4	120651	21.9N 124.5E	700MB	3035							+14 +10	02
5	121505	22.6N 122.9E	700MB	3008	987		250 40 180 15	2 2			+18 +18 +08	03
6	121920	23.1N 122.1E	700MB	2990	984		210 35 110 20	5 5			+18 +20 +06	03

RADAR FIXES

FIX NO.	TIME (Z)	FIX POSITION	RADAR	ACCRY	EYE SHAPE	EYE DIAM	RADOB-CODE ASWAN TDOFF	COMMENTS	RADAR POSITION	SITE WMO NO.
1	121700	22.9N 122.8E	LAND				25/73 51314		24.0N 121.6E	46699
2	121800	23.1N 122.6E	LAND				25/// 53114		24.0N 121.6E	46699
3	121900	23.2N 122.4E	LAND				25/73 53312		24.0N 121.6E	46699
4	122000	23.5N 122.4E	LAND				24/72 53413		24.0N 121.6E	46699
5	122100	23.4N 122.2E	LAND				25/73 52312		24.0N 121.6E	46699
6	122200	23.4N 122.4E	LAND				24/72 53413		24.0N 121.6E	46699
7	122300	23.5N 122.1E	LAND				24/73 53313		24.0N 121.6E	46699
8	130000	23.8N 122.2E	LAND				///// 50217		24.0N 121.6E	46699
9	130100	24.1N 122.1E	LAND				10572 50515		24.0N 121.6E	46699

SATELLITE FIXES

FIX NO.	TIME (Z)	FIX POSITION	ACCRY	DVORAK CODE	SAT	COMMENTS	SITE
1	132200	9.4N 162.6E	PCN 6	TV.0/0.0	NOAA5	INIT DHS	PGTW
2	141341	11.4N 159.0E	PCN 6		DMSP35	CI DDWN	PGTW
3	150041	12.4N 156.9E	PCN 5	TV.0/0.0 /S0.0/27HRS	DMSP35		PGTW
4	150952	13.5N 156.8E	PCN 5		NOAA5	CI UP	PGTW
5	151323	13.4N 156.9E	PCN 6		DMSP35		PGTW
6	160923	16.0N 154.4E	PCN 5	TD.0/0.0 /S0.0/24HRS	DMSP35		PGTW
7	170147	19.5N 150.4E	PCN 3	T1.0/1.0 /D1.0/24HRS	DMSP35		PGTW
8	170955	20.4N 148.9E	PCN 6		DMSP36		PGTW
9	172059	21.8N 149.4E	PCN 5	T1.0/1.0 /S0.0/19HRS	DMSP36		PGTW
10	180129	22.2N 148.4E	PCN 6		DMSP35		PGTW
* 11	181122	24.5N 145.7E	PCN 6		DMSP36		PGTW
12	181133	24.5N 144.5E	PCN 6		NOAA5		PGTW
13	181411	24.3N 144.8E	PCN 4		DMSP35	PARTIALLY EXPOSED LLCC	PGTW
* 14	182119	25.1N 141.4E	PCN 5	T2.0/2.0+/D1.0/24HRS	DMSP37		PGTW
15	182223	25.7N 141.5E	PCN 3		DMSP36		PGTW
16	190009	26.0N 141.0E	PCN 3		NOAA5		PGTW
17	191000	27.6N 138.2E	PCN 3		DMSP37	CI DDWN	PGTW
18	191000	27.5N 138.1E	PCN 3		DMSP37		RKSO
19	191049	27.8N 137.9E	PCN 4		NOAA5		PGTW
20	191356	28.2N 137.8E	PCN 3		DMSP35		PGTW
21	192059	30.1N 135.5E	PCN 3	T2.5/2.5-/D0.5/24HRS	DMSP37		PGTW
22	192059	30.0N 135.6E	PCN 3	T2.0/2.0	DMSP37	INIT DHS	RKSO
23	192059	30.1N 135.5E	PCN 3	T1.0/1.0	DMSP37	INIT DHS	RODN
24	192205	30.4N 135.4E	PCN 3		DMSP36		PGTW
25	192325	30.8N 135.2E			NOAA5		PGTW
26	200054	31.2N 135.1E	PCN 3		DMSP35		PGTW
27	200235	31.7N 134.9E	PCN 3		DMSP35		PGTW
28	200235	31.7N 134.8E	PCN 3		DMSP35		RKSO
29	200940	33.0N 134.4E	PCN 5		DMSP37		PGTW
30	200940	33.8N 133.6E	PCN 6		DMSP37		RODN

AIRCRAFT FIXES

FIX NO.	TIME (Z)	FIX POSITION	FLT LVL	MIN HGT	OBS MSLP	MAX-SFC-WND VEL/RRG/RNG	MAX-FLT-LVL-WND DIR/VEL/RRG/RNG	ACCRY NAV/MET	EYE SHAPE	EYE ORIENTATION	EYE TEMP (C) OUT/ IN/ DP/SST	MSN NO.
1	181350	24.1N 144.3E	700MB	3103	1002		100 48 080 95	5 3			+11 +10 + R	2
2	190135	25.9N 140.5E	700MB									3
3	190324	26.3N 139.9E	700MB	3004	998	50 360 15	080 50 360 15	2 3			+24 +26 +26 28	3
* 4	191922	27.9N 135.5E	700MB	3116			090 38 040 40	13 4			+10 +10 +10	4
5	200248	31.3N 134.5E	1500FT		1006	20 130 40	250 35 130 40	5 20			+26 +17	5

RADAR FIXES

FIX NO.	TIME (Z)	FIX POSITION	RADAR	ACCRY	EYE SHAPE	EYE DIAM	RADOB-CODE ASWAH TDDFF	COMMENTS	RADAR POSITION	SITE WMO NO.
1	200700	33.2N 134.4E	LAND				53627 /999/		33.3N 134.2E	47899
2	200800	33.4N 134.5E	LAND				5//// 50127		33.3N 134.2E	47899

TYPHOON ELAINE

SATELLITE FIXES

FIX NO.	TIME (Z)	FIX POSITION	ACCRY	OVERLAY CODE	SAT	COMMENTS	SITE
1	192325	9.3N 133.2E	PCN 5	T0.0/0.0	NOAA5	INIT DHS	PGTW
2	210034	13.2N 130.3E	PCN 5	T0.0/0.0 /S0.0/25HRS	NOAA5		PGTW
3	211115	16.2N 129.3E	PCN 6		NOAA5	CI UP	PGTW
4	212334	17.3N 126.2E	PCN 5	T0.0/0.0 /S0.0/24HRS	NOAA5		PGTW
5	221230	17.4N 125.2E	PCN 6		NOAA5		PGTW
6	222330	17.4N 124.8E	PCN 4	T2.0/2.0	DMSP36	INIT DHS PENETRATING CBS	RPMK
7	230105	17.8N 124.4E	PCN 6	T1.0/1.0 /D1.0/25HRS	NOAA5		PGTW
8	230323	18.1N 123.8E	PCN 4		DMSP35	PENETRATING CBS AT 18.2N 123.8E	RPMK
9	231024	18.6N 122.8E	PCN 5		DMSP37	CI UP	PGTW
10	231024	18.0N 122.8E	PCN 5		DMSP37		RODN
11	231145	18.4N 122.3E	PCN 5		NOAA5		PGTW
12	231505	17.7N 121.8E	PCN 5		DMSP35		RPMK
13	231905	17.2N 120.8E	PCN 5		DMSP35		RODN
14	232305	16.5N 120.7E	PCN 5	T2.0/2.0	DMSP37	INIT DHS SECONDARY 17.5N 121.4E	RODN
15	240020	17.7N 120.9E	PCN 3		DMSP36	PSBL SECONDARY CC 17.4N 120.7E	RPMK
16	240020	17.5N 120.8E	PCN 5		DMSP37		RODN
17	240022	17.5N 121.4E	PCN 5	T2.0/2.0 /D1.0/25HRS	NOAA5		PGTW
18	240305	17.3N 120.4E	PCN 3		DMSP35		PGTW
19	241145	17.1N 120.2E	PCN 6		DMSP37		RODN
20	241145	17.1N 119.5E	PCN 3		DMSP37		RPMK
21	241238	17.1N 119.4E	PCN 5		NOAA5		PGTW
22	241302	17.0N 119.5E	PCN 3		DMSP36	SECONDARY CC 17.8N 119.1E	RPMK
23	241547	17.4N 119.4E	PCN 5		DMSP35	SECONDARY CC 16.9N 118.9E	RODN
24	242245	17.6N 118.9E	PCN 4	T3.0/3.0+/D1.0/23HRS	DMSP37		RODN
25	250002	17.8N 118.5E	PCN 5	T3.0/3.0	DMSP36	INIT DHS	RPMK
26	250003	17.6N 114.4E			DMSP36		RODN
27	250134	17.8N 119.5E	PCN 5	T2.5/2.5 /D0.5/25HRS	NOAA5		PGTW
28	251125	17.1N 117.4E	PCN 5		DMSP37		RPMK
29	251214	16.8N 117.9E	PCN 6		NOAA5		PGTW
30	251244	17.0N 117.6E	PCN 3		DMSP36	LOW LVL CIRCULATION	RPMK
31	251529	17.4N 117.3E	PCN 3		DMSP35		PGTW
32	252226	18.0N 117.2E	PCN 1	T3.5/3.5 /D1.0/21HRS	DMSP37		PGTW
* 33	252225	17.9N 117.4E	PCN 5	T3.0/3.0 /S0.0/22HRS	DMSP37		RPMK
* 34	252345	17.6N 117.4E	PCN 5	T3.0/3.0 /S0.0/25HRS	DMSP36		RODN
35	252345	18.3N 117.2E	PCN 5		DMSP36		PGTW
36	260051	18.5N 117.0E	PCN 4		NOAA5		PGTW
37	260230	18.6N 116.3E	PCN 3		DMSP35		PGTW
38	260230	18.7N 116.3E	PCN 3		DMSP35		RPMK
39	261107	19.4N 115.6E	PCN 3		DMSP37		RODN
40	261130	19.2N 115.3E	PCN 6		NOAA5		PGTW
41	261227	19.4N 114.9E	PCN 5		DMSP36		RPMK
42	261512	20.0N 114.8E	PCN 3		DMSP35		PGTW
43	261512	19.9N 114.6E	PCN 3		DMSP35		RPMK
44	261554	20.0N 114.6E	PCN 4		DMSP35	BASED ON CONTINUITY	RPMK
45	262205	20.1N 113.3E	PCN 5		DMSP37		PGTW
46	262328	20.2N 113.0E	PCN 3	T4.0/4.0 /D0.5/25HRS	DMSP36		PGTW
47	270354	20.6N 112.3E	PCN 1	T5.0/5.0 /D2.0/29HRS	DMSP35		RPMK
48	271047	21.4N 110.8E	PCN 4		DMSP37		PGTW
49	271047	21.4N 110.6E	PCN 4		DMSP37		RPMK
50	271209	21.4N 110.4E	PCN 4		DMSP36		PGTW
51	271535	21.4N 108.7E	PCN 5		DMSP37	EYE GONE	RPMK
52	280119	21.7N 106.6E	PCN 5		NOAA5		PGTW

AIRCRAFT FIXES

FIX NO.	TIME (Z)	FIX POSITION	FLT LVL	MIN HGT	OBS MSLP	MAX-SFC-WND VEL/ARG/RNG	MAX-FLT-LVL-WND DIR/VEL/RNG/ANG	ACCRY NAV/MET	EYE SHAPE	EYE ORIEN-TATION	EYE DIAM	EYE TEMPS (C) DWT/ INT/ DP/SST	MSN NO.
1	240034	17.4N 120.3E	700MB	2999		30 010 50	080 61 010 120					+12 +12	1
2	240230	17.0N 120.2E	700MB	2995		40 330 50	060 50 320 130	2 5				+12 +12 +12	1
3	241255	16.9N 119.1E	700MB										2
4	241345	16.5N 119.1E	700MB	2976			020 42 300 155	2 7				+11 +13 +11	2
5	250355	17.6N 118.1E	700MB	2961	981	30 160 120	240 48 160 120	5 10				+26 +25	3
6	250532	17.3N 117.9E	700MB										3
7	250835	17.0N 117.8E	700MB	2924	981	40 200 35	270 45 200 45	5 10				+14 +14 +11	3
8	251504	17.2N 118.1E	700MB	2897	977		220 43 150 75	20 H				+12 +14 +10	4
9	251938	17.6N 117.8E	700MB	2885	977		310 40 240 120	25 5				+12 +14 +10	4
10	252225	18.2N 117.0E	700MB	2882	975		360 40 230 60	15 3				+12 +14 +12	4
11	261028	19.2N 115.5E	700MB	2867	970	45 120 125	180 55 110 60	2 5				+12 +15 +14	27 5
12	261330	19.5N 114.8E	700MB	2867			170 68 270 105					+13 +13	5

RADAR FIXES

FIX NO.	TIME (Z)	FIX POSITION	RADAR	ACCRY	EYE SHAPE	EYE DIAM	RADOB-CODE ASWAN TDOFF	COMMENTS	RADAR POSITION	SITE WMO NO.
* 1	231200	18.6N 121.5E	LAND				2221/ 427//		16.3N 120.6E	98321
* 2	231300	18.4N 121.3E	LAND				2212/ 427//		16.3N 120.6E	98321
* 3	231740	19.4N 120.6E	LAND				25/// /////		16.3N 120.6E	98321
4	240001	17.6N 120.3E	LAND				1060/ /////		16.3N 120.6E	98321
5	240200	17.3N 120.2E	LAND				1152/ 62115		16.3N 120.6E	98321
6	240605	17.3N 119.7E	LAND					PSBL CNTR	16.6N 120.3E	
7	240630	17.3N 120.0E	LAND				10123 73008		16.3N 120.6E	98321
8	240800	17.5N 119.7E	LAND				11197 10413		16.3N 120.6E	98321
9	241700	17.2N 118.7E	LAND				45/// 9////		16.3N 120.6E	98321
10	250015	16.9N 119.4E	LAND		CIRCULAR	21		EYE	16.6N 120.3E	
11	250230	17.5N 118.2E	LAND				4//// /////		16.3N 120.6E	98321
* 12	250355	16.3N 119.5E	LAND						16.6N 120.3E	
13	250740	17.2N 117.6E	LAND				4//// 6////		16.3N 120.6E	98321
14	250930	17.2N 117.6E	LAND				4//// 6////		16.3N 120.6E	98321
15	251330	17.1N 117.4E	LAND				4//// 6////	10DEG SPRL OVERLAY	16.3N 120.6E	98321
16	262240	19.9N 113.1E	LAND				30902 52710		22.3N 114.2E	45005
17	262350	20.0N 112.9E	LAND				30912 53110		22.3N 114.2E	45005
18	270003	20.1N 112.7E	LAND				2091/ 52914		22.3N 114.2E	45005
19	270130	20.1N 112.6E	LAND				2091< 52907		22.3N 114.2E	45005
20	270300	20.3N 112.4E	LAND				2091< 53210		22.3N 114.2E	45005
21	270400	20.6N 112.0E	LAND				2091< 63117		22.3N 114.2E	45005
22	270600	20.9N 111.8E	LAND				2091< 63211		22.3N 114.2E	45005
23	270800	21.3N 111.5E	LAND				2091< 63215		22.3N 114.2E	45005
24	270900	21.4N 111.3E	LAND				2094< 63213		22.3N 114.2E	45005

TYPHOON FAYE

SATELLITE FIXES

FIX NO.	TIME (Z)	FIX POSITION	ACCRY	DVORAK CODE	SAT	COMMENTS	SITE
1	242142	6.4N 160.8E	PCN 6	T0.0/0.0	NOAA5	INIT OBS	PGTW
2	251017	7.8N 157.8E	PCN 6		NOAA5		PGTW
3	252254	6.5N 155.8E	PCN 6	T0.0/0.0 /S0.0/25HRS	NOAA5		PGTW
4	260934	7.3N 152.9E	PCN 6		NOAA5		PGTW
5	271028	10.5N 148.9E	PCN 6		DMSP36		PGTW
6	272129	12.7N 146.4E	PCN 3	T1.0/1.0	DMSP36	INIT OBS	PGTW
7	272323	12.7N 145.8E	PCN 3		NOAA5		PGTW
8	280155	13.6N 146.0E	PCN 5		DMSP35		PGTW
9	280346	14.6N 145.0E	PCN 6		DMSP37	CI UP	PGTW
10	281011	14.8N 145.0E	PCN 5		DMSP36		PGTW
11	281437	15.1N 144.7E	PCN 6		DMSP35		PGTW
12	282127	16.3N 145.9E	PCN 5	T3.5/3.5 /D2.5/24HRS	DMSP37		PGTW
13	282253	16.6N 145.8E	PCN 5		DMSP36		PGTW
14	290137	17.0N 145.2E	PCN 5		DMSP35		PGTW
15	290827	17.3N 145.4E	PCN 6		DMSP37	CI SAME	PGTW
16	290953	18.0N 145.2E	PCN 6		DMSP36		PGTW
17	291619	18.4N 145.7E	PCN 6		DMSP35		PGTW
18	292108	19.3N 146.3E	PCN 5	T3.5/3.5 /S0.0/24HRS	DMSP37		PGTW
19	292108	19.3N 146.5E	PCN 3	T3.5/3.5	DMSP37	INIT OBS	RPMK
20	292236	19.4N 146.6E	PCN 5		DMSP36		PGTW
21	300948	18.6N 147.6E	PCN 6		DMSP37		RKSO
22	300949	19.4N 147.6E	PCN 5		DMSP37	CI SAME	PGTW
23	301118	19.3N 148.1E	PCN 5		DMSP36		PGTW
24	301401	19.0N 148.3E	PCN 6		DMSP35		PGTW
25	302048	17.8N 148.5E	PCN 5	T3.5/3.5 /S0.0/24HRS	DMSP37		PGTW
26	302048	18.2N 149.1E	PCN 3	T3.0/3.0	DMSP37	INIT OBS	RODN
27	302218	17.9N 148.9E	PCN 4		DMSP36		PGTW
28	310929	17.6N 149.0E	PCN 5		DMSP37		RKSO
29	310929	17.9N 148.6E	PCN 6		DMSP37		PGTW
30	310929	17.5N 148.6E	PCN 6		DMSP37		RODN
31	311100	17.9N 148.9E	PCN 5		DMSP36		PGTW
32	311343	17.1N 147.9E	PCN 3		DMSP35	EXPOSED LOW LVL	PGTW
33	312028	16.9N 147.5E	PCN 3	T4.0/4.0 /D0.5/24HRS	DMSP37		PGTW
34	312201	17.4N 147.5E	PCN 3		DMSP36		PGTW
35	010043	16.7N 147.2E	PCN 3		DMSP35		PGTW
36	010910	17.4N 146.4E	PCN 5		DMSP37	CI UP	PGTW
37	010910	17.3N 146.0E	PCN 6		DMSP37		RODN
38	011043	17.5N 146.1E	PCN 5		DMSP36		PGTW
39	011325	17.9N 145.6E	PCN 5		DMSP35		PGTW
40	012009	19.5N 145.0E	PCN 2	T4.5/4.5 /D0.5/24HRS	DMSP37		PGTW
41	012143	18.9N 144.9E	PCN 1		DMSP36		PGTW
42	020207	19.3N 144.6E	PCN 1		DMSP35		PGTW
43	020850	20.2N 143.7E	PCN 2		DMSP37	CI UP	PGTW
44	020850	19.9N 143.2E	PCN 6		DMSP37		RODN
45	021026	20.4N 143.6E	PCN 1		DMSP36		PGTW
46	021449	20.9N 143.6E	PCN 5		DMSP35		PGTW
47	022126	21.9N 141.6E	PCN 2		DMSP36		PGTW
48	022308	22.0N 141.4E	PCN 4		DMSP36		PGTW
49	030149	22.6N 140.7E	PCN 4	T5.0/5.0-/D0.5/30HRS	DMSP35		PGTW
50	031012	23.5N 139.4E	PCN 6		DMSP37		PGTW
51	031012	23.6N 139.2E	PCN 6		DMSP37		RKSO
52	031150	24.0N 138.9E	PCN 6		DMSP36		PGTW
53	031150	24.0N 139.2E	PCN 5		DMSP36		RODN
54	031431	24.6N 138.2E	PCN 5		DMSP35		PGTW
55	032112	25.2N 137.3E	PCN 5	T3.5/4.5 /W1.5/19HRS	DMSP37		PGTW
56	032251	25.6N 137.7E	PCN 5	T4.0/4.0	DMSP36	INIT OBS	RKSO
57	032251	25.6N 137.0E	PCN 5		DMSP36		PGTW
58	040131	26.2N 136.4E	PCN 3		DMSP35		RKSO
59	040131	26.1N 136.6E	PCN 3		DMSP35		PGTW
60	040953	27.6N 135.4E	PCN 4		DMSP37		RKSO
61	040953	27.5N 135.5E	PCN 4		DMSP37	CENTER OF CDO	PGTW
62	041133	27.9N 135.4E	PCN 5		DMSP36		PGTW
63	041413	28.2N 134.8E	PCN 5		DMSP35		PGTW
64	042053	28.7N 134.8E	PCN 5	T3.0/3.5 /W0.5/24HRS	DMSP37		PGTW
65	042233	28.8N 134.8E	PCN 3	T3.5/4.0 /W0.5/24HRS	DMSP36		RKSO
66	042233	28.9N 134.7E	PCN 5		DMSP36		PGTW
67	050934	30.4N 135.4E	PCN 6		DMSP37		RKSO
68	050934	29.8N 135.5E	PCN 6		DMSP37		PGTW
69	051115	30.2N 136.0E	PCN 5		DMSP36		PGTW
70	051356	30.0N 136.5E	PCN 5		DMSP35	CI UP	PGTW
71	051356	29.9N 136.5E	PCN 5		DMSP35		RODN
72	052033	30.1N 137.9E	PCN 4	T3.0/3.0 /S0.0/24HRS	DMSP37		PGTW
73	052033	33.0N 137.9E	PCN 3	T3.5/3.5-/S0.0/22HRS	DMSP37		RKSO
74	052216	30.1N 138.4E	PCN 5		DMSP36		PGTW
75	060056	30.2N 138.3E	PCN 5		DMSP35		RKSO
76	060056	30.0N 138.0E	PCN 3		DMSP35		PGTW
77	060914	30.1N 139.4E	PCN 5		DMSP37	CI DOWN	PGTW
78	060914	30.0N 139.3E	PCN 6		DMSP37		RODN
79	061056	30.0N 139.5E	PCN 5		DMSP36		PGTW
80	061338	29.8N 139.9E	PCN 5		DMSP35		PGTW
81	061519	29.3N 141.3E	PCN 6		DMSP35		RODN
82	062014	30.6N 140.1E	PCN 3	T2.5/3.0 /W0.5/24HRS	DMSP37		PGTW
83	062014	30.6N 140.3E	PCN 3	T2.5/3.5 /W1.0/24HRS	DMSP37		RKSO
84	062158	30.7N 140.3E	PCN 3		DMSP36		PGTW
85	070038	30.7N 140.8E	PCN 3		DMSP35		PGTW
86	070219	30.6N 140.6E	PCN 4		DMSP37		KGWC
87	070219	30.6N 140.6E	PCN 4		DMSP37		KGWC
88	071028	30.5N 141.2E	PCN 4		NOAA5	CI DOWN	PGTW
89	071036	30.2N 140.9E	PCN 6		DMSP37		RODN
90	071502	30.5N 141.8E	PCN 4		DMSP35		PGTW
91	071502	30.1N 141.6E	PCN 5		DMSP35		RODN
92	072136	30.3N 142.5E	PCN 3		DMSP37		PGTW
93	072141	30.4N 142.4E	PCN 3		DMSP36		PGTW

AIRCRAFT FIXES

FIX NO.	TIME (Z)	FIX POSITION	FLT LVL	MIN HGT	OBS MSLP	MAX-SFC-WND VEL/BRG/RNG	MAX-FLT-LVL-WND DIR/VEL/BRG/RNG	ACCRY NAV/MET	EYE SHAPE	EYE ORIEN-DIAM/TATION	EYE TEMP (C) OUT/ IN/ DP/SST	MSN NO.
1	272253	12.4N 146.3E	1500FT		1000	65 110 55	150 48 110 55	5 3			+23 +26 30	1
2	280158	13.2N 146.0E	1500FT		997	25 180 45	260 30 180 45	5 3			+24 +26 30	1
3	281535	15.9N 144.9E	700MB	3095	1001		290 30 250 30	3 5			+11 +15 + 7	2
4	281827	16.1N 145.0E	700MB	3091			040 38 360 38				+ 15+ 6	2
5	282102	16.2N 145.1E	700MB	3098	1001	50 180 15	030 29 300 40	3 5			+14 +15 + 7	2
6	290100	16.9N 145.0E	700MB	3125		50 050 40	140 43 050 40				+ 15+ 12	3
7	290324	17.3N 145.1E	700MB	3100	1002	35 310 45	030 20 310 37	4 2			+14 +20 +11	3
8	291503	17.2N 145.8E	700MB	3053	996		350 35 270 30	5 2			+13 +20 + 9	4
9	300034	19.2N 146.9E	700MB			50 360 20	170 65 030 15					5
10	300332	19.2N 147.0E	700MB	3055	984	60 020 15	140 65 020 15	2 2	CIRCULAR	15	+14 +16 + 9	28 5
11	301205	19.0N 147.9E	700MB	3053			330 49 210 30				+16 + 6	6
12	301452	18.8N 148.3E	700MB	3100	1002		010 38 270 40	10 10	ELLIPTICAL	50 20 090	+12 +12 +11	6
13	302340	18.0N 148.6E	700MB	3069	997	35 120 35	320 45 120 35				+16 + 7	7
14	310340	17.8N 148.8E	700MB	2974	987	50 240 20	350 50 270 15	3 1			+11 +19 + 7	7
15	311202	17.4N 148.7E	700MB	2994			100 45 360 20				+19 + 8	8
16	311442	17.3N 148.3E	700MB	2974	986		350 45 280 20	3 5	CIRCULAR	30	+11 +17 +13	8
17	312052	17.0N 147.7E	700MB	2994	987	60 090 10	240 38 180 15	3 5			+10 +15 +11	29 9
18	010035	16.9N 147.3E	700MB	2982		80 010 10	110 52 010 20				+ 15+ 11	9
19	010333	17.0N 147.0E	700MB	2919	981	85 300 10	240 62 290 10	3 5	CIRCULAR	30	+12 +15 +11	9
20	011521	18.0N 145.6E	700MB	2821	969		230 77 170 15	5 2	CIRCULAR	15	+12 +14 +13	10
21	011830	18.5N 145.3E	700MB	2779			170 95 140 12				+ 15+ 13	10
22	012031	18.7N 145.1E	700MB	2949	961	60 180 50	010 75 280 10	5 2	CIRCULAR	12	+10 +15 +13	10
23	020044	19.1N 144.8E	700MB	2866	949	40 230 50	310 80 230 15	3 2	ELLIPTICAL	15 12 040	+13 +17 +12	11
24	020339	19.5N 144.5E	700MB	2957	939	130 270 7	310 100 270 10	2 1	CIRCULAR	15	+12 +19 +14	11
25	021503	21.3N 143.1E	700MB	2529	936		270 94 180 15	20 2	CIRCULAR	12	+12 +19 +15	12
26	021833	21.6N 142.4E	700MB	2528			080 103 350 5				+ 19+ 15	12
27	022042	21.8N 141.8E	700MB	2542	937		290 93 210 6	5 2	CIRCULAR	15	+12 +19 +15	12
28	030053	22.2N 141.1E	700MB	2653	950							13
29	030340	22.6N 140.6E	700MB	2746	961	100 360 10	110 122 360 10	5 5	CIRCULAR	15	+13 +15 +15	13
30	031513	24.7N 138.2E	700MB	3000	990		190 61 110 55	5 5	ELLIPTICAL	30 20 150	+12 +20 + 8	14
31	032118	25.5N 137.3E	700MB	3008	991	50 090 20	120 58 090 20	5 10			+15 +11 +11	14
32	040108	26.1N 136.5E	700MB	2954		60 050 20	190 55 120 60				+16	15
33	040339	26.7N 136.1E	700MB	2974	987	55 310 45	070 35 310 45	3 3			+15 +19	15
34	041455	28.2N 134.7E	700MB	3014	989		200 53 140 30	2 5			+12 +18 +13	16
35	041901	28.2N 134.6E	700MB	2978			160 45 040 40				+ 19+ 9	18
36	042057	28.9N 134.7E	700MB	2977	985	35 360 15	010 35 300 25	4 2			+15 +18 +11	16
37	050030	29.2N 134.5E	700MB	2922		40 090 20	180 54 090 30				+16	17
38	050315	29.5N 135.1E	700MB	2903	979	30 330 30	030 49 330 20	4 3	CIRCULAR	25	+12 +16	17
39	051236	30.0N 136.6E	700MB	2898			180 70 120 25				+17 +11	18
40	051541	30.2N 136.9E	700MB	2877	972		010 80 280 15	3 3	CIRCULAR	17	+19 +20 +10	18
41	060040	30.3N 138.3E	700MB	2866	975	80 270 5	74				+25 + 9	19
42	060330	30.2N 138.6E	700MB	2870	975	100 040 25	140 65 040 30	2 2			+16 +21 + 8	19
43	062356	30.7N 140.6E	700MB			30 0	31					20
44	070036	30.8N 140.5E	700MB	3104	1002	25 240 50	320 41 240 90	4 2			+17 +18 + 9	20
45	070302	30.7N 140.7E	700MB	3084	1000	35 010 120	090 20 010 40	5 3			+17 +18 + 8	20

RADAR FIXES

FIX NO.	TIME (Z)	FIX POSITION	RADAR	ACCRY	EYE SHAPE	EYE DIAM	RADOB-CODE ASWAR	TDOFF	COMMENTS	RADAR POSITION	SITE WMO NO.
1	272330	12.7N 146.1E	LAND						1 BAND 50NM	13.6N 144.9E	91218
2	280125	13.2N 145.7E	LAND						POORLY DEFINED SPIRAL BAND	13.6N 144.9E	91218
3	280235	13.3N 145.5E	LAND						FEEDER BANDS APPEAR WEAKER	13.6N 144.9E	91218
4	280310	13.6N 145.7E	LAND	POOR					PSBL CNTR	13.6N 144.9E	91218
5	280335	13.6N 145.7E	LAND	GOOD	CIRCULAR	20			PSBL CNTR WALL CLD OPEN S-N	13.6N 144.9E	91218
6	280410	13.7N 145.6E	LAND	POOR	CIRCULAR	15			PSBL CNTR WALL CLD OPEN SE-N	13.6N 144.9E	91218
7	280435	13.9N 145.5E	LAND	GOOD	ELLIPTICAL				PSBL CNTR WALL CLD OPEN SW-NE	13.6N 144.9E	91218
8	280510	13.9N 145.5E	LAND	POOR					PSBL CNTR	13.6N 144.9E	91218
9	281310	14.8N 145.2E	LAND	FAIR	CIRCULAR	25			PSBL EYE	13.6N 144.9E	91218

TROPICAL STORM GLORIA

SATELLITE FIXES

FIX NO.	TIME (Z)	FIX POSITION	ACCRY	DVORAK CODE	SAT	COMMENTS	SITE
1	261512	20.2N 132.4E	PCN 5		DMSP35		PGTW
* 2	272310	17.5N 129.4E	PCN 5	T1.0/1.0	DMSP34	INIT DBS	ROOV
3	280159	21.1N 130.4E	PCN 3	T1.0/1.0	DMSP34	INIT DBS	PGTW
* 4	281028	19.4N 128.4E	PCN 5		DMSP37	CI UP	PGTW
* 5	281152	19.6N 128.7E	PCN 5		DMSP34	SECONDARY 22.3N 128.0E	PGTW
* 6	281437	19.6N 128.6E	PCN 5		DMSP35		PGTW
7	282127	20.1N 126.6E	PCN 3		DMSP37	SECONDARY 22.2N 129.7E	PGTW
8	282253	22.2N 129.0E	PCN 3	T1.0/1.0	DMSP34	INIT DBS	RKSO
9	282253	22.2N 129.1E	PCN 3	T1.0/1.0	DMSP36	INIT DBS	RPMK
10	282253	22.2N 129.0E	PCN 3	T2.0/2.0 /01.0/21HRS	DMSP34	SECONDARY 20.0N 126.6E	PGTW
11	290035	22.0N 128.9E	PCN 3		NOAA5	SECONDARY 22.3N 130.8E	PGTW
12	290137	21.8N 128.5E	PCN 3		DMSP35	SECONDARY 22.5N 130.1E	RPMK
13	290137	21.9N 128.3E	PCN 3		DMSP35	SECONDARY 22.6N 129.9E	PGTW
14	291005	22.3N 128.0E	PCN 6		DMSP37		RKSO
* 15	291008	20.9N 126.5E	PCN 6		DMSP37		RPMK
16	291008	22.1N 127.9E	PCN 5		DMSP37	CI SAME	PGTW
17	291135	22.0N 127.9E	PCN 5		DMSP36		PGTW
18	291419	22.0N 127.8E	PCN 5		DMSP35		PGTW
19	291500	23.0N 130.0E			DMSP35		RPMK
20	292108	23.3N 129.0E	PCN 3	T2.0/2.0 /01.0/22HRS	DMSP37		RKSO
21	292108	23.9N 128.7E	PCN 3	T2.5/2.5 /01.5/23HRS	DMSP37		RPMK
22	292108	24.0N 128.7E	PCN 3	T2.5/2.5 /00.5/22HRS	DMSP37		PGTW
23	292236	24.1N 128.7E	PCN 3		DMSP36		PGTW
* 24	300949	24.9N 127.4E	PCN 4		DMSP37		RKSO
25	300949	25.0N 128.9E	PCN 5		DMSP37	CI SAME	PGTW
26	301118	25.1N 129.1E	PCN 5		DMSP36		PGTW
27	301542	25.3N 128.9E	PCN 4		DMSP35		RPMK
28	302218	27.5N 130.3E	PCN 3		DMSP36		PGTW
29	302236	27.4N 130.5E	PCN 3	T2.0/2.5-/W0.5/25HRS	DMSP37		RPMK
30	302230	27.4N 130.3E	PCN 3		DMSP37		RKSO
31	310242	27.6N 130.0E	PCN 3		DMSP35	SECONDARY 31.3N 134.7E	RPMK
32	310242	27.7N 129.9E	PCN 3		DMSP35		PGTW
33	310243	27.5N 130.0E	PCN 5		DMSP35		RKSO
34	311100	28.4N 130.7E	PCN 5		DMSP36		PGTW
35	311242	28.0N 130.4E	PCN 6		DMSP36		RPMK
* 36	312201	27.4N 131.9E	PCN 5		DMSP36		PGTW
* 37	312210	27.2N 131.9E	PCN 5		DMSP37		RKSO

AIRCRAFT FIXES

FIX NO.	TIME (Z)	FIX POSITION	FLT LVL	MIN HGT	OBS MSLP	MAX-SFC-WND VEL/BRG/RNG	MAX-FLT-LVL-WND DTM/VEL/BRG/RNG	ACCRY NAV/MET	EYE SHAPE	EYE ORIEN-TATION	EYE TEMP (C) DWT/ INT/ DP/SST	MSN NO.
1	290117	21.1N 129.2E	150DFI		998	25 360 70	040 24 300 70	5 20			+24 +24 +24	1
2	290231	21.3N 128.9E	700MB	3057	996	25 020 50	040 24 020 50	5 10			+11 +10	1
3	291437	22.5N 127.9E	700MB	3034	994		030 20 300 40	4 10			+11 +13 +10	2
4	300640	24.7N 128.5E	700MB	3000	990	25 180 35	260 29 210 60	4 2			+13 +14 + 9	3
5	301400	25.4N 128.4E	700MB	3019			210 27 120 90				+14 + 9	4
6	301630	26.2N 128.4E	700MB	3045	995		230 36 120 150	5 15			+15 +14 + 5	4
7	310408	27.7N 130.1E	700MB	3039	993	15 270 35	260 15 110 30	1 4			+13 +13 +12	5

TROPICAL STORM HESTER

SATELLITE FIXES

FIX NO.	TIME (Z)	FIX POSITION	ACCRY	DVORAK CODE	SAT	COMMENTS	SITE
1	281011	27.2N 150.4E	PCN 5		DMSP36	UPPER LVL POSITION	PGTW
2	281437	28.0N 150.3E	PCN 6		DMSP35	UPPER LVL POSITION	PGTW
3	290137	29.4N 149.3E	PCN 6	T1.0/1.0	DMSP35	INIT OBS	PGTW
4	290827	29.6N 148.5E	PCN 6		DMSP37	CI UP	PGTW
5	290953	29.9N 148.4E	PCN 6		DMSP36		PGTW
6	291419	30.3N 149.0E	PCN 6		DMSP35	UPPER LVL	PGTW
7	291926	30.9N 149.6E	PCN 6		DMSP37		PGTW
8	292054	31.3N 150.1E	PCN 5	T2.0/2.0 /01.0/19HRS	DMSP36		PGTW
9	292108	31.3N 150.1E	PCN 6		DMSP37		PGTW
10	300945	32.6N 150.3E	PCN 4		DMSP37		RKSO
11	300949	32.9N 150.5E	PCN 3		DMSP37	CI UP	PGTW
12	301118	33.1N 150.5E	PCN 2		DMSP36		RODN
13	301118	32.9N 150.7E	PCN 1		DMSP36		PGTW
14	301401	33.2N 150.8E	PCN 2		DMSP35		PGTW
15	301402	32.9N 150.8E	PCN 4		DMSP35		RKSO
16	301906	33.6N 151.1E	PCN 4		DMSP37		KGWC
17	302048	34.2N 151.9E	PCN 1	T3.0/3.0	DMSP37	INIT OBS	RODN
18	302048	34.0N 151.8E	PCN 2	T3.5/3.5-/01.5/24HRS	DMSP37		PGTW
19	310101	35.2N 152.5E	PCN 1		DMSP35		RKSO
20	310101	34.9N 152.4E	PCN 2		DMSP35		RODN
21	310101	35.0N 152.2E	PCN 1		DMSP35		PGTW
22	310929	36.1N 155.0E	PCN 2		DMSP37		RKSO
23	311100	36.6N 155.7E	PCN 2		DMSP36		PGTW
24	311343	37.2N 156.6E	PCN 2		DMSP35		PGTW
25	311343	37.7N 156.6E	PCN 2		DMSP35		KGWC
26	311847	38.9N 159.6E	PCN 4	T3.0/3.0	DMSP37	INIT OBS	KGWC
* 27	312029	39.7N 156.0E	PCN 5		DMSP37	LOW/MID LVL FEATURE	RKSO
28	312301	41.1N 161.5E	PCN 4		DMSP35		KGWC
29	010043	40.5N 164.1E	PCN 6		DMSP35		PGTW
* 30	010910	53.5N 174.5E			DMSP37		KGWC
31	010910	43.0N 168.0E			DMSP		KGWC

AIRCRAFT FIXES

FIX NO.	TIME (Z)	FIX POSITION	FLT LVL	MIN HGT	OBS MSLP	MAX-SFC-WND VEL/BRG/RNG	MAX-FLT-LVL-WND DIR/VEL/BRG/RNG	ACCRY NAV/MET	EYE SHAPE	EYE ORIEN- DIAM/TATION	EYE TEMP (C) OUT/ IN/ DP/SST	MSN NO.
1	291909	30.9N 149.6E	700MB	3080	999		060 36 320 23	5 5			+14 + 8	1

TYPHOON IRMA

SATELLITE FIXES

FIX NO.	TIME (Z)	FIX POSITION	ACCRY	OVERAK CODE	SAT	COMMENTS	SITE
1	091147	19.5N 124.7E	PCN 5		DMSP36		PGTW
2	092248	21.8N 123.0E	PCN 5	T1.0/1.0	DMSP36	INIT JHS	PGTW
3	101130	23.2N 121.2E	PCN 5		DMSP36		PGTW
4	102219	21.7N 121.8E	PCN 5	T1.5/1.5	DMSP37	INIT JHS	RPMK
5	110012	22.0N 121.8E	PCN 5		DMSP36		RPMK
6	110250	22.3N 121.5E	PCN 5		DMSP35		PGTW
7	111059	23.0N 122.3E	PCN 6		DMSP37		PGTW
8	112159	23.6N 122.7E	PCN 3	T2.5/2.5	DMSP37	INIT JHS	RODN
9	112159	24.6N 122.9E	PCN 5	T2.5/2.5	DMSP37	INIT JHS	PGTW
10	121040	25.5N 123.8E	PCN 6		DMSP37		PGTW
11	121237	25.8N 123.6E	PCN 5		DMSP36		RPMK
12	121514	26.2N 123.5E	PCN 2		DMSP35		RKSO
13	121514	26.1N 123.6E	PCN 4		DMSP35	PSBL EYE FORMING	PGTW
14	122139	27.3N 123.7E	PCN 3	T3.0/3.0	DMSP37	INIT JHS	RPMK
15	122140	27.0N 123.2E	PCN 3	T3.0/3.0 /DD0.5/24HRS	DMSP37		PGTW
16	122338	27.4N 123.1E	PCN 3	T3.0/3.0 /DD0.5/26HRS	DMSP36		RODN
17	130214	27.5N 123.2E	PCN 4		DMSP35		PGTW
18	131020	28.2N 123.9E	PCN 4		DMSP37		PGTW
19	131021	28.3N 124.3E	PCN 4		DMSP37		RKSO
20	131220	28.6N 124.2E	PCN 5		DMSP36		RODN
21	131456	28.7N 124.3E	PCN 3		DMSP35		PGTW
22	132120	29.4N 124.5E	PCN 6		DMSP37		PGTW
23	132120	29.6N 124.6E	PCN 4	T3.0/3.0-/S0.0/24HRS	DMSP37		RPMK
24	132220	29.8N 124.9E	PCN 3	T3.5/3.5-/D0.5/25HRS	DMSP36		PGTW
25	141001	31.5N 125.8E	PCN 4		DMSP36		PGTW
26	141001	31.6N 125.8E	PCN 4		DMSP37		RKSO
27	141001	31.3N 125.8E	PCN 6		DMSP37		RODN
28	141202	31.7N 126.2E	PCN 2		DMSP36		RKSO
29	141202	31.7N 126.0E	PCN 1		DMSP35		PGTW
30	141438	32.0N 126.5E	PCN 4		DMSP35		RKSO
31	141438	31.9N 126.4E	PCN 3		DMSP37		PGTW
32	142101	32.6N 128.1E	PCN 1		DMSP37		PGTW
33	142101	32.8N 128.0E	PCN 2		DMSP36		RODN
34	142303	32.9N 128.8E	PCN 1		DMSP35		PGTW
35	150139	33.2N 129.2E	PCN 3	T3.0/3.5-/W0.5/28HRS	DMSP37		PGTW
36	150942	34.6N 132.5E	PCN 6		DMSP37	CI 00W	PGTW
37	151123	34.3N 133.1E	PCN 5		DMSP36		RKSO
38	151145	34.6N 133.2E	PCN 5		DMSP35		PGTW
39	151421	35.2N 134.5E	PCN 6		DMSP35		PGTW
40	151421	35.1N 134.5E	PCN 5		DMSP35		RKSO
41	151421	35.5N 136.0E	PCN 6				RODN

AIRCRAFT FIXES

FIX NO.	TIME (Z)	FIX POSITION	FLT LVL	MIN HGT	OBS MSLP	MAX-SFC-WND VEL/BRG/RNG	MAX-FLT-LVL-WND DIR/VEL/BRG/RNG	ACCRY NAV/MET	EYE SHAPE	EYE ORIEN-DIAM/TATION	EYE TEMP (C) UNT/ IN/ DP/SST	MSW NO.
1	120727	25.5N 123.1E	700MB	2957	985	30 030 30	150 40 080 60				+15 +12	1
2	120935	25.7N 123.6E	700MB	2987	988	50 220 10	170 57 090 20	1 2	CIRCULAR	15	+12 +15 +12	1
3	131225	28.4N 124.1E	700MB				180 58 010 30					3
4	140100	30.3N 124.7E	700MB	2908	979	55 110 75	180 70 110 20				+14 +12	4
5	140333	30.5N 125.1E	700MB	2906	978		130 74 080 25	5 5	CIRCULAR	30	+11 +13 +12	4
6	141248	31.6N 126.2E	700MB	2882	976		170 53 050 20				+15 +12	5
7	141546	32.0N 126.8E	700MB	2875	972		240 80 150 50	2 3	CIRCULAR	25	+13 +14 +12	5

RADAR FIXES

FIX NO.	TIME (Z)	FIX POSITION	RADAR	ACCRY	EYE SHAPE	EYE DIAM	RADOB-CODE ASWAN TDOFF	COMMENTS	RADAR POSITION	SITE WMO NO.
1	111938	24.3N 122.8E	LAND				21511 /////		24.3N 124.2E	47918
2	112000	24.4N 122.9E	LAND				65/71 40217		24.3N 124.2E	47918
3	112100	24.7N 122.8E	LAND				6////1 53514		24.3N 124.2E	47918
4	112100	24.5N 122.7E	LAND				65//4 5////		24.8N 125.3E	47927
5	112200	24.7N 122.8E	LAND				6////1 53305		24.3N 124.2E	47918
6	112200	24.7N 122.6E	LAND				65//4 53314		24.8N 125.3E	47927
7	112300	25.0N 122.7E	LAND				6////2 53514		24.3N 124.2E	47918
8	112300	24.9N 122.6E	LAND				6///3 50208		24.8N 125.3E	47927
9	120000	25.1N 122.6E	LAND				65//3 53210		24.3N 124.2E	47918
10	120000	25.2N 122.6E	LAND				6///3 50119		24.8N 125.3E	47927
11	120100	25.3N 122.6E	LAND				6///3 53506		24.3N 124.2E	47918
12	120100	25.2N 122.5E	LAND				6///3 52705		24.8N 125.3E	47927
13	120200	25.3N 122.6E	LAND				6///3 50108		24.3N 124.2E	47918
14	120200	25.2N 122.6E	LAND				6////4 50000		24.8N 125.3E	47927
15	120300	25.2N 122.7E	LAND				6////4 50707		24.8N 125.3E	47927
16	120400	25.3N 122.9E	LAND				6///3 50515		24.8N 125.3E	47927
17	120400	25.5N 122.8E	LAND				6////2 50608		24.3N 124.2E	47918
18	120500	25.3N 122.9E	LAND				6////4 50000		24.8N 125.3E	47927
19	120700	25.4N 123.1E	LAND				40504 50506		24.8N 125.3E	47927
20	120700	25.4N 123.2E	LAND				65/04 71007		24.3N 124.2E	47918
21	122000	27.0N 123.3E	LAND				3////4 53406		24.8N 125.3E	47927
22	130100	27.4N 123.5E	LAND				6//15 50214		24.8N 125.3E	47927
23	130200	27.5N 123.3E	LAND				6////6 53011		24.8N 125.3E	47927
24	130237	27.4N 123.8E	ACFT	GOOD	CIRCULAR	35		EYE 10NM THICK 54 WRS	26.5N 123.9E	
25	131319	28.4N 124.1E	ACFT	GOOD				54 WRS	29.4N 125.6E	

26	141800	32.5N	127.3E	LAND			55770	60416				33.4N	130.3E 47806
27	141900	32.5N	127.3E	LAND			55770	60605				33.4N	130.3E 47806
28	142100	32.6N	127.9E	LAND			55771	50716				33.4N	130.3E 47806
29	142200	32.7N	128.3E	LAND			55771	50719				33.4N	130.3E 47806
30	142300	33.0N	128.5E	LAND			55771	50319				33.4N	130.3E 47806
31	142300	33.0N	128.5E	LAND	FAIR	40			EYE MOV 0625		SEBURI		
32	150000	33.2N	128.8E	LAND			20911	50616				33.4N	130.3E 47806
33	150000	33.2N	128.7E	LAND	FAIR	40			EYE MOV 0625		SEBURI		
34	150100	33.3N	128.9E	LAND			10881	50311				33.4N	130.3E 47806
35	150100	33.3N	128.9E	LAND	GOOD	45			EYE MOV 0625		SEBURI		
36	150200	33.5N	129.1E	LAND			10811	50516				33.4N	130.3E 47806
37	150200	33.4N	129.2E	LAND	FAIR	45			EYE MOV 0625		SEBURI		
38	150230	32.5N	129.4E	LAND			20901	4////				34.3N	132.6E 47792
39	150300	33.7N	129.5E	LAND			19931	50622				33.4N	130.3E 47806
40	150300	33.5N	129.7E	LAND			20911	40914				34.3N	132.6E 47792
41	150300	33.5N	129.7E	LAND	POOR	40			EYE MOV 0620		SEBURI		
42	150400	33.4N	130.8E	LAND			30951	50522				34.3N	132.6E 47792
43	150400	33.4N	129.7E	LAND			14851	50616				33.4N	130.3E 47806
44	150400	33.4N	129.9E	LAND	POOR	20			EYE MOV 0520		NISHIMA		
45	150500	34.0N	130.4E	LAND			35851	50516				34.3N	132.6E 47792
46	150500	34.1N	130.7E	LAND			65///	50622				35.5N	133.1E 47791
47	150500	34.1N	130.2E	LAND			25841	50625				33.4N	130.3E 47806
48	150500	33.9N	130.2E	LAND	POOR	10			EYE MOV 0630		NISHIMA		
49	150600	34.3N	130.6E	LAND	POOR	25			EYE MOV 0625		TAKAO	35.6N	133.2E
50	150600	34.2N	130.8E	LAND			65772	5////				35.5N	133.1E 47791
51	150600	34.1N	130.6E	LAND			25841	50722				33.4N	130.3E 47806
52	150700	34.3N	130.9E	LAND	POOR	20			EYE MOV 0720		TAKAO	35.6N	133.2E
53	150700	34.2N	131.0E	LAND			21971	60816				33.4N	130.3E 47806
54	150700	34.2N	131.1E	LAND			30771	50816				35.5N	133.1E 47791
55	150800	34.4N	131.4E	LAND			30621	50722				34.3N	132.6E 47792
56	150800	34.3N	131.3E	LAND			21961	50616				33.4N	130.3E 47806
57	150800	34.3N	131.5E	LAND			35771	50716				35.5N	133.1E 47791
58	150900	34.4N	131.6E	LAND			20611	50814				34.3N	132.6E 47792
59	150900	34.5N	131.9E	LAND	POOR	30			EYE MOV 0920		TAKAO	35.6N	133.2E
60	150900	34.4N	131.9E	LAND			35771	50722				35.5N	133.1E 47791
61	150900	34.4N	131.8E	LAND			21911	60719				33.4N	130.3E 47806
62	151000	34.7N	132.0E	LAND			31941	60622				33.4N	130.3E 47806
63	151000	34.5N	132.2E	LAND			75771	50716				35.5N	133.1E 47791
64	151000	34.3N	132.1E	LAND			35771	50922				34.3N	132.6E 47792
65	151100	34.6N	132.7E	LAND			75///	50716				35.5N	133.1E 47791
66	151100	34.7N	132.4E	LAND			34770	60519				33.4N	130.3E 47806
67	151100	34.6N	132.6E	LAND			3//71	50722				34.3N	132.6E 47792
68	151200	34.8N	133.0E	LAND			25770	50532				33.4N	130.3E 47806
69	151200	34.6N	132.8E	LAND			/////	50916				35.5N	133.1E 47791
70	151200	34.7N	133.1E	LAND			3//71	50827				34.3N	132.6E 47792
71	151300	34.7N	133.4E	LAND			/////	50819				35.5N	133.1E 47791
72	151300	34.8N	133.4E	LAND			3//71	50819				34.3N	132.6E 47792
73	151400	34.6N	133.8E	LAND			/////	51024				35.5N	133.1E 47791
74	151400	34.9N	133.9E	LAND			3//71	50824				34.3N	132.6E 47792

SATELLITE FIXES

FIX NO.	TIME (Z)	FIX POSITION	ACCRY	DVORAK CODE	SAT	COMMENTS	SITE
1	091006	19.3N 145.3E	PCN 6		DMSP36	APPARENT LOW LVL	PGTW
2	092106	19.9N 150.5E	PCN 6	T0.0/0.0	DMSP36	INIT DBS	PGTW
3	100948	20.9N 158.8E	PCN 4		DMSP36	EXPOSED LLCC	PGTW
4	102049	22.3N 157.0E	PCN 4	T1.0/1.0 /D1.0/24HRS	DMSP36		PGTW
5	110931	23.3N 153.3E	PCN 6		DMSP36	EXTRAP TO ILL DEFINED LLCC	PGTW
6	112018	22.9N 150.2E	PCN 5	T2.0/2.0 /D1.0/24HRS	DMSP37		PGTW
7	121055	23.6N 148.0E	PCN 3		DMSP		PGTW
8	121332	23.8N 147.9E	PCN 3		DMSP35		PGTW
9	121958	24.2N 147.2E	PCN 5		DMSP37		PGTW
10	122156	24.5N 147.0E	PCN 5	T3.5/3.5 /D1.5/26HRS	DMSP36		PGTW
11	130033	24.6N 146.7E			DMSP35		PGTW
12	130939	25.5N 146.5E	PCN 6		DMSP37		PGTW
13	131038	26.4N 146.1E	PCN 4		DMSP36		PGTW
14	131038	26.5N 146.3E	PCN 6		DMSP36		RODN
15	131314	26.9N 146.1E	PCN 5		DMSP35		PGTW
16	132120	27.5N 145.4E	PCN 6		DMSP37		PGTW
17	132139	27.4N 145.5E	PCN 5	T4.0/4.0 /D0.5/24HRS	DMSP36		PGTW
18	132139	27.5N 146.1E	PCN 6		DMSP36		RODN
19	141001	28.3N 145.0E	PCN 3		DMSP37		PGTW
20	141001	28.5N 144.9E	PCN 6		DMSP37		RKSO
21	141001	28.5N 145.0E	PCN 6		DMSP37		RODN
22	141020	28.4N 145.0E	PCN 3		DMSP36		PGTW
23	141438	28.6N 144.8E	PCN 6		DMSP35		RKSO
24	141438	28.9N 144.6E	PCN 6		DMSP35		PGTW
25	142101	29.3N 144.2E	PCN 1	T4.0/4.0 /S0.0/23HRS	DMSP37		PGTW
26	142101	29.5N 144.0E	PCN 2	T5.0/5.0	DMSP37	INIT DBS	RODN
27	142101	29.2N 144.4E	PCN 2	T5.0/5.0	DMSP37	INIT DBS	RPMK
28	142121	29.4N 144.1E	PCN 3		DMSP36		PGTW
29	150139	29.9N 144.1E	PCN 1		DMSP35		PGTW
30	150942	31.0N 144.6E	PCN 2		DMSP37	RAGGED EYE	RODN
31	150942	30.9N 144.6E	PCN 2		DMSP37	CI SAME	PGTW
32	151003	30.9N 144.5E	PCN 2		DMSP36		PGTW
33	151145	31.1N 144.8E	PCN 1		DMSP36		PGTW
34	151421	31.6N 144.8E	PCN 2		DMSP35		PGTW
35	151421	31.6N 145.0E	PCN 2		DMSP35		RODN
36	151421	31.6N 144.7E	PCN 1		DMSP35		RKSO
37	152041	33.0N 145.5E	PCN 2	T5.0/5.0 /S0.0/24HRS	DMSP37		RODN
38	152041	32.8N 145.5E	PCN 1	T4.5/4.5-/D0.5/24HRS	DMSP37		PGTW
39	152104	32.9N 145.6E	PCN 1		DMSP36		PGTW
40	152245	33.2N 146.0E	PCN 1		DMSP36		PGTW
41	160121	34.0N 146.1E	PCN 1		DMSP35		PGTW
42	160922	36.0N 148.5E	PCN 2		DMSP37		RODN
43	160922	35.9N 148.4E	PCN 1		DMSP37	CI SAME	PGTW
44	161128	34.4N 149.2E	PCN 1		DMSP36		PGTW
45	161603	37.0N 149.7E	PCN 3		DMSP35		PGTW
46	162022	39.2N 152.5E	PCN 5		DMSP37		RKSO
47	162022	39.1N 152.3E	PCN 3	T3.0/4.0 /W1.5/24HRS	DMSP37		PGTW
48	170103	40.5N 154.1E	PCN 5	T3.5/3.5	DMSP35	INIT DBS	KGWC
49	170902	43.0N 158.9E	PCN 6		DMSP		KGWC
50	171345	44.1N 160.8E	PCN 6		DMSP		KGWC

AIRCRAFT FIXES

FIX NO.	TIME (Z)	FIX POSITION	FLT LVL	MIN HGT	OBS MSLP	MAX-SFC-WND VEL/BRG/RNG	MAX-FLT-LVL-WND DIR/VEL/BRG/RNG	ACCRY NAV/MET	EYE SHAPE	EYE ORIEN-DIAM/TATION	EYE TEMP (C) OUT/ IN/ DP/SST	MSG NO.
1	130000	24.6N 146.6E	700MB	3015	991	90 070 75	150 56 080 75	4 2			+14 +10	1
2	130340	25.0N 146.4E	700MB	3007	990	40 270 50	360 30 270 60	4 10			+13 +13 + 9	1
3	131410	26.8N 145.8E	700MB	2936			140 51 100 51				+18 +10	2
4	131652	26.9N 145.6E	700MB	2917	980		110 55 360 90	5 5	CIRCULAR	35	+11 +14 +11	2
5	140330	27.9N 145.2E	700MB	2917	979	55 270 30	360 45 270 35	2 2			+12 +16 +12	3
6	140545	28.1N 145.1E	700MB	2899	977	40 140 90	210 50 140 30				+16 +12	3
7	141335	28.8N 144.5E	700MB	2888	977		160 80 060 25			30	+15 +11	4
8	141618	29.1N 144.4E	700MB	2867	972		200 50 250 25	4 2	ELLIPTICAL	30 20 090	+14 +17 +12	4
9	150030	29.9N 144.1E	700MB	2778	964	90 010 15	070 78 010 23				+15 +11	5
10	150317	30.2N 144.2E	700MB	2754	962	70 250 20	330 72 250 20	5 5	ELLIPTICAL	35 28 020	+16 +14 +10	5
11	151330	31.5N 144.7E	700MB	2713	957		270 105 210 20				+17 +14	6
12	151540	31.9N 144.8E	700MB	2680	953		270 120 180 16	2 3	CIRCULAR	25	+16 +19 +13	6
13	160032	33.8N 146.1E	700MB	2656	950	90 250 15	090 92 060 16				+19 +13	7
14	160318	34.5N 146.7E	700MB	2661	950	90 260 16	360 106 270 12	4 2	CIRCULAR	38	+13 +18 +15	7

TROPICAL STORM KIT

SATELLITE FIXES

FIX NO.	TIME (Z)	FIX POSITION	ACCRY	DVORAK CODE	SAT	COMMENTS	SITE
1	192318	13.6N 133.6E	PCN 5	T0.0/0.0	DMSP36	INIT DBS	PGTW
* 2	200946	16.3N 128.2E	PCN 6		DMSP37		PGTW
* 3	202227	13.7N 127.2E	PCN 5	T1.0/1.0 /D1.0/23HRS	DMSP37		PGTW
* 4	202227	13.2N 128.0E	PCN 5	T1.5/1.5	DMSP37	INIT DBS	RPMK
5	210315	13.6N 128.0E	PCN 5		DMSP35		RPMK
* 6	211048	12.6N 125.4E	PCN 5		DMSP37		RODN
7	211108	13.4N 126.5E	PCN 5		DMSP37		RPMK
8	211142	13.5N 127.2E	PCN 6		DMSP36		PGTW
9	211415	13.0N 128.4E	PCN 6		DMSP35		RODN
10	211556	14.0N 125.7E	PCN 5		DMSP35	BASED ON CB W EDGE OUTFLOW	RODN
* 11	212208	13.7N 123.8E	PCN 5	T2.0/2.0 /D0.5/24HRS	DMSP37		RPMK
* 12	212208	14.9N 123.2E	PCN 5	T1.5/1.5-/D0.5/24HRS	DMSP37		PGTW
13	220257	14.0N 120.7E	PCN 5		DMSP35	2ND 15.0N 120.7E 15.0N 122.7E	RPMK
14	220257	15.0N 123.3E	PCN 5		DMSP35		PGTW
15	221048	15.2N 120.8E	PCN 5		DMSP37		RPMK
16	221048	15.5N 121.0E	PCN 5		DMSP37		PGTW
17	221539	16.4N 118.1E	PCN 5		DMSP35		RPMK
18	221539	16.4N 118.6E	PCN 5		DMSP35		PGTW
19	222148	17.8N 117.8E	PCN 5		DMSP37	CI UP	PGTW
20	222148	18.1N 117.7E	PCN 5		DMSP37		RPMK
21	222330	15.5N 115.7E	PCN 5		DMSP37		RPMK
22	230239	15.5N 115.8E	PCN 5	T2.0/2.0 /D0.5/28HRS	DMSP35	APPARENT LOW LVL CIRCULATION	PGTW
23	230239	15.5N 115.4E	PCN 5	T2.0/2.0+/S0.0/28HRS	DMSP35		RPMK
24	230421	15.5N 115.0E	PCN 5		DMSP35		RPMK
25	231029	14.8N 114.0E	PCN 6		DMSP37		RPMK
26	231029	15.2N 115.4E	PCN 6		DMSP37		PGTW
27	231210	15.0N 112.7E	PCN 6		DMSP37		RPMK
28	231249	14.5N 114.3E	PCN 6		DMSP36		RODN
29	232310	15.7N 113.4E	PCN 5	T2.5/2.5 /D0.5/21HRS	DMSP37		RPMK
30	232350	16.3N 112.9E	PCN 6	T2.5/2.5-/D0.5/21HRS	DMSP36	2ND 17.6N 123.7E 17.9N 112.9E	PGTW
31	232350	16.3N 113.0E	PCN 6	T3.0/3.0	DMSP36	INIT DBS	RODN
32	240403	16.0N 113.3E	PCN 5		DMSP35	BETTER ORGANIZED	RPMK
33	241151	16.9N 112.2E	PCN 5		DMSP37	CI UOWN	RPMK
34	241151	17.1N 112.4E	PCN 6		DMSP37		RODN
35	241645	17.6N 111.7E	PCN 5		DMSP35		RPMK
36	242251	17.9N 111.2E	PCN 3	T3.0/3.0-/D0.5/24HRS	DMSP37		RPMK
37	242251	17.9N 111.2E	PCN 6		DMSP37	SECONDARY AT 16.8N 110.1E	RODN
38	242332	18.2N 111.0E	PCN 6		DMSP36		PGTW
39	250345	17.9N 110.4E	PCN 5		DMSP35		RPMK
40	250345	18.5N 109.5E	PCN 5		DMSP35		RODN
41	251132	18.9N 109.0E	PCN 5		DMSP37		RPMK
42	251132	17.8N 108.7E	PCN 6		DMSP37	CI UP	RODN
43	251215	18.3N 109.1E	PCN 5		DMSP36		PGTW
44	251527	18.8N 108.3E	PCN 5		DMSP35		RPMK
45	252231	18.2N 107.6E	PCN 5	T2.0/2.5-/W0.5/23HRS	DMSP37		PGTW
46	260058	17.9N 107.2E	PCN 1	T3.5/3.5-/D0.5/26HRS	DMSP36	RAGGED EYE	RPMK
47	260327	17.8N 107.0E	PCN 3		DMSP35		RPMK
48	261112	17.5N 106.4E	PCN 5		DMSP37		RPMK
49	261112	17.6N 105.3E	PCN 5		DMSP37		RODN
50	261609	17.7N 104.4E	PCN 6		DMSP35		RODN

AIRCRAFT FIXES

FIX NO.	TIME (Z)	FIX POSITION	FLT LVL	MIN HGT	OBS MSLP	MAX-SFC-WND VEL/BRG/RNG	MAX-FLT-LVL-WND DIR/VEL/BRG/RNG	ACCRY NAV/MET	EYE SHAPE	EYE ORIENTATION	EYE TEMPS (C) OUT/ IN/ DP/SST	MSN NO.
1	210122	13.5N 128.8E	1500FT		1001	15 040 50	190 18 070 20	5 20	ELLIPTICAL	360	+25 +23 +23 27	1
2	210152	13.2N 128.0E	1500FT				070 12 310 120				+10 + 9	1
3	212258	14.7N 125.2E	1500FT		995	20 090 245	180 26 100 260	5 2			+25 +25 +23 27	2
4	220251	14.9N 124.2E	1500FT		995	25 100 145	180 23 170 145	4 6			+25 +24 +23 28	2
5	221542	15.4N 121.9E	700MB	3099	1001		080 20 350 10	2 5	CIRCULAR	15	+10 +10 +10	3
6	230200	15.3N 115.7E	700MB	3054		25 080 210	150 33 080 210				+11 + 9	4
7	230337	14.6N 115.2E	700MB	3049	996	10 120 100	210 25 120 100	4 5			+10 +10 + 9	4
8	230958	14.9N 115.8E	700MB	3031	994	40 090 20	180 37 090 25	3 4			+13 +15 + 7	5
9	231458	15.3N 115.3E	700MB	3019	992		350 19 270 15	10 3			+12 +15 +12	5
10	232137	15.4N 114.2E	700MB	3044	995		210 53 110 50	5 4	ELLIPTICAL	20 15 150	+10 +13 +10	6
11	232137	15.4N 114.2E	700MB	3044		35 050 45	210 53 110 50				+13 +10	6
12	240040	16.0N 113.7E	700MB									6

TYPHOON LOLA

SATELLITE FIXES

FIX NO.	TIME (Z)	FIX POSITION	ACCRY	OVERAK CODE	SAT	COMMENTS	SITE
1	202046	9.1N 146.6E	PCN 5	T0.0/0.0	DMSP37	INIT OBS	PGTW
2	210926	10.2N 146.1E	PCN 6		DMSP37	BASED ON POSS ILCC	PGTW
3	211415	9.8N 146.1E	PCN 6		DMSP35		PGTW
4	212243	11.3N 142.4E	PCN 6	T0.0/0.0 /S0.0/24HRS	DMSP36		PGTW
5	221357	9.6N 141.4E	PCN 5		DMSP35		PGTW
6	231107	11.0N 139.3E	PCN 5		DMSP36		PGTW
7	232208	12.7N 137.6E	PCN 5	T1.0/1.0	DMSP36	INIT OBS SECONDARY 11.4N 136.5E	PGTW
8	240222	12.1N 135.3E	PCN 5		DMSP35		PGTW
9	241010	12.2N 134.2E	PCN 6		DMSP37	CI UP	PGTW
10	241010	12.4N 134.6E	PCN 5		DMSP37		RPMK
11	241050	12.4N 133.9E	PCN 5		DMSP36		PGTW
12	241503	12.5N 133.1E	PCN 5		DMSP35		PGTW
13	241503	12.4N 134.1E	PCN 5		DMSP35		RPMK
14	242109	13.7N 131.7E	PCN 5	T2.5/2.5 /D1.5/23HRS	DMSP37		PGTW
15	242332	13.1N 131.7E	PCN 5		DMSP36	BASED ON CH BANDS	PGTW
16	250204	13.0N 130.5E	PCN 5		DMSP35		PGTW
17	250204	12.9N 130.8E	PCN 3	T2.0/2.0	DMSP35	INIT OBS	RPMK
18	250950	12.0N 129.6E	PCN 5		DMSP37	CI UP	PGTW
19	250950	11.7N 129.5E	PCN 6		DMSP37	MULTI CB LINES	RPMK
20	251215	12.1N 129.6E	PCN 5		DMSP36		PGTW
21	251215	11.9N 129.8E	PCN 5		DMSP36		RPMK
22	251446	12.2N 129.0E	PCN 5		DMSP35		PGTW
23	252231	12.2N 126.9E	PCN 5	T2.5/2.5+/S0.0/25HRS	DMSP37		PGTW
24	252231	12.7N 125.9E	PCN 5	T2.5/2.5 /D0.5/20HRS	DMSP37		RPMK
25	252315	12.3N 126.6E	PCN 5		DMSP36		PGTW
26	260327	12.8N 125.9E	PCN 5		DMSP35		RPMK
27	261112	13.0N 124.7E	PCN 5		DMSP37		RPMK
28	261112	12.1N 124.7E	PCN 5		DMSP37		RODN
29	261157	12.9N 124.5E	PCN 5		DMSP36	CI UP	PGTW
30	261428	13.0N 124.5E	PCN 6		DMSP35		RPMK
31	261428	13.3N 124.0E	PCN 5		DMSP35		PGTW
32	262211	13.5N 122.1E	PCN 3	T3.0/3.0	DMSP37	INIT OBS	RKSO
33	262212	13.3N 122.4E	PCN 3	T3.5/3.5 /D1.0/24HRS	DMSP37		RPMK
34	262212	13.4N 122.5E	PCN 5	T3.5/3.5 /D1.0/24HRS	DMSP37		PGTW
35	262258	13.6N 122.4E	PCN 6		DMSP36		PGTW
36	270310	13.8N 121.7E	PCN 3	T4.0/4.0+/D1.0/24HRS	DMSP35		RPMK
37	270310	13.7N 121.7E	PCN 3		DMSP35		PGTW
38	270310	13.9N 121.7E	PCN 5	T2.0/2.0	DMSP35	INIT OBS	RODN
39	271053	14.3N 120.2E	PCN 3		DMSP37		PGTW
40	271053	14.1N 120.4E	PCN 3		DMSP37		RPMK
41	271140	14.4N 119.9E	PCN 4		DMSP36		PGTW
42	271140	14.5N 120.2E	PCN 5		DMSP36		RPMK
43	271551	14.9N 119.2E	PCN 5		DMSP35	CI UP	RPMK
44	272152	14.6N 117.9E	PCN 5		DMSP37		PGTW
45	272152	15.0N 118.9E	PCN 6		DMSP37		RPMK
46	272152	14.5N 118.8E	PCN 5		DMSP36		RODN
47	280022	16.1N 118.2E	PCN 6		DMSP36		RPMK
48	280252	15.4N 117.1E	PCN 3	T3.5/3.5+/S0.0/29HRS	DMSP35		RPMK
49	280252	14.5N 117.3E	PCN 3	T3.5/3.5 /S0.0/29HRS	DMSP35		PGTW
50	281033	15.7N 116.6E	PCN 3		DMSP37	INDISTINCT EYE	PGTW
51	281033	15.4N 116.5E	PCN 3		DMSP37		RODN
52	281304	16.2N 116.6E	PCN 5		DMSP36		RPMK
53	281534	16.2N 116.0E	PCN 3		DMSP35		PGTW
54	282314	16.7N 115.0E	PCN 1	T4.5/4.5 /D1.0/20HRS	DMSP37		RPMK
55	290004	16.7N 114.9E	PCN 1		DMSP36		RPMK
56	290004	16.5N 114.7E	PCN 1	T4.5/4.5	DMSP36	INIT OBS	RODN
57	290234	16.3N 114.6E	PCN 3		DMSP35		PGTW
58	290416	16.5N 114.6E	PCN 1		DMSP35	EYE EXPANDING 3/4 DEG CIRCULAR	RPMK
59	291246	17.0N 113.5E	PCN 1		DMSP36		RPMK
60	291516	17.1N 113.1E	PCN 1		DMSP35		PGTW
61	291516	16.9N 113.0E	PCN 1		DMSP35		RODN
62	292255	17.1N 113.2E	PCN 1	T5.5/5.5 /D1.0/24HRS	DMSP37		RPMK
63	292255	17.2N 113.0E	PCN 1	T5.0/5.0 /D0.5/22HRS	DMSP37		RODN
64	292347	17.1N 113.1E	PCN 1	T4.5/4.5	DMSP36	INIT OBS	PGTW
65	300358	17.6N 112.7E	PCN 1		DMSP35		RPMK
66	301136	18.1N 112.4E	PCN 1		DMSP37		RPMK
67	301136	18.0N 112.6E	PCN 4		DMSP37		RODN
68	301640	18.4N 112.2E	PCN 1		DMSP35		RPMK
69	302235	18.7N 111.7E	PCN 1	T4.5/4.5	DMSP37	INIT OBS	RKSO
70	302235	18.8N 111.7E	PCN 3	T4.0/5.0-/W1.0/24HRS	DMSP37		RODN
71	302329	18.5N 112.0E	PCN 3		DMSP36	EDGE OF DATA	PGTW
72	010110	18.7N 112.0E	PCN 1	T5.5/5.5-/S0.0/26HRS	DMSP36		RPMK
73	010340	19.1N 111.4E	PCN 1		DMSP35	RAGGED EYE	RKSO
74	010340	19.0N 111.3E	PCN 6		DMSP35		RODN
75	011116	19.4N 110.5E	PCN 5		DMSP37		RODN
76	011116	19.6N 110.5E	PCN 1		DMSP37		RPMK
77	011212	19.5N 110.7E	PCN 1		DMSP36	EXTREME EDGE OF DATA	PGTW
78	011622	19.8N 110.6E	PCN 6		DMSP35		RODN
79	011622	20.0N 110.3E	PCN 1		DMSP35		RPMK
80	012215	20.0N 110.0E	PCN 2		DMSP37		PGTW
81	012216	20.1N 109.9E	PCN 1		DMSP37		RKSO
82	020322	20.7N 109.6E	PCN 1		DMSP35		RODN
83	020322	20.6N 109.5E	PCN 1	T5.0/5.0-/W0.5/22HRS	DMSP35		RPMK
84	021057	21.5N 108.6E	PCN 1		DMSP37		RKSO
85	021057	21.4N 108.5E	PCN 1		DMSP37		PGTW
86	021336	21.2N 108.0E	PCN 2		DMSP36		RPMK
87	021604	21.3N 107.7E	PCN 1		DMSP35		RKSO
88	021604	21.5N 107.6E	PCN 1		DMSP35		RPMK
89	022338	21.4N 106.9E	PCN 1	T3.0/4.0-/W2.0/20HRS	DMSP37	EYE ALMOST GONE	RPMK
90	030034	21.6N 106.4E	PCN 6	T1.0/1.0	DMSP36	INIT OBS	RODN

AIRCRAFT FIXES

FIX NO.	TIME (Z)	FIX POSITION	FLT LVL	MIN HGT	OBS MSLP	MAX-SFC-WND VEL/ARG/RNG	MAX-FLT-LVL-WND DIR/VEL/BRG/RNG	ACCRY NAV/MET	EYE SHAPE	EYE ORIEN-TATION DIAM/	EYE TEMP (C) OUT/ IN/ DP/SST	MSN NO.
1	242200	12.1N 131.3E	700MB	3104	1005	25 340 50	050 30 340 60	5 10			+12 +12 + 8	1
2	250135	12.2N 130.5E	700MB	3105		25 340 50	040 37 340 60				+11 +11	1
3	250315	12.2N 130.3E	700MB	3097	1002	10 130 35	210 20 130 15	3 5			+11 +13 + 9	1
4	251551	12.8N 128.1E	700MB	3070			130 50 060 180	5 10			+12 + 7	2
5	251950	12.3N 127.7E	700MB	3045			330 33 230 60				+12 + 7	2
6	252110	12.0N 127.3E	700MB	3044		35 290 30	070 38 290 120	5 10			+12 + 8	2
7	260200	12.2N 126.6E	700MB	3041		30 120 90	210 40 130 60				+12 +11	3
8	260356	12.3N 126.2E	700MB	3013	992	45 100 80	180 45 090 40	2 3			+10 +13 +10	3
9	271100	14.2N 120.4E	700MB	2965			080 72 310 60				+14 +12	4
10	271510	14.5N 119.5E	700MB	2964	985		300 62 190 10	5 5			+13 +15 +11	4
11	280306	15.2N 117.7E	700MB			50 0						5
12	280415	15.3N 117.4E	700MB	2935	983	50 120 40	190 57 120 60	3 2			+12 +15 + 9	5
13	281855	16.3N 115.7E	700MB	2825	969		130 74 020 45	10 5	ELLIPTICAL	50 20 360	+14 +15 +12	6
14	282120	16.4N 115.1E	700MB	2815	969		140 62 160 50	7 5	ELLIPTICAL	50 20 360	+14 +15 +11	6
15	290351	16.6N 114.6E	700MB	2812	968	65 090 30	170 74 090 30	3 4	CIRCULAR	50	+12 +15 + 9	7
16	290635	16.8N 114.3E	700MB	2773		70 350 50	080 82 350 60	5 4			+16 + 9	7
17	290948	17.0N 114.0E	700MB	2764	963		180 87 090 30	15 3	ELLIPTICAL	50 40 340	+12 +17 + 8	7

RADAR FIXES

FIX NO.	TIME (Z)	FIX POSITION	RADAR	ACCRY	EYE SHAPE	EYE DIAM	RADOB-CODE ASWAN TDOFF	COMMENTS	RADAR POSITION	SITE WMO NO.
1	261900	13.4N 123.4E	LAND					PROBABLE EYE NOT WELL DEFINED	14.1N 123.0E	98440
2	262330	13.4N 122.5E	LAND					PSBL CENTER	15.2N 120.6E	98327
3	270055	13.5N 122.4E	LAND				258// 53212		14.1N 123.0E	98440
4	270130	13.6N 122.4E	LAND	POOR				PSBL CENTER	15.2N 120.6E	98327
5	270210	13.6N 122.2E	LAND	POOR				PSBL CENTER	15.2N 120.6E	98327
6	270230	13.6N 122.1E	LAND	POOR				PSBL CENTER	15.2N 120.6E	98327
7	270310	13.6N 122.0E	LAND	POOR				PSBL CENTER	15.2N 120.6E	98327
8	270330	13.4N 121.9E	LAND	POOR				PSBL CENTER	15.2N 120.6E	98327
9	270430	13.4N 121.7E	LAND	POOR				PSBL CENTER	15.2N 120.6E	98327
10	270510	13.6N 121.8E	LAND	POOR				PSBL CENTER	15.2N 120.6E	98327
11	270535	13.7N 121.6E	LAND	POOR				PSBL CENTER	15.2N 120.6E	98327
12	270630	14.1N 121.3E	LAND	POOR				PSBL CENTER	15.2N 120.6E	98327
13	270710	14.0N 121.1E	LAND					EYE NEG WALL CLD	15.2N 120.6E	98327
14	270730	14.0N 121.0E	LAND	FAIR	CIRCULAR	33		EYE NEG WALL CLD	15.2N 120.6E	98327
15	270810	14.0N 121.1E	LAND	FAIR	CIRCULAR	24		EYE APPNT WALL CLD FRMG E QUAD	15.2N 120.6E	98327
16	270830	14.0N 121.1E	LAND	FAIR	CIRCULAR	29		EYE NEG WALL CLD	15.2N 120.6E	98327
17	270910	13.9N 121.1E	LAND	FAIR	CIRCULAR	23		EYE NEG WALL CLD	15.2N 120.6E	98327
18	271010	14.0N 120.8E	LAND	FAIR	CIRCULAR	29		EYE NEG WALL CLD	15.2N 120.6E	98327
19	271030	13.9N 120.7E	LAND	FAIR	CIRCULAR	30		EYE NEG WALL CLD	15.2N 120.6E	98327
20	271100	14.7N 119.8E	LAND				1020/ /////		16.3N 120.6E	98321
21	271210	14.3N 120.3E	LAND	POOR	CIRCULAR	12		EYE APPEARS TO BE REORGANIZING	15.2N 120.6E	98327
22	271235	14.3N 120.4E	LAND	POOR	CIRCULAR	36		EYE APPEARS TO BE REORGANIZING	15.2N 120.6E	98327
23	271310	14.3N 120.3E	LAND	POOR	CIRCULAR	38		EYE BCMG INDISTINCT DUE TO MTNS	15.2N 120.6E	98327
24	271410	14.3N 120.1E	LAND	POOR	CIRCULAR	36		PSBL EYE NEG WALL CLD	15.2N 120.6E	98327
25	271500	15.0N 119.5E	LAND				45/// /////		16.3N 120.6E	98321
26	271800	14.9N 119.7E	LAND				4//// /////	10 DEG SPRL OVERLAY	16.3N 120.6E	98321
27	272100	15.0N 118.8E	LAND				4//// /////		16.3N 120.6E	98321
28	272300	15.0N 118.3E	LAND				45/// 62712	10 DEG SPRL OVERLAY	16.3N 120.6E	98321
29	280300	15.3N 117.4E	LAND				45/// 52709	15 DEG SPRL OVERLAY	16.3N 120.6E	98321

TYPHOON MAMIE

SATELLITE FIXES

FIX NO.	TIME (Z)	FIX POSITION	ACCRY	DVORAK CODE	SAT	COMMENTS	SITE
1	282223	19.9N 154.0E	PCN 5	T0.0/0.0	DMSP36	INIT OBS	PGTW
2	290924	19.7N 153.3E	PCN 6		DMSP36	CI UP	PGTW
3	291105	20.0N 153.3E	PCN 5		DMSP36	CI UP	PGTW
4	292205	19.6N 153.2E	PCN 5	T1.5/1.5 /D1.5/24HRS	DMSP36		PGTW
5	300035	19.4N 152.9E	PCN 5		DMSP35		PGTW
6	300813	19.5N 153.2E	PCN 6		DMSP37		PGTW
7	301048	19.9N 152.9E	PCN 5		DMSP36		PGTW
8	301316	20.1N 153.0E	PCN 5		DMSP35		PGTW
9	302053	21.5N 153.3E	PCN 6		DMSP37		PGTW
10	302054	21.5N 153.3E	PCN 6		DMSP37	BASED ON CENTER CDO	RODN
11	302148	21.3N 153.6E	PCN 6	T2.5/2.5 /D1.0/23HRS	DMSP36		PGTW
12	010016	21.8N 152.3E	PCN 4		DMSP35	BASED ON EXTRAP CU/TCU LINES	PGTW
13	010935	23.2N 152.0E	PCN 5		DMSP37	CI UP	PGTW
14	011030	23.5N 151.9E	PCN 5		DMSP36		PGTW
15	011259	23.8N 151.8E	PCN 5		DMSP35		PGTW
16	012034	24.0N 150.3E	PCN 4	T3.5/3.5 /D1.0/26HRS	DMSP37		PGTW
17	012034	24.8N 150.4E	PCN 6	T1.0/1.0	DMSP37	INIT OBS	RODN
18	012130	24.3N 150.7E	PCN 4		DMSP36		PGTW
19	020140	25.2N 149.8E	PCN 5		DMSP35		PGTW
20	020915	26.3N 150.1E	PCN 5		DMSP37	CI SAME	PGTW
21	020915	26.5N 150.4E	PCN 6		DMSP37		RODN
22	021013	26.6N 150.2E	PCN 5		DMSP36		PGTW
23	021422	27.4N 150.5E	PCN 5		DMSP35		PGTW
24	022014	28.1N 150.4E	PCN 4	T3.0/3.0+/D2.0/24HRS	DMSP37		RODN
25	022015	28.2N 150.4E	PCN 4	T3.0/3.5 /W0.5/24HRS	DMSP37		PGTW
26	022113	28.2N 150.6E	PCN 4		DMSP36		PGTW
27	030122	29.5N 151.1E	PCN 4		DMSP35		PGTW
28	030956	31.2N 152.7E	PCN 5		DMSP37	CI UNCH	PGTW
29	030956	31.5N 152.6E	PCN 6		DMSP36		PGTW
30	031404	32.4N 153.4E	PCN 6		DMSP35		PGTW
31	031955	35.0N 155.9E	PCN 3	T2.0/3.0 /W1.0/24HRS	DMSP37		PGTW
32	031955	34.9N 155.9E	PCN 4	T2.5/2.5	DMSP37	INIT OBS	KGWC
33	032056	35.6N 156.8E	PCN 3		DMSP36		PGTW
34	040105	36.9N 158.2E	PCN 3		DMSP35		PGTW
35	040936	39.9N 161.6E	PCN 4		DMSP	NO CONVECTION	KGWC
36	041346	41.5N 164.3E	PCN 6		DMSP35	CONVECTION NORTH OF STORM	KGWC
37	041935	42.1N 168.5E	PCN 4		DMSP37	WELL DEFINED SC BANDING	KGWC
38	042305	42.2N 170.5E	PCN 4		DMSP35	WELL DEFINED SC BANDING	KGWC

AIRCRAFT FIXES

FIX NO.	TIME (Z)	FIX POSITION	FLT LVL	MIN HGT	OBS MSLP	MAX-SFC-WND VEL/BRG/RNG	MAX-FLT-LVL-WND DIR/VEL/BRG/RNG	ACCRY NAV/MET	EYE SHAPE	EYE ORIENTATION	EYE TEMPS (C) OUT/ IN/ DP/SST	MSG NO.
1	300213	19.3N 152.5E	1500FT		996	30 150 40	240 27 160 35	3 1			+23 +25 +25 23	1
2	300358	19.3N 152.6E	700MB	3056	996	35 150 40	220 22 150 20	5 2			+10 +13 +10	1
3	010156	21.6N 152.5E	700MB	3030		35 050 30	190 43 050 30				+15 + 7	2
4	010350	22.1N 152.5E	700MB	3003	990	35 260 30	330 30 260 30	4 2			+13 +16 + 9	2
5	011455	23.8N 150.9E	700MB	2967	986		240 38 160 25	5 2			+12 +18 +12	3
6	020357	25.5N 150.0E	700MB	2983	985	45 060 15	040 54 330 25	3 7			+14 +15 +12	4
7	021928	28.1N 150.3E	700MB	2858	973		260 50 160 25	4 3	CIRCULAR	10	+13 +15 +15	5
8	030050	29.1N 150.9E	700MB	2797		65 130 45	220 70 130 20				+20 +10	6
9	030317	29.6N 151.3E	700MB	2774	965	50 060 55	160 65 060 30	3 3			+12 +18 +11	6
10	031243	32.5N 153.1E	700MB	2813	969		200 87 090 60				+18 +12	7
11	031405	33.3N 153.5E	700MB	2824	969		170 75 080 120				+15 +12	7
12	031503	33.6N 154.0E	700MB	2795	963		360 58 310 R	4 4	ELLIPTICAL	40 30 150	+13 +17 +12	7

TROPICAL STORM NINA

SATELLITE FIXES

FIX NO.	TIME (Z)	FIX POSITION	ACCRY	DVORAK CODE	SAT	COMMENTS	SITE
1	052203	15.6N 140.6E	PCN 5	T0.0/0.0	DMSP36	INIT OBS	PGTW
2	061045	17.7N 137.3E	PCN 6		DMSP36		PGTW
3	062327	16.0N 134.2E	PCN 5	T1.5/1.5 /01.5/24HRS	DMSP35		PGTW
4	071209	16.5N 131.1E	PCN 5		DMSP36		PGTW
5	071435	16.4N 130.0E	PCN 5		DMSP35		PGTW
6	072200	15.7N 128.3E	PCN 5	T2.5/2.5 /01.0/23HRS	DMSP37		PGTW
7	072310	15.4N 128.2E	PCN 5		DMSP36		PGTW
8	081041	14.8N 126.8E	PCN 5		DMSP37	CI UP	PGTW
9	041041	13.4N 126.8E	PCN 5		DMSP37		RPMK
10	081152	15.1N 127.1E	PCN 3		DMSP36		PGTW
11	081658	15.6N 126.1E	PCN 5		DMSP35		RODN
12	082141	14.5N 124.8E	PCN 6		DMSP37		PGTW
13	082252	14.9N 124.6E	PCN 6		DMSP36		PGTW
14	090259	15.1N 123.5E	PCN 5	T2.0/2.0	DMSP35	INIT OBS	RPMK
15	090259	15.0N 124.3E	PCN 5	T3.0/3.0-/D0.5/29HRS	DMSP35		PGTW
16	091022	15.5N 124.0E	PCN 3		DMSP37		PGTW
17	091135	15.3N 123.1E	PCN 5		DMSP36		PGTW
18	091541	15.0N 122.0E	PCN 5		DMSP35		RPMK
19	091541	14.7N 122.6E	PCN 5		DMSP35		RODN
20	092303	14.3N 121.0E	PCN 5	T2.0/2.0+/S0.0/20HRS	DMSP37		RPMK
21	092303	16.5N 120.9E	PCN 6		DMSP37	SE QUAD CDO	RODN
22	100016	14.4N 120.0E	PCN 4	T2.5/2.5+/D0.5/22HRS	DMSP36		RPMK
23	100049	14.5N 120.3E	PCN 5	T3.5/3.5 /D0.5/22HRS	NOAA5		PGTW
24	101522	15.3N 118.0E	PCN 5		DMSP35		RPMK
25	101523	14.5N 119.0E	PCN 5		DMSP35		PGTW
26	102243	14.9N 117.3E	PCN 5	T3.0/3.0 /D0.5/23HRS	DMSP37		RPMK
27	102243	12.7N 117.5E	PCN 6		DMSP37	POSSIBLE 2ND 16.7N 114.3E	RODN
28	102359	14.4N 117.8E	PCN 3	T4.0/4.0-/D0.5/24HRS	DMSP36		PGTW
29	102359	15.0N 117.3E	PCN 3		DMSP36		RPMK
30	110223	15.1N 117.6E	PCN 3		DMSP35	PARTIALLY EXPOSED LLCC	PGTW
31	110223	15.0N 118.2E	PCN 5		DMSP35	BASED ON EXPOSED LLCC	RPMK
32	110405	15.2N 118.3E	PCN 3		DMSP35	BASED ON EXPOSED LLCC	RPMK
33	111124	15.4N 117.9E	PCN 3		DMSP37		RPMK
34	111241	15.4N 117.8E	PCN 3		DMSP36		RPMK
35	111505	15.6N 117.1E	PCN 3		DMSP35	PARTIALLY EXPOSED LLCC	PGTW
36	111505	15.5N 117.5E	PCN 3		DMSP35		RPMK
37	112223	15.4N 116.6E	PCN 3		DMSP37	PARTIALLY EXPOSED LLCC	PGTW
38	112223	15.4N 116.1E	PCN 5	T3.0/3.0 /S0.0/24HRS	DMSP37	POSS 2ND EXPOSED 16.2N 117.0E	RPMK
39	112223	15.2N 115.8E	PCN 5		DMSP37		RKSO
40	120347	15.2N 115.7E	PCN 1		DMSP35		RPMK
41	121105	15.5N 115.8E	PCN 5		DMSP37		RODN
42	121105	15.5N 116.3E	PCN 1		DMSP37		RPMK
43	121629	15.6N 116.1E	PCN 3		DMSP35		RPMK
44	122204	15.6N 115.6E	PCN 4		DMSP37		PGTW
45	122324	15.5N 116.0E	PCN 3		DMSP36		PGTW
46	122324	15.2N 116.5E	PCN 3		DMSP36		RPMK
47	130329	15.2N 116.2E	PCN 3	T4.0/4.0	DMSP35	INIT OBS	RODN
48	130329	15.2N 116.8E	PCN 3	T3.0/3.0 /S0.0/29HRS	DMSP35	LLCC	RPMK
49	131045	15.5N 115.2E	PCN 6		DMSP37		RPMK
50	131045	15.3N 116.4E	PCN 5		DMSP37	CI OOWN	PGTW
51	131207	15.7N 116.4E	PCN 3		DMSP37		PGTW
52	131611	15.6N 115.2E	PCN 5		DMSP35	PARTIALLY EXPOSED LLCC NW	RPMK
53	132326	17.1N 115.7E	PCN 5	T1.5/2.5 /W1.5/20HRS	DMSP37	BASED ON CENTER OF FEATURES	RPMK
54	140311	16.7N 114.9E	PCN 5	T3.5/4.0 /W0.5/24HRS	DMSP35		RODN
55	140311	15.7N 115.2E	PCN 3	T2.5/2.5	DMSP35	INIT OBS PARTIALLY EXPOSED LLCC	PGTW
56	140311	16.2N 115.1E	PCN 3	T3.0/3.0	DMSP35	INIT OBS	RKSO
57	141207	17.7N 115.3E	PCN 3		DMSP37	EXPOSED LLCC	RPMK
58	141553	17.9N 114.9E	PCN 3		DMSP35		RPMK
59	141553	17.9N 114.8E	PCN 3		DMSP35		RODN
60	141553	18.1N 114.7E	PCN 5		DMSP35	NE OF CDO	RKSO
61	142307	18.4N 113.6E	PCN 4		DMSP37		RODN
62	151148	18.8N 111.9E	PCN 3		DMSP37		RPMK
63	151314	19.2N 111.9E	PCN 3		DMSP35		RPMK
64	151535	19.0N 112.2E	PCN 3		DMSP35		RODN
65	151535	20.0N 111.7E	PCN 5		DMSP35		PGTW
66	160014	20.9N 112.1E	PCN 5	T2.0/2.0	DMSP36	INIT OBS	RPMK
67	160417	21.3N 112.0E	PCN 5		DMSP35		RPMK
68	161128	21.6N 113.1E	PCN 3		DMSP37		RODN
69	161128	21.6N 114.2E	PCN 5		DMSP37		RPMK
70	161256	22.7N 112.6E	PCN 5		DMSP36		RODN
71	161517	21.6N 114.4E	PCN 5		DMSP35		RPMK
72	161517	22.6N 114.2E	PCN 5		DMSP35	CI OOWN	PGTW
73	162356	21.9N 114.2E	PCN 5		DMSP36	2ND 21.7N 110.9E	RODN
74	162359	21.6N 111.3E	PCN 3		DMSP36		RPMK

AIRCRAFT FIXES

FIX NO.	TIME (Z)	FIX POSITION	FLT LVL	MIN HGT	OBS MSLP	MAX-SFC-WND VEL/BRG/RNG	MAX-FLT-LVL-WND DIR/VEL/BRG/RNG	ACCRY NAV/MET	EYE SHAPE	EYE ORIEN-DIAM/TATION	EYE TEMP (C) OUT/ IN/ DP/SST	MSN NO.
1	072334	15.2N 129.3E	1500FT		993	30 080 55	110 36 050 168	3 2			+26 +26 +29 28	3
2	080230	15.2N 128.7E	1500FT		992	30 060 30	120 33 060 90	4 2			+26 +27 +29 27	3
3	081555	14.5N 126.1E	700MB	2973	986		100 53 010 40	4 4			+14 +14 +11	4
4	081900	14.6N 125.6E	700MB	2974			090 53 320 120				+13 +13	4
5	082040	14.7N 125.3E	700MB	2964	986		240 39 120 120	4 8			+14 +14 +12	4

6	090946	15.2N	123.4E	700MB	2945	984	65	350	50	080	45	350	50	5	5				5
7	100521	13.9N	119.7E	700MB	3012		45	350	100	260	42	150	25	4	10		+10	+10	6
8	100844	14.5N	119.7E	700MB	3009	994	45	200	30	240	52	200	20	3	10		+10	+10	6
9	110255	15.3N	117.8E	700MB	2939	984	45	040	100	150	44	040	125	4	6	+12	+12	+10	7
10	110533	15.4N	117.5E	700MB	2923	981	40	230	55	200	30	100	55	6	5		+13	+09	7
11	111329	15.5N	117.6E	700MB	2991	989				100	46	200	80				+12	+11	8
12	111528	15.4N	117.3E	700MB	2979	987				220	46	140	90	5	2	+13	+13		8
13	120927	15.5N	116.2E	700MB			67	100	140	190	57	110	60	4	5		+08		9
14	121505	14.5N	115.7E	700MB	2956	985				190	61	070	125	5	4	+11	+15	+09	10
15	142201	18.1N	113.6E	700MB	2954	984				190	55	100	35	7	2				10
16	150235	18.5N	112.8E	700MB	2970	987	45	090	60	180	50	090	40	7	5				10

RADAR FIXES

FIX NO.	TIME (Z)	FIX POSITION		RADAR	ACCRY	EYE SHAPE	EYE DIAM	RADOB-CODE ASWAM	TDDFF	COMMENTS	RADAR POSITION		SITE WMO NO.
1	081945	14.0N	125.0E	LAND		CIRCULAR				EYE OPEN S MOVG 270? PARADES	14.2N	122.7E	
2	090730	15.2N	122.8E	LAND				25///	/////	QNT 40 KTS	16.3N	120.6E	98321
R 3	090900	15.2N	120.8E	LAND				1261/	5////	QNT 30 KTS	16.3N	120.6E	98321
4	091100	15.2N	122.8E	LAND				1151/	/////	EYE ELLIPTICAL OPEN NE	16.3N	120.6E	98321
5	091230	15.3N	122.4E	LAND				1199/	52927	EYE ELLIPTICAL OPEN N 36 KTS	16.3N	120.6E	98321
6	091330	14.8N	122.5E	LAND				1038/	4////	EYE CIRCULAR OPEN NW 42 KTS	16.3N	120.6E	98321
7	091330	14.8N	122.2E	LAND	FAIR	CIRCULAR	11				15.2N	120.6E	98327
8	091400	14.8N	122.5E	LAND				1031/	4////	QNT 40 KTS	16.3N	120.6E	98321
9	091403	14.8N	122.2E	LAND	GOOD	CIRCULAR	9				15.2N	120.6E	98327
10	091430	14.9N	122.1E	LAND	FAIR	CIRCULAR	9			EYE PASSING OVER POLILLO IS	15.2N	120.6E	98327
11	091500	14.9N	122.3E	LAND				1031/	42706	QNT 40 KTS	16.3N	120.6E	98321
12	091510	14.9N	122.0E	LAND	FAIR	CIRCULAR	8			EYE	15.2N	120.6E	98327
13	091530	15.0N	122.1E	LAND				1031/	42710	QNT 40 KTS	16.3N	120.6E	98321
14	091605	15.0N	121.8E	LAND	GOOD	CIRCULAR	10			EYE	15.2N	120.6E	98327
15	091630	15.0N	121.8E	LAND				1134/	52715	QNT 30 KTS	16.3N	120.6E	98321
16	091630	14.9N	121.7E	LAND	FAIR	CIRCULAR	10			EYE	15.2N	120.6E	98327
17	091710	15.0N	121.6E	LAND						NEG WALL CLD MOVED ONSHR	15.2N	120.6E	98327
18	091730	15.0N	121.5E	LAND	FAIR					NEG WALL CLD CNTR OVR LAND	15.2N	120.6E	98327
19	091810	15.0N	121.4E	LAND	POOR					PSBL CNTR NEG WALL CLD OVR MTNS	15.2N	120.6E	98327
20	091830	15.0N	121.3E	LAND	POOR					PSBL CNTR NEG WALL CLD	15.2N	120.6E	98327
21	091910	15.0N	121.2E	LAND	POOR					PSBL CNTR NEG WALL CLD	15.2N	120.6E	98327
22	091930	15.1N	121.1E	LAND	FAIR					CNTR LEAVING MTNS	15.2N	120.6E	98327
23	092000	14.7N	120.7E	LAND	POOR	CIRCULAR	14			PSBL EYE WALLACE	16.6N	120.3E	
24	092010	15.0N	121.0E	LAND	POOR					NEG WALL CLD MVY ATTENUATION	15.2N	120.6E	98327
25	092050	15.0N	120.9E	LAND	POOR					PSBL CNTR NEG WALL CLD ATTEN	15.2N	120.6E	98327
26	092100	15.0N	120.6E	LAND		CIRCULAR	19			PSBL EYE WALLACE	16.6N	120.3E	
27	092110	15.0N	120.8E	LAND	POOR					PSBL CNTR NEG WALL CLD	15.2N	120.6E	98327
28	100605	14.9N	120.5E	LAND	POOR					LOCATED 190/21 FROM CLARK	15.2N	120.6E	98327
29	151150	19.4N	112.3E	LAND				2511?	53108		22.3N	114.2E	45005
30	151510	19.2N	112.2E	LAND				45/??	/3107		22.3N	114.2E	45005
31	151820	19.4N	112.1E	LAND				65/??	/3106		22.3N	114.2E	45005
32	152120	19.9N	112.2E	LAND				6//??	83606		22.3N	114.2E	45005
33	152350	20.3N	112.2E	LAND				6//??	93605		22.3N	114.2E	45005
34	160300	20.9N	112.5E	LAND				6//?3	90109		22.3N	114.2E	45005

SATELLITE FIXES

FIX NO.	TIME (Z)	FIX POSITION	ACCRY	OVERAK CODE	SAT	COMMENTS	SITE
1	072310	11.2N 137.4E	PCN 5	T0.0/0.0	DMSP45	INIT DHS	PGTW
2	081417	11.2N 138.4E	PCN 6		DMSP45	SECONDARY 11.0N 142.4E	PGTW
3	082141	14.5N 138.5E	PCN 6	T1.0/1.0 /D1.0/23HRS	DMSP47		PGTW
4	082252	14.4N 138.8E	PCN 6		DMSP36		PGTW
5	090117	14.3N 138.2E	PCN 5		DMSP35		PGTW
6	091022	14.4N 136.7E	PCN 5		DMSP37		PGTW
7	091135	14.4N 135.5E	PCN 5		DMSP35		PGTW
8	091359	14.5N 134.9E	PCN 5		DMSP35		PGTW
9	092121	17.0N 133.3E	PCN 6	T1.0/1.0 /S0.0/24HRS	DMSP37		PGTW
10	092234	17.1N 133.2E	PCN 6		DMSP36		PGTW
11	101002	14.7N 132.2E	PCN 6		DMSP37	CI UP PARTIALLY EXPOSED LLCC	PGTW
12	101002	14.4N 133.1E	PCN 5		DMSP37		RPMK
13	101117	19.9N 132.1E	PCN 5		DMSP46		PGTW
14	101523	13.0N 131.1E	PCN 6		DMSP35		PGTW
15	102101	14.9N 128.4E	PCN 6		DMSP37		PGTW
16	102102	14.0N 130.4E	PCN 6		DMSP37		RODN
17	102359	19.3N 129.3E	PCN 6		DMSP36		PGTW
18	110223	20.1N 129.5E	PCN 5	T3.0/3.0	DMSP35	INIT DHS EXPOSED LLCC	RODN
19	110223	20.0N 129.5E	PCN 3	T2.5/2.5	DMSP35	INIT DHS	RPMK
20	110223	13.9N 129.3E	PCN 3	T2.0/2.0-/D1.0/27HRS	DMSP35		PGTW
21	110943	20.9N 128.2E	PCN 5		DMSP37	CI UP	PGTW
22	111241	21.3N 127.3E	PCN 3		DMSP46	CI UP	RPMK
23	111241	20.5N 126.1E	PCN 3		DMSP36		RKSO
24	111505	21.0N 126.3E	PCN 5		DMSP35		PGTW
25	111505	21.3N 126.5E	PCN 5		DMSP35		RPMK
26	112223	21.4N 125.1E	PCN 3	T3.5/3.5-/D1.0/20HRS	DMSP37		RPMK
27	112223	21.9N 124.7E	PCN 6	T3.0/3.0 /D1.0/20HRS	DMSP37		PGTW
28	112223	21.8N 124.8E	PCN 3	T3.0/3.0	DMSP37	INIT DHS	RKSO
29	120205	22.0N 123.9E	PCN 3		DMSP35	BEGINNING OF HANDING TYPE EYE	PGTW
30	120205	22.0N 124.1E	PCN 3	T3.0/3.0 /S0.0/24HRS	DMSP35		RODN
31	121105	22.3N 122.8E	PCN 1		DMSP47		RODN
32	121105	22.0N 123.1E	PCN 1		DMSP37		RPMK
33	121447	22.0N 123.1E	PCN 1		DMSP35		RODN
34	121447	22.1N 122.5E	PCN 2		DMSP35	CI UP	PGTW
35	122204	22.8N 122.7E	PCN 2	T4.0/4.0 /D1.0/24HRS	DMSP37		PGTW
36	122204	22.9N 122.9E	PCN 1	T4.0/4.0-/D1.0/24HRS	DMSP37		RKSO
37	122324	23.1N 122.8E	PCN 1	T4.5/4.5-/D1.0/25HRS	DMSP36		RPMK
38	122324	23.0N 122.9E	PCN 1		DMSP46		PGTW
39	130329	23.7N 122.9E	PCN 1		DMSP35		RPMK
40	130329	23.7N 122.9E	PCN 1	T4.0/4.0 /D1.0/25HRS	DMSP35		RODN
41	131045	24.4N 123.3E	PCN 3		DMSP37		PGTW
42	131045	24.7N 123.2E	PCN 3		DMSP37		RKSO
43	131049	24.2N 123.3E	PCN 3		DMSP37		RPMK
44	131207	24.7N 123.2E	PCN 3		DMSP36		PGTW
45	131611	25.0N 123.7E	PCN 1		DMSP35		RODN
46	132144	25.5N 123.5E	PCN 4	T3.0/4.0 /W1.0/23HRS	DMSP37		PGTW
47	132306	25.9N 123.4E	PCN 3		DMSP36	EXPOSED LLCC	PGTW
48	140311	26.5N 123.9E	PCN 5	T3.0/4.0-/W1.0-/24HRS	DMSP35		RODN
49	140311	26.6N 123.9E	PCN 3	T3.0/3.0 /W1.0/24HRS	DMSP35	PARTIALLY EXPOSED LLCC	RKSO
50	141026	27.2N 125.7E	PCN 5		DMSP37		RODN
51	141026	27.3N 126.4E	PCN 5		DMSP37	CI DOWN	PGTW
52	141149	27.2N 126.3E	PCN 5		DMSP37		PGTW
53	141553	27.2N 127.2E	PCN 5		DMSP35		RPMK
* 54	141553	29.0N 127.9E	PCN 5		DMSP35		RODN
55	141553	27.2N 126.7E	PCN 3		DMSP35		RKSO
56	142125	24.3N 128.8E	PCN 4		DMSP37	PART EXP LLCC E EDGE MAJ CONV	PGTW
57	142125	27.4N 129.5E	PCN 5	T2.0/2.5-/W1.0/05HRS	DMSP37		RODN
58	142249	29.0N 129.1E	PCN 5	T2.0/3.0-/W1.0/25HRS	DMSP36		PGTW
59	151006	31.5N 135.3E	PCN 5		DMSP37		PGTW

AIRCRAFT FIXES

FIX NO.	TIME (Z)	FIX POSITION	FLT LVL	MIN MGT	OBS MSLP	MAX-SFC-WND VEL/RAD/RNG	MAX-FLT-LVL-WND DIR/VEL/RAD/RNG	ACCRY NAV/MET	EYE SHAPE	EYE ORIENTATION	EYE TEMP (C) DIFF/ IN/ OR/RST	MSN NO.
1	092254	17.1N 134.0E	700MB	3080	997	50 150 10	200 38 080 20	5 2			+23 +25 +22	1
2	100238	17.6N 133.5E	700MB	3073	998	50 150 10	270 40 210 30	5 2			+ 9 +13 + 7	1
3	101230	17.7N 131.3E	700MB	3057			160 35 050 60				+13 + 7	2
4	101456	18.3N 131.0E	700MB	3033	996		040 40 290 60	5 15			+12 +11 +11	2
5	110321	19.9N 129.2E	700MB			30 110 45	110 45 210 45	3 H			+12 +16 +16	3
6	110530	20.3N 128.5E	700MB			30 310 90	060 36 310 120				+13 +11	3
7	110939	20.7N 128.1E	700MB		987		240 33 190 75	4 H			+11 +14 +11	3
8	111326	21.9N 126.9E	700MB	2987	989		050 42 310 90				+15 +12	4
9	111530	21.2N 126.4E	700MB	2965	982		190 55 090 20	5 2			+12 +14 +14	4
10	120306	22.1N 123.9E	700MB	2923	970		130 65 040 5	3 7	CIRCULAR	15	+14 +16 +13	5
11	120710	22.4N 123.4E	700MB	2963	962	75 180 15	240 70 150 10	5 5	CIRCULAR	15	+14 +16 +12	5
12	130430	23.7N 122.7E	700MB	2900	944	100 060 5	210 80 120 10	2 2	CIRCULAR	7	+14 +15 +14	5
13	130559	24.0N 122.8E	700MB	2940	949	100 180 15	240 70 180 20				+15 +12	5
14	132122	26.9N 123.4E	700MB	2980	988		220 62 130 20	2 1			+17 +19 +11	7
15	140040	26.0N 123.8E	700MB	2967	986	40 160 10	250 54 160 10				+18 +19	7
16	140252	26.2N 124.0E	700MB	3025	991	35 180 75	230 48 180 10	2 4			+14 +19 + 8	7
17	141315	27.6N 126.6E	700MB	3040	995		240 47 180 90				+14 +13	8
18	141430	27.6N 126.6E	700MB	3036	998		240 45 200 30	2 3			+11 +12 +12	8

FIX NO.	TIME (Z)	FIX POSITION	RADAR	ACCRY	EYE SHAPE	EYE DIAM	RADDB-CODE ASWAN TDUFF	COMMENTS	RADAR POSITION	SITE WMO NO.
1	112300	21.7N 124.8E	LAND				35/// /////		24.3N 124.2E	47918
2	120000	21.8N 124.5E	LAND				21613 52916		24.3N 124.2E	47918
3	120100	21.9N 124.3E	LAND				10613 52919		24.3N 124.2E	47918
4	120100	22.0N 124.4E	LAND				2//05 5////		24.8N 125.3E	47927
5	120200	21.9N 124.2E	LAND				10423 62710		24.3N 124.2E	47918
6	120200	22.0N 124.2E	LAND				25/75 52711		24.8N 125.3E	47927
7	120300	22.0N 123.9E	LAND				10413 72809		24.3N 124.2E	47918
8	120300	22.0N 124.1E	LAND				25/73 52911		24.8N 125.3E	47927
9	120400	22.1N 123.8E	LAND				10732 72911		24.3N 124.2E	47918
10	120400	22.1N 123.9E	LAND				20675 53014		24.8N 125.3E	47927
11	120500	22.1N 123.7E	LAND				20823 73011		24.3N 124.2E	47918
12	120500	22.1N 123.7E	LAND				35/45 52710		24.8N 125.3E	47927
13	120600	22.2N 123.5E	LAND				45/42 72911		24.3N 124.2E	47918
14	120600	22.1N 123.4E	LAND				35/75 52715		24.8N 125.3E	47927
15	120700	22.2N 123.4E	LAND				21522 72709		24.3N 124.2E	47918
16	120700	22.2N 123.3E	LAND				35/74 53305		24.8N 125.3E	47927
17	120700	22.3N 123.3E	LAND	GOOD		25		EYE	24.8N 125.3E	47927
18	120800	22.2N 123.1E	LAND				35/76 52711		24.8N 125.3E	47927
19	120800	22.3N 123.2E	LAND				10444 53329		24.0N 121.6E	46699
20	120900	22.2N 123.2E	LAND				10512 72911		24.3N 124.2E	47918
21	120900	22.2N 123.1E	LAND				21633 72708		24.3N 124.2E	47918
22	120900	22.2N 123.1E	LAND				10584 52907		24.0N 121.6E	46699
23	120900	22.2N 123.1E	LAND				21633 72708		24.8N 125.3E	47927
24	121100	22.2N 122.8E	LAND				35/76 52708		24.8N 125.3E	47927
25	121100	22.1N 122.9E	LAND				11323 52709		24.0N 121.6E	46699
26	121100	22.2N 122.8E	LAND				31542 72506		24.3N 124.2E	47918
27	121200	22.1N 122.7E	LAND				3144/ 72606		24.3N 124.2E	47918
28	121300	22.1N 122.6E	LAND				12424 52607		24.0N 121.6E	46699
29	121300	22.1N 122.6E	LAND				3154/ 72708		24.3N 124.2E	47918
30	121400	22.0N 122.5E	LAND				11324 52105		24.0N 121.6E	46699
31	121400	22.0N 122.5E	LAND				31511 72506		24.3N 124.2E	47918
32	121500	21.9N 122.5E	LAND				10314 50000		24.0N 121.6E	46699
33	121500	21.9N 122.5E	LAND				31541 50000		24.3N 124.2E	47918
34	121500	22.1N 122.6E	LAND				12424 52607		24.0N 121.6E	46699
35	121500	21.9N 122.5E	LAND				31511 50000		24.3N 124.2E	47918
36	121700	22.0N 122.7E	LAND				12513 50708		24.0N 121.6E	46699
37	121700	22.0N 122.5E	LAND				3141/ 50106		24.3N 124.2E	47918
38	121800	22.1N 122.7E	LAND				12424 50308		24.0N 121.6E	46699
39	121800	22.1N 122.7E	LAND				10342 50311		24.3N 124.2E	47918
40	121900	22.3N 122.7E	LAND				20312 53615		24.3N 124.2E	47918
41	122000	22.5N 122.8E	LAND				12322 53609		24.0N 121.6E	46699
42	122000	22.5N 122.8E	LAND				21322 50310		24.3N 124.2E	47918
43	122100	22.7N 122.6E	LAND				35/76 43613		24.8N 125.3E	47927
44	122100	22.5N 122.8E	LAND				21312 73612		24.3N 124.2E	47918
45	122200	22.8N 122.6E	LAND				20476 53613		24.8N 125.3E	47927
46	122200	22.8N 122.8E	LAND				11312 73611		24.3N 124.2E	47918
47	122300	23.0N 122.7E	LAND				20416 50112		24.8N 125.3E	47927
48	122300	23.0N 122.8E	LAND				12243 53513		24.0N 121.6E	46699
49	122300	23.0N 122.7E	LAND				21313 73511		24.3N 124.2E	47918
50	130000	23.1N 122.7E	LAND				10313 73511		24.3N 124.2E	47918
51	130000	23.1N 122.7E	LAND				22416 53505		24.8N 125.3E	47927
52	130100	23.3N 122.7E	LAND				10224 73509		24.3N 124.2E	47918
53	130100	23.3N 122.7E	LAND				11213 53509		24.0N 121.6E	46699
54	130100	23.2N 122.8E	LAND				22326 53306		24.8N 125.3E	47927
55	130200	23.4N 122.7E	LAND				22375 50212		24.8N 125.3E	47927
56	130200	23.3N 122.6E	LAND				12213 53506		24.0N 121.6E	46699
57	130200	23.4N 122.7E	LAND				10214 53508		24.3N 124.2E	47918
58	130300	23.5N 122.7E	LAND				10122 73607		24.3N 124.2E	47918
59	130300	23.5N 122.6E	LAND				11212 53510		24.0N 121.6E	46699
60	130300	23.4N 122.7E	LAND				22285 53404		24.8N 125.3E	47927
61	130300	23.4N 122.8E	LAND	GOOD		55		EYE MOV 0120	24.8N 125.3E	47927
62	130400	23.6N 122.7E	LAND				10212 50308		24.0N 121.6E	46699
63	130400	23.7N 122.7E	LAND				11212 73608		24.3N 124.2E	47918
64	130400	23.6N 122.7E	LAND				12285 50213		24.8N 125.3E	47927
65	130500	23.8N 122.8E	LAND				12212 50211		24.0N 121.6E	46699
66	130500	23.8N 122.8E	LAND				12335 50110		24.8N 125.3E	47927
67	130500	23.8N 122.7E	LAND				12313 70109		24.3N 124.2E	47918
* 68	130600	24.0N 122.0E	LAND				11213 53610		24.0N 121.6E	46699
69	130600	23.9N 122.7E	LAND				10212 70209		24.3N 124.2E	47918
70	130500	23.9N 122.9E	LAND				12314 54011		24.8N 125.3E	47927
71	130700	24.0N 122.9E	LAND				12415 53605		24.8N 125.3E	47927
72	130700	24.1N 122.9E	LAND				10213 70209		24.3N 124.2E	47918
73	130800	24.2N 123.0E	LAND				12463 50309		24.0N 121.6E	46699
74	130800	24.1N 123.0E	LAND				20354 50408		24.8N 125.3E	47927
75	130800	24.2N 123.0E	LAND				10213 70309		24.3N 124.2E	47918
76	130900	24.3N 123.1E	LAND				12323 50309		24.0N 121.6E	46699
77	130900	24.3N 123.1E	LAND				10212 70309		24.3N 124.2E	47918
78	130900	24.3N 123.1E	LAND				10474 52012		24.8N 125.3E	47927
79	130900	24.3N 123.1E	LAND	GOOD		10		EYE MOV 0115	24.8N 125.3E	47927
80	131000	24.5N 123.1E	LAND				11312 70309		24.3N 124.2E	47918
81	131000	24.5N 123.1E	LAND				10314 53612		24.8N 125.3E	47927
82	131000	24.5N 123.1E	LAND	GOOD		10		EYE MOV 3615	24.8N 125.3E	47927
83	131100	24.6N 123.1E	LAND				10314 51008		24.8N 125.3E	47927
84	131100	24.7N 123.1E	LAND				11311 70210		24.3N 124.2E	47918
85	131100	24.7N 123.1E	LAND	GOOD		10		EYE MOV 3620	24.8N 125.3E	47927
86	131200	24.9N 123.1E	LAND				35/// 50211		24.0N 121.6E	46699
87	131200	24.9N 123.1E	LAND				67/1 73611		24.8N 125.3E	47927
88	131200	24.9N 123.1E	LAND				6///1 73611		24.3N 124.2E	47918
89	131200	24.8N 123.1E	LAND	GOOD		10		EYE MOV 3615	24.8N 125.3E	47927
90	131300	25.0N 123.1E	LAND				6///1 73609		24.3N 124.2E	47918
91	131300	24.9N 123.1E	LAND				6//74 50106		24.8N 125.3E	47927
92	131400	25.1N 123.1E	LAND				3//74 53611		24.8N 125.3E	47927
93	131500	25.3N 123.1E	LAND				6//74 53614		24.8N 125.3E	47927
94	131700	25.4N 123.0E	LAND				35/// 53505		24.0N 121.6E	46699
95	140700	26.7N 124.9E	LAND	GOOD		55		EYE	24.8N 125.3E	47927
96	140800	26.8N 125.3E	LAND	GOOD				EYE MOV 0740	24.8N 125.3E	47927

TROPICAL DEPRESSION 26

SATELLITE FIXES

FIX NO.	TIME (Z)	FIX POSITION	ACCRY	DVORAK CODE	SAT	COMMENTS	SITE
1	042111	19.5N 163.3E	PCN 5	T0.0/0.0	DMSP36	INIT JHS	PGTW
2	091939	21.4N 161.7E	PCN 6	T0.0/0.0 /S0.0/22HRS	DMSP37		PGTW
3	092053	22.0N 162.0E	PCN 6		DMSP36		PGTW
4	100936	22.2N 160.8E	PCN 6		DMSP36	CI SAME	PGTW
5	102035	22.1N 160.0E	PCN 6	T1.0/1.0 /01.5/25HRS	DMSP36		PGTW
6	110041	22.0N 160.5E	PCN 6		DMSP35	POOR 2ND EXPOSED LLCC	PGTW
7	110901	22.0N 158.3E	PCN 5		DMSP37	CI SAME	PGTW
8	111918	21.9N 158.1E	PCN 6		DMSP36		PGTW
9	111323	22.1N 156.0E	PCN 6		DMSP35		PGTW
10	112042	23.0N 153.4E	PCN 4		DMSP37	PSN BY EXPOSED LLCC NW QUAD	PGTW
11	112042	23.2N 153.3E	PCN 4		DMSP47	BASED ON APPARENT LLCC	RODN
12	112200	23.2N 153.0E	PCN 3	T1.0/1.0 /S0.0/25HRS	DMSP36	EXPOSED LLCC	PGTW
13	120023	23.4N 152.5E	PCN 4		DMSP35	CI DOWN EXPOSED LLCC	PGTW
14	120923	23.9N 150.5E	PCN 3		DMSP37	CI DOWN EXPOSED LLCC	PGTW
15	120923	24.2N 150.6E	PCN 6		DMSP37		RODN
16	121042	24.0N 150.0E	PCN 4		DMSP36		PGTW
17	122022	25.0N 149.4E	PCN 4	T0.0/1.0 /W1.0/22HRS	DMSP37	EXPOSED LLCC	PGTW

TROPICAL DEPRESSION 27

SATELLITE FIXES

FIX NO.	TIME (Z)	FIX POSITION	ACCRY	DVORAK CODE	SAT	COMMENTS	SITE
1	082111	7.3N 153.6E	PCN 5	T0.0/0.0	DMSP36	INIT JHS	PGTW
2	090840	6.2N 152.6E	PCN 6		DMSP37		PGTW
3	100936	7.5N 152.3E	PCN 6		DMSP36		PGTW
4	102101	6.9N 151.4E	PCN 6		DMSP37		PGTW
5	102217	6.5N 151.2E	PCN 6	T1.0/1.0	DMSP36	INIT JHS	PGTW
6	111323	8.5N 147.5E	PCN 6		DMSP35		PGTW
7	112042	8.5N 145.8E	PCN 6	T1.5/1.5-/D0.5/22HRS	DMSP37		PGTW
8	112200	9.0N 145.4E	PCN 6		DMSP36		PGTW
9	120205	10.4N 145.0E	PCN 6		DMSP35		PGTW
10	120923	10.7N 143.1E	PCN 6		DMSP37	CI SAME	PGTW
11	121042	11.0N 142.9E	PCN 6		DMSP36		PGTW
12	121447	11.1N 142.1E	PCN 6		DMSP35		PGTW
13	122324	11.4N 139.0E	PCN 6	T1.0/1.5 /W0.5/27HRS	DMSP36		PGTW
14	130147	11.5N 138.6E	PCN 3		DMSP35	BASED ON APPARENT LLCC	PGTW
15	130904	12.7N 137.1E	PCN 6		DMSP37		PGTW
16	131207	13.7N 135.2E	PCN 5		DMSP36		PGTW
17	131429	13.7N 134.6E	PCN 5		DMSP35		PGTW
18	132144	16.5N 133.2E	PCN 6	T2.0/2.0 /D1.0/22HRS	DMSP37		PGTW
19	132306	16.8N 133.1E	PCN 5		DMSP36		PGTW
20	140129	17.5N 133.3E	PCN 5		DMSP35		PGTW
21	141025	19.1N 132.0E	PCN 5		DMSP37	CI DOWN 2ND 15.1N 132.0E	PGTW
22	141149	19.3N 131.6E	PCN 5		DMSP36	2ND 19.1N 131.7E	PGTW
23	141411	20.0N 131.5E	PCN 6		DMSP35	2ND 19.4N 130.7E	PGTW
24	142126	16.5N 131.4E	PCN 6		DMSP37		RODN
25	142249	16.5N 130.3E	PCN 6	T2.0/2.0 /S0.0/25HRS	DMSP36		PGTW
26	151132	15.5N 129.2E	PCN 5		DMSP36		PGTW
27	152105	16.2N 129.9E	PCN 5		DMSP37		PGTW
28	152105	17.6N 130.3E	PCN 6		DMSP37		RODN

AIRCRAFT FIXES

FIX NO.	TIME (Z)	FIX POSITION	FLT LVL	MIN MGT	OBS MSLP	MAX-SFC-WND VEL/BRG/RNG	MAX-FLT-LVL-WND DIR/VEL/BRG/RNG	ACCRY NAV/MET	EYE SHAPE	EYE ORIENTATION	EYE TEMP (C) UNT/ IN/ OP/SST	MSN NO.
1	120538	8.9N 144.7E	1500FT		1005	15 090 40	200 17 090 40	5 4			+25 +26 +23 29	3
2	130353	10.1N 138.6E	1500FT		1003	15 120 35	170 24 050 70	10 5			+26 29	4

TYPHOON PHYLLIS

SATELLITE FIXES

FIX NO.	TIME (Z)	FIX POSITION	ACCRY	OVERAK CODE	SAT	COMMENTS	SITE
1	131248	9.0N 165.5E	PCN 6		DMSP35		PGTW
2	132003	9.9N 164.9E	PCN 6	T0.0/0.0	DMSP37		PGTW
3	132125	9.1N 164.7E	PCN 6		DMSP36		PGTW
4	132348	10.8N 163.3E	PCN 6	T1.5/1.5	DMSP35	INIT DBS	KGWC
5	141006	11.3N 164.2E	PCN 6		DMSP36		PGTW
6	141230	11.8N 163.9E	PCN 6		DMSP35	CI UP	PGTW
7	141943	13.4N 162.9E	PCN 4	T0.0/0.0 /S0.0/24HRS	DMSP37		PGTW
8	142107	13.6N 163.1E	PCN 4		DMSP36		PGTW
9	150325	14.4N 162.0E	PCN 6		DMSP37		PGTW
10	150950	14.6N 161.6E	PCN 6		DMSP36	CI UP	PGTW
11	150951	14.7N 162.9E	PCN 6		DMSP36		NNUL
12	151212	14.5N 161.7E	PCN 5		DMSP35		PGTW
13	151212	14.4N 161.6E	PCN 6		DMSP35		NNUL
14	151924	15.2N 161.1E	PCN 5	T2.0/2.0 /D2.0/24HRS	DMSP37		PGTW
15	151924	15.0N 161.5E	PCN 4		DMSP37		KGWC
16	152050	15.3N 161.2E	PCN 5		DMSP36		PGTW
17	160054	15.3N 161.0E	PCN 5		DMSP35		PGTW
18	160905	15.5N 160.3E	PCN 6		DMSP37		PGTW
19	160905	16.1N 159.7E	PCN 6		DMSP37		KGWC
20	160908	15.5N 159.5E	PCN 4		DMSP37		NNUL
21	160933	15.5N 159.8E	PCN 5		DMSP36	CI UP	PGTW
22	161336	15.7N 159.6E	PCN 5		DMSP35		PGTW
23	161336	15.6N 159.4E	PCN 4		DMSP35	MDT INFLOW SW-S QUADS	NNUL
24	162033	16.6N 158.6E	PCN 6		DMSP36		PGTW
25	170036	16.8N 158.5E	PCN 1	T4.0/4.0+/D2.0/29HRS	DMSP35		PGTW
26	170038	16.9N 158.5E	PCN 1	T4.5/4.5	DMSP35	INIT DBS WELL DFND CC SML EYE	NNUL
27	170915	17.6N 157.0E	PCN 6		DMSP36		PGTW
28	171318	18.4N 157.2E	PCN 1		DMSP35		PGTW
29	171318	18.0N 157.0E	PCN 2		DMSP35	WELL DFND CC SML EYE VSBL	NNUL
30	172157	19.4N 156.9E	PCN 1	T4.5/4.5 /D0.5/22HRS	DMSP36		PGTW
31	172157	19.4N 156.0E	PCN 1	T5.0/5.0 /D0.5/21HRS	DMSP36	WELL DFND CC EYE VSBL	NNUL
32	181040	20.8N 155.3E	PCN 1		DMSP36		PGTW
33	181040	21.0N 155.6E	PCN 2		DMSP36	SML EYE VSBL	NNUL
34	181040	20.9N 155.5E	PCN 6		DMSP36		RODN
35	181300	20.9N 155.1E	PCN 3		DMSP35		PGTW
36	181300	20.8N 155.2E	PCN 2		DMSP35	SML EYE VSBL	NNUL
37	182139	21.8N 155.5E	PCN 2	T4.5/4.5 /S0.0/24HRS	DMSP36		PGTW
38	182140	21.9N 155.5E	PCN 3	T5.5/5.5 /D0.5/24HRS	DMSP36	1 DEG CDO STRNG LL INFLOW ALQDS	NNUL
39	190000	22.1N 155.5E	PCN 1		DMSP35	RAGGED EYE	PGTW
40	190000	22.1N 155.6E	PCN 2		DMSP	MDT LL INFLOW ALQDS	NNUL
41	191022	22.9N 155.6E	PCN 2		DMSP36		PGTW
42	191242	23.2N 155.7E	PCN 2		DMSP35		PGTW
43	192122	23.8N 155.1E	PCN 2	T5.0/5.0 /D0.5/24HRS	DMSP36		PGTW
44	200124	24.1N 154.7E	PCN 3		DMSP35		PGTW
45	201005	25.2N 154.3E	PCN 2		DMSP36		PGTW
46	201406	25.5N 154.2E	PCN 2		DMSP35		PGTW
47	201406	25.4N 154.2E	PCN 2		DMSP35		RKSO
48	202105	26.5N 153.5E	PCN 3	T4.5/5.0-/W0.5/24HRS	DMSP36		PGTW
49	210106	27.2N 153.6E	PCN 4	T4.0/4.0	DMSP35	INIT DBS	KGWC
50	210106	27.3N 153.1E	PCN 4		DMSP35		PGTW
51	210106	27.6N 153.5E	PCN 4	T4.5/4.5	DMSP35	INIT DBS	RODN
52	210947	28.4N 153.8E	PCN 4		DMSP36	CI DOWN	PGTW
53	211348	29.2N 155.0E	PCN 1		DMSP35		RODN
54	211348	28.9N 154.9E	PCN 4		DMSP35		PGTW
55	212048	31.5N 158.5E	PCN 5		DMSP36		PGTW
56	220048	33.2N 160.8E	PCN 5	T3.0/4.0 /W1.5/27HRS	DMSP35		PGTW
57	220749	36.5N 166.6E	PCN 6		DMSP		KGWC
58	221329	40.3N 171.3E	PCN 6		DMSP35		KGWC

AIRCRAFT FIXES

FIX NO.	TIME (Z)	FIX POSITION	FLT LVL	MIN MGT	OBS MSLP	MAX-SFC-WND VEL/BRG/RNG	MAX-FLT-LVL-WND DIR/VEL/BRG/RNG	ACCRY NAV/MET	EYE SHAPE	EYE ORIEN- DIAM/TATION	EYE TEMP (C) UNIT/ IN/ DP/SST	MSN NO.
1	160330	15.9N 160.6E	700MB	3015	992	55 030 20	130 60 030 15	10 5	CIRCULAR	20	+14 +17 + 9	1
2	161447	16.3N 159.5E	700MB	2964	986		040 52 360 20	5 5	CIRCULAR	15	+16 +16 +11	2
3	170355	17.3N 158.1E	700MB	2907	980	40 220 30	320 55 220 15	4 2	CIRCULAR	25	+ 9 +13 +13	3
4	171451	18.7N 156.8E	700MB	2820	968		360 80 270 10	3 5	ELLIPTICAL	20 12 350	+11 +16	4
5	171557	18.8N 156.7E	700MB				320 85 260 10				+17	4
6	180245	20.0N 155.3E	700MB	2707	953	90 140 10	230 83 140 10	4 2	CIRCULAR	20	+19 +19 + 9	5
7	180515	20.3N 155.3E	700MB	2709		50 060 70	120 105 060				+19 + 9	5
8	182321	22.0N 155.3E	700MB	2740	957	100 160 15	220 90 120 15	2 3	CIRCULAR	22	+12 +20 +12	6

RADAR FIXES

FIX NO.	TIME (Z)	FIX POSITION	RADAR	ACCRY	EYE SHAPE	EYE DIAM	RADOB-CODE ASWAR TDDFF	COMMENTS	RADAR POSITION	SITE WMO NO.
1	182042	21.9N 155.4E	ACFT					54 WRS		

SATELLITE FIXES

FIX NO.	TIME (Z)	FIX POSITION	ACCRY	OVERLAY CODE	SAT	COMMENTS	SITE
1	142315	10.0N 174.5W			GOES3		PHNL
2	152215	9.5N 177.0W			GOES3		PHNL
3	152312	9.0N 178.1W		T3.5/3.5	DMSP35	UPR LVL ANTICYCLONE	KGWC
4	161154	9.1N 179.2E			DMSP35		KGWC
5	161156	9.5N 179.5E	PCN 6		DMSP35		NNJL
6	162033	8.9N 178.4E		T3.5/3.5	DMSP35	INIT DTG	KGWC
7	162033	8.9N 179.2E	PCN 4	T3.5	DMSP36	WELL DEFINED LLCC	NNJL
8	162315	9.0N 178.5E			GOES3	WELL DEFINED BANDING BANDS	PHNL
9	170349	9.8N 177.7E			GOES3		PHNL
10	170915	10.1N 177.2E	PCN 6		DMSP36		PGTW
11	170915	9.5N 177.4E	PCN 6		DMSP36		KGWC
12	170915	9.7N 176.7E	PCN 4		DMSP36	MDT LOW LVL INFLOW ALGDS	NNJL
13	171126	10.0N 176.6E	PCN 4		DMSP35	MDT LOW LVL INFLOW ALGDS	NNJL
14	171136	9.4N 176.5E	PCN 6		DMSP35		PHIK
15	171845	10.3N 176.2E	PCN 4		DMSP37	MDT LOW LVL INFLOW ALGDS	NNJL
16	172015	10.0N 174.5E	PCN 6	T3.5/3.5 /S0.0/24HRS	DMSP36		KGWC
17	180349	10.7N 173.8E			GOES3	1.5 DEG CDO	PHNL
18	180726	10.0N 173.5E	PCN 4		DMSP37		NNJL
19	180957	10.5N 172.9E	PCN 6	T3.5/3.5 / 5.0/24HRS	DMSP36		KGWC
20	180959	10.9N 173.3E	PCN 4		DMSP36	MDT LOW LVL INFLOW ALGDS	NNJL
21	181118	11.2N 172.8E	PCN 6		DMSP36		PHIK
22	181118	10.4N 171.9E	PCN 6	T2.5/2.5 /D1.0/16HRS	DMSP35		KGWC
23	190000	11.2N 170.0E	PCN 3	T3.0/3.0	DMSP35	INIT DTG	PGTW
24	190000	11.4N 169.5E	PCN 2	T2.5	DMSP35	EYE BARELY DISCERNIBLE INIT DTG	NNJL
25	190946	11.9N 168.3E	PCN 6		NOAA5		PHIK
26	191242	11.2N 167.3E	PCN 4		DMSP35		NNJL
27	191242	11.3N 167.4E	PCN 6		DMSP35		PGTW
28	191948	11.3N 167.2E	PCN 4	T3.0/3.0 /D0.5/20HRS	DMSP37	STRONG LOW LVL INFLOW ALGDS	NNJL
29	192122	11.6N 165.1E	PCN 2	T4.0/4.0 /D1.0/24HRS	DMSP36		PGTW
30	192122	11.6N 165.4E	PCN 2	T5.0/5.0	NOAA5	INIT DTG NO GEOGRAPHY	PHIK
31	192342	12.1N 164.0E	PCN 2	T4.5/4.5	DMSP35	INIT DTG	KGWC
32	201005	11.7N 161.7E	PCN 6		DMSP36		PGTW
33	201224	11.9N 161.0E	PCN 2		DMSP35		PGTW
34	201224	11.9N 161.2E			DMSP35	STRONG LOW LVL INFLOW ALGDS	NNJL
35	202105	11.4N 158.8E	PCN 1	T5.5/5.5 /D1.5/24HRS	DMSP36		PGTW
36	210106	11.5N 157.8E	PCN 2		DMSP35		PGTW
37	210106	11.8N 158.6E	PCN 1	T5.5/5.5 /D2.5/28HRS	DMSP35	EYE VSBL STRONG LOW LVL INFLOW	NNJL
38	210947	11.1N 155.6E	PCN 6		DMSP36	UPR LVL ANTICYCLONE	PGTW
39	211348	10.9N 155.4E	PCN 6		DMSP35	UPR LVL ANTICYCLONE	PGTW
40	212050	11.2N 154.4E	PCN 1	T6.0/6.0 /D0.5/19HRS	DMSP37	EYE OBSCURED BY THIN OVC	NNJL
41	212229	11.1N 153.9E	PCN 1	T6.5/6.5 /D1.0/25HRS	DMSP36		PGTW
42	220048	11.4N 153.7E	PCN 1		DMSP35	WELL DEFINED EYE	NNJL
43	220048	11.4N 153.2E	PCN 1		DMSP35		PGTW
44	220929	11.5N 151.5E	PCN 2		DMSP36		PGTW
45	220932	11.2N 152.4E			DMSP37		NNJL
46	221330	11.6N 151.0E	PCN 2		DMSP35		PGTW
47	221330	11.8N 151.0E	PCN 2		DMSP35		RODN
48	221330	11.6N 151.0E	PCN 2		DMSP35		NNJL
49	222211	11.3N 149.0E	PCN 1	T7.0/7.0 /D1.0/26HRS	DMSP	STRONG LOW LVL INFLOW ALGDS	NNJL
50	222212	11.6N 148.9E	PCN 1	T7.0/7.0 /D0.5/24HRS	DMSP36		PGTW
51	230912	12.0N 146.2E	PCN 2		DMSP37		NNJL
52	231054	11.9N 145.8E	PCN 2		DMSP36		PGTW
53	231312	12.1N 145.2E	PCN 1		DMSP35		PGTW
54	232011	11.9N 142.7E	PCN 2		DMSP37		PGTW
55	232154	12.2N 142.0E	PCN 1	T7.0/7.0 /S0.0/24HRS	DMSP36		PGTW
56	240154	12.1N 141.1E	PCN 1		DMSP35		PGTW
57	240154	12.2N 141.4E	PCN 1	T7.0/7.0	DMSP35	INIT DTG	RPMK
58	240852	12.5N 138.7E	PCN 2		DMSP37		RODN
59	240852	12.5N 138.7E	PCN 2		DMSP37		PGTW
60	241036	12.5N 138.0E	PCN 2		DMSP36		PGTW
61	241435	12.6N 136.7E	PCN 2		DMSP35		PGTW
62	241436	12.6N 137.0E	PCN 2		DMSP35	EYE DIA 20NM	NNJL
* 63	242133	12.2N 140.1E		T7.0/7.0	DMSP37	EYE DIA 25NM INIT DTG	NNJL
64	242133	12.9N 134.1E	PCN 1	T7.5/7.5 /D0.5/20HRS	DMSP37		RPMK
65	242319	12.7N 133.3E	PCN 1	T7.5/7.5 /D0.5/25HRS	DMSP36		PGTW
66	250136	12.7N 132.6E	PCN 1		DMSP35		RPMK
67	250136	12.7N 132.4E	PCN 1		DMSP35		PGTW
68	251014	13.3N 129.7E	PCN 1		DMSP37		RPMK
69	251014	13.2N 129.7E	PCN 1		DMSP37		PGTW
70	251014	13.0N 129.5E	PCN 2		DMSP37	EYE DIA 20NM	NNJL
71	251201	13.2N 128.9E	PCN 1		DMSP36		PGTW
72	251201	13.3N 129.0E	PCN 2		DMSP36		RPMK
73	251201	13.1N 129.0E	PCN 2		DMSP36	EYE DIA 20NM	NNJL
74	251418	13.3N 128.2E	PCN 1		DMSP35		PGTW
75	251418	13.5N 128.5E	PCN 2		DMSP35	EYE DIA 20NM	NNJL
76	252113	13.8N 126.1E	PCN 1		DMSP37		RPMK
77	252255	13.4N 125.6E	PCN 1	T7.0/7.0 /S0.0/25HRS	DMSP37	EYE DIA 20NM	NNJL
78	252301	14.0N 125.5E	PCN 1	T7.0/7.5-/W0.5/24HRS	DMSP36		PGTW
79	260258	14.6N 124.3E	PCN 1	T6.0/7.0-/W1.5/30HRS	DMSP35		RPMK
80	260300	14.6N 124.3E	PCN 1		DMSP35		PGTW
81	260955	14.5N 122.5E	PCN 1		DMSP37		PGTW
82	260955	14.7N 122.4E	PCN 1		DMSP37		RODN
83	260955	14.6N 122.5E	PCN 2		DMSP37		RPMK
84	261000	14.9N 122.5E	PCN 2		DMSP37	EYE DIA 25NM	NNJL
85	261143	14.7N 122.5E	PCN 1		DMSP36		PGTW
86	261542	15.2N 121.7E	PCN 2		DMSP35		RPMK
87	261542	15.2N 122.0E	PCN 1		DMSP35		RODN
88	261542	15.1N 121.9E	PCN 2		DMSP35	EYE DIA 15NM	NNJL
89	262236	15.2N 120.1E	PCN 5		DMSP37		RKSO
90	262236	15.9N 120.2E	PCN 5	T3.0/6.0 /W1.0/20HRS	DMSP37		RPMK

91	262335	14.4N 120.6E	PCN 3	T4.5/4.5+		DMSP37	INIT JAS		RDDN
92	270025	14.7N 119.6E	PCN 5	T5.0/6.0 /S0.0/22HRS		DMSP36			RPMK
93	271242	14.4N 118.4E	PCN 3	T4.5/5.5+/W2.5/20HRS		NOAA5			PGTW
94	271117	14.8N 117.3E	PCN 4			DMSP37			RDDN
95	271308	14.3N 117.3E	PCN 2			DMSP36	SMALL EYE VSBL		NNJL
96	271308	14.3N 117.1E	PCN 1			DMSP36			RPMK
97	271524	17.1N 116.9E	PCN 4			DMSP35	EYE NOT VSBL		NNJL
98	271524	17.3N 116.9E	PCN 3			DMSP35	CI DOWN		PGTW
99	272215	17.2N 115.6E	PCN 4	T4.0/5.5 /W0.5/20HRS		DMSP37			PGTW
100	272217	16.6N 115.4E	PCN 4			DMSP37	NO VSBL EYE		NNJL
101	280008	16.7N 115.5E	PCN 3	T4.5/5.5 /W1.5/24HRS		DMSP36			RPMK
102	280008	16.2N 115.5E	PCN 3	T4.-		DMSP36	NO VSBL EYE		NNJL
103	280405	17.0N 114.3E	PCN 3			DMSP35	EYE NOT VSBL		NNJL
104	280405	17.6N 115.5E	PCN 3			DMSP35			RPMK
105	280406	17.2N 115.0E	PCN 3	T3.0/5.0 /D0.5/20HRS		DMSP35	PARTIALLY EXPOSED LLCC		RDDN
106	281057	16.4N 115.2E	PCN 4			DMSP37			NNJL
107	281057	16.5N 115.0E	PCN 5			DMSP37	CI DOWN UPR LVL		PGTW
108	281057	16.8N 115.1E	PCN 5			DMSP37	UPR LVL		RKSO
109	281250	14.3N 115.0E	PCN 5			DMSP36			RDDN
110	281505	16.2N 114.5E	PCN 5			DMSP35			RPMK
111	281505	16.4N 114.6E	PCN 6			DMSP35	UPR LVL		PGTW
112	282350	14.5N 112.6E	PCN 5	T2.0/3.0-/W2.0/26HRS		DMSP36	PARTIALLY EXPOSED LLCC		PGTW
113	282351	14.2N 112.6E	PCN 5	T3.0/4.0 /W1.0/20HRS		DMSP36	APPARENT LLCC		RDDN
114	282351	14.4N 113.5E	PCN 5	T2.5/2.5		DMSP36	INIT JAS		RKSO
115	291037	13.9N 113.6E	PCN 5			DMSP37	CI DOWN		PGTW
*116	291232	16.2N 110.4E	PCN 5			DMSP36			RDDN
*117	291530	15.3N 109.2E	PCN 6			DMSP35			RDDN
*118	291630	15.2N 109.0E	PCN 5			DMSP35	POSSIBLE SECONDARY 12.8N 109.0E		RPMK

AIRCRAFT FIXES

FIX NO.	TIME (Z)	FIX POSITION	FLT LVL	MIN HGT	OBS MSLP	MAX-SFC-WND VEL/ARG/RNG	MAX-FLT-LVL-WND DIR/VEL/ARG/RNG	ACCRY NAV/MET	EYE SHAPE	EYE ORIEN-TATION	EYE DIAM	EYE TEMP (C) OUT/ IN/ DP/SST	MSN NO.
1	180015	10.5N 174.2E	700MB	3095	1002	40 070 15	120 40 360 10	1 1	CIRCULAR		250	+11 +13 + 9	1
2	182250	11.1N 170.2E	700MB	3103		50 140 30	030 48 140 30					+14 + 9	2
3	190245	11.3N 169.4E	700MB	3035	995	35 100 20	090 50 300 10	1 1	ELLIPTICAL 10 05		100	+12 +14 + 9	2
4	191019	11.2N 167.8E	700MB	3032	995		080 65 340 15	7 3	CIRCULAR		120	+12 +13 + 9	3
5	191205	11.4N 167.3E	700MB	3024			180 70 060 15						3
6	192100	11.7N 165.1E	700MB	2813	968	100 300 3	040 100 310 10	2 1	CIRCULAR		80	+12 +16 +12	4
7	192340	11.6N 164.8E	700MB	2805		90 360 4	090 85 010 12					+15 +12	4
8	200355	11.7N 163.3E	700MB	2791	967	80 240 10	140 71 100 6	5 3	CIRCULAR		40	+10 +11 +11	4
9	200638	11.7N 162.6E	700MB	2830	970	75 290 10	060 80 290 10					+11 +11	4
10	201545	11.6N 159.9E	700MB	2732	959		200 90 120 M	1 1	CIRCULAR		40	+10 +16 + 9	5
11	202030	11.4N 159.0E	700MB	2563	938	130 180 10	330 95 220 15	1 1	CIRCULAR		50	+18 +20 +10	5
12	210520	11.4N 156.9E	700MB	2525	935	130 230 10	340 75 230 12	4 2	CIRCULAR		100	+12 +15 +14	7
13	210922	11.2N 156.3E	700MB		945		030 95 300 10	5 1	CIRCULAR		60	+11 +21 +16	7
14	211515	11.1N 155.0E	700MB	2546	937		020 105 290 12	3 2	CIRCULAR		120	+12 +17 +14	8
15	211520	11.2N 154.4E	700MB	2476	930		030 110 310 24					+17 +14	8
16	212009	11.2N 154.2E	700MB	2432	925	110 360 5	270 95 180 12	4 2	CIRCULAR		100	+15 +17 +14	8
17	220054	11.3N 153.3E	700MB	2370		130 030 10	110 114 030 10					+16 +16	9
18	220307	11.3N 152.8E	700MB	2320	911	130 320 8	060 113 320 M	2 2	CIRCULAR		120	+13 +23 +17	9
19	220645	11.5N 152.2E	700MB	2320		120 250 10	320 110 250 7					+19 +13	10
20	220949	11.5N 151.8E	700MB	2319	913		040 112 320 12	3 2	CIRCULAR		130	+11 +19 +14	10
21	221222	11.6N 151.1E	700MB	2213			180 98 160 12					+21 +12	11
22	221630	11.6N 150.9E	700MB	2174	897		070 122 310 M	6 2	CIRCULAR		100	+11 +20 +12	11
23	222222	11.6N 148.8E	700MB	2111	888	130 330 5	020 110 300 12	4 3	CIRCULAR		100	+12 +29 +14	12
24	230202	11.7N 148.2E	700MB	2060	882	150 100 5	120 105 030 12	4 2	CIRCULAR		120	+12 +31 + 8	12
25	230835	11.9N 146.4E	700MB	2055	884		340 115 270 M	0 0	CIRCULAR		80	+12 +27 +10	13
26	231423	12.1N 144.7E	700MB	2188	899		060 127 330 15	3 3	CIRCULAR		120	+11 +21 +13	14
27	232035	11.9N 142.9E	700MB	2166	897	115 020 20	290 120 190 10	5 2	CIRCULAR		130	+13 +20 +10	15
28	240217	12.2N 141.2E	700MB	2205	900		300 126 250 9	5 5	CIRCULAR		190	+16 +17 +17	15
29	240315	12.4N 140.2E	700MB	2168	897	140 0	141					+24 +13	15
30	241408	12.6N 136.7E	700MB	2151	895		320 109 230 14	4 1	CIRCULAR		160	+12 +19 +13	17
31	241906	12.6N 135.2E	700MB	2139			091 15 12					+19 +14	17
32	242027	12.9N 134.3E	700MB	2073	886	90 080 38	140 135 080 10	4 1	CIRCULAR		130	+12 +24 +15	18
33	250015	12.7N 133.2E	700MB	2064	882	130 230 10	130 115 040 10					+25 +18	18
34	250317	12.8N 132.1E	700MB	2007	878	130 010 12	130 110 010 10	1 1	CIRCULAR		100	+12 +27 +19	18
35	251415	13.6N 128.0E	700MB	2061	886		330 110 220 10	5 5	CIRCULAR		150	+12 +18 +16	19
36	251902	13.7N 126.9E	700MB	2124	889		060 114 330 30					+17 +14	19
37	252001	13.8N 126.5E	700MB	2128	892		300 116 190 20	5 1	CIRCULAR		200	+10 +18 +17	19
38	270357	16.8N 117.8E	700MB	2940	984	55 360 17	130 56 060 120	2 1	CIRCULAR		220	+13 + 8	21
39	271205	16.3N 117.4E	700MB	2956	984		060 44 300 M					+13 +10	21
40	271411	17.0N 117.0E	700MB	2970	987		170 44 080 25	2 2	CIRCULAR		250	+12 +13 +12	21
41	272030	17.2N 115.9E	700MB	2938	990		170 54 090 130	0 0	CIRCULAR		200	+11 +14 +11	22
42	280321	16.8N 115.8E	700MB	2984	988	35 050 30	060 57 310 90	5 2				+ 9 +13 + 8	23
43	280621	16.8N 115.2E	700MB	2979	988	35 060 30	150 49 060 120					+12 + 9	23

RADAR FIXES

FIX NO.	TIME (Z)	FIX POSITION	RADAR	ACCRY	EYE SHAPE	EYE DIAM	RAINOB-CODE &SWATH TOUFF	COMMENTS	RADAR POSITION	SITE WMO NO.
1	230320	11.7N 147.7E	LAND	GOOD	CIRCULAR	10		EYE	13.6N 144.9E	91218
2	230410	11.8N 147.5E	LAND	GOOD	CIRCULAR	10		EYE	13.6N 144.9E	91218
3	230435	11.8N 147.3E	LAND	GOOD	CIRCULAR	15		EYE	13.6N 144.9E	91218
4	230510	11.8N 147.3E	LAND	GOOD	CIRCULAR	15		EYE	13.6N 144.9E	91218
5	230535	11.8N 147.3E	LAND	GOOD	CIRCULAR	15		EYE	13.6N 144.9E	91218
6	230610	11.8N 147.1E	LAND	GOOD	CIRCULAR	15		EYE	13.6N 144.9E	91218
7	230635	11.8N 147.0E	LAND	GOOD	CIRCULAR	15		EYE	13.6N 144.9E	91218
8	230710	11.8N 146.7E	LAND	GOOD	CIRCULAR	15		EYE	13.6N 144.9E	91218
9	230735	12.0N 146.7E	LAND	GOOD	CIRCULAR	15		EYE	13.6N 144.9E	91218
10	230835	12.0N 146.4E	LAND	GOOD	CIRCULAR	15		EYE	13.6N 144.9E	91218
11	230910	12.0N 146.3E	LAND	GOOD	CIRCULAR	15		EYE	13.6N 144.9E	91218
12	230935	12.0N 146.3E	LAND	GOOD	CIRCULAR	15		EYE	13.6N 144.9E	91218
13	231010	12.1N 146.0E	LAND	GOOD	CIRCULAR	15		EYE	13.6N 144.9E	91218
14	231035	12.2N 145.7E	LAND	GOOD	CIRCULAR	15		EYE	13.6N 144.9E	91218
15	231110	12.2N 145.7E	LAND	GOOD	CIRCULAR	15		EYE	13.6N 144.9E	91218

16	231135	12.2N	145.5E	LAND	GOOD	CIRCULAR	15			EYE			13.6N	144.9E	91218
17	231210	12.2N	145.3E	LAND	GOOD	CIRCULAR	15			EYE			13.6N	144.9E	91218
18	231235	12.2N	145.2E	LAND	GOOD	CIRCULAR	15			EYE			13.6N	144.9E	91218
19	231310	12.2N	145.0E	LAND	GOOD	CIRCULAR	14			EYE			13.6N	144.9E	91218
20	231335	12.3N	144.8E	LAND	GOOD	CIRCULAR	15			EYE			13.6N	144.9E	91218
21	231410	12.3N	144.7E	LAND	GOOD	CIRCULAR	15			EYE			13.6N	144.9E	91218
22	231435	12.3N	144.7E	LAND	GOOD	CIRCULAR	15			EYE			13.6N	144.9E	91218
23	231510	12.3N	144.5E	LAND	GOOD	CIRCULAR	15			EYE			13.6N	144.9E	91218
24	231535	12.3N	144.3E	LAND	GOOD	CIRCULAR	15			EYE			13.6N	144.9E	91218
25	231610	12.3N	144.2E	LAND	GOOD	CIRCULAR	15			EYE			13.6N	144.9E	91218
26	231635	12.2N	144.1E	LAND	GOOD	CIRCULAR	15			EYE			13.6N	144.9E	91218
27	231710	12.2N	143.8E	LAND	GOOD	CIRCULAR	15			EYE			13.6N	144.9E	91218
28	231735	12.2N	143.7E	LAND	GOOD	CIRCULAR	15			EYE			13.6N	144.9E	91218
29	231810	12.1N	143.6E	LAND	GOOD	CIRCULAR	15			EYE			13.6N	144.9E	91218
30	231835	12.0N	143.4E	LAND	GOOD	CIRCULAR	15			EYE			13.6N	144.9E	91218
31	231910	12.0N	143.2E	LAND	GOOD	CIRCULAR	15			EYE			13.6N	144.9E	91218
32	231935	11.9N	143.0E	LAND	GOOD	CIRCULAR	15			EYE			13.6N	144.9E	91218
33	232010	11.8N	143.0E	LAND	GOOD	CIRCULAR	15			EYE			13.6N	144.9E	91218
34	232035	11.8N	142.8E	LAND	GOOD	CIRCULAR	15			EYE			13.6N	144.9E	91218
35	232100	11.8N	142.6E	LAND	GOOD	CIRCULAR	15			EYE			13.6N	144.9E	91218
36	232135	11.8N	142.5E	LAND	GOOD	CIRCULAR	15			EYE			13.6N	144.9E	91218
37	252300	14.0N	125.5E	LAND		CIRCULAR	33			EYE	OPEN E	PARADES	14.2N	122.7E	
38	260000	14.5N	125.4E	LAND				10410	52935				14.0N	124.3E	98447
39	260001	14.0N	125.0E	LAND		CIRCULAR	25			EYE	MOVG NNW 18KTS	PARADES	14.2N	122.7E	
40	260100	14.0N	124.8E	LAND		CIRCULAR	22			EYE	MOVG WNW 24KTS	PARADES	14.2N	122.7E	
41	260100	14.5N	125.2E	LAND				10H4/	52735	EYE	BECOMING LARGER		14.0N	124.3E	98447
42	260200	14.2N	124.4E	LAND			23			EYE		PARADES	14.2N	122.7E	
43	260200	14.5N	124.7E	LAND				10H10	52740				14.0N	124.3E	98447
44	260200	14.5N	124.6E	LAND				11240	3087/				14.1N	123.0E	98440
45	260300	14.5N	124.3E	LAND				30H40	52935				14.0N	124.3E	98447
46	260300	14.2N	124.2E	LAND			23				MOVG 2710 AVG SPD 19KTS	PARADES	14.2N	122.7E	
47	260300	14.4N	124.3E	LAND				20H11	52518				14.1N	123.0E	98440
48	260400	14.4N	124.0E	LAND			21			EYE	MOVG WNW 15KTS	PARADES	14.2N	122.7E	
49	260500	14.5N	123.7E	LAND						EYE	MOVG W 14KTS	PARADES	14.2N	122.7E	
50	260500	14.5N	123.6E	LAND				20H40	61035				14.1N	123.0E	98440
51	260530	14.7N	123.9E	LAND				4////	4////				16.3N	120.6E	98321
52	260600	14.8N	123.7E	LAND				1070/	4////	EYE	CIRCULAR OPEN SE		16.3N	120.6E	98321
53	260600	14.5N	123.5E	LAND						EYE	MOVG WNW 15KTS	PARADES	14.2N	122.7E	
54	260700	14.8N	123.6E	LAND				1071/	52912	EYE	CIRCULAR OPEN SE		16.3N	120.6E	98321
55	260700	14.5N	123.3E	LAND		CIRCULAR	17			EYE	MOVG W 17KTS	PARADES	14.2N	122.7E	
56	260730	14.8N	123.4E	LAND				1071/	42712	EYE	CIRCULAR		16.3N	120.6E	98321
57	260800	14.8N	123.3E	LAND				1077/	42710	EYE	CIRCULAR OPEN S		16.3N	120.6E	98321
58	260800	14.7N	122.9E	LAND		CIRCULAR	22			EYE	MOVG W 15KTS	PARADES	14.2N	122.7E	
59	260820	14.7N	123.1E	LAND	POOR	CIRCULAR	22			WALL	CLD		15.2N	120.6E	98327
60	260830	14.7N	123.2E	LAND				1062/	4////	EYE	CIRCULAR OPEN		16.3N	120.6E	98321
61	260900	14.7N	122.7E	LAND						EYE	MOVG WSW 13KTS	PARADES	14.2N	122.7E	
62	260910	14.8N	122.9E	LAND	POOR	CIRCULAR	24			WALL	CLD		15.2N	120.6E	98327
63	260930	14.7N	122.9E	LAND	FAIR	CIRCULAR	24			WALL	CLD		15.2N	120.6E	98327
64	260930	14.7N	123.1E	LAND				1077/	4////	EYE	CIRCULAR OPEN S		16.3N	120.6E	98321
65	261000	14.7N	122.6E	LAND		CIRCULAR				EYE	MOVG W 8KTS	PARADES	14.2N	122.7E	
66	261030	14.7N	122.7E	LAND	GOOD	CIRCULAR	29			EYE			15.2N	120.6E	98327
67	261100	14.7N	122.5E	LAND						CTNR	MOVG W 9KTS	GOZAR			
68	261100	14.6N	122.6E	LAND				21750	52708				14.1N	123.0E	98440
69	261110	14.7N	122.6E	LAND	GOOD	CIRCULAR	26			EYE	OPEN SW		15.2N	120.6E	98327
70	261200	14.6N	122.5E	LAND				35750	52900				14.1N	123.0E	98440
71	261200	14.7N	122.4E	LAND		CIRCULAR	25			EYE	MOVG W 8KTS	GOZAR			
72	261200	14.7N	122.6E	LAND				1087/	4////	EYE	CIRCULAR 100 PERCENT		16.3N	120.6E	98321
73	261210	14.8N	122.5E	LAND	GOOD	CIRCULAR	23			EYE	OPEN S		15.2N	120.6E	98327
74	261300	14.8N	122.2E	LAND		CIRCULAR				EYE	MOVG NW 9KTS	GOZAR			
75	261300	14.9N	122.4E	LAND				1072/	4////	EYE	CIRCULAR		16.3N	120.6E	98321
76	261310	14.9N	122.2E	LAND	GOOD	CIRCULAR	24			EYE	OPEN SW-S		15.2N	120.6E	98327
77	261330	14.9N	122.2E	LAND	GOOD	CIRCULAR	20			EYE	OPEN SW-S		15.2N	120.6E	98327
78	261330	14.9N	122.3E	LAND				1174/	42708	EYE	ELLIPTICAL		16.3N	120.6E	98321
79	261400	14.9N	122.0E	LAND		CIRCULAR	25			EYE	MOVG W 8KTS	GOZAR			
80	261400	14.9N	122.1E	LAND	GOOD	CIRCULAR	25			EYE	OPEN SE-S		15.2N	120.6E	98327
81	261430	15.1N	122.1E	LAND				1073/	4////	EYE	CIRCULAR		16.3N	120.6E	98321
82	261430	15.0N	122.0E	LAND	GOOD	CIRCULAR	20			EYE	OPEN S-W		15.2N	120.6E	98327
83	261500	14.9N	122.9E	LAND						EYE	MOVG W 10KTS	PARADES	14.2N	122.7E	
84	261500	14.8N	122.1E	LAND				6////	52808				14.1N	123.0E	98440
85	261510	15.0N	121.9E	LAND	GOOD	CIRCULAR	22			EYE	OPEN SW		15.2N	120.6E	98327
86	261530	15.1N	121.8E	LAND	GOOD	CIRCULAR	15			EYE	OPEN NW		15.2N	120.6E	98327
87	261600	15.2N	121.9E	LAND				1067/	43008	EYE	CIRCULAR		16.3N	120.6E	98321
88	261700	15.3N	121.6E	LAND			15			EYE	MOVG NW 12KTS	GOZAR			
89	261700	15.4N	121.7E	LAND				1044/	53210	EYE	CIRCULAR		16.3N	120.6E	98321
90	261730	15.2N	121.5E	LAND	FAIR					CNTR	FILLED AND OVR LAND		15.2N	120.6E	98327
91	261815	15.4N	121.6E	LAND				1044/	52707	EYE	CIRCULAR OPEN SE		16.3N	120.6E	98321
92	261830	15.5N	121.2E	LAND	FAIR					CNTR	REFORMING W OF MTNS		15.2N	120.6E	98327
93	261915	15.6N	121.1E	LAND	FAIR					CNTR	NFG WALL CLD		15.2N	120.6E	98327
94	261930	15.5N	120.9E	LAND	FAIR					CNTR	NFG WALL CLD		15.2N	120.6E	98327
95	262010	15.8N	120.8E	LAND	FAIR					CNTR	NFG WALL CLD		15.2N	120.6E	98327
96	262032	16.0N	120.5E	LAND	FAIR					CNTR	NFG WALL CLD		15.2N	120.6E	98327
97	262105	16.0N	120.5E	LAND	FAIR					CNTR	NFG WALL CLD		15.2N	120.6E	98327
98	262130	16.0N	120.4E	LAND	FAIR					CNTR			15.2N	120.6E	98327
99	262200	16.1N	120.3E	LAND	FAIR					CNTR			15.2N	120.6E	98327
100	262235	16.3N	120.2E	LAND	POOR					NFG	WALL CLD		15.2N	120.6E	98327
101	262300	16.2N	120.2E	LAND				1230/	/////	EYE	ELLIPTICAL		16.3N	120.6E	98321
102	262300	16.0N	120.0E	LAND		ELLIPTICAL				MOVG	N 24KTS AXIS 18/12	WALLACE	16.0N	120.3E	
103	262308	16.3N	120.1E	LAND	POOR					NFG	WALL CLD		15.2N	120.6E	98327
104	270000	16.5N	119.7E	LAND				1251/	52820	EYE	ELLIPTICAL		16.3N	120.6E	98321
105	270030	16.7N	119.5E	LAND				1251/	4////	EYE	ELLIPTICAL		16.3N	120.6E	98321
106	270100	16.6N	119.5E	LAND		CONCENTRIC				EYE	MOVG W 20KTS	WALLACE	16.0N	120.3E	
107	270200	16.6N	119.0E	LAND				1081/	4////				16.3N	120.6E	98321
108	270200	16.6N	119.2E	LAND		CIRCULAR	22			EYE	MOVG W 10KTS	WALLACE	16.0N	120.3E	
109	270300	16.6N	119.0E	LAND				1081I	4////	EYE	CIRCULAR		16.3N	120.6E	98321
110	270300	16.6N	119.2E	LAND		CIRCULAR	20			EYE	STNRY	WALLACE	16.0N	120.3E	
111	270400	16.6N	118.8E	LAND		CIRCULAR	36			EYE	MOVG W 18KTS	WALLACE	16.0N	120.3E	
112	270500	17.0N	118.5E	LAND		CIRCULAR	14			EYE	MOVG NW 6KTS	WALLACE	16.0N	120.3E	
113	270600	17.2N	118.3E	LAND		CIRCULAR	30			EYE	MOVG NW 10KTS	WALLACE	16.0N	120.3E	
114	270800	16.8N	117.5E	LAND				10HH/	5////	EYE	ELLIPTICAL		16.3N	120.6E	98321
115	271030	16.9N	117.3E	LAND				45///	7////	EYE	FIX USING 10 DEG SPRL OVRLY		16.3N	120.6E	98321

TROPICAL STORM TESS

SATELLITE FIXES

FIX NO.	TIME (Z)	FIX POSITION	ACCRY	OVERLAY CODE	SAT	COMMENTS	SITE
1	302134	14.4N 144.7E	PCN 6	T0.0/0.0	DMSP36	INIT DBS	PGTW
2	310131	14.0N 144.0E	PCN 5		DMSP35		PGTW
3	311015	14.2N 144.8E	PCN 5		DMSP36		PGTW
4	312059	13.2N 144.5E	PCN 4	T1.0/1.0 /D1.0/23HRS	DMSP37		PGTW
5	312259	13.1N 145.1E	PCN 3		DMSP36		PGTW
6	010939	13.5N 143.7E	PCN 6		DMSP37		PGTW
7	011140	13.5N 143.4E	PCN 6		DMSP36		PGTW
8	011354	13.6N 143.4E	PCN 6		DMSP35		PGTW
9	012059	14.0N 143.4E	PCN 6	T2.0/2.0 /D1.0/24HRS	DMSP37		PGTW
10	012241	14.3N 144.8E	PCN 5		DMSP36		PGTW
11	020055	14.6N 145.5E	PCN 5		DMSP35		PGTW
12	020919	17.5N 145.4E	PCN 6		DMSP37		PGTW
13	020919	17.3N 144.9E	PCN 6		DMSP37		RODN
14	021123	18.4N 145.8E	PCN 6		DMSP36		PGTW
15	021336	18.7N 146.1E	PCN 5		DMSP35		PGTW
16	021337	18.5N 146.6E	PCN 6		DMSP35		RODN
17	022223	14.5N 145.2E	PCN 5	T2.5/2.5 /D0.5/26HRS	DMSP36		PGTW
18	030037	18.6N 146.3E	PCN 6		DMSP35		PGTW
19	030900	19.3N 146.5E	PCN 6		DMSP37		PGTW
20	030900	19.1N 146.4E	PCN 6		DMSP37		RODN
21	031106	19.6N 146.5E	PCN 5		DMSP36		PGTW
22	031319	19.9N 146.5E	PCN 6		DMSP35		PGTW
23	032206	21.1N 146.5E	PCN 5	T3.5/3.5 /D1.0/24HRS	DMSP36		PGTW
24	040201	21.4N 146.5E	PCN 5		DMSP35		PGTW
25	040340	22.4N 146.6E	PCN 6		DMSP37		PGTW
26	040340	22.7N 146.8E	PCN 4		DMSP37		RODN
27	041049	22.7N 147.0E	PCN 3		DMSP36		PGTW
28	041301	23.2N 147.0E	PCN 6		DMSP35		PGTW
29	042149	25.0N 148.2E	PCN 3	T4.0/4.0-/D0.5/24HRS	DMSP36		PGTW
30	042149	24.7N 147.9E	PCN 4	T3.0/3.0	DMSP36	INIT DBS	RODN
31	050143	26.0N 148.5E	PCN 4		DMSP35		PGTW
32	050921	27.3N 148.9E	PCN 4		DMSP37		PGTW
33	051031	27.7N 149.3E	PCN 3		DMSP36		PGTW
34	051031	27.7N 149.5E	PCN 4		DMSP36		RODN
35	051424	28.3N 150.1E	PCN 3		DMSP35		PGTW
36	051424	28.2N 150.0E	PCN 3		DMSP35		RKSO
37	052131	29.5N 152.0E	PCN 4	T3.5/3.5-/D0.5/24HRS	DMSP36		RODN
38	052131	29.9N 151.9E	PCN 4	T3.0/4.0 /W1.0/24HRS	DMSP36		PGTW
39	060124	30.8N 153.1E	PCN 4		DMSP35		PGTW
40	061013	32.9N 157.0E	PCN 6		DMSP36	UPR ANTICYCLONE CI DOWN	PGTW
41	061607	33.3N 159.0E	PCN 6		DMSP35		PGTW
42	061607	34.0N 159.4E	PCN 5		DMSP35		RKSO

AIRCRAFT FIXES

FIX NO.	TIME (Z)	FIX POSITION	FLT LVL	MIN HGT	OBS MSLP	MAX-SFC-WND VEL/BRG/RNG	MAX-FLT-LVL-WND DIR/VEL/BRG/RNG	ACCRY NAV/MET	EYE SHAPE	EYE ORIEN- DIAM/TATION	EYE TEMP (C) OUT/ IN/ DP/SST	MSN NO.
1	012157	15.4N 144.3E	700MB	3032	995	30 180 90	220 27 180 90	3 5			+26 +26 +25 24	1
2	020303	17.3N 144.5E	700MB	3005	991	15 270 90	020 20 270 120	5 8			+12 +11	1
3	021504	18.3N 144.9E	700MB	3012	992		280 33 120 120	3 2			+12 +12	2
4	021910	18.6N 145.0E	700MB	2991	989		160 40 120 90				+12 +12	2
5	022106	18.6N 145.3E	700MB	2998	990		160 44 060 120	3 4			+10 +10	2
6	030131	19.2N 145.6E	1500FT	2990	990	25 190 120	130 31 190 120				+26 +24	3
7	030229	18.5N 145.6E	1500FT		988	55 350 90	130 35 060 60	1 2			+26 +26 +23 24	3
8	030302	19.7N 145.7E	700MB	2958							+14 +12	3
9	031629	19.6N 146.6E	700MB	2901	977		170 65 080 120	5 2	ELLIPTICAL	35 20 180	+14 +14 +12	4
10	031800	20.5N 144.4E	700MB	2918	981		140 50 360 90				+14 +14	4
11	032010	20.7N 146.3E	700MB	2922	981	35 270 90	120 77 050 90	5 3			+10 +14 +12	4
12	040003	21.2N 146.5E	700MB	2920	981	60 120 75	280 60 180 120	5 3			+14 +15 +14	5
13	041200	23.1N 147.6E	700MB	2876	973		220 77 120 90				+16 +16	5
14	041445	23.6N 147.4E	700MB	2984	974		320 62 240 90	3 5			+17 +11	5
15	050024	25.6N 148.0E	700MB	2901	976	65 190 100	160 85 040 100	2 4			+14 +15 +12	7
16	050300	26.1N 148.4E	700MB	2892	977	70 130 90	210 75 130 130	2 4			+13 +15 +13	7
17	060304	31.7N 153.2E	700MB	2874	975	65 190 30	240 80 120 90	5 5			+15 +16 +12	9

TROPICAL DEPRESSION 32

SATELLITE FIXES

FIX NO.	TIME (Z)	FIX POSITION	ACCRY	DVORAK CODE	SAT	COMMENTS	SITE
1	162341	15.2N 129.7E	PCN 6	T0.0/0.0	DMSP36	INIT OBS	PGTW
2	152341	15.0N 130.1E	PCN 5	T1.5/1.5	DMSP36	INIT OBS	NNUL
3	152342	16.7N 131.4E	PCN 5	T1.0/1.0	DMSP36	INIT OBS	RPMK
4	160149	16.2N 129.0E	PCN 5		DMSP37		NNUL
5	161223	15.4N 129.7E	PCN 6		DMSP36	CI UP	PGTW
6	161431	16.4N 129.8E	PCN 6		DMSP35		NNUL
7	162324	16.5N 129.7E	PCN 6	T2.5/2.5 /D1.0/24HRS	DMSP36		NNUL
8	162324	16.8N 130.1E	PCN 5	T1.0/1.0 /D1.0/24HRS	DMSP36		PGTW
9	162324	17.1N 130.3E	PCN 5	T1.5/1.5 /D0.5/24HRS	DMSP36		RPMK
10	170313	16.4N 129.0E	PCN 5		DMSP35		NNUL
11	170930	16.8N 129.3E	PCN 6		DMSP37	CI SAME	PGTW
12	170931	16.6N 130.3E	PCN 6		DMSP37		NNUL
13	170932	17.1N 128.6E	PCN 6		DMSP37		RODN
14	171206	16.8N 130.7E	PCN 6		DMSP36		NNUL
15	171206	17.0N 129.3E	PCN 6		DMSP36		PGTW
16	171413	17.4N 130.5E	PCN 6		DMSP35		NNUL
17	171413	17.1N 129.5E	PCN 6		DMSP35		PGTW
18	171413	18.1N 130.4E	PCN 6		DMSP35	UPPER LVL	RPMK
19	172212	17.0N 128.5E	PCN 5		DMSP37		NNUL
20	172212	14.6N 126.8E	PCN 3	T3.0/3.0-/D2.0/23HRS	DMSP37		PGTW
21	172212	14.6N 126.7E	PCN 3	T3.0/3.0	DMSP37	INIT OBS	RODN
22	172307	14.8N 126.7E	PCN 3		DMSP36		PGTW
23	180255	15.1N 128.0E	PCN 5	T2.0/2.5 /W0.5/27HRS	DMSP35		NNUL
24	180255	14.9N 127.0E	PCN 3		DMSP35		PGTW
25	180255	15.2N 127.2E	PCN 3	T1.5/1.5 /S0.0/27HRS	DMSP35		RPMK
26	181052	14.5N 127.4E	PCN 5		DMSP37	BASED ON CONTINUITY OF FEATURES	PGTW
27	181052	14.8N 127.6E	PCN 5		DMSP37	NO APPARENT CNTR	RODN
28	181536	14.3N 126.8E	PCN 6		DMSP35	BASED ON CONTINUITY OF FEATURES	PGTW
29	181537	14.3N 126.3E	PCN 5		DMSP35		RPMK
30	182158	16.0N 125.9E	PCN 5	T1.0/2.0 /W2.0/24HRS	DMSP37		PGTW
31	190237	13.4N 125.6E	PCN 3		DMSP35		PGTW
32	190237	13.8N 124.9E	PCN 5	T1.0/2.0 /W1.0/24HRS	DMSP35		NNUL
33	191032	13.5N 124.8E	PCN 5		DMSP37		PGTW
34	191033	13.8N 125.2E	PCN 5		DMSP37		RODN
35	191518	13.5N 124.3E	PCN 5		DMSP35		PGTW
36	191518	14.0N 124.0E	PCN 5		DMSP35		RPMK

TYPHOON VIOLA

SATELLITE FIXES

FIX NO.	TIME (Z)	FIX POSITION	ACCRY	DVORAK CODE	SAT	COMMENTS	SITE
1	152159	3.1N 155.7E	PCN 6	T0.0/0.0	DMSP36	INIT OBS	PGTW
2	161042	5.9N 154.8E	PCN 6		DMSP38	CI UP	PGTW
3	162049	6.2N 151.6E	PCN 6		DMSP37		PGTW
4	162142	6.4N 151.3E	PCN 6	T1.5/1.5 /D1.5/24HRS	DMSP35		PGTW
5	170930	8.1N 149.3E	PCN 5		DMSP37	CI UP	PGTW
6	171024	8.3N 148.9E	PCN 6		DMSP36		PGTW
7	171413	8.9N 148.0E	PCN 6		DMSP35		PGTW
8	171413	8.6N 146.6E	PCN 6		DMSP35		NNUL
9	172030	9.3N 146.8E	PCN 6		DMSP37		PGTW
10	172307	9.4N 145.9E	PCN 5	T3.0/3.0 /D1.5/25HRS	DMSP36		PGTW
11	172307	9.4N 145.7E	PCN 3	T3.0/3.0	DMSP36	INIT OBS	NNUL
12	180113	9.6N 145.4E	PCN 5		DMSP35		PGTW
13	181006	11.3N 143.3E	PCN 6		DMSP36		PGTW
14	181354	11.3N 142.2E	PCN 6		DMSP35		PGTW
15	181355	11.1N 141.8E	PCN 6		DMSP35		RODN
16	181355	11.2N 141.7E	PCN 4		DMSP34		NNUL
17	182152	11.4N 139.5E	PCN 3		DMSP37		NNUL
18	182158	11.2N 141.3E	PCN 5		DMSP37		PGTW
19	182249	11.2N 140.3E	PCN 3	T4.0/4.0 /D1.0/24HRS	DMSP36		NNUL
20	182249	11.5N 141.1E	PCN 5	T3.5/3.5 /D0.5/24HRS	DMSP36		PGTW
21	190237	12.2N 139.6E	PCN 5	T3.5/3.5+	DMSP35	INIT OBS	RPMK
22	190237	11.7N 140.0E	PCN 5		DMSP35		PGTW
23	190237	12.3N 140.4E	PCN 1		DMSP35		NNUL
24	190851	12.3N 138.4E	PCN 6		DMSP37		PGTW
25	191130	12.8N 138.0E	PCN 6		DMSP36		PGTW
26	191133	13.1N 138.2E	PCN 4		DMSP36		NNUL
27	191336	12.8N 137.7E	PCN 6		DMSP35		PGTW
28	192132	14.2N 136.5E	PCN 1	T4.5/4.5 /D1.0/23HRS	DMSP37		PGTW
29	192133	14.6N 136.2E	PCN 1		DMSP37		NNUL
30	192232	14.2N 136.2E	PCN 5		DMSP36		PGTW
31	192232	14.0N 136.2E	PCN 5		DMSP36		RPMK
32	201013	15.1N 134.8E	PCN 1		DMSP37		PGTW
33	201013	15.1N 134.9E	PCN 1		DMSP37		RODN
34	201113	15.2N 135.0E	PCN 1		DMSP36		PGTW
35	201114	15.1N 134.8E	PCN 2		DMSP36		NNUL
36	201500	15.3N 134.3E	PCN 1		DMSP35		PGTW
37	201501	15.9N 134.5E	PCN 2		DMSP35		NNUL
38	202113	15.9N 133.6E	PCN 2		DMSP37		PGTW
39	202113	15.9N 133.5E	PCN 2		DMSP37		RODN
40	202356	16.0N 133.2E	PCN 2	T5.5/5.5 /D1.0/26HRS	DMSP36		PGTW
41	210200	16.1N 133.0E	PCN 1	T6.0/6.0	DMSP35	INIT OBS	RPMK
42	210201	16.2N 132.9E	PCN 1		DMSP35		PGTW
43	210201	16.2N 133.6E	PCN 1		DMSP35		NNUL
44	210954	16.7N 131.9E	PCN 1		DMSP37	CI UP	PGTW
45	210954	16.9N 132.0E	PCN 2		DMSP37		NNUL
46	211056	17.0N 131.6E	PCN 1		DMSP36		PGTW
47	211238	16.6N 131.5E	PCN 1		DMSP36		RPMK
48	211443	17.2N 131.1E	PCN 1		DMSP35		PGTW
49	211443	16.9N 131.6E	PCN 2		DMSP35		NNUL
50	212053	18.1N 130.2E	PCN 5		DMSP37		PGTW
51	212235	18.4N 129.9E	PCN 2	T5.0/5.0	DMSP37	INIT OBS	RODN
52	212338	18.3N 129.7E	PCN 1	T5.0/5.5 /W0.5/24HRS	DMSP36		PGTW
53	220143	18.5N 129.7E	PCN 1	T5.0/6.0-/W1.0/24HRS	DMSP35		RPMK
54	220143	18.6N 129.7E	PCN 1		DMSP35		PGTW
55	220143	18.9N 129.0E	PCN 1		DMSP35		NNUL
56	220934	19.7N 128.4E	PCN 5		DMSP37		PGTW
57	220934	20.3N 128.2E	PCN 4		DMSP37		RPMK
58	221220	20.2N 128.2E	PCN 5		DMSP36		PGTW
59	221255	21.2N 128.2E	PCN 6		DMSP36		NNUL
60	221625	20.2N 128.0E	PCN 5		DMSP35		PGTW
61	222215	21.5N 129.3E	PCN 1	T4.5/5.0 /W0.5/23HRS	DMSP37		PGTW
62	222321	21.6N 129.3E	PCN 1		DMSP36		PGTW
63	231056	24.1N 131.5E	PCN 3		DMSP37	CI DOWN	PGTW
64	231056	23.8N 130.7E	PCN 3		DMSP37		RODN
65	231056	24.0N 130.7E	PCN 4		DMSP37		NNUL
66	231056	23.8N 130.7E	PCN 3		DMSP37		RKSO
67	231203	24.3N 131.8E	PCN 5		DMSP36		PGTW
68	232155	25.2N 133.9E	PCN 6	T3.0/4.0 /W1.5/24HRS	DMSP37		PGTW
69	232303	25.2N 133.7E	PCN 4		DMSP36		PGTW
70	240248	25.3N 134.6E	PCN 4		DMSP35		PGTW

AIRCRAFT FIXES

FIX NO.	TIME (Z)	FIX POSITION	FLT LVL	MIN HGT	OBS MSLP	MAX-SFC-WND DIR/VEL/RRG/RNG	MAX-FLT-LVL-WND DIR/VEL/RNG/RNG	ACCRY NAV/MET	EYE SHAPE	EYE ORIEN-TATION	EYE DIAM	EYE TEMP (C) OUT/ IN/ DP/SST	MSN NO.
1	170710	8.2N 149.7E	1500FT		998	30 270 53 110	35 340 120 5 10					+23 +23 29	2
2	172118	9.2N 146.4E	700MB	3045	995	55 030 25 070	40 330 100 10 10					+11 +12 +10	3
3	180208	9.4N 144.9E	700MB	3062	999	40 360 50 060	50 360 100 4 5		CIRCULAR		90	+10 +10 +10	3
4	180641	10.4N 144.4E	700MB	3025	993	30 120 30 090	38 360 120					+14 +14	5
5	180832	10.6N 144.0E	700MB	3017	991	35 070 40 160	44 070 60 4 5		CIRCULAR		50	+12 +12 +12	5
6	182100	11.5N 141.1E	700MB	2966	984	40 060 35 140	48 060 120 3 5		ELLIPTICAL	30 20 360		+14 +10	6
7	190028	11.7N 140.0E	700MB	2965	986	65 010 30 100	55 010 60					+11 +11	6
8	191223	11.8N 139.7E	700MB	2964	986	55 050 50 150	57 050 90 3 5					+14 +12	6
9	191505	13.3N 137.5E	700MB	2896	977	160	77 090 35 10 7		CIRCULAR		600	+11 +15 + 9	7

10	280023	14.0N	136.4E	700MM	2833	970	55	050	120	240	87	180	27	6	2					+16	+12		4
11	280250	14.3N	136.1E	700MM	2799	966	97	100	27	020	78	310	20	2	2	CIRCULAR		400	+15	+15	+11		8
12	281447	15.3N	134.3E	700MM	2570	938				060	94	340	25	6	1	CIRCULAR		250	+12	+18	+16		9
13	210308	16.1N	132.9E	700MM	2356	912	120	120	15	200	120	120	10	5	4	CIRCULAR		250	+13	+26	+ 5		10
14	210515	16.4N	132.5E	700MB	2333	913	120	200	15	350	127	040	10							+30	+14		10
15	210900	16.5N	132.0E	700MM	2312	911				350	105	220	30	3	3	CIRCULAR		220	+14	+29	+14		11
16	211437	17.1N	131.2E	700MB	2363	917				070	101	320	20	2	5	CIRCULAR		200	+12	+21	+14		11
17	220049	18.2N	129.4E	700MM	2452		25	080	120	140	90	050	30			ELLIPTICAL	45 40	360		+17	+17		12
18	220322	18.7N	128.6E	700MM	2433	925	90	130	30	140	120	110	40	5	2	CIRCULAR		350	+16	+16	+16		12
19	221530	20.7N	126.4E	700MB	2546	938				170	110	100	60	5	5	CIRCULAR		300	+13	+17	+ 8		13
20	222112	21.3N	125.7E	700MB	2599	944	50	240	120	030	75	320	15	5	10	CIRCULAR		100	+11	+15	+15		13
21	232144	25.2N	132.4E	700MB	2998	994	25	090	90	140	58	040	90	5	3				+16	+16	+ 9		15
22	240030	25.2N	133.9E	1500FT		993	25	170	15	140	33	170	15	5	1				+23	+23	+23	25	15

TROPICAL STORM WINNIE

SATELLITE FIXES

FIX NO.	TIME (Z)	FIX POSITION		ACCRY	DVORAK CODE		SAT	COMMENTS	SITE
1	232155	8.5N	161.9E	PCN 6	T0.0/0.0		DMSP36	INIT DBS	PGTW
2	250049	10.5N	155.3E	PCN 6	T0.0/0.0	/S0.0/24HRS	DMSP35		PGTW
3	250946	12.2N	154.4E	PCN 6			DMSP36		PGTW
4	251331	12.5N	153.7E	PCN 6			DMSP35		PGTW
5	252228	12.5N	151.1E	PCN 6	T0.0/0.0	/S0.0/21HRS	DMSP36		PGTW
6	260031	12.3N	150.8E	PCN 6			DMSP35	SECONDARY PSN 13.7N 154.4E	PGTW
7	261110	11.6N	147.4E	PCN 5			DMSP36		PGTW
8	262211	11.0N	144.5E	PCN 5	T0.0/0.0	/S0.0/24HRS	DMSP36		PGTW
9	271052	12.9N	149.6E	PCN 6			DMSP36		PGTW
10	271255	13.0N	149.2E	PCN 6			DMSP35		PGTW
11	272037	14.2N	147.5E	PCN 6			DMSP37		PGTW
12	272153	14.3N	147.4E	PCN 5	T2.0/2.0	/02.0/24HRS	DMSP36		PGTW
13	280137	14.9N	147.5E	PCN 5			DMSP35		PGTW
14	281035	17.0N	144.8E	PCN 6			DMSP36		PGTW
15	281418	18.2N	146.7E	PCN 6			DMSP35		PGTW
16	282136	20.7N	146.2E	PCN 4	T3.5/3.5	/01.5/24HRS	DMSP36		PGTW
17	290119	21.0N	146.4E	PCN 4			DMSP35		PGTW
18	290358	23.1N	148.0E	PCN 4			DMSP37		PGTW
19	290859	23.2N	147.9E	PCN 6			DMSP37		RODN
20	291012	23.2N	148.2E	PCN 5			DMSP36		PGTW
21	291400	24.7N	149.7E	PCN 4			DMSP35		PGTW
22	291958	27.0N	152.9E	PCN 6			DMSP37	UPR LVL ANTICYCLONE	PGTW
23	291959	27.2N	153.1E	PCN 6			DMSP37		RODN
24	292119	27.3N	153.7E	PCN 5	T2.0/2.0	/W1.5/24HRS	DMSP36		PGTW
25	300101	28.4N	156.3E	PCN 6			DMSP35		PGTW
26	300101	29.3N	157.9E	PCN 6	T1.0/1.0		DMSP35	INIT DBS	RODN
27	300939	30.5N	164.0E	PCN 6			DMSP37	CI UNW	PGTW
28	301000	30.4N	164.9E	PCN 6			DMSP36		PGTW

AIRCRAFT FIXES

FIX NO.	TIME (Z)	FIX POSITION		FLT LVL	MIN MSLP	OBS MSLP	MAX-SFC-WND VEL/BRG/RNG			MAX-FLT-LVL-WND DIR/VEL/BRG/RNG				ACCRY NAV/MET		EYE SHAPE	EYE ORIEN-TATION	EYE DIAM	EYE TEMP (C) OUT/ IN/ DP/SST				MSN NO.
1	270700	11.6N	149.5E	1500FT		992	35	230	50	310	35	240	80	7	2				+25	+26	+25	29	4
2	270830	11.9N	149.5E	700MB	3038	994								5	5					+14	+12		4
3	272050	14.3N	148.1E	700MB	3017	991	35	360	10	130	36	020	60	4	2				+12	+13	+11		5
4	280619	15.3N	147.6E	700MB	2979	987	35	080	10	220	41	130	60	5	2				+12	+12	+12		6
5	280730	16.2N	147.4E	700MB	2988	989	45	050	50	140	49	050	60	4	2				+12	+12	+ 9		6
6	281210	17.8N	146.7E	700MB	2952	984				140	60	050	60	4	3				+12	+14	+11		7
7	281447	18.4N	146.3E	700MB	2972	984				200	52	150	90	4	4				+13	+13	+12		7
8	281805	19.5N	146.3E	700MB	2935	982				160	54	040	60	4	4				+13	+13	+13		7
9	282031	20.1N	146.2E	700MB	2884	975	50	140	30	230	48	140	90	4	2				+14	+15	+11		8
10	290019	20.9N	146.2E	700MB	2916					150	60	090	120							+14	+14		9
11	290224	21.4N	146.4E	700MB	2908	980	45	290	30	360	52	280	90	3	5				+13	+15	+13		9
12	291706	26.2N	151.1E	700MB	2897	978				240	64	220	100	4	2				+14	+15	+14		9

2. NORTH INDIAN OCEAN CYCLONE FIX DATA

TC18-78

SATELLITE FIXES

FIX NO.	TIME (Z)	FIX POSITION		ACCRY	DVORAK CODE	SAT	COMMENTS	SITE
1	130450	10.8N	89.0E	PCN 6		DMSP35		KGWC
2	140058	11.5N	89.5E	PCN 6		DMSP36		KGWC
3	140432	11.8N	89.6E	PCN 6	T1.5/1.5 /D0.5/24HRS	DMSP35		KGWC
* 4	141339	11.4N	87.0E	PCN 6		DMSP36		KGWC
* 5	141714	11.5N	86.1E	PCN 6		DMSP35		KGWC
6	150040	12.5N	89.4E	PCN 5		DMSP36		RPMK
7	150040	12.5N	89.9E	PCN 6		DMSP35		KGWC
8	150556	13.1N	90.2E	PCN 6	T2.5/2.5 /D1.0/24HRS	DMSP35		KGWC
* 9	151323	15.0N	92.9E	PCN 6		DMSP36		KGWC
* 10	151557	15.2N	92.4E	PCN 6		DMSP35		KGWC
11	160204	15.9N	89.7E	PCN 6		DMSP36		KGWC
12	160538	16.8N	90.2E	PCN 6	T1.5/2.5 /W1.0/24HRS	DMSP35		KGWC
13	160543	15.3N	89.2E	CONF 1		DMSP		FWFS
14	161305	18.1N	91.3E	PCN 6		DMSP36		KGWC
15	161647	18.1N	91.3E	PCN 6		DMSP		KGWC
16	161820	18.3N	90.8E	PCN 6		DMSP36		KGWC
17	170147	14.9N	92.4E	PCN 6		DMSP36		KGWC
18	170152	18.5N	92.1E	CONF 1	T3.5/3.5 /D1.5/24HRS	DMSP		FWFS
19	170520	18.5N	92.6E	PCN 4	T2.5/2.5-/D1.0/24HRS	DMSP35		KGWC
20	171429	20.0N	93.8E	PCN 2		DMSP36		KGWC
21	171902	20.5N	94.3E	PCN 6		DMSP35		KGWC

TC19-78

SATELLITE FIXES

FIX NO.	TIME (Z)	FIX POSITION		ACCRY	DVORAK CODE	SAT	COMMENTS	SITE
1	250056	12.7N	91.9E	PCN 6	T1.0/1.0	DMSP37	INIT OBS	KGWC
2	250459	13.0N	90.8E	PCN 3	T1.5/1.5	DMSP35	INIT OBS	KGWC
3	251337	15.1N	89.8E	PCN 5		DMSP37	GOOD FEEDER BAND TO NORTH	KGWC
4	260036	15.2N	87.9E	PCN 4	T2.5/2.5 /D1.0/20HRS	DMSP37	FEEDER BAND IN SE QUAD	KGWC
5	260641	16.5N	87.9E	PCN 4	T2.5/2.5 /D1.0/24HRS	DMSP35		KGWC
6	261317	17.1N	86.9E	PCN 6		DMSP37		KGWC
7	261723	18.0N	87.1E	PCN 6		DMSP35		KGWC
8	270017	18.3N	87.3E	PCN 6		DMSP37	HVY CONVECTION NE	KGWC
9	270423	19.1N	88.1E	PCN 6		DMSP35		KGWC
10	270505	19.1N	88.3E	PCN 6	T3.0/3.0 /D0.5/24HRS	DMSP35		KGWC
11	271258	20.5N	88.8E	PCN 6		DMSP37	DECREASED ORGANIZATION	KGWC
12	271705	20.4N	90.0E	PCN 6		DMSP35		KGWC
13	280906	20.0N	92.6E	PCN 6		DMSP35		RODN

SATELLITE FIXES

FIX NO.	TIME (Z)	FIX POSITION		ACCRY	DVORAK CODE	SAT	COMMENTS	SITE
1	050647	10.5N	73.5E	PCN 6	T2.0/2.0	DMSP35	INIT DAS	KGWC
2	051325	10.6N	73.0E	PCN 6		DMSP37	CI OUTFLOW WEST	KGWC
3	052129	10.5N	71.6E	PCN 6		DMSP35	INCREASED CONV ACTIVITY	KGWC
4	060206	10.9N	72.6E	PCN 6	T3.0/3.0	DMSP37	INIT DAS BASED ON CI OUTFLOW	KGWC
5	060529	11.4N	71.5E	PCN 7	T3.5/3.5	DMSP35	INIT DAS RAGGED EYE FORMING	KGWC
6	061003	11.8N	71.0E		T3.0	TTROSN	CDO 1 DEG RAD CNTR	NRPG
7	061447	13.5N	70.9E	PCN 6		DMSP37	CENTER POORLY DEFINED	KGWC
8	061911	13.5N	70.4E	PCN 6		DMSP35		KGWC
9	070146	13.2N	68.3E	PCN 6	T4.5/4.5 /01.5/24HRS	DMSP37	BANDING MORE ORGANIZED	KGWC
10	070512	13.4N	67.1E	PCN 1	T4.5/4.5 /01.0/24HRS	DMSP35	EYE CI COVERED	KGWC
11	070956	13.0N	66.9E		T5.0	TTROSN	CDO EXTENDS 150NM RAD OF CNTR	NRPG
12	071427	15.4N	66.1E	PCN 4		DMSP37		KGWC
13	071853	15.4N	65.3E	PCN 4		DMSP35		KGWC
14	080127	16.0N	63.7E	PCN 2		DMSP35	EYE 5 NM DIA	KGWC
15	080735	16.5N	63.5E	PCN 2	T6.0/6.0 /01.5/26HRS	DMSP35	EYE 20 NM DIA	KGWC
16	080948	17.5N	62.5E		T5.0	TTROSN		NRPG
17	081407	17.5N	62.9E	PCN 6		DMSP		KGWC
18	081835	17.8N	62.8E	PCN 4		DMSP35	NO EYE VSBL	KGWC
19	082019	18.2N	62.7E	PCN 4		DMSP35	BASED ON CONSERVATIVE FEATURES	KGWC
20	090249	18.6N	62.3E	PCN 2		DMSP37	RAGGED EYE VSBL LESS ORGANIZED	KGWC
21	090717	19.7N	62.2E	PCN 2	T4.5/5.5 /W1.5/24HRS	DMSP35		KGWC
22	091120	20.3N	62.8E			TTROSN	CDO EXTENDS 100NM RAD OF CNTR	NRPG
23	091529	20.3N	62.8E	PCN 6		DMSP37	CDO ORIENTED NE-SW	KGWC
24	091959	20.6N	62.5E	PCN 4		DMSP35	DECREASED INTENSITY	KGWC
25	100229	21.8N	63.3E	PCN 4		DMSP37		KGWC
26	100559	22.2N	63.8E	PCN 3	T3.0/4.0 /W1.5/24HRS	DMSP35	NO SIGNIFICANT LLCC	KGWC
27	101111	22.3N	64.1E		T5.0	TTROSN	45NM ILL DEFINED EYE	NRPG
28	101510	23.1N	65.2E	PCN 6		DMSP37	UPPER LVL ANTICYCLONE	KGWC
29	101941	23.5N	66.9E	PCN 6		DMSP35	BASED ON APRNT LLCC	KGWC
30	110209	22.5N	66.0E	PCN 3		DMSP37	EXPOSED LLCC	KGWC
31	110642	22.8N	66.8E	PCN 3	T1.5/2.5 /W1.5/24HRS	DMSP35		KGWC
32	110905	23.0N	68.0E			TTROSN	NO OUTFLOW	NRPG
33	111450	22.9N	68.7E	PCN 6		DMSP37	NO CLEARLY DEFINED LLCC	KGWC
34	111923	23.0N	69.1E	PCN 6		DMSP35		KGWC
35	120150	22.6N	68.6E	PCN 6		DMSP37		KGWC
36	120623	22.5N	69.1E	PCN 4		DMSP35		KGWC

RADAR FIXES

FIX NO.	TIME (Z)	FIX POSITION		RADAR	ACCRY	EYE SHAPE	EYE DIAM	RADOB-CODE ASWAR TDOFF	COMMENTS	RADAR POSITION	SITE WMO NO.
1	080710	16.7N	63.5E	ACFT					EYE 32 MILES WIDE		

SATELLITE FIXES

FIX NO.	TIME (Z)	FIX POSITION		ACCRY	DVORAK CODE	SAT	COMMENTS	SITE
1	192114	7.9N	90.6E	PCN 6		DMSP37		KGWC
2	200055	8.0N	91.0E	PCN 6	T3.0/3.0	DMSP37	INITIAL OBS W/L ANTICYCLONE	KGWC
3	200542	8.0N	90.7E	PCN 1	T3.5/3.5	DMSP35	INITIAL OBS EYE DIAM 15NM	KGWC
4	201336	8.3N	89.5E	PCN 4		DMSP37		KGWC
5	201542	7.8N	89.2E	PCN 6		DMSP35		KGWC
6	210035	7.6N	88.8E	PCN 3	T3.5/3.5	DMSP37	INITIAL OBS	KGWC
7	210526	7.3N	88.0E	PCN 2	T4.0/4.0 /00.5/24HRS	DMSP35		KGWC
8	211316	7.3N	87.4E	PCN 6		DMSP37		KGWC
9	211805	7.2N	87.3E	PCN 6		DMSP35		KGWC
10	220016	6.7N	86.3E	PCN 2		DMSP37		KGWC
11	220505	6.8N	85.6E	PCN 2	T5.0/5.0 /01.0/24HRS	DMSP35		KGWC
12	220903	7.0N	85.1E		T5.0	TTRDSN	CDO EXTENDS 90NM RAD FROM CNTR	NRPG
13	221257	6.7N	84.8E	PCN 2		DMSP37		KGWC
14	221747	6.8N	84.6E	PCN 2		DMSP35		KGWC
15	230138	7.3N	83.7E	PCN 2		DMSP37		KGWC
16	230529	7.1N	83.3E	PCN 2	T6.5/6.5 /01.5/24HRS	DMSP35		KGWC
17	230850	7.0N	83.0E			TTRDSN	WELL DEFINED EYE	NRPG
18	231237	7.6N	81.7E	PCN 2		DMSP37		KGWC
19	231729	7.6N	81.4E	PCN 1		DMSP35		KGWC
20	240118	8.5N	80.5E	PCN 2	T5.0/6.0 /W1.5/20HRS	DMSP37		KGWC
21	240511	9.0N	79.9E	PCN 1		DMSP35		KGWC
22	241400	9.3N	78.2E	PCN 3		DMSP37		KGWC
23	241953	9.9N	77.5E	PCN 5		DMSP35		KGWC
24	250058	11.1N	75.7E	PCN 3	T4.0/5.0 /W1.0/23HRS	DMSP37		KGWC
25	250553	11.0N	74.6E	PCN 3		DMSP35		KGWC
26	251015	11.2N	73.7E			TTRDSN		NRPG
27	251339	11.3N	73.3E	PCN 3		DMSP37		KGWC
28	251835	12.2N	72.7E	PCN 5		DMSP35	UPR LVL ANTICYCLONE	KGWC
29	260220	12.5N	71.5E	PCN 5	T4.5/4.5 /00.5/22HRS	DMSP		KGWC
30	260535	12.3N	71.3E	PCN 5		DMSP35		KGWC
31	261006	13.1N	71.6E		T4.0	TTRDSN		NRPG
32	261320	13.7N	70.9E	PCN 5		DMSP37		KGWC
33	261917	14.3N	71.5E	PCN 5		DMSP35		KGWC
34	270201	14.2N	71.6E	PCN 5	T1.0/2.0-/W3.5/24HRS	DMSP37		KGWC
35	270559	14.6N	68.6E	PCN 3		DMSP35		KGWC
36	270956	14.8N	69.0E		T3.0	TTRDSN	UPPER LVL SHEARING OFF	NRPG
37	271442	15.1N	67.8E	PCN 3		DMSP37		KGWC
38	271941	15.1N	67.8E	PCN 4		DMSP35		KGWC
39	280141	14.9N	67.4E	PCN 3	T2.0/3.0 /W1.0/20HRS	DMSP37		KGWC
40	280641	14.9N	69.9E	PCN 3	T1.5/2.5 /W1.5/24HRS	DMSP35		KGWC
41	280945	17.5N	70.9E			TTRDSN		NRPG
42	281423	15.1N	67.8E	PCN 5		DMSP37		KGWC
43	281923	16.8N	68.2E	PCN 5		DMSP35		KGWC
44	290121	16.8N	68.2E	PCN 5		DMSP37		KGWC
45	290623	17.0N	68.6E	PCN 5	T0.0/1.0 /W1.5/24HRS	DMSP35		KGWC
46	291402	18.3N	68.9E	PCN 5		DMSP37		KGWC

APPENDIX

1. CONTRACTIONS

AC&W	Aircraft Control and Warning System
ACCRY	Accuracy
ACFT	Aircraft
AIREP	Aircraft Weather Report(s) (Commercial and Military)
ANT	Antenna
APT	Automatic Picture Transmission
ARWO	Aerial Reconnaissance Weather Officer
ATT	Attenuation
AVG	Average
AWN	Automated Weather Network
BRG	Bearing
CDO	Central Dense Overcast
CI	Current Intensity
CLD	Cloud
CLSD	Closed
CNTR	Center
CONF	Confidence (number)
DEG	Degree(s)
DIAM	Diameter
DIR	Direction
DMSP	Defense Meteorological Satellite Program
ELEV	Elevation
FLT	Flight
GOES	Geostationary Operational Environmental Satellite
HATRACK	Hurricane and Typhoon Tracking (numerical forecast)
HGT	Height
HPAC	Mean of XTRP and Climatology
HU	Hurricane
HR	Hour(s)
HVY	Heavy
ICAO	International Civil Aviation Organization
IR	Infrared
KM	Kilometer(s)
KT	Knot(s)
LLCC	Low Level Circulation Center
LVL	Level
M	Meter(s)
M/SEC	Meters per Second
MAX	Maximum
MB	Millibar(s)
MET	Meteorological
MIN	Minimum
MOHATT	Modified Hatrack
MSN	Mission
NAV	Navigational
NEDN	Naval Environmental Data Network
NEDS	Naval Environmental Display Station
NESS	National Environmental Satellite Service
NET	Near Equatorial Trough
NM	Nautical Mile(s)
NOAA	National Oceanic and Atmospheric Administration
NTCC	Naval Telecommunications Center
OBS	Observation(s)
PCN	Position Code Number
PSBL	Possible
PTLY	Partly
QUAD	Quadrant
RADOB	Radar Observation
RECON	Reconnaissance
RNG	Range
RPD	Rapid
SAT	Satellite
SFC	Surface
SLP(MSLP)	Sea Level Pressure (Minimum Sea Level Pressure)
SMS	Synchronous Meteorological Satellite
SPOL	Spiral Overlay
SRP	Selective Reconnaissance Program
STNRY	Stationary

ST	Super Typhoon
TC	Tropical Cyclone
TCARC	Tropical Cyclone Aircraft Reconnaissance Coordinator
TCM	Tropical Cyclone Model
TD	Tropical Depression
TIROS	Television Infrared Observation Satellite
TS	Tropical Storm
TY	Typhoon
TUTT	Tropical Upper Tropospheric Trough
VEL	Velocity
VIS	Visual
VSBL	Visible
WESTPAC	Western Pacific
WMO	World Meteorological Organization
WND	Wind
WRS	Weather Reconnaissance Squadron
XTRP	Extrapolation
Z	Zulu Time (Greenwich mean time)

2. DEFINITIONS

BEST TRACK - A subjectively smoothed path, versus a precise and very erratic fix-to-fix path, used to represent tropical cyclone movement.

CENTER - The axis or pivot of a tropical cyclone. Usually determined by wind, temperature or pressure distribution.

CYCLONE - A closed atmospheric circulation rotating about an area of low pressure (counterclockwise in the northern hemisphere).

EPHEMERIS - Position of a body (satellite) in space as a function of time. When no geographical reference is available for gridding satellite imagery, then only ephemeris gridding is possible which is solely based on the theoretical satellite position and is susceptible to errors from satellite pitch, orbit eccentricity and the non-spherical earth.

EXTRATROPICAL - A term used in warnings and tropical summaries to indicate that a cyclone has lost its "tropical" characteristics. The term implies both poleward displacement from the tropics and the conversion of the cyclone's primary energy sources from release of latent heat of condensation to baroclinic processes. The term carries no implications as to strength or size.

EYE - "EYE" is used to describe the central area of a tropical cyclone when it is more than half surrounded by wall cloud.

MAXIMUM SUSTAINED WIND - Maximum surface wind speed averaged over a 1-minute period of time. Peak gusts over water average 20 to 25 percent higher than sustained wind.

RECURVATURE - The turning of a tropical cyclone from an initial path toward the west of northwest to the north then northeast.

SIGNIFICANT TROPICAL CYCLONE - A tropical cyclone becomes "significant" with the issuance of the first numbered warning by the responsible warning agency.

SUPER TYPHOON/HURRICANE - A typhoon/hurricane in which the maximum sustained surface wind (1-minute mean) is 130 kt or greater.

TROPICAL CYCLONE - A nonfrontal low pressure system of synoptic scale developing over tropical or subtropical waters and having a definite organized circulation.

TROPICAL CYCLONE AIRCRAFT RECONNAISSANCE COORDINATOR - A CINCPACAF representative designated to levy tropical cyclone aircraft weather reconnaissance requirements on reconnaissance units within a designated area of the PACOM and to function as coordinator between CINCPACAF, aircraft weather reconnaissance units, and the appropriate typhoon/hurricane warning center.

TROPICAL DEPRESSION - A tropical cyclone in which the maximum sustained surface wind (1-minute mean) is 33 kt or less.

TROPICAL DISTURBANCE - A discrete system of apparently organized convection--generally 100 to 300 miles in diameter--originating in the tropics or subtropics, having a non-frontal migratory character, and having maintained its identity for 24 hours or more. It may or may not be associated with a detectable perturbation of the wind field. As such, it is the basic generic designation which, in successive stages of intensification, may be classified as a tropical depression, tropical storm or typhoon (hurricane).

TROPICAL STORM - A tropical cyclone with maximum sustained surface winds (1-minute mean) in the range of 34 to 63 kt, inclusive.

TROPICAL UPPER TROPOSPHERIC TROUGH (TUTT) - "A dominant climatological system, and a daily synoptic feature, of the summer season over the tropical North Atlantic, North Pacific and South Pacific Oceans," from Sadler, James C., Feb. 1976: Tropical Cyclone Initiation by the Tropical Upper Tropospheric Trough. (NAVENVPREDRSCHFAC Technical Paper No. 2-76).

TYPHOON/HURRICANE - A tropical cyclone in which the maximum sustained surface wind (1-minute mean) is 64 kt or greater. West of 180 degrees longitude they are called typhoons and east of 180 degrees they are called hurricanes. Foreign governments use these or other terms for tropical cyclones and may apply different intensity criteria.

WALL CLOUD - An organized band of cumuliform clouds immediately surrounding the central area of a tropical cyclone. The wall cloud may entirely enclose the eye or only partially surround the center.

DISTRIBUTION

AFGWC (2)
AFGL/LYU (2)
AMER EMBASSY, BANGKOK (6)
ANDREWS UNIV (1)
ARIZONA STATE UNIV (1)
ARRS/CC (4)
AWS/DNT (5)
AWS/DOR (5)
BUR OF MET, BRISBANE (2)
BUR OF MET, MELBOURNE (1)
BUR OF MET, PERTH (1)
CAF WEACEN TAIWAN (3)
CATH UNIV OF AMER (2)
CENWEABUR TAIWAN (3)
CINCPAC (2)
CINCPACAF/DOW (2)
CINCPACFLT (5)
CIVIL DEFENSE (GUAM) (4)
CNO WASHINGTON, DC (1)
COLORADO STATE UNIV (2)
COLORADO STATE UNIV (LIBR) (1)
COMFAIRECONRON ONE (VQ-1) (4)
COMLOGSUPFORSEVENTHFLT (1)
COMNAVAIRSYSCOM (1)
COMNAVFACENGCOMPACDIV (1)
COMNAVFORJAPAN (1)
COMNAVMARIANAS (1)
COMNAVSURFPAC (2)
COMPATRECONFORSEVENTHFLT (1)
COMPHIBGRU ONE (2)
COMSC (1)
COMSEVENTHFLT (2)
COMSUBGRU SEVEN (2)
COMSUBPAC (1)
COMTHIRDFLT (1)
COMUSNAVPHIL (2)
DDC VA (12)
DEPT AIR FORCE (1)
DET 2, 1WW (2)
DET 2, 7WW (2)
DET 4, 1WW (2)
DET 4, HQ AWS (2)
DET 5, 1WW (3)
DET 8, 30WS (2)
DET 10, 30WS (1)
DET 15, 30WS (1)
DET 17, 30WS (1)
DET 18, 30WS (1)
DISTAD MARSHALLS (1)
DMA WASHINGTON, DC (1)
ENVSCISUPGRU (5)
ESCAP THAILAND (2)
FAA (GUAM) (5)
FLENUMWEACEN (2)
FLEWEACEN NORFOLK (1)
FLEWEACEN PEARL HARBOR (2)
FLEWEACEN ROTA (1)
FLEWEAFAC SUITLAND (1)
FLORIDA STATE UNIV TALLAHASSEE (2)
GEN MTE DEPT THAILAND (2)
GEOLOGICAL SURVEY, GUAM (1)
GOVERNOR OF GUAM (4)
GOVERNMENT OF NORTHERN MARIANAS (2)
GUAM PUBLIC LIBRARY (5)
INDIA MET DEPT (2)
JAPAN MET AGENCY (3)
JASDF TOKYO, JAPAN (1)
LIBR OF CONGRESS (EXCHANGE & GIFT DIV) (2)
LOS ANGELES PUBLIC LIBR (1)
MAC/HO (2)
MCAS FUTENMA (1)
MCAS IWAKUNI (2)
MCAS KANEOHE BAY (2)
MET DEPT BANGKOK (2)
MET RESEARCH INSTITUTE LIBR, JAPAN (3)
NASA GREENBELT, MD (3)
NASA WALLOPS ISLAND (1)
NAT CLIM CNTR, NC (1)
NATWEASERV FOROFF HONOLULU (2)
NATWEASERV PACREG (2)
NAVAL ACADEMY (1)
NAVWEASERVFAC ALAMEDA (1)
NAVWEASERVFAC JACKSONVILLE (1)
NAVWEASERVFAC YOKOSUKA (2)
NEPRF, MONTEREY, CA (8)
NESS/SFSS (2)
NHC, NOAA (2)
NOAA/EDS CORAL GABLES, FL (4)
NOAA/EDS WASHINGTON, DC (2)
NOAA/ERL BOULDER, CO (2)
NOAA/ERL MIAMI (1)
NOAA/HYDROLOGY BR SILVER SPRING, MD (1)
NOAA/LIBRARY ROCKVILLE, MD (1)
NOAA/NESS WASHINGTON, DC (2)
NOAA/PMEL SEATTLE, WA (2)
NPGS DEPT OF MET (4)
NPGS LIBR (1)
NWESA (1)
NWSD ASHEVILLE (1)
NWSED AGANA (1)
NWSED ATSUGI (1)
NWSED BARBERS POINT (1)
NWSED CUBI POINT (1)
NWSED KADENA (2)
NWSED MISAWA (1)
OCEANAV (3)
OKINAWA MET OBS (1)
OLG/HQ AWS (1)
OUSDRE, WASHINGTON, DC (2)
PAGASA RP (5)
ROYAL OBSERVATORY HONG KONG (4)
TAIWAN UNIV (3)
TEXAS A&M UNIV (1)
TIME INC., NY (1)
TTPI SAIPAN (8)
TYPHOON COMM SECR (1)
UNIV OF CHICAGO (1)
UNIV OF GUAM (2)
UNIV OF HAWAII DEPT OF MET (3)
UNIV OF HAWAII LIBR (1)
UNIV OF MEXICO (1)
UNIV OF RP (2)
UNIV OF WASHINGTON (1)
USAFSAAS/TMWF (1)
USDOC/NOAA (1)
USS BLUE RIDGE (LCC 19) (2)
USS CONSTELLATION (CV 64) (2)
USS CORAL SEA (CV 43) (1)
USS ENTERPRISE (CVN 65) (1)
USS KITTY HAWK (CV 63) (1)
USS LONG BEACH (CGN 9) (2)
USS MIDWAY (CV 41) (2)
USS NEW ORLEANS (LPH 11) (2)
USS OKINAWA (LPH 3) (1)
USS OKLAHOMA CITY (CG 5) (2)
USS RANGER (CV 61) (2)
USS TARAWA (LHA 1) (1)
USS TRIPOLI (LPH 10) (1)
WEA SERV MET OBS (2)
1WW/DON (6)
3AD/DOX (1)
3WW/DNC (1)
5WW/DNC (1)
7WW/DON (1)
30WSQ (3)
41RWRW (2)
43SW/OI (2)
54WRS (3)
3360 TCHTG (1)

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE *(When Data Entered)*

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER Annual Typhoon Report 1978	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE *(and Subtitle)* ANNUAL TYPHOON REPORT 1978		5. TYPE OF REPORT & PERIOD COVERED Annual (JAN-DEC 1978) 6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s)		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS FLEET WEATHER CENTRAL/JOINT TYPHOON WARNING CENTER (FLEWEACEN/JTWC), GUAM FPO SAN FRANCISCO 96630		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS FLEET WEATHER CENTRAL/JOINT TYPHOON WARNING CENTER (FLEWEACEN/JTWC), GUAM FPO SAN FRANCISCO 96630		12. REPORT DATE 1978 13. NUMBER OF PAGES 166
14. MONITORING AGENCY NAME & ADDRESS*(if different from Controlling Office)*		15. SECURITY CLASS. *(of this report)* UNCLASSIFIED 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT *(of this Report)*

Approved for public release; distribution unlimited.

17. DISTRIBUTION STATEMENT *(of the abstract entered in Block 20, if different from Report)*

18. SUPPLEMENTARY NOTES

19. KEY WORDS *(Continue on reverse side if necessary and identify by block number)*

Tropical cyclones	Tropical storms
Tropical cyclone forecasting	Tropical depressions
Tropical cyclone research	Typhoons
Tropical cyclone steering model	Meteorological satellite
Tropical cyclone fix data	Aircraft reconnaissance

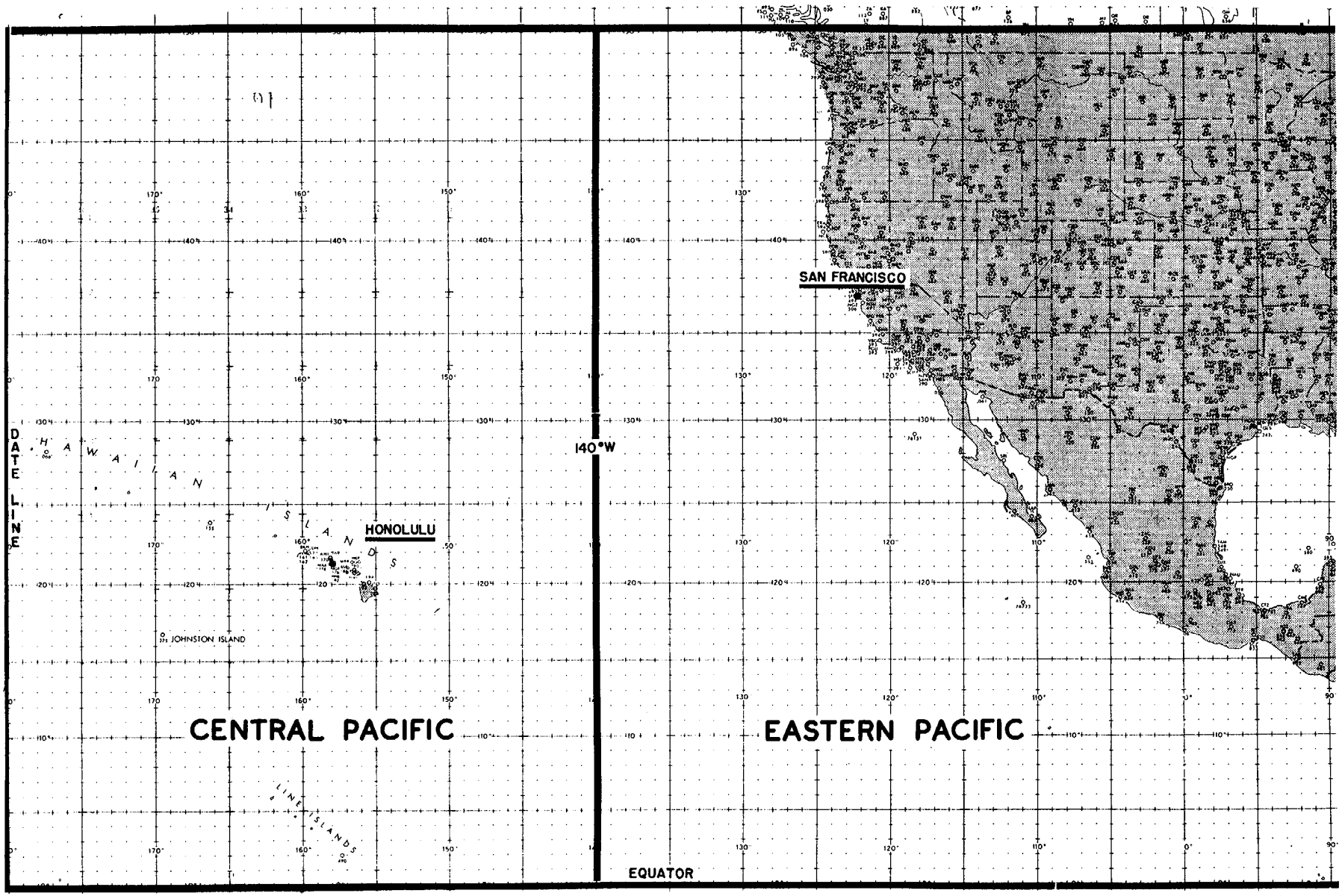
20. ABSTRACT *(Continue on reverse side if necessary and identify by block number)*

Annual publication summarizing the tropical cyclone season in the western North Pacific, Bay of Bengal, and the central North Pacific. A brief narrative is given on each typhoon in the western North Pacific including the best track. Pertinent reconnaissance data used to construct the best tracks are provided. Forecast verification data and statistics for the JTWC are summarized. Research efforts at the JTWC are discussed briefly.

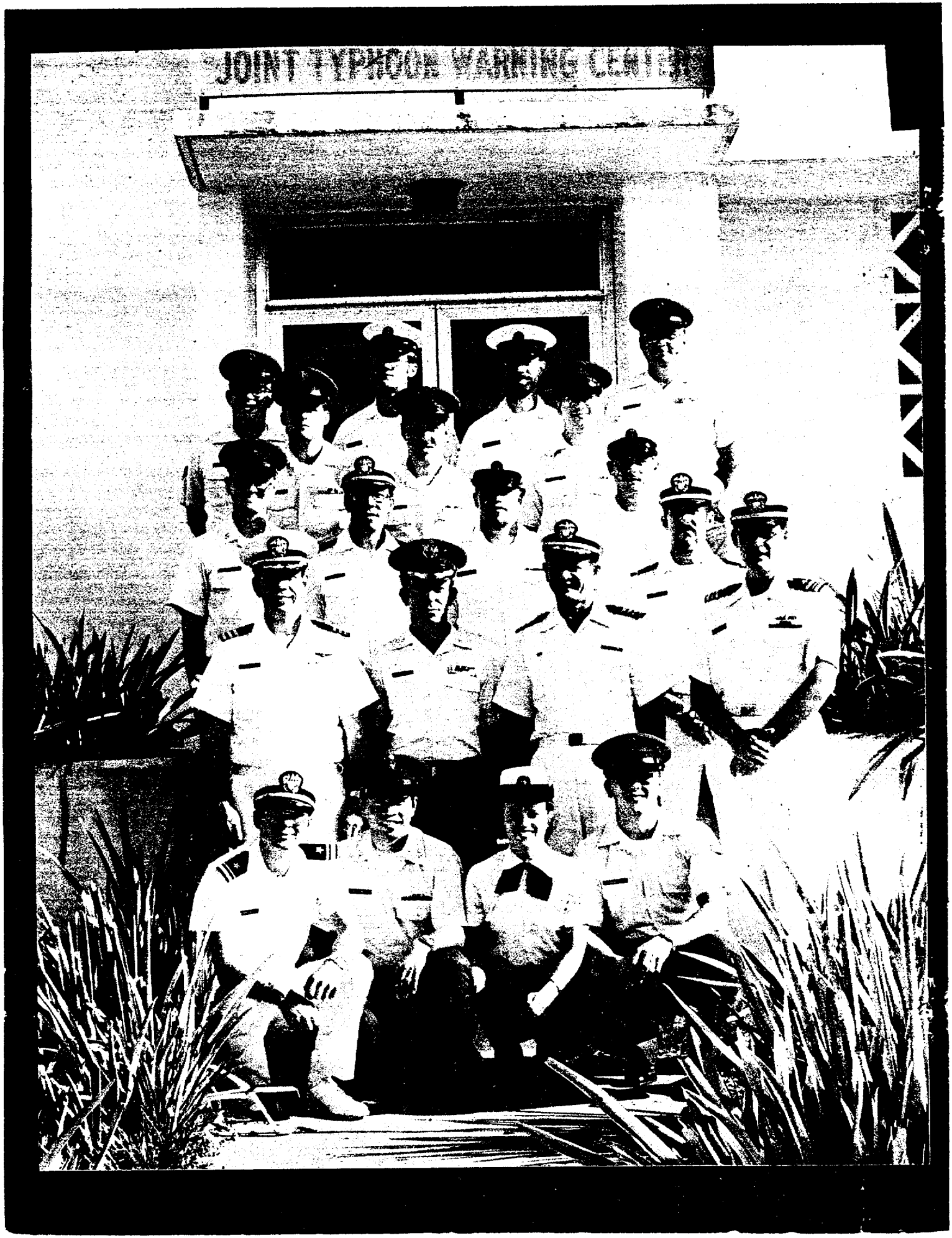
DD FORM 1 JAN 73 1473 EDITION OF 1 NOV 65 IS OBSOLETE
S/N 0102-014-6601

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE *(When Data Entered)*



Areas of Responsibility - Central and Eastern Pacific Hurricane Centers


JOINT TYPHOON WARNING CENTER