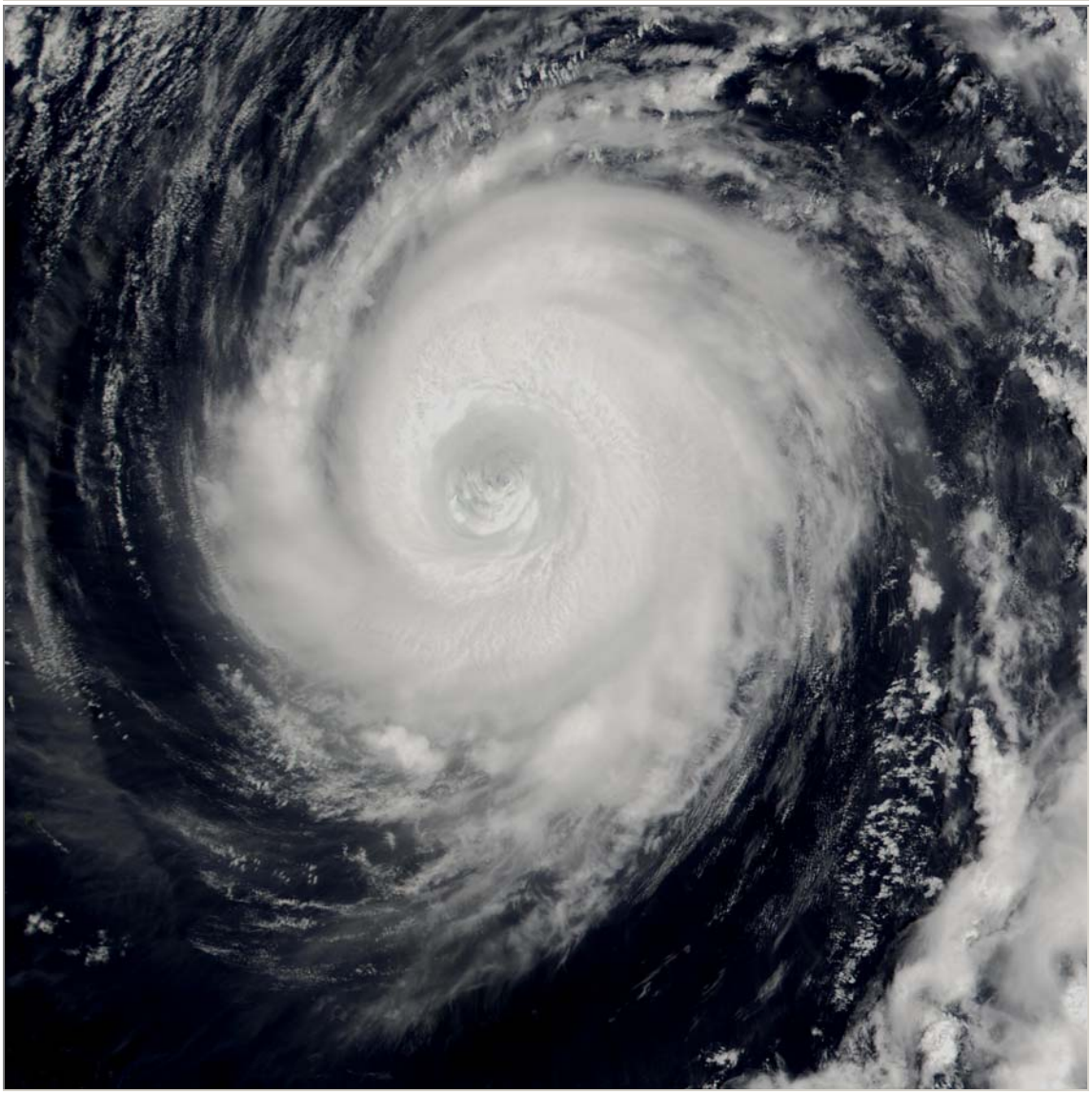
2007

Annual Tropical Cyclone Report

U.S. Naval Maritime Forecast Center/ Joint Typhoon Warning Center Pearl Harbor, Hawaii



MODIS visible image of Typhoon Man-Yi (04W) as it passed northeast of Iwo To, taken on 6 August 2007. Image courtesy of NASA Earth Observatory.

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Executive Summary

The Annual Tropical Cyclone Report is prepared by the staff of the Joint Typhoon Warning Center (JTWC), a combined Air Force/Navy organization operating under the command of the Commanding Officer, U.S. Naval Maritime Forecast Center/Joint Typhoon Warning Center (NMFC/JTWC), Pearl Harbor, Hawaii. JTWC was established in April 1959 when USCINCPAC directed USCINCPACFLT to provide a single tropical cyclone warning center for the western North Pacific region. The operations of JTWC are guided by USPACOM Instruction 0539.1.

This edition contains yet another modification to the content. While the standard tropical cyclone summaries by basin remain the core of the document, this year more detailed reviews of operationally or meteorologically significant tropical cyclones are included. The primary reason for this change is to document significant challenges and/or shortfalls in the tropical cyclone warning system to serve as a focal point for research and development efforts.

Year 2007 continued the below normal activity in the western North Pacific, with 27 tropical cyclones occurring compared to an average of 31. This below average activity trend is also apparent in the South Indian Ocean and South Pacific, with 24 cyclones compared to an average of 27. The North Indian Ocean was near normal with 6 cyclones compared to an average of 5. Of significance in the North Indian Ocean was TC 02A, Gonu, and TC 06B, Sidr. Gonu formed in the south central Arabian Sea and tracked west-northwestward into the Straights of Hormuz, reaching a peak intensity of 145 knots before making a rare landfall in Iran. Sidr, which formed in the central Bay of Bengal, had large societal impacts as it tracked northward and made landfall in Bangladesh after reaching peak intensity of 140 knots. Other significant cyclones include Super Typhoon 17W, Krosa, and Typhoon 23W, Hagabis. Krosa was significant because is underwent explosive intensification of 40 knots in 24 hours for two consecutive days, strengthening from a 25 knot tropical depression to a 100 knot typhoon. Hagabis was significant due to its unforecast turn to the east by JTWC and most of the numerical models.

Weather satellite data continued to be the mainstay for the tropical cyclone reconnaissance mission at JTWC. Satellite analysts exploited a wide variety of conventional and microwave satellite data to produce over 8,600 position and intensity estimates. The USAF primary weather satellite direct readout system, Mark IVB, was threatened to be terminated due to funding issues, but thanks to the hard work by satellite experts at JTWC to show significant warfighter impacts, the Director of Weather decided to continue the program.

Advances in the numerical models and the careful use of the multi-model consensus, CONW, contributed to another record forecast year, whereby JTWC met or exceeded the USCINCPAC goal of 50 nm (24 hours), 100 nm (48 hours), 150 nm (72 hours), 200 nm (96 hours), and 250 nm (120 hours). 2007, however, was not without challenges for JTWC with individual cyclones such as STY 17W (Krosa) and TY 23W (Hagibis) presenting significant forecast challenges, with either intricate tracks and/or rapid changes in intensity. Subsequently for 2008, while will we continue our efforts to improve our track forecasting, we will also refocus efforts to improve our intensity forecast capability. Intensity and structure continue to be a significant forecast challenges at other warning centers and was a major theme at the 62nd Interdepartmental Hurricane Conference in Charleston SC in March 2008.

Continuing dialogue and interaction with TC forecast support and research organizations such as the Fleet Numerical Meteorology and Oceanography Center, Naval Research Laboratory, Monterey, Naval Post Graduate School, and the Office of Naval Research for continued development of numerical TC models and forecast aids, including improvements to the Navy's version of the Geophysical Fluid Dynamics Lab (GFDL) mesoscale hurricane model (GFDN) and implementation of the Hurricane Weather and Research Forecast model (H-WRF) is expected to improve complicated scenario forecast capability.

Behind all these efforts are people - the dedicated men and women at JTWC, including the entire N6 Department for their outstanding IT support with special thanks to Mr. Angelo Alvarez for his tireless efforts to keep the computers, communications and numerous websites working. Thanks also to the Navy and Air Force personnel across the Pacific who support our reconnaissance and forecasting functions, the researchers and programmers helping develop our knowledge base and tool kit to better forecast tropical cyclones. Without an integrated effort, the challenging task of locating and forecasting the movement and structure of tropical cyclones would be considerably more difficult. That entire TC community will continue to focus all available science and technology on providing the best possible support to you, our customers, who stand in harm's way.

Special thanks to: Fleet Numerical Meteorology and Oceanography Center (FNMOC) for their operational support; the Naval Research Laboratory for its dedicated research; the Air Force Weather Agency (AFWA) and National Oceanic and Atmospheric Administration (NOAA) National Environmental Satellite, Data, and Information Service (NESDIS) for satellite support; for their high quality support; all the men and women of the ships and facilities ashore throughout the JTWC area of responsibility (AOR); Dr. John Knaff, Dr. Jeff Hawkins, Dr Mark DeMaria, and Chris Veldon for their continuing efforts to exploit remote sensing technologies in new and innovative ways; Mr. Charles R. "Buck" Sampson and Ann J. Schrader for their support and continued development of the Automated Tropical Cyclone Forecasting (ATCF) system.

Table of Contents

Chapter 1 Western North Pacific Ocean Tropical Cyclones

Section 1 Informational Tables

Table 1-1 is a summary of Tropical Cyclone activity in the western North Pacific Ocean (NWP) during the 2007 season. JTWC issued warnings on 26 cyclones and, during post-season reanalysis, added one more cyclone that was not warned on. Table 1-2 shows the monthly distribution of Tropical Cyclone activity summarized for 1959 - 2007 and Table 1-3 shows the monthly average occurrence of tropical cyclones separated into: (1) typhoons and (2) tropical storms and typhoons. Table 1-4 summarizes Tropical Cyclone Formation Alerts issued. The annual number of tropical cyclones of tropical storm strength or higher appears in Figure 1-1, while the number of tropical cyclones of Super Typhoon intensity appears in Figure 1-2. Figure 1-3 illustrates a monthly average number of cyclones based on intensity categories. Graphics showing 2007 tropical cyclone best tracks appear following Figure 1-3.

Table 1-1
WESTERN NORTH PACIFIC SIGNIFICANT TROPICAL CYCLONES FOR 2007
(01 JAN 2007 - 31 DEC 2007)

TC	NAME*	PERIOD**	WARNINGS ISSUED	EST MAX SFC WINDS KTS	MSLP (MB)***
TY 01W	Kong-Rey	31 Mar - 05 APR	19	110	940
STY 02W	Yutu	16 May - 22 May	23	130	925
TS 03W	Toraji	4 Jul - 05 Jul	6	35	996
TY 04W	Man-Yi	07 Jul - 15 Jul	32	125	929
TY 05W	Usagi	28 Jul - 03 Aug	26	120	933
TD 06W	-	02 Aug - 07 Aug	19	30	1000
TY 07W	Pabuk	05 Aug - 09 Aug	19	70	970
STY 09W	Sepat	12 Aug - 19 Aug	28	140	918
TY 10W	Fitow	28 Aug - 07 Sep	39	85	959
TS 11W	Danas	07 Sep - 11 Sep	16	60	977
TY 12W	Nari	12 Sep - 16 Sep	16	125	929
STY 13W	Wipha	15 Sep - 19 Sep	17	135	921
TD 14W	-	20 Sep - 21 Sep	5	30	1000
TS 15W	Francisco	23 Sep - 25 Sep	9	45	988
TY 16W	Lekima	30 Sep - 03 Oct	16	70	970
STY 17W	Krosa	01 Oct - 08 Oct	30	130	925
TS 18W	Lingling	12 Oct - 13 Oct	7	40	992
TS 19W	Kajiki	19 Oct - 21 Oct	11	115	936
TS 20W	Faxai	26 Oct - 27 Oct	5	40	992
TY 21W	Peipah	03 Nov - 09 Nov	26	75	966
TS 22W	Tapah	11 Nov - 12 Nov	6	35	996
TY 23W	Hagibis	18 Nov - 27 Nov	34	80	963
TY 24W	Mitag	20 Nov - 27 Nov	31	95	951
TD 25W	-	26 Nov - 27 Nov	7	25	1003
TD 26W	-	28 Nov - 28 Nov	2	25	1003
# TS 27W	Haiyan	-	-	50	981

* As Designated by RSMC Tokyo

** Dates are based on the issuance of JTWC warnings on system.

***MSLP converted from estimated maximum surface winds using Knaff-Zehr wind-pressure relationship.

JTWC never issued warnings on TS 27W, estimated maximum surface winds are based on post-season reanalysis. Refer to the individual storm summary in section 1.3 (Summary of Western North Pacific and North Indian Ocean Tropical Cyclones) for further details.

Table 1-1 Significant western North Pacific Tropical Cyclones, 2007.

Table 1-2
DISTRIBUTION OF WESTERN NORTH PACIFIC TROPICAL CYCLONES
FOR 1959 - 2007

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTALS
1959	0	1	1	1	0	1	3	8	9	3	2	2	31
	000	010	010	100	000	001	111	512	423	210	200	200	17 7 7
1960	1	0	1	1	1	3	3	9	5	4	1	1	30
	001	000	001	100	010	210	210	810	041	400	100	100	19 8 3
1961	1	1	1	1	4	6	5	7	6	7	2	1	42
	010	010	100	010	211	114	320	313	510	322	101	100	20 11 11
1962	0	1	0	1	3	0	8	8	7	5	4	2	39
	000	010	000	100	201	000	512	701	313	311	301	020	24 6 9
1963	0	0	1	1	0	4	5	4	4	6	0	3	28
	000	000	001	100	000	310	311	301	220	510	000	210	19 6 3
1964	0	0	0	0	3	2	8	8	8	7	6	2	44
	000	000	000	000	201	200	611	350	521	331	420	101	26 13 5
1965	2	2	1	1	2	4	6	7	9	3	2	1	40
	110	020	010	100	101	310	411	322	531	201	110	010	21 13 6
1966	0	0	0	1	2	1	4	9	10	4	5	2	38
	000	000	000	100	200	100	310	531	532	112	122	101	20 10 8
1967	1	0	2	1	1	1	8	10	8	4	4	1	41
	010	000	110	100	010	100	332	343	530	211	400	010	20 15 6
1968	0	1	0	1	0	4	3	8	4	6	4	0	31
	000	001	000	100	000	202	120	341	400	510	400	000	20 7 4
1969	1	0	1	1	0	0	3	3	6	5	2	1	23
	100	000	010	100	000	000	210	210	204	410	110	010	13 6 4
1970	0	1	0	0	0	2	3	7	4	6	4	0	27
	000	100	000	000	000	110	021	421	220	321	130	000	12 12 3
1971	1	0	1	2	5	2	8	5	7	4	2	0	37
	010	000	010	200	230	200	620	311	511	310	110	000	24 11 2
1972	1	0	1	0	0	4	5	5	6	5	2	3	32
	100	000	001	000	000	220	410	320	411	410	200	210	22 8 2
1973	0	0	0	0	0	0	7	6	3	4	3	0	23
	000	000	000	000	000	000	430	231	201	400	030	000	12 9 2
1974	1	0	1	1	1	4	5	7	5	4	4	2	35
	010	000	010	010	100	121	230	232	320	400	220	020	15 17 3
1975	1	0	0	1	0	0	1	6	5	6	3	2	25
	100	000	000	001	000	000	010	411	410	321	210	020	14 6 5
1976	1	1	0	2	2	2	4	4	5	0	2	2	25
	100	010	000	110	200	200	220	130	410	000	110	020	14 11 0
1977	0	0	1	0	1	1	4	2	5	4	2	1	21
	000	000	010	000	001	010	301	020	230	310	200	100	11 8 2
1978	1	0	0	1	0	3	4	8	4	7	4	0	32
	010	000	000	100	000	030	310	341	310	412	121	000	15 13 4
1979	1	0	1	1	2	0	5	4	6	3	2	3	28
	100	000	100	100	011	000	221	202	330	210	110	111	14 9 5
1980	0	0	1	1	4	1	5	3	7	4	1	1	28
	000	000	001	010	220	010	311	201	511	220	100	010	15 9 4
1981	0	0	1	1	1	2	5	8	4	2	3	2	29
	000	000	100	010	010	200	230	251	400	110	210	200	16 12 1
1982	0	0	3	0	1	3	4	5	6	4	1	1	28
	000	000	210	000	100	120	220	500	321	301	100	100	19 7 2

1983	0	0	0	0	0	1	3	6	3	5	5	2	25
	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 1 0	3 0 0	2 3 1	1 1 1	3 2 0	3 2 0	0 2 0	12 11 2
1984	0	0	0	0	0	2	5	7	4	8	3	1	30
	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 2 0	4 1 0	2 3 2	1 3 0	5 4 1	3 0 0	1 0 0	16 11 3
1985	2	0	0	0	1	3	1	7	5	5	1	2	27
	0 2 0	0 0 0	0 0 0	0 0 0	1 0 0	2 0 1	1 0 0	5 2 0	3 2 0	4 1 0	0 1 0	1 1 0	17 9 1
1986	0	1	0	1	2	2	2	5	2	5	4	3	27
	0 0 0	1 0 0	0 0 0	1 0 0	1 1 0	1 1 0	2 0 0	4 1 0	2 0 0	3 2 0	2 2 0	2 1 0	19 8 0
1987	1	0	0	1	0	2	4	4	7	2	3	1	25
	1 0 0	0 0 0	0 0 0	0 1 0	0 0 0	1 1 0	4 0 0	3 1 0	5 1 1	2 0 0	1 2 0	1 0 0	18 6 1
1988	1	0	0	0	1	3	2	5	8	4	2	1	27
	1 0 0	0 0 0	0 0 0	0 0 0	1 0 0	1 1 1	1 1 0	2 3 0	2 6 0	4 0 0	2 0 0	0 1 0	14 12 1
1989	1	0	0	1	2	2	6	8	4	6	3	2	35
	0 1 0	0 0 0	0 0 0	1 0 0	2 0 0	1 1 0	2 3 1	3 3 2	2 2 0	6 0 0	3 0 0	1 0 1	21 10 4
1990	1	0	0	1	2	4	4	5	5	5	4	1	32
	1 0 0	0 0 0	0 0 0	0 1 0	1 1 0	2 1 1	2 2 0	5 0 0	4 1 0	2 3 0	3 1 0	1 0 0	21 10 1
1991	0	0	2	1	1	1	4	8	6	3	6	0	32
	0 0 0	0 0 0	1 1 0	0 1 0	1 0 0	1 0 0	4 0 0	3 3 2	4 2 0	3 0 0	3 3 0	0 0 0	20 10 2
1992	1	1	0	0	0	3	4	8	5	6	5	0	33
	1 0 0	0 1 0	0 0 0	0 0 0	0 0 0	2 1 0	2 2 0	4 4 0	4 1 0	5 1 0	3 1 1	0 0 0	21 11 1
1993	0	0	2	2	1	2	5	8	5	6	4	3	38
	0 0 0	0 0 0	0 1 1	0 0 2	0 1 0	1 0 1	3 2 0	6 1 1	4 1 0	3 2 1	1 1 2	3 0 0	21 9 8
1994	1	0	1	0	2	2	9	9	8	7	0	2	41
	0 0 1	0 0 0	1 0 0	0 0 0	1 0 1	0 2 0	3 4 2	6 3 0	4 4 0	5 1 1	0 0 0	1 1 0	21 15 5
1995	1	0	0	0	1	2	3	7	7	8	2	3	34
	0 0 1	0 0 0	0 0 0	0 0 0	0 1 0	0 2 0	2 1 0	4 2 1	4 1 2	5 1 2	0 2 0	0 1 2	15 11 8
1996	1	1	0	2	2	0	7	10	7	5	6	3	43
	0 0 1	0 0 1	0 0 0	0 1 1	1 1 0	0 0 0	6 1 0	4 3 3	6 1 0	2 1 2	1 3 2	1 1 1	21 12 10
1997	1	0	0	2	3	3	4	8	4	6	1	1	33
	0 1 0	0 0 0	0 0 0	1 1 0	1 2 0	3 0 0	3 1 0	6 1 1	3 1 0	4 1 1	1 0 0	1 0 0	23 8 2
1998	0	0	0	0	0	0	3	3	8	6	3	4	27
	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 1 2	2 1 0	4 1 3	2 1 3	0 3 0	1 1 2	9 8 10
1999	1	1	0	3	0	1	5	9	6	2	3	3	34
	0 1 0	0 1 0	0 0 0	2 1 0	0 0 0	1 0 0	1 1 3	4 2 3	2 4 0	1 1 0	1 1 1	0 0 3	12 12 10
2000	0	0	0	0	4	0	8	9	6	3	3	1	34
	0 0 0	0 0 0	0 0 0	0 0 0	1 1 2	0 0 0	2 3 3	4 3 2	4 1 1	2 1 0	1 1 1	1 0 0	15 10 9
2001	0	1	0	1	1	2	6	7	5	3	3	4	33
	0 0 0	0 0 1	0 0 0	0 0 1	0 1 0	2 0 0	4 1 1	3 3 1	5 0 0	3 0 0	1 2 0	2 2 0	20 9 4
2002	1	1	1	1	2	3	6	8	3	5	1	1	33
	0 1 0	1 0 0	0 0 1	0 0 1	1 0 1	3 0 0	3 2 1	4 3 1	1 2 0	3 0 2	1 0 0	1 0 0	18 8 7
2003	1	0	0	1	3	2	2	5	3	6	3	1	27
	0 1 0	0 0 0	0 0 0	1 0 0	1 1 1	1 1 0	2 0 0	4 1 0	3 0 0	2 1 3	3 0 0	0 1 0	17 6 4
2004	0	1	1	1	3	5	2	9	3	3	2	2	32
	0 0 0	0 1 0	0 1 0	1 0 0	2 1 0	5 0 0	1 1 0	6 2 1	1 1 1	3 0 0	2 0 0	0 2 0	21 9 2
2005	1	0	1	1	0	1	4	6	5	3	2	1	25
	1 0 0	0 0 0	1 0 0	1 0 0	0 0 0	1 0 0	1 3 0	6 0 0	4 1 0	2 0 1	1 1 0	0 1 0	18 6 1
2006	0	0	1	0	1	1	3	8	5	4	2	2	27
	0 0 0	0 0 0	0 1 0	0 0 0	1 0 0	0 1 0	2 1 0	3 4 1	3 0 2	2 1 1	2 0 0	1 0 1	14 8 5
2007	0	0	1	0	1	0	3	6	5	5	6	0	27
	0 0 0	0 0 0	1 0 0	0 0 0	1 0 0	0 0 0	2 1 0	3 2 1	2 2 1	3 2 0	3 1 2	0 0 0	15 8 4
(1959 - 2007)													
Mean	0.6	0.3	0.6	0.8	1.3	2	4.5	6.7	5.6	4.7	2.9	1.6	31.4
Cases	28	15	28	39	66	97	221	326	272	228	142	77	1538

The criteria used in TABLE 1-2 are as follows:
1) If a tropical cyclone was first warned on during the last two days of a particular month and continued into the next month for longer than two days, the system was attributed to the second month.
2) If a tropical cyclone was warned on prior to the last two days of a month, it was attributed to the first month, regardless of how long the system lasted.
3) If a tropical cyclone began on the last day of the month and ended on the first day of the next month, that system was attributed to the first month. However, if a tropical cyclone began on the last day of the month and continued into the next month for only two days, it was attributed to the second month.

Table 1-2 Monthly distribution of Tropical Cyclones by year 1959-2007.

TABLE 1-2 Legend		
Total month/year		
GTE 64 knots (Typhoon)	34 to 63 knots (Tropical Storm)	LTE 33 knots (Tropical Depression)

TABLE 1-3 WESTERN NORTH PACIFIC TROPICAL CYCLONES													
TYPHOONS (1945 - 1958)													
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTALS
MEAN	0.4	0.1	0.3	0.4	0.7	1.1	2	2.9	3.2	2.4	2	0.9	24.4
CASES	5	1	4	5	10	15	28	41	45	34	28	12	228
TYPHOONS (1959 - 2007)													
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTALS
MEAN	0.2	0.1	0.2	0.4	0.7	1.1	2.5	3.4	3.2	3.0	1.6	0.7	17.6
CASES	11	3	10	19	34	54	124	169	159	148	78	34	0
TROPICAL STORMS AND TYPHOONS (1945 - 1958)													
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTALS
MEAN	0.4	0.1	0.5	0.5	0.8	1.6	2.9	4	4.2	3.3	2.7	1.2	22.2
CASES	6	2	7	8	11	22	44	60	64	49	41	18	332
TROPICAL STORMS AND TYPHOONS (1959 - 2007)													
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTALS
MEAN	0.4	0.2	0.4	0.6	1	1.5	3.8	5.1	4.6	3.8	2.4	1.1	25.7
CASES	22	9	20	30	49	75	185	252	227	185	120	56	1259

Table 1-3 Average occurrences of Tropical Cyclones in the western North Pacific.

TABLE 1-4 TROPICAL CYCLONE FORMATION ALERTS FOR THE WESTERN NORTH PACIFIC OCEAN 1976 - 2007					
YEAR	INITIAL TCFAS	TROPICAL CYCLONES WITH TCFAS	TOTAL TROPICAL CYCLONES	PROBABILITY OF TCFA WITHOUT WARNING*	PROBABILITY OF TCFA BEFORE WARNING
1976	34	25	25	36%	100%
1977	26	20	21	29%	95%
1978	32	27	32	16%	84%
1979	27	23	28	14%	82%
1980	37	28	28	32%	100%
1981	29	28	29	3%	97%
1982	36	26	28	36%	93%
1983	31	25	25	24%	100%
1984	37	30	30	23%	100%
1985	39	26	27	48%	96%
1986	38	27	27	41%	100%
1987	31	24	25	28%	96%
1988	33	26	27	26%	96%
1989	51	32	35	54%	91%
1990	33	30	31	10%	97%
1991	37	29	31	26%	94%
1992	36	32	32	13%	100%
1993	50	35	38	39%	92%
1994	50	40	40	25%	100%
1995	54	33	35	60%	94%
1996	41	39	43	5%	91%
1997	36	30	33	18%	91%
1998	38	18	27	74%	67%
1999	39	29	33	30%	88%
2000	40	31	34	26%	91%
2001	34	28	33	18%	82%
2002	39	31	33	24%	94%
2003	31	27	27	15%	100%
2004	35	32	32	9%	100%
2005	26	25	25	4%	100%
2006	23	22	26	4%	85%
2007	27	26	27	4%	96%
MEAN	35.9	28.3	30.2	25.4%	93.5%
CASES	1150	904	967		
* Percentage of initial TCFAs not followed by warnings.					

Table 1-4 Tropical Cyclone Formation Alerts for the western North Pacific, 1976-2007

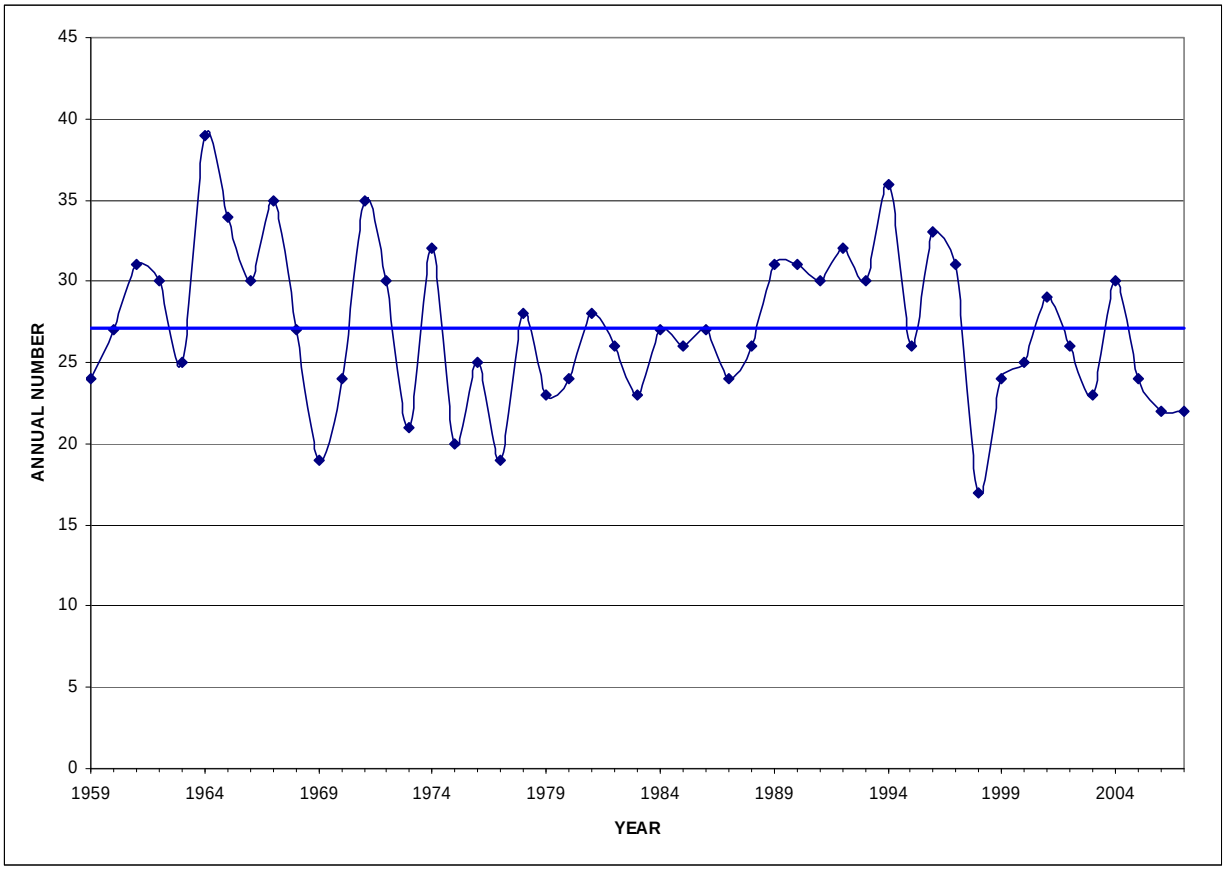


Figure 1-1 Annual number of Tropical Cyclones of Tropical Storm intensity or greater.

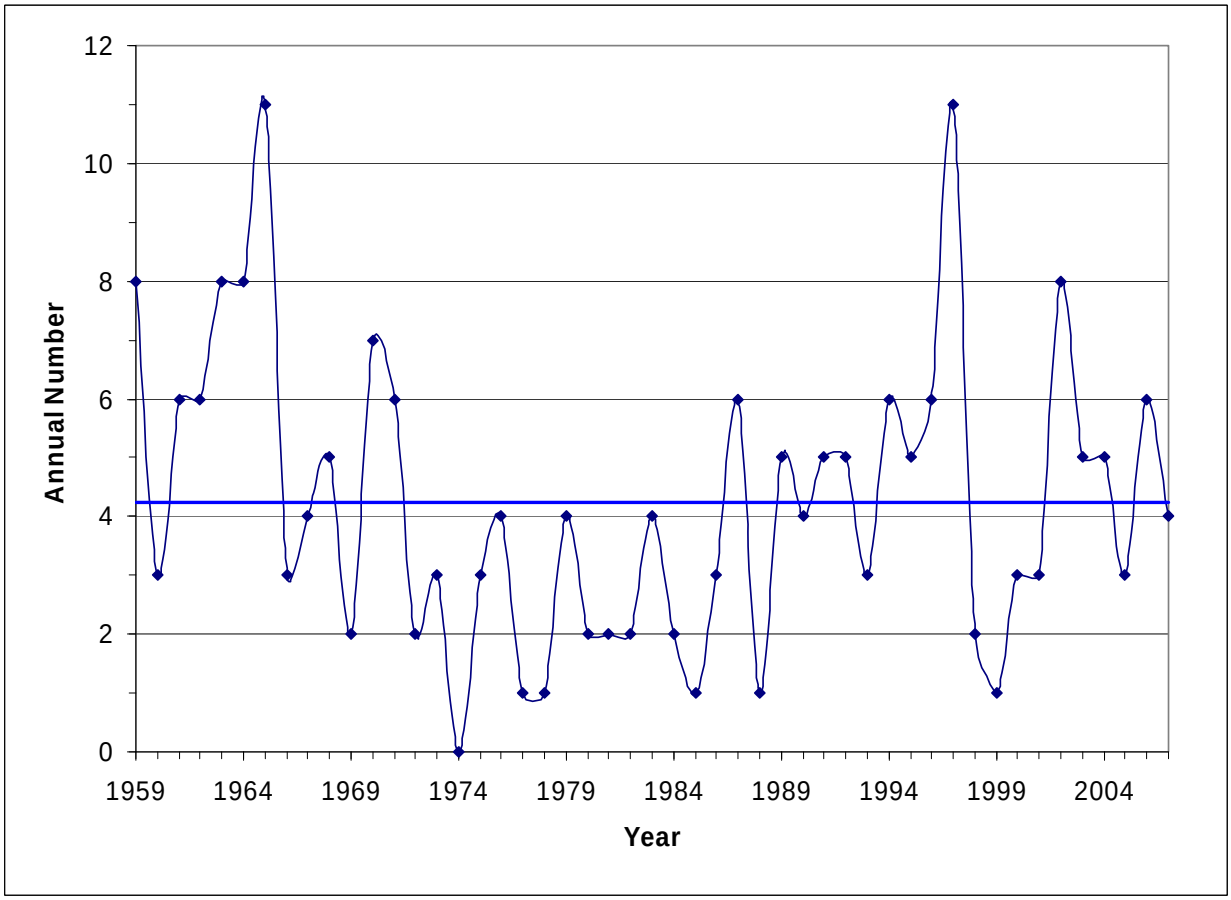


Figure 1-2 Annual number of Tropical Cyclones of Super Typhoon intensity.

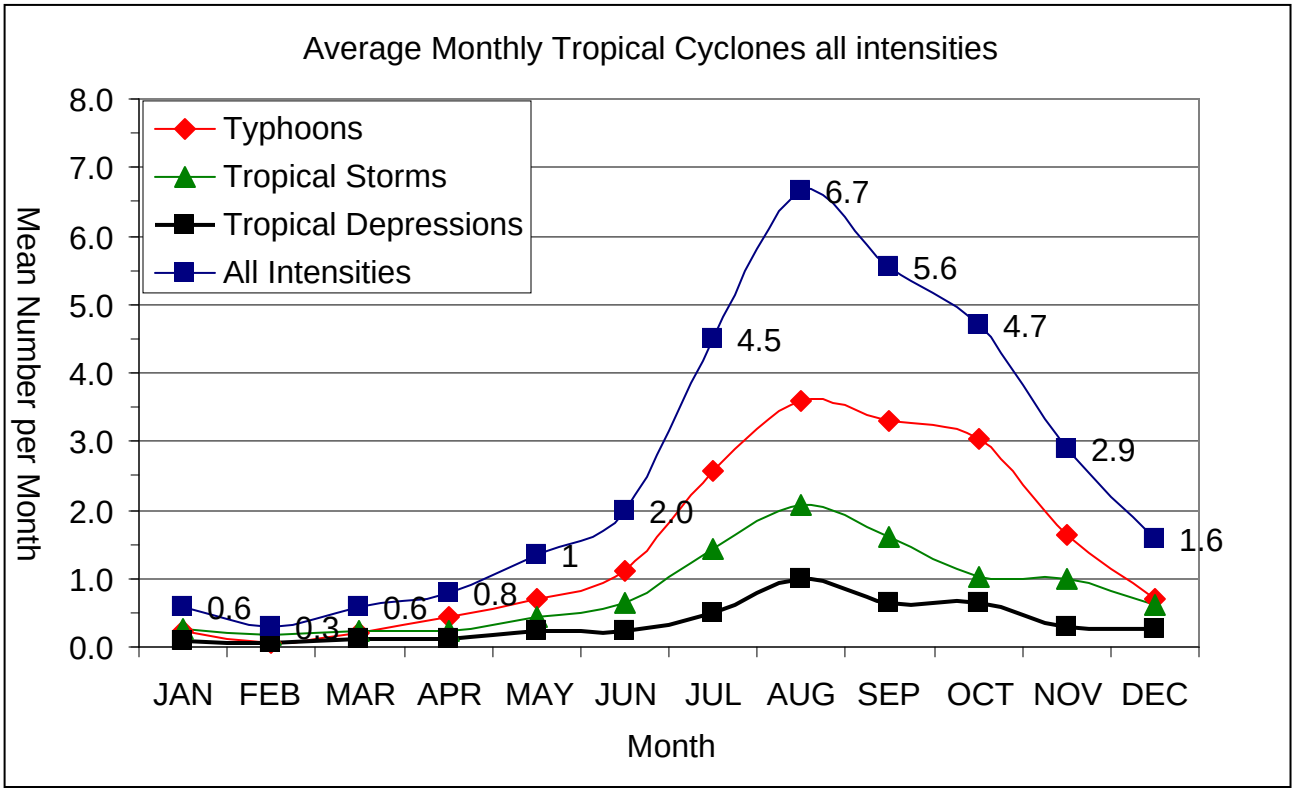


Figure 1-3 Average monthly Tropical Cyclones of all strength, 1959 - 2007.

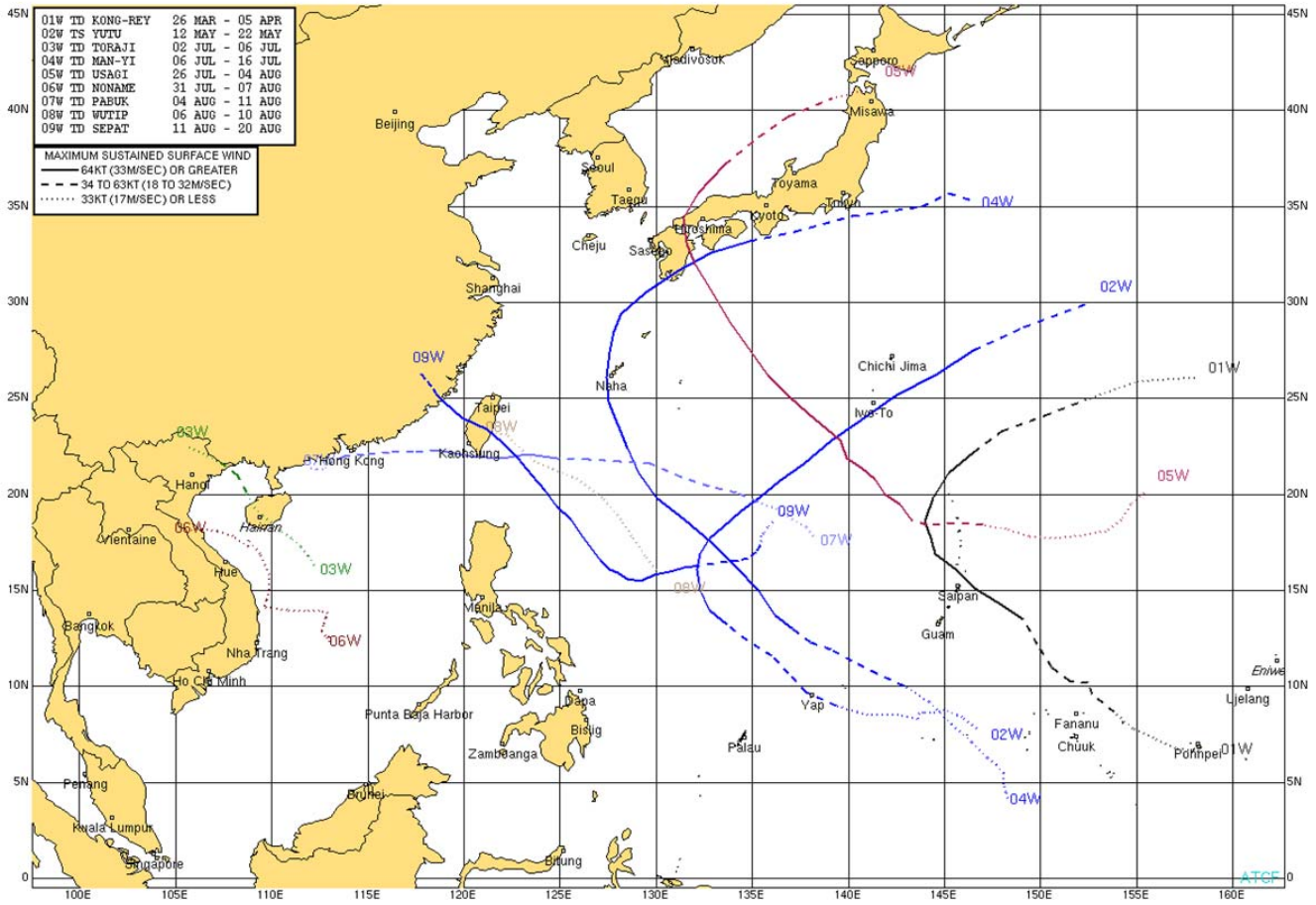


Figure 1-4 Western North Pacific Tropical Cyclones 26 Mar - 20 Aug

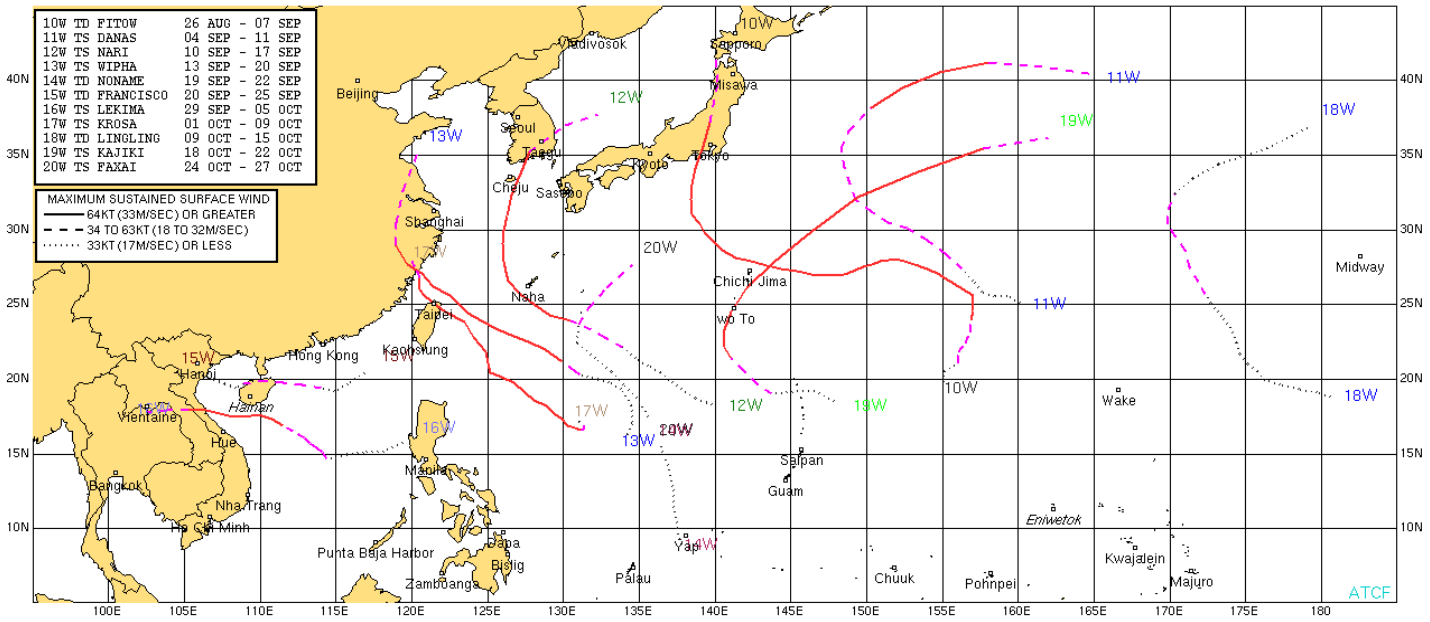


Figure 1-5 Western North Pacific Tropical Cyclones 26 Aug - 27 Oct

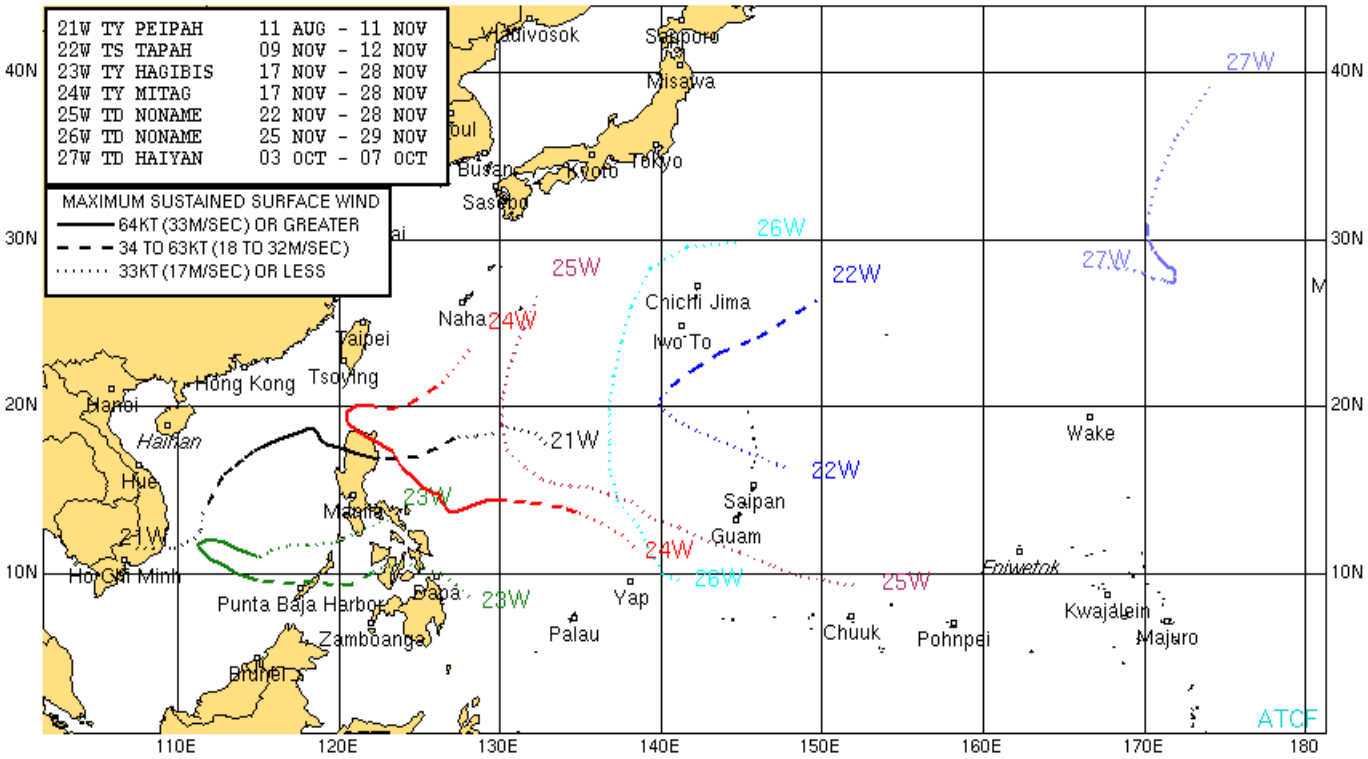


Figure 1-6 Western North Pacific Tropical Cyclones 02 Nov - 29 Nov

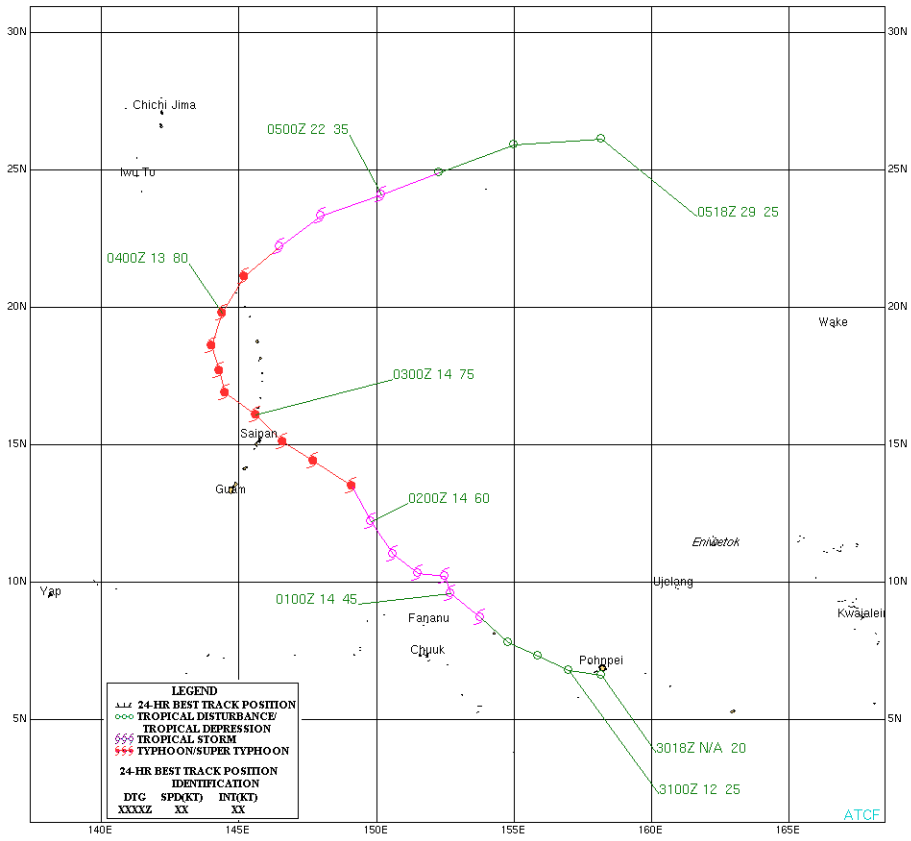
Section 2 Cyclone Summaries

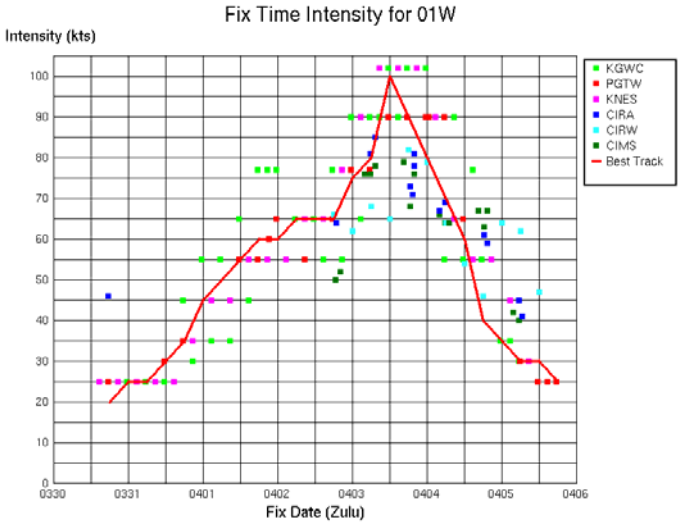
This section presents a synopsis of each cyclone that occurred during 2007 in the western North Pacific Ocean. Each cyclone is presented, with the number and basin identifier used by JTWC, along with the RSMC Tokyo assigned name. Dates are also listed when JTWC first designated the various stages of development; as an area of interest (Poor classification), increased potential for development (Fair classification) and development occurring/TC expected (Good classification). Furthermore, first Tropical Cyclone Formation Alert (TCFA), and the initial and final warnings dates are also presented with the number of warnings issued by JTWC. Landfall over major landmasses with approximate locations and times are presented as well.

The JTWC post-event reanalysis best track is also provided for each cyclone. Data included on the best track are position and intensity noted with cyclone symbols and color coded track. Best track positions are marked by date at 0000 UTC, as well as the beginning and end points. Best track position labels include the date-time, track speed in knots, and maximum wind speed in knots. A graph of best track intensity and fix intensity versus time is presented. The fix plots on this graph are color coded by fixing agency.

TYPHOON 01W (Kong-Rey)

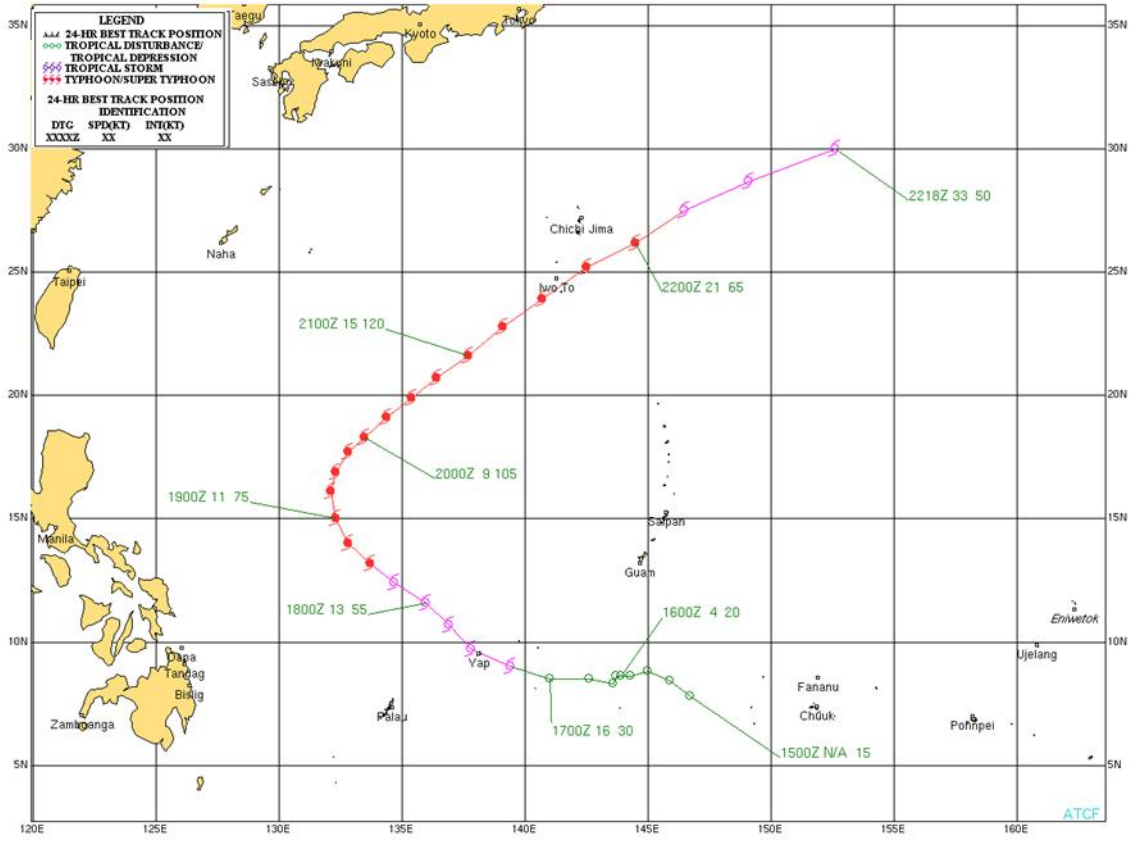
ISSUED POOR:	30 March 1400Z
ISSUED FAIR:	30 March 2300Z
FIRST TCFA:	31 March 0600Z
FIRST WARNING:	31 March 1200Z
LAST WARNING:	05 April 0000Z
LANDFALL:	None.
MAX INTENSITY:	100 knots
NUMBER OF WARNINGS:	19

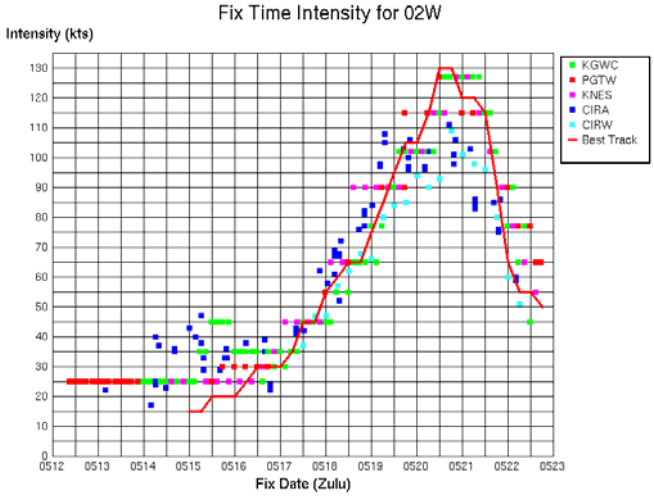




SUPER TYPHOON 02W (Yutu)

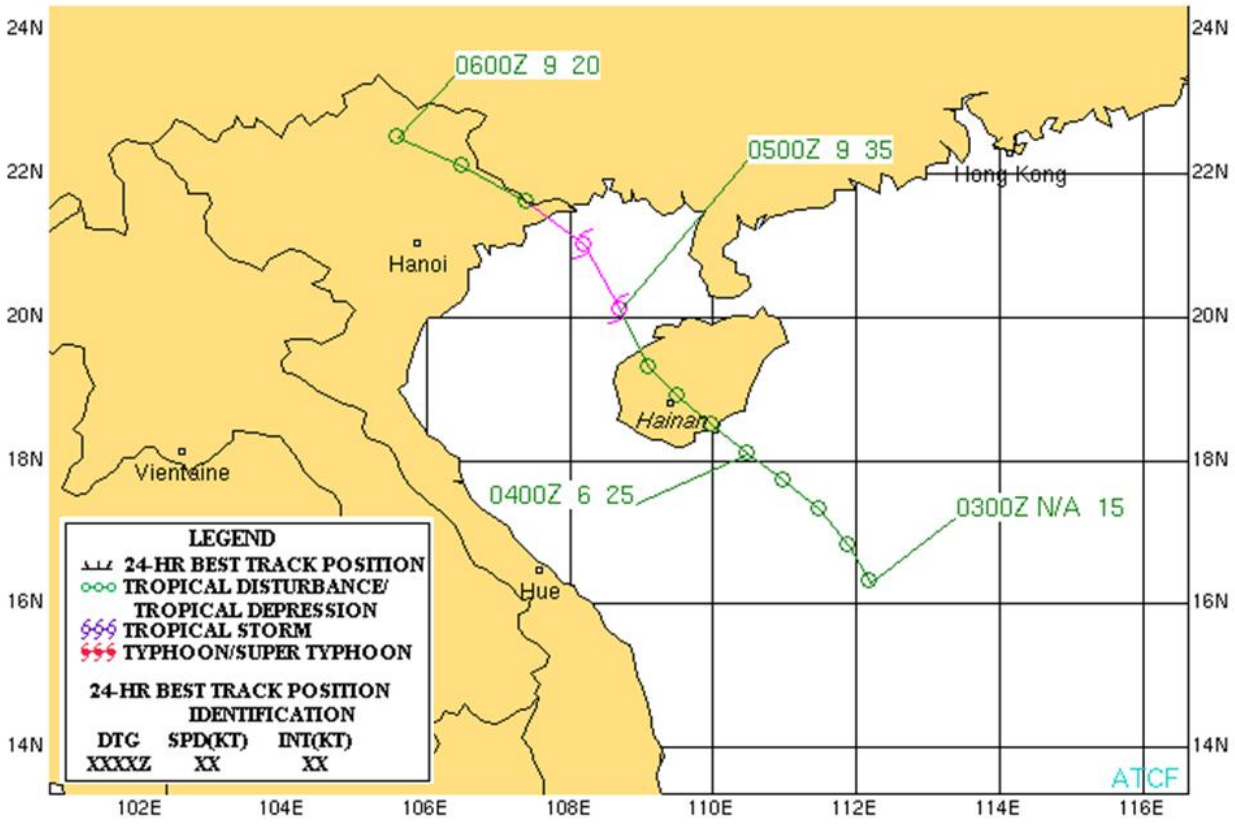
ISSUED POOR:	13 May 1300Z
ISSUED FAIR:	14 May 0300Z
FIRST TCFA:	15 May 1030Z
FIRST WARNING:	16 May 1200Z
LAST WARNING:	22 May 1200Z
LANDFALL:	None.
MAX INTENSITY:	130 knots
NUMBER OF WARNINGS:	23

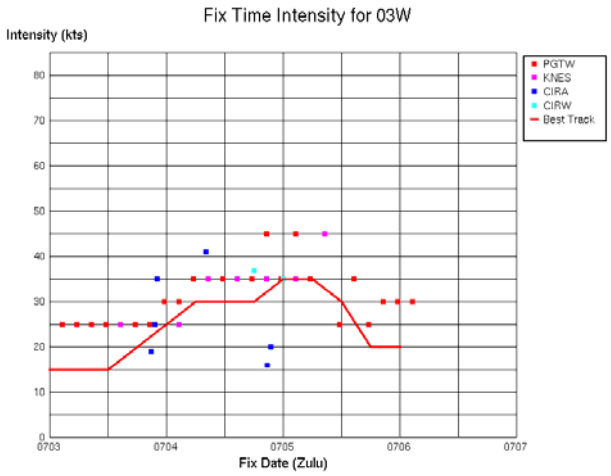




TROPICAL DEPRESSION 03W (Toraji)

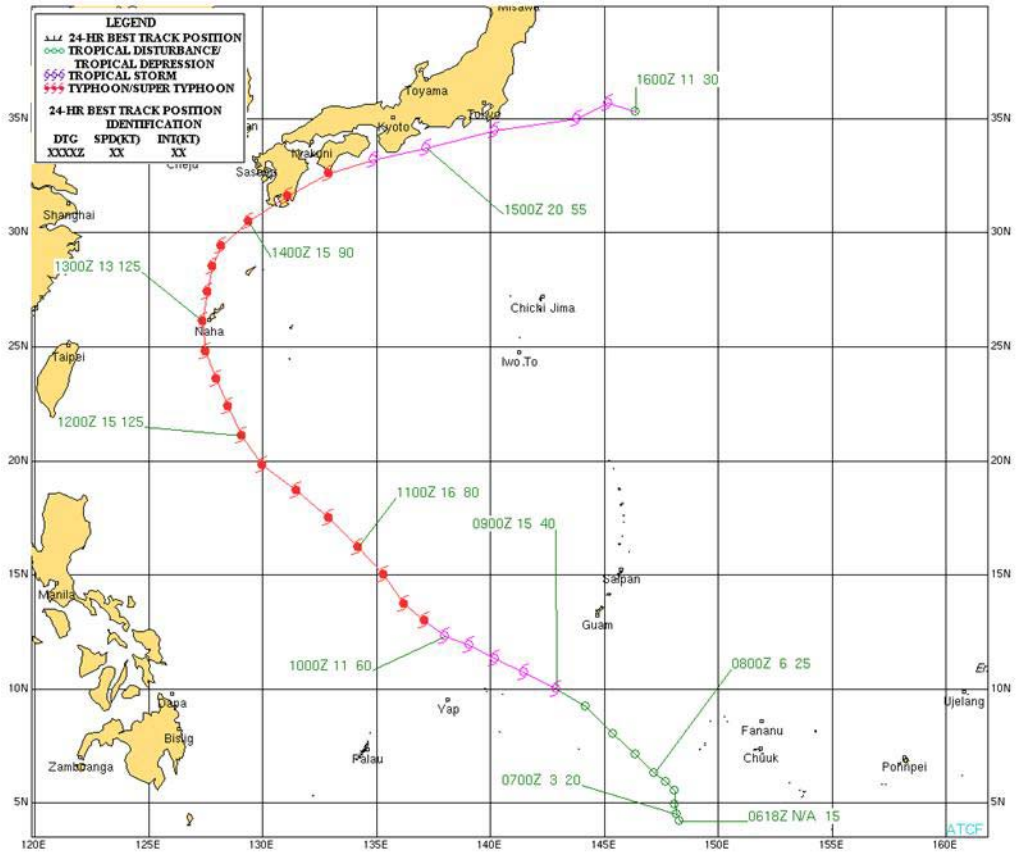
ISSUED POOR:	03 July 0100Z
ISSUED FAIR:	03 July 1900Z
FIRST TCFA:	04 July 0130Z
FIRST WARNING:	04 July 0600Z
LAST WARNING:	05 July 1200Z
LANDFALL:	Hainan Island, near 04 July 0600Z, near Cam Pha, Vietnam near 05 July 1200Z
MAX INTENSITY:	35 knots
NUMBER OF WARNINGS:	6

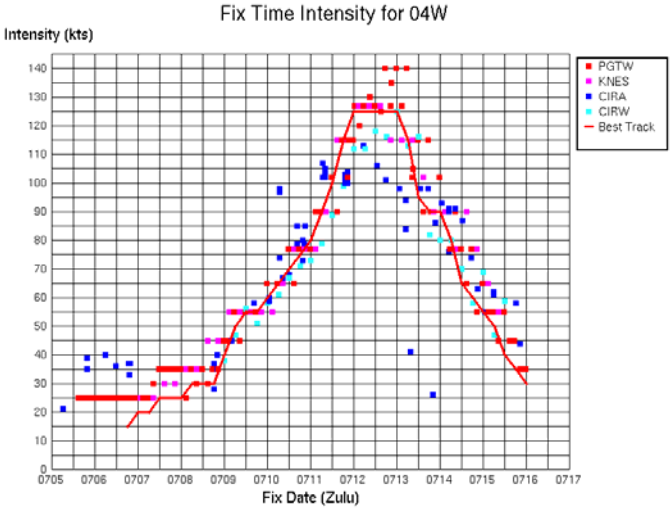




TYPHOON 04W (Man-yi)

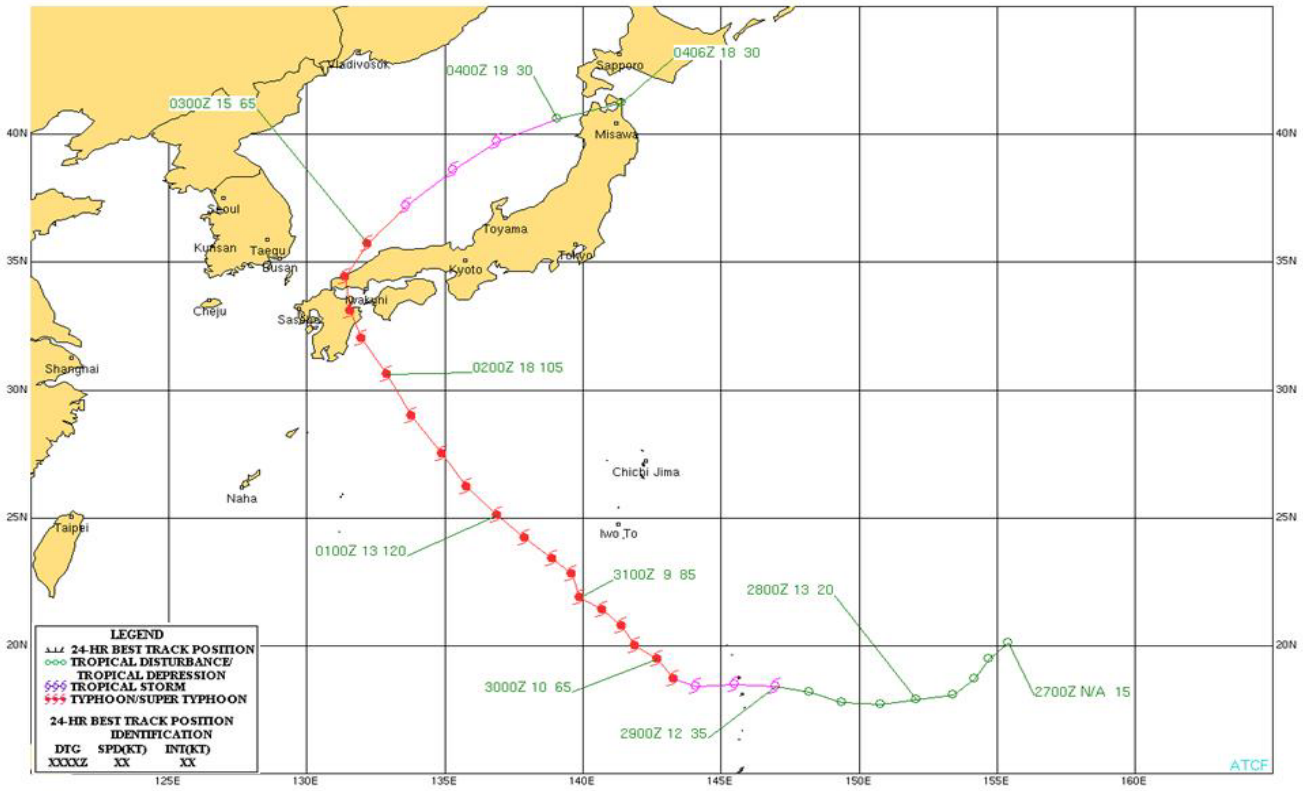
ISSUED POOR:	05 July 1600Z
ISSUED FAIR:	05 July 1930Z
FIRST TCFA:	07 July 0200Z
FIRST WARNING:	07 July 1200Z
LAST WARNING:	15 July 0600Z
LANDFALL:	Makurazaki, Japan, near 14 July 0600Z
MAX INTENSITY:	125 knots
NUMBER OF WARNINGS:	32

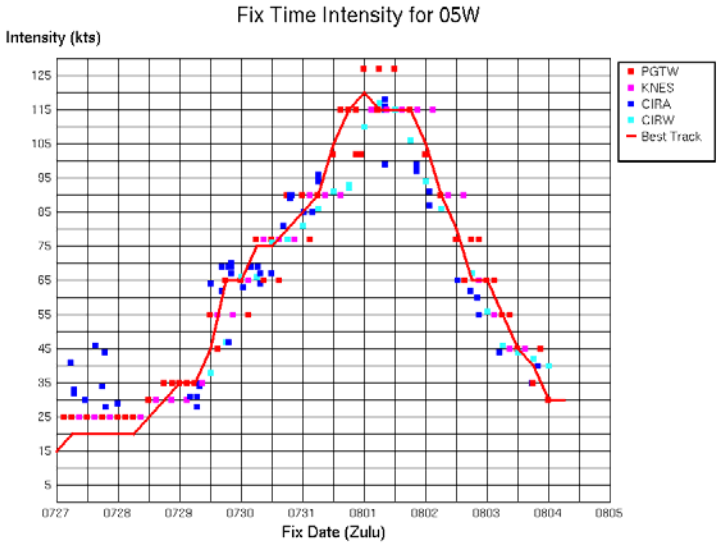




TYPHOON 05W (Usagi)

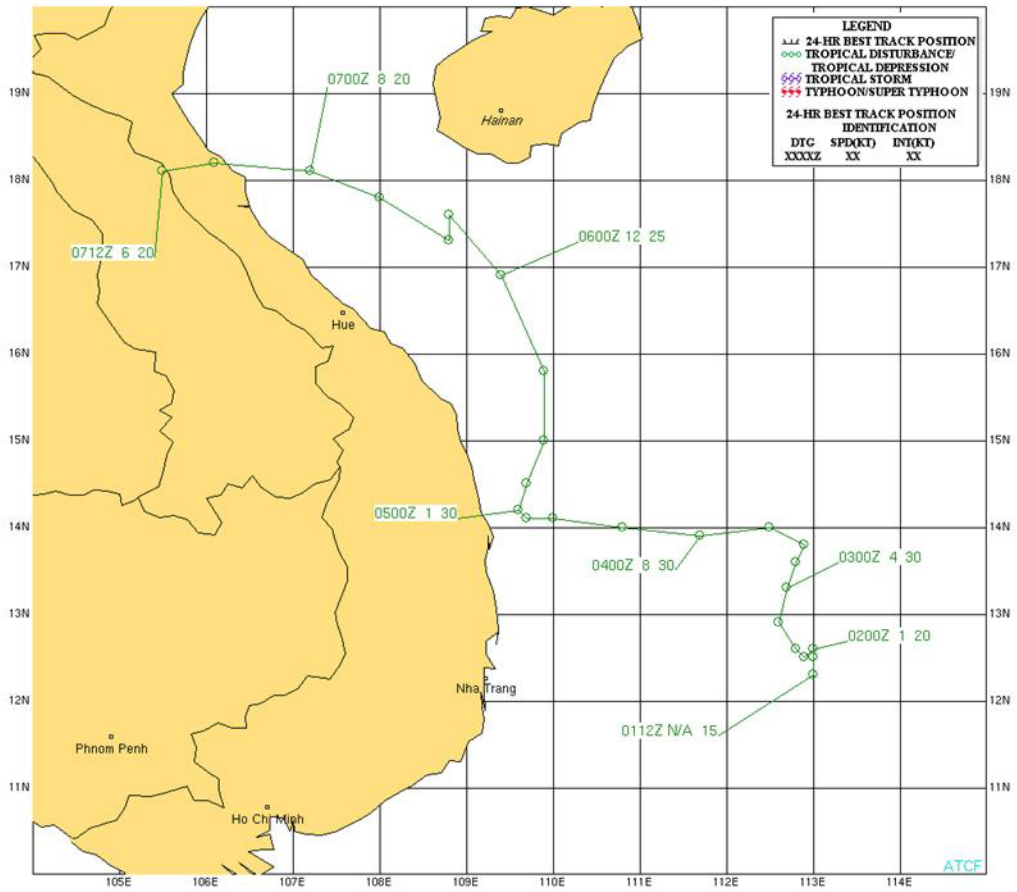
ISSUED POOR:	None.
ISSUED FAIR:	27 July 0600Z
FIRST TCFA:	27 July 1430Z
FIRST WARNING:	28 July 1200Z
LAST WARNING:	03 Aug 1800Z
LANDFALL:	Near Nobeoka, Japan 02 Aug 0600Z, near Ube, Japan 02 Aug 1800Z
MAX INTENSITY:	120 knots
NUMBER OF WARNINGS:	26

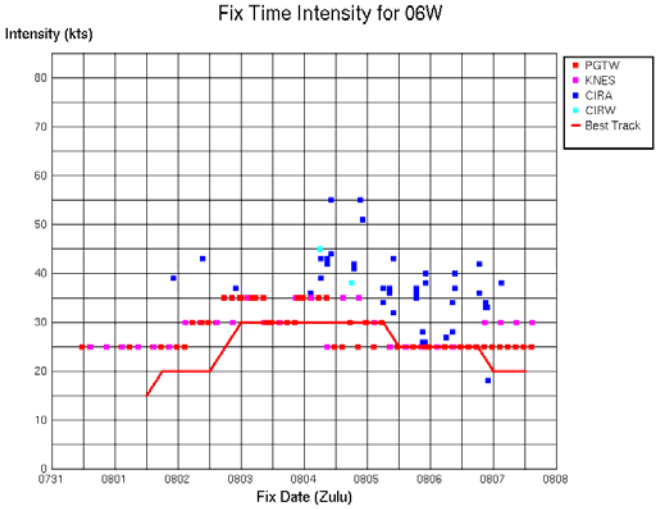




TROPICAL DEPRESSION 06W

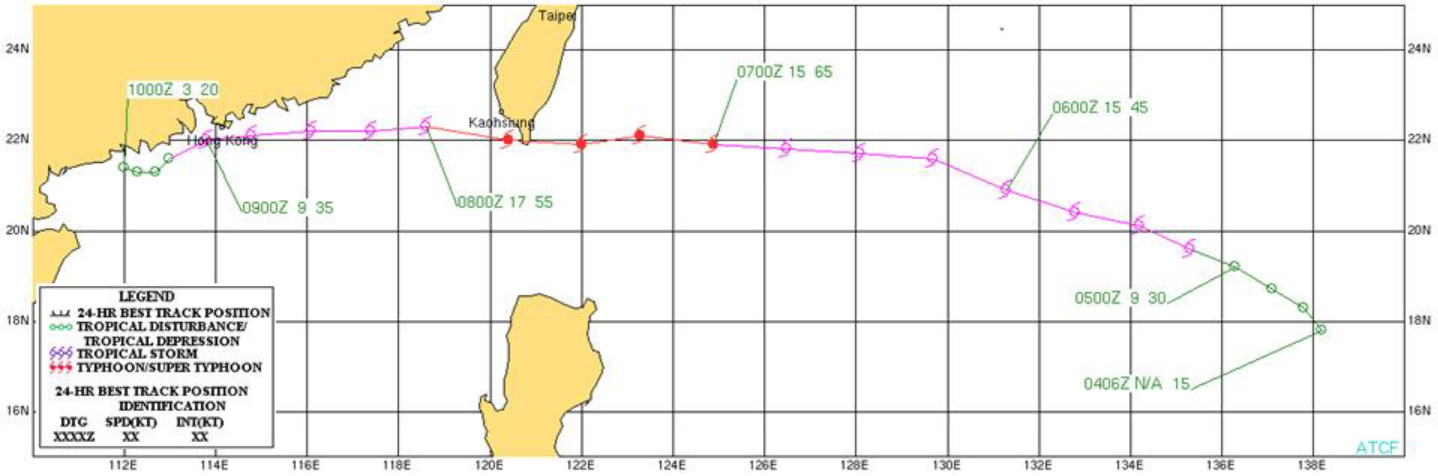
ISSUED POOR:	01 Aug 0000Z
ISSUED FAIR:	01 Aug 2330Z
FIRST TCFA:	02 Aug 0400Z
FIRST WARNING:	02 Aug 1800Z
LAST WARNING:	07 Aug 0600Z
LANDFALL:	Northern Vietnam 07 Aug near 0600Z
MAX INTENSITY:	30 knots
NUMBER OF WARNINGS:	19

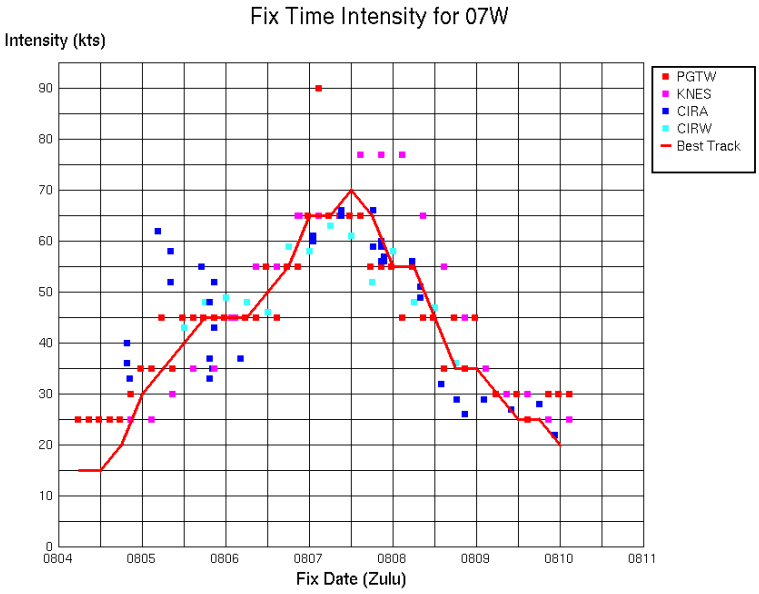




TYPHOON 07W (Pabuk)

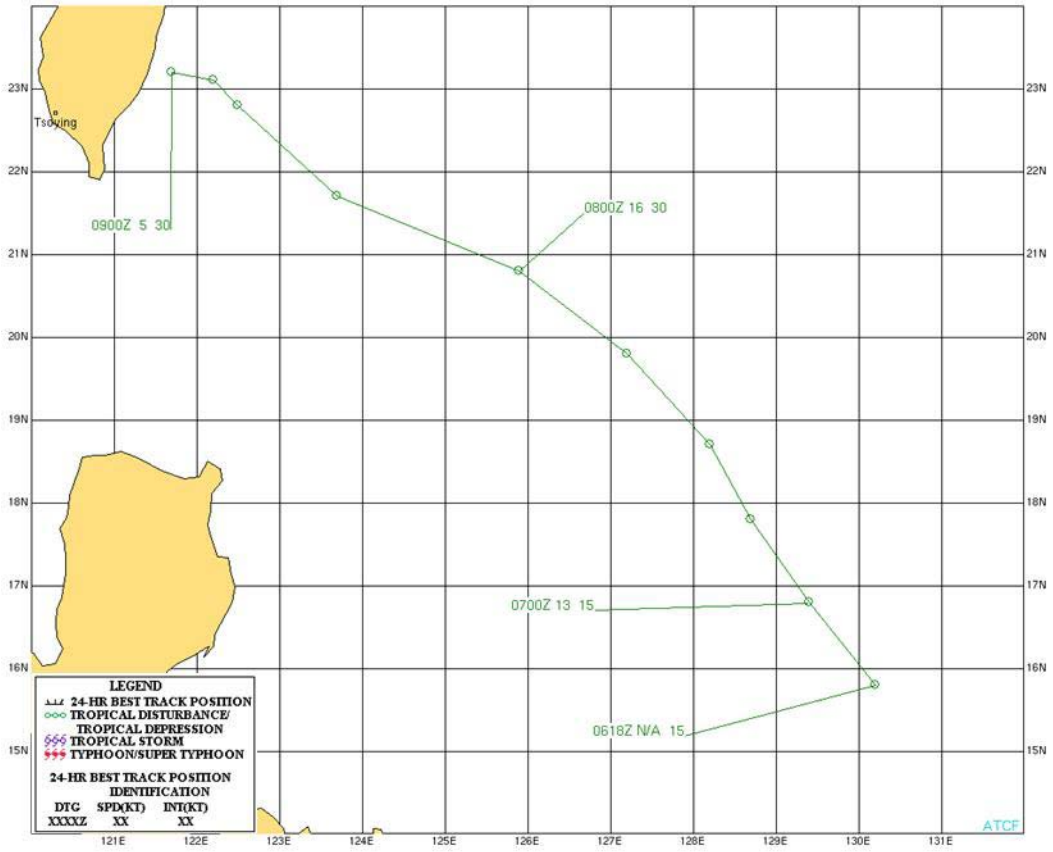
ISSUED POOR:	04 Aug 0800Z
ISSUED FAIR:	04 Aug 2100Z
FIRST TCFA:	05 Aug 0300Z
FIRST WARNING:	05 Aug 0600Z
LAST WARNING:	09 Aug 1800Z
LANDFALL:	Southern Taiwan, 07 Aug near 1800Z
MAX INTENSITY:	70 knots
NUMBER OF WARNINGS:	19

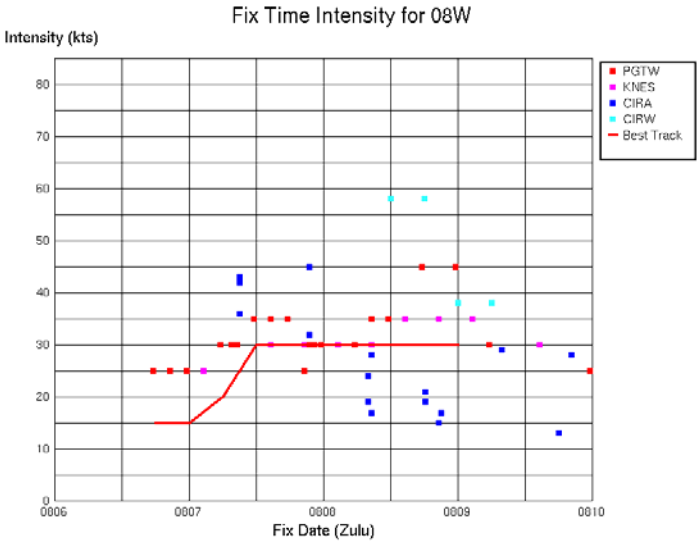




TROPICAL DEPRESSION 08W (Wutip)

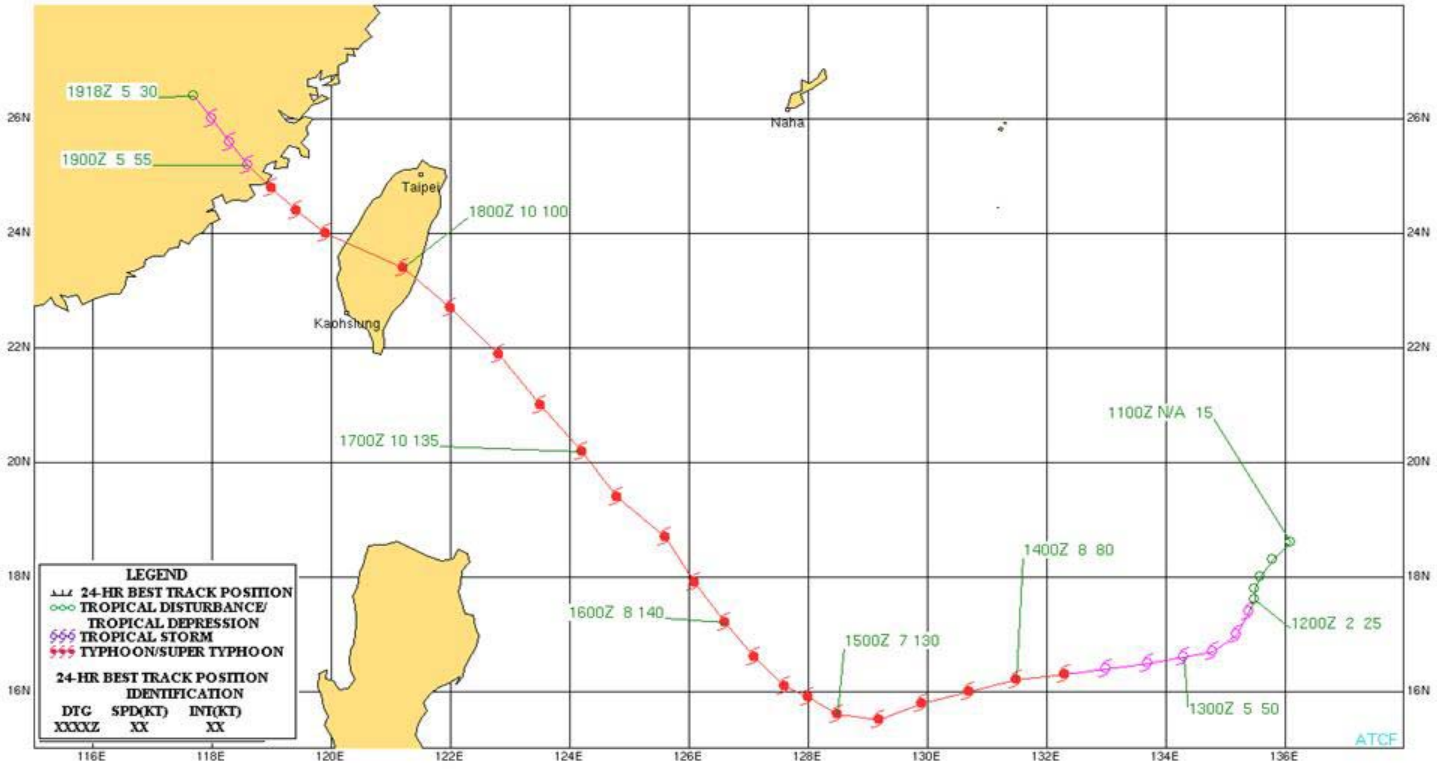
ISSUED POOR:	06 Aug 2200Z
ISSUED FAIR:	07 Aug 0600Z
FIRST TCFA:	07 Aug 0900Z
FIRST WARNING:	07 Aug 1200Z
LAST WARNING:	09 Aug 1800Z
LANDFALL:	None.
MAX INTENSITY:	30 knots
NUMBER OF WARNINGS:	10

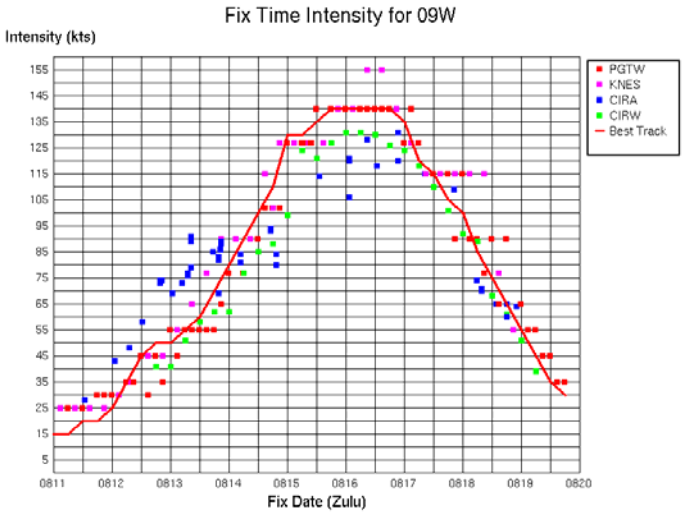




SUPER TYPHOON 09W (Sepat)

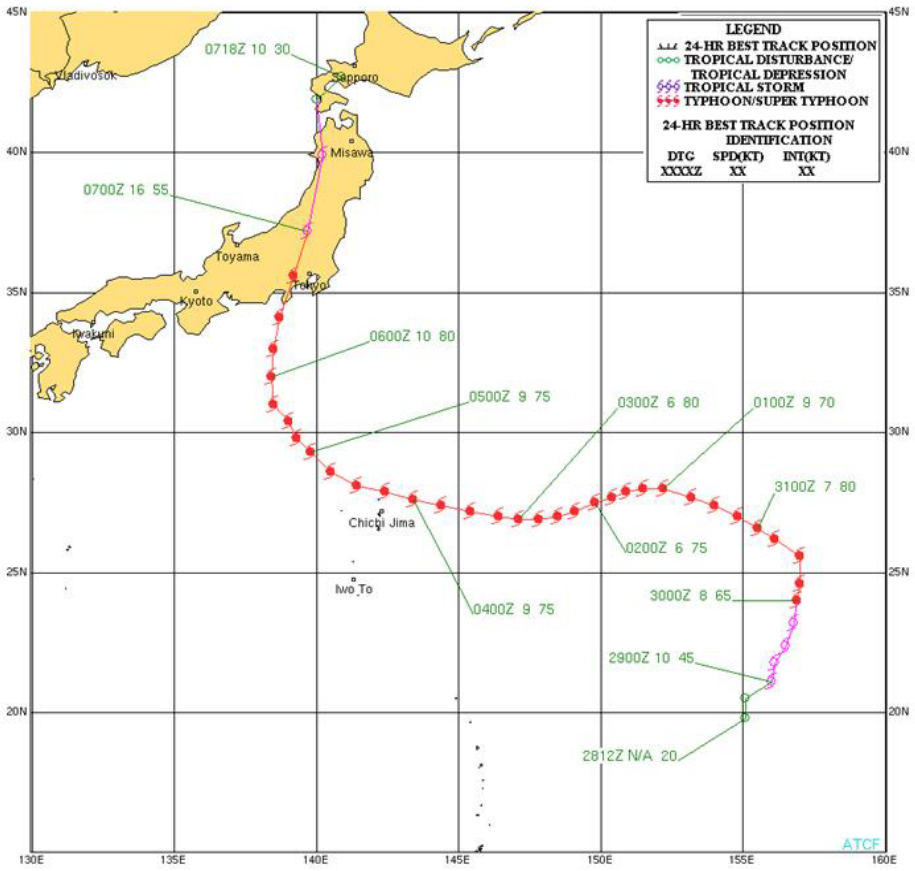
ISSUED POOR:	11 Aug 0600Z
ISSUED FAIR:	11 Aug 1330Z
FIRST TCFA:	11 Aug 2000Z
FIRST WARNING:	12 Aug 0600Z
LAST WARNING:	19 Aug 0000Z
LANDFALL:	Near Kuanshan, Taiwan 17 Aug near 1800Z and near Quanzhou, China 18 Aug near 1800Z
MAX INTENSITY:	140 knots
NUMBER OF WARNINGS:	28

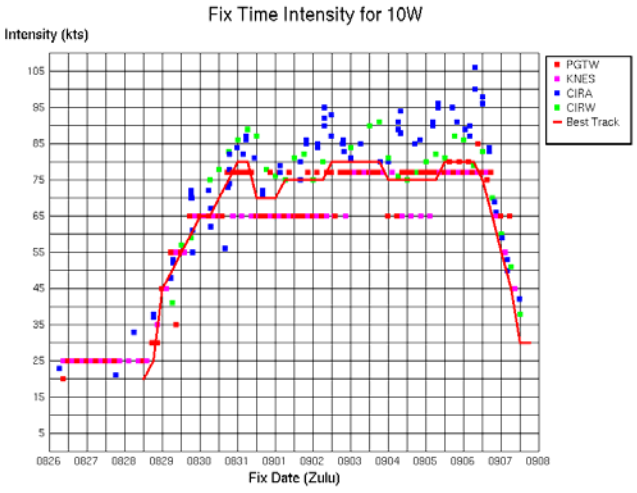




TYPHOON 10W (Fitow)

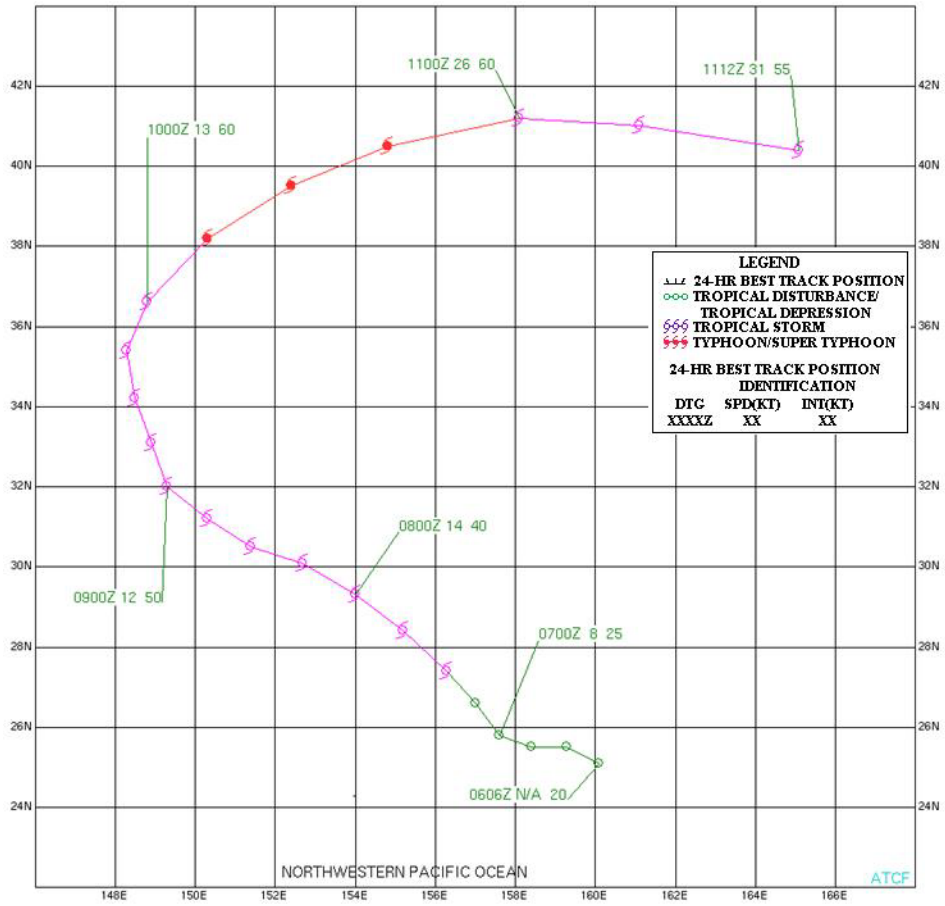
ISSUED POOR:	27 Aug 1730Z
ISSUED FAIR:	28 Aug 1330Z
FIRST TCFA:	28 Aug 1630Z
FIRST WARNING:	28 Aug 1800Z
LAST WARNING:	07 Sep 0600Z
LANDFALL:	Near Numazu, Japan 06 Sep near 1200Z, near Otobe, Japan 07 Sep near 1200Z
MAX INTENSITY:	80 knots
NUMBER OF WARNINGS:	39

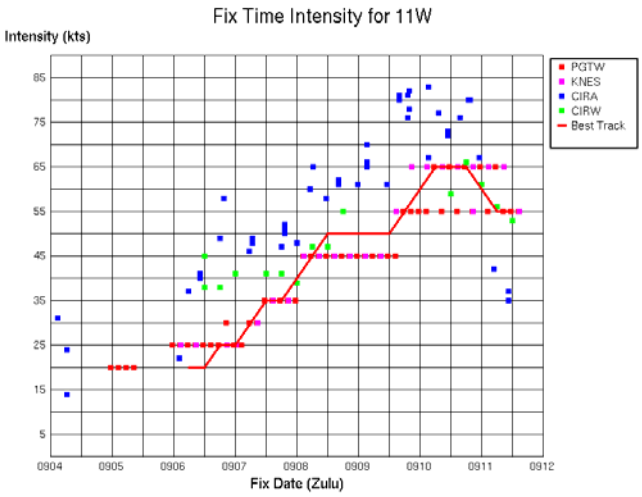




TYPHOON 11W (Danas)

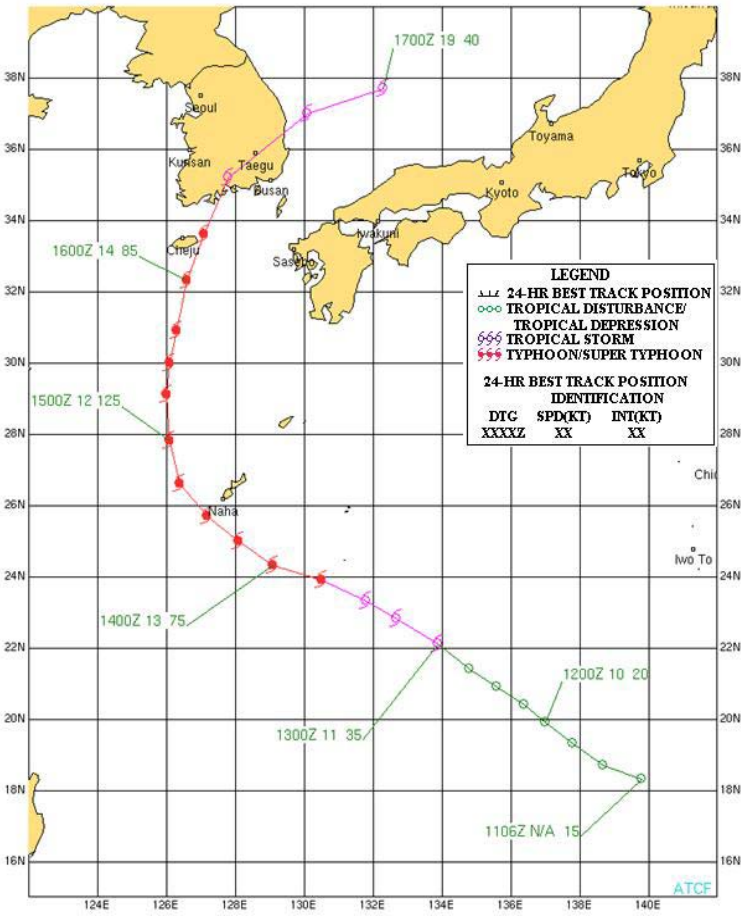
ISSUED POOR:	04 Sep 0600Z
ISSUED FAIR:	06 Sep 0030Z
FIRST TCFA:	06 Sep 2230Z
FIRST WARNING:	07 Sep 0600Z
LAST WARNING:	11 Sep 0000Z
LANDFALL:	None.
MAX INTENSITY:	65 knots
NUMBER OF WARNINGS:	16

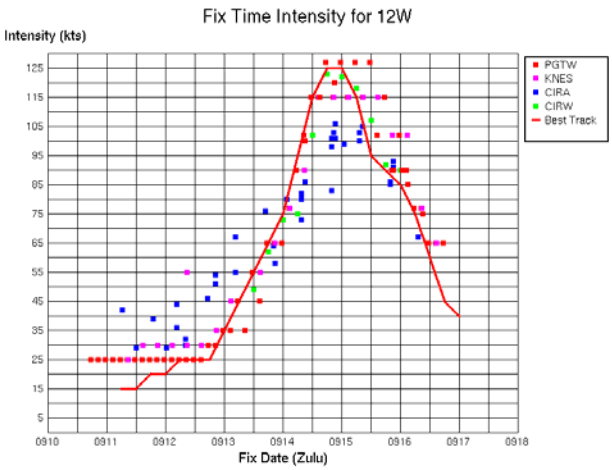




TYPHOON 12W (Nari)

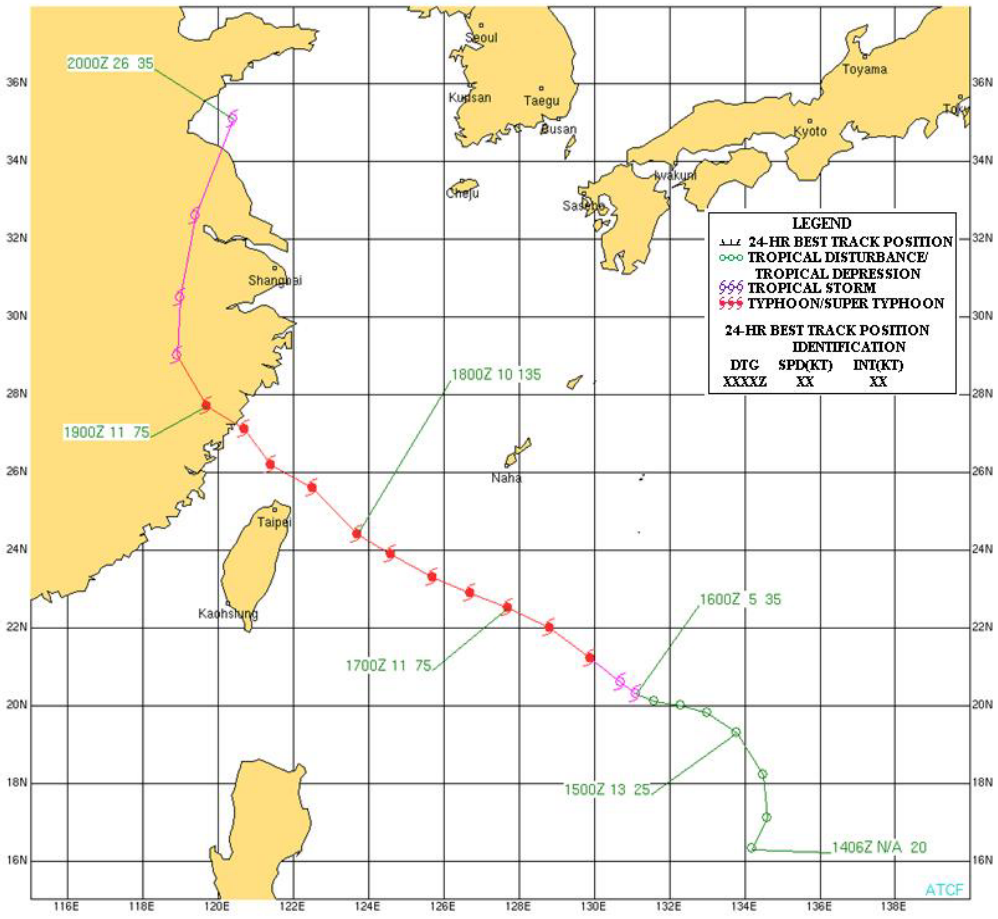
ISSUED POOR:	10 Sep 2230Z
ISSUED FAIR:	11 Sep 2000Z
FIRST TCFA:	12 Sep 1630Z
FIRST WARNING:	12 Sep 1800Z
LAST WARNING:	16 Sep 1200Z
LANDFALL:	Near Yeosu, South Korea 16 Sep, near 1200Z
MAX INTENSITY:	125 knots
NUMBER OF WARNINGS:	16

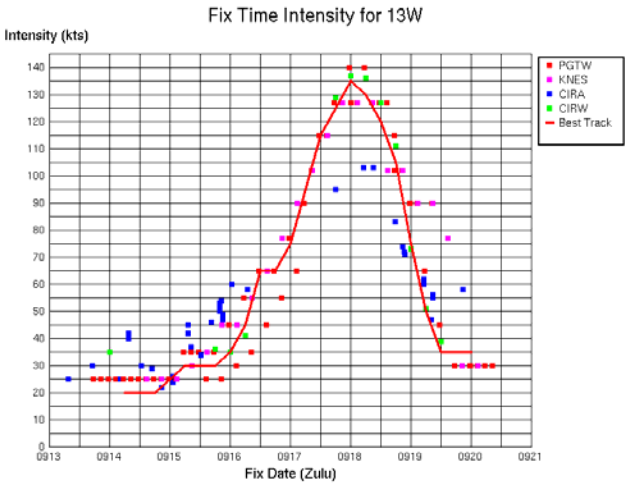




SUPER TYPHOON 13W (Wipha)

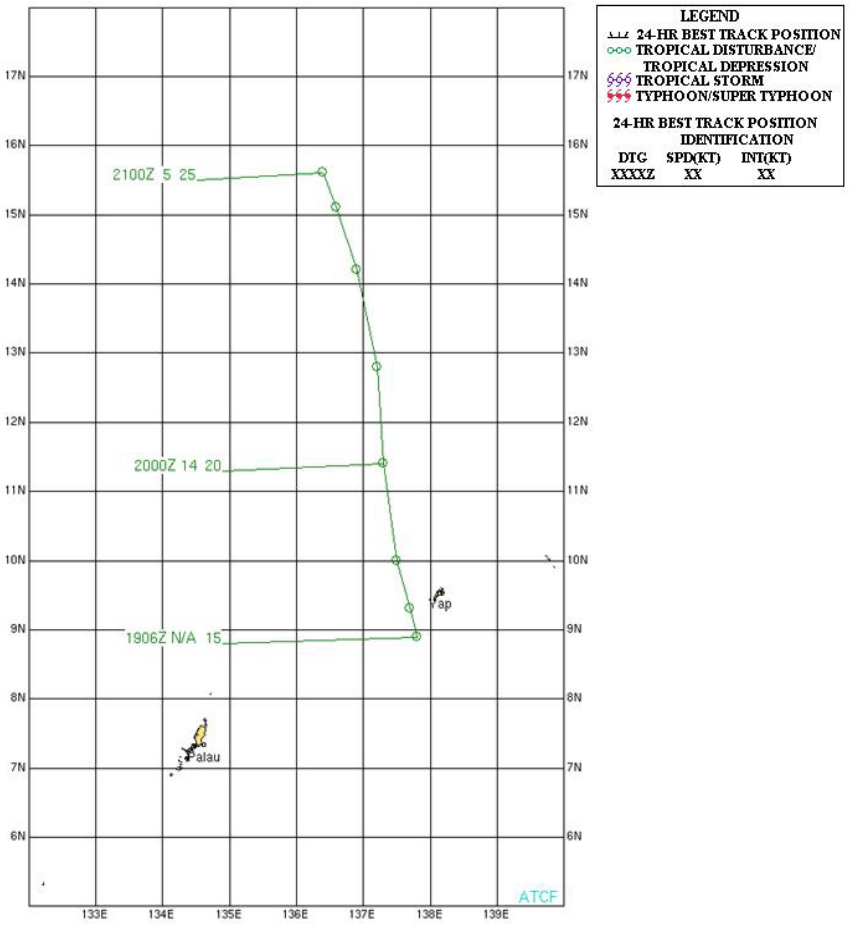
ISSUED POOR:	None.
ISSUED FAIR:	13 Sep 1730Z
FIRST TCFA:	14 Sep 2200Z
FIRST WARNING:	15 Sep 0600Z
LAST WARNING:	19 Sep 0600Z
LANDFALL:	Near Wenzhou, China 18 Sep near 1800Z
MAX INTENSITY:	135 knots
NUMBER OF WARNINGS:	17

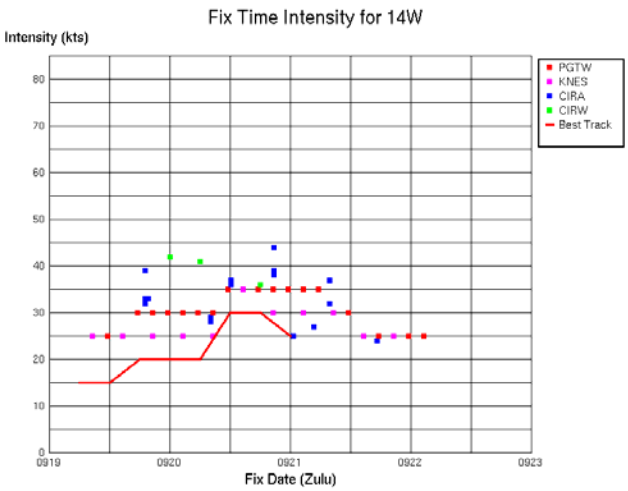




TROPICAL DEPRESSION 14W

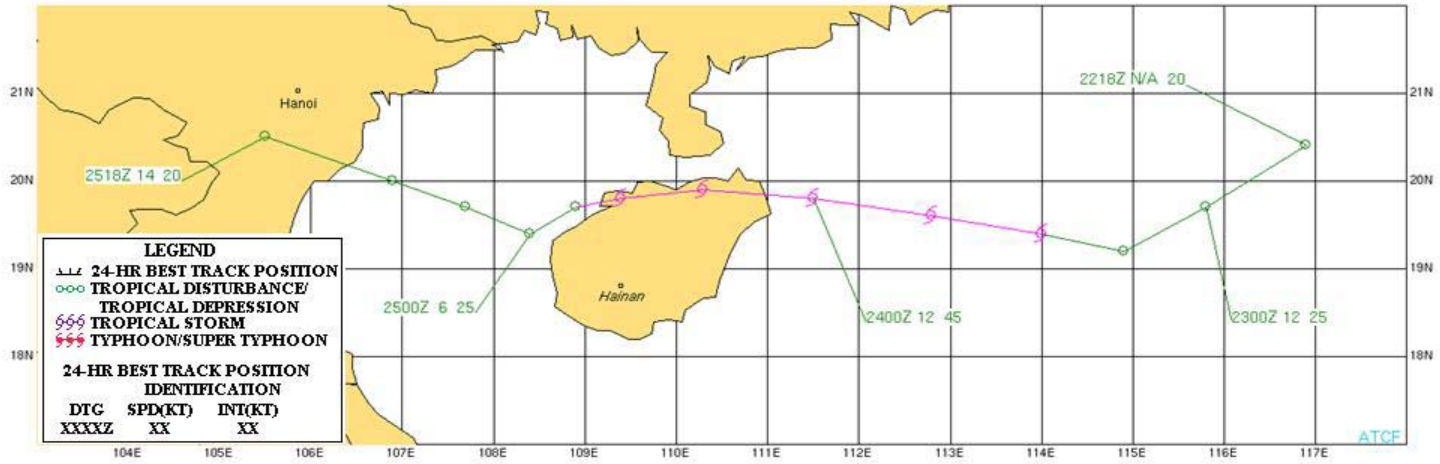
ISSUED POOR:	19 Sep 1430Z
ISSUED FAIR:	None.
FIRST TCFA:	19 Sep 2000Z
FIRST WARNING:	20 Sep 1200Z
LAST WARNING:	21 Sep 1200Z
LANDFALL:	None.
MAX INTENSITY:	30 knots
NUMBER OF WARNINGS:	5

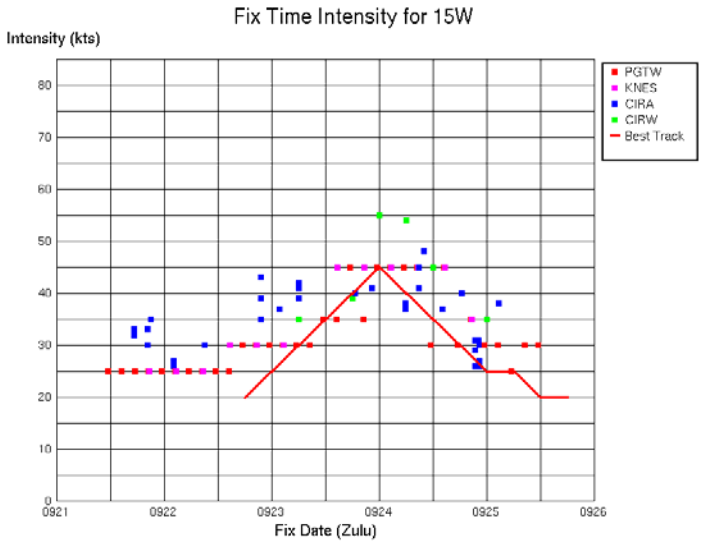




TROPICAL STORM 15W (Francisco)

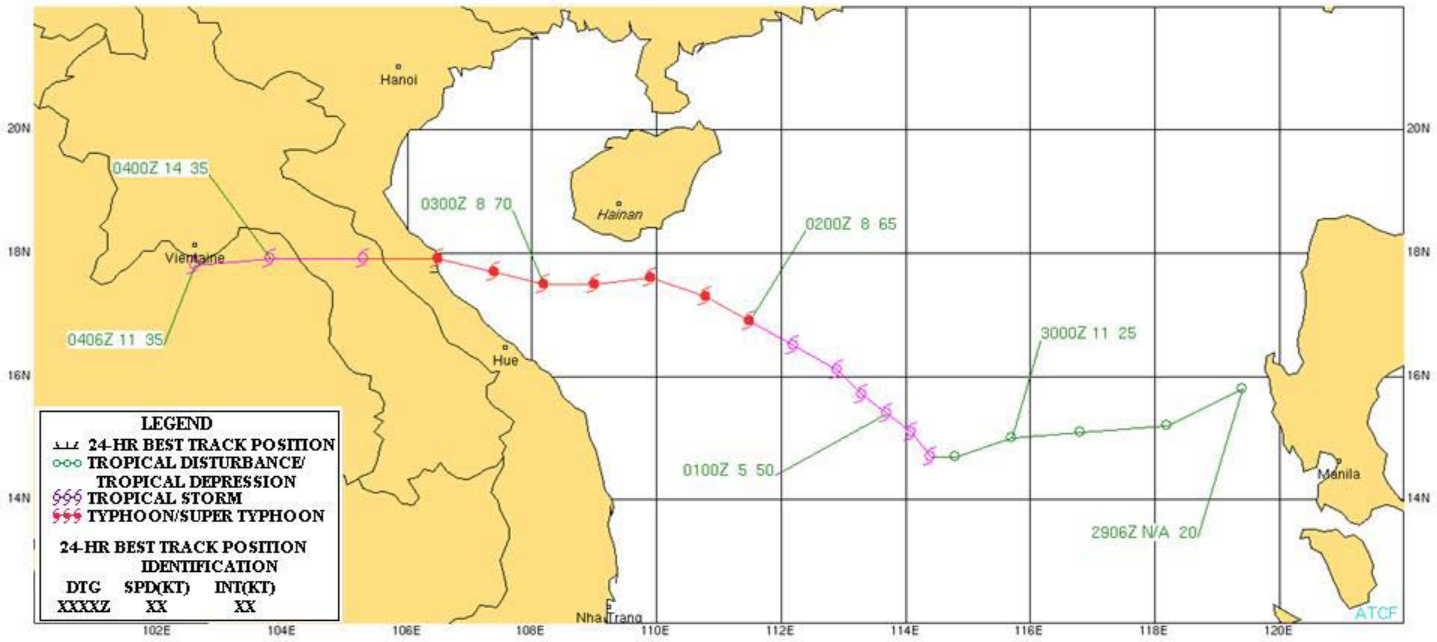
ISSUED POOR:	21 Sep 1800Z
ISSUED FAIR:	21 Sep 2200Z
FIRST TCFA:	22 Sep 1500Z
FIRST WARNING:	23 Sep 0000Z
LAST WARNING:	25 Sep 0000Z
LANDFALL:	Near Haikou, China 24 Sep near 0000Z, near Nam Dinh, Vietnam 25 Sep near 1200Z
MAX INTENSITY:	45 knots
NUMBER OF WARNINGS:	9

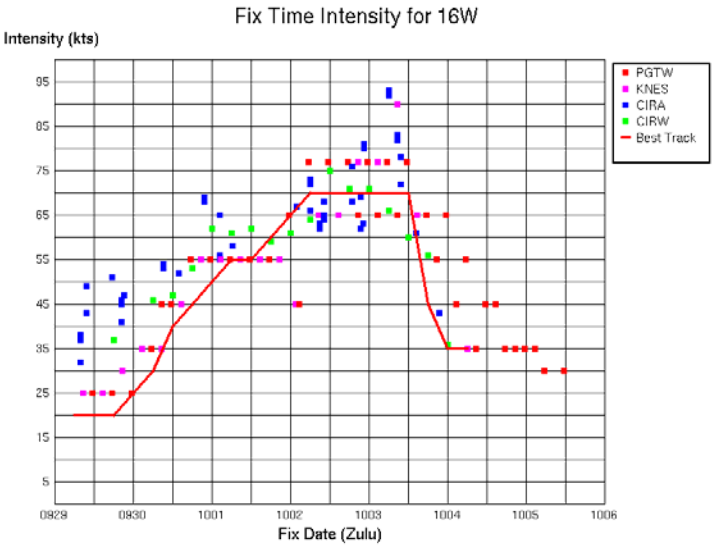




TYPHOON 16W (Lekima)

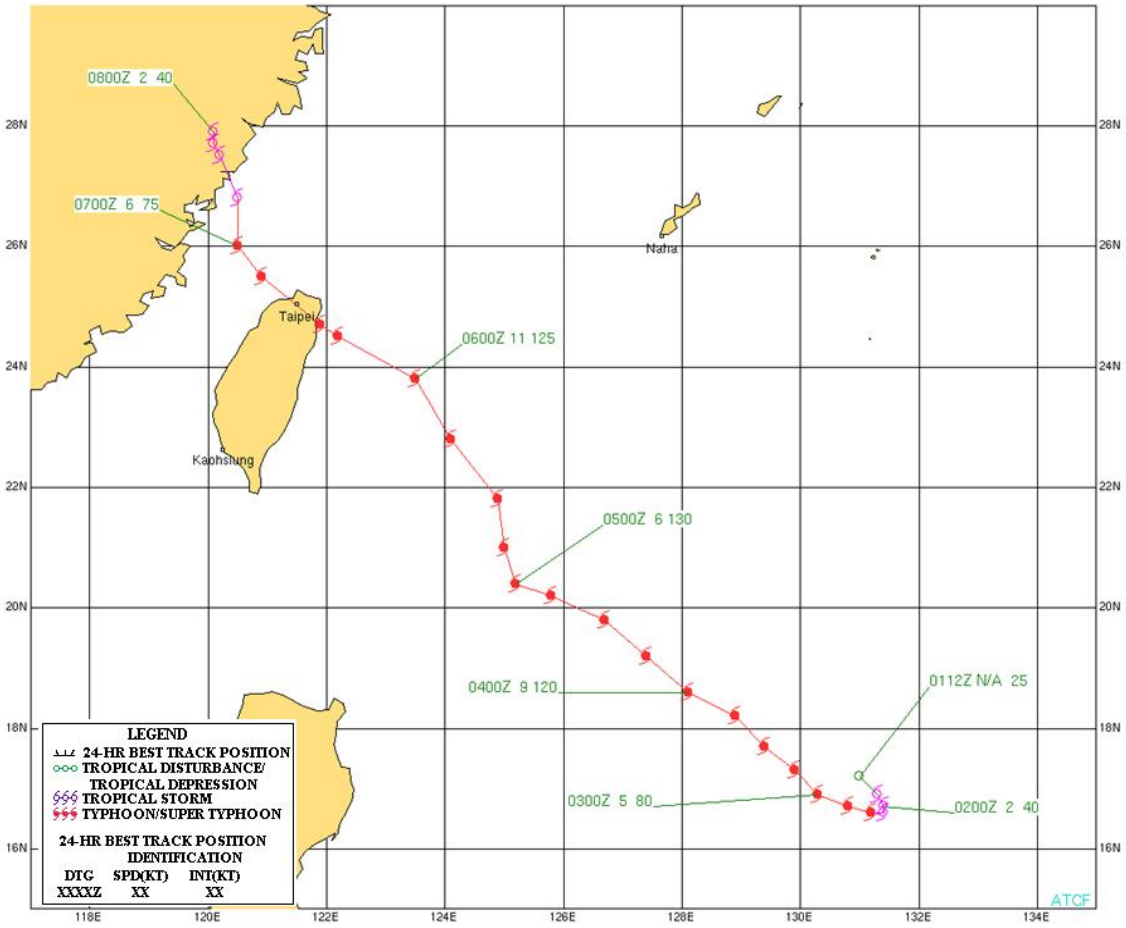
ISSUED POOR:	None.
ISSUED FAIR:	None.
FIRST TCFA:	29 Sep 0900Z
FIRST WARNING:	30 Sep 0000Z
LAST WARNING:	03 Oct 1800Z
LANDFALL:	Near Dong Hoi, Vietnam 03 Oct 1200Z
MAX INTENSITY:	70 knots
NUMBER OF WARNINGS:	16

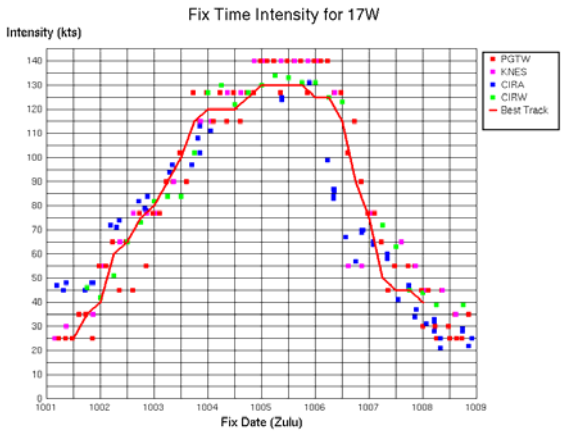




SUPER TYPHOON 17W (Krosa)

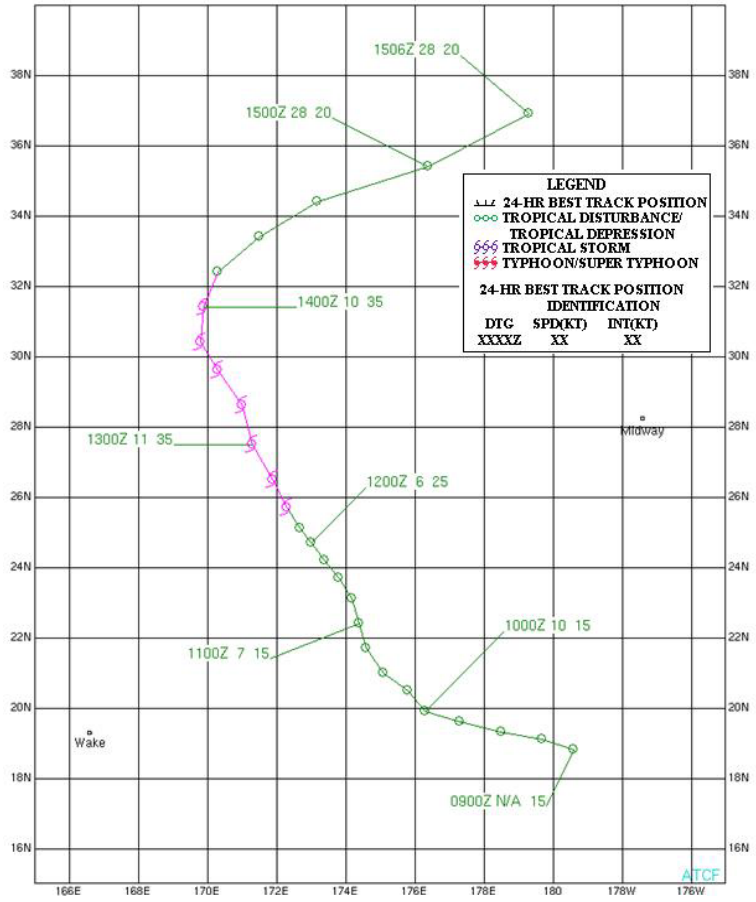
ISSUED POOR:	None.
ISSUED FAIR:	01 Oct 0800Z
FIRST TCFA:	01 Oct 0830Z
FIRST WARNING:	01 Oct 1200Z
LAST WARNING:	08 Oct 1800Z
LANDFALL:	Near Lotung, Taiwan 06 Oct near 1200Z, near Ningde, China 07 Oct near 0600Z
MAX INTENSITY:	130 knots
NUMBER OF WARNINGS:	30

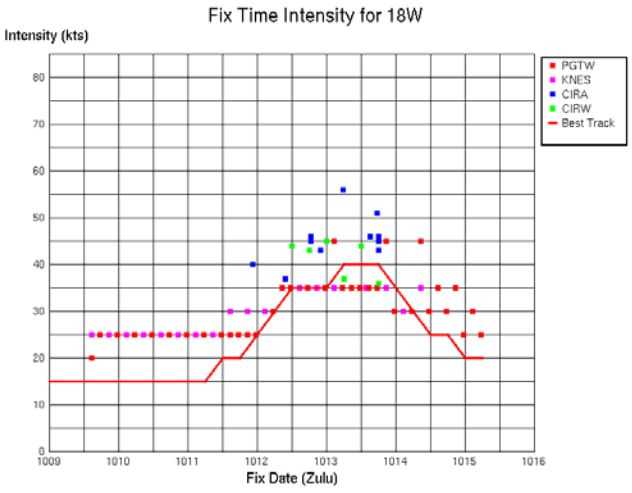




TROPICAL STORM 18W (Lingling)

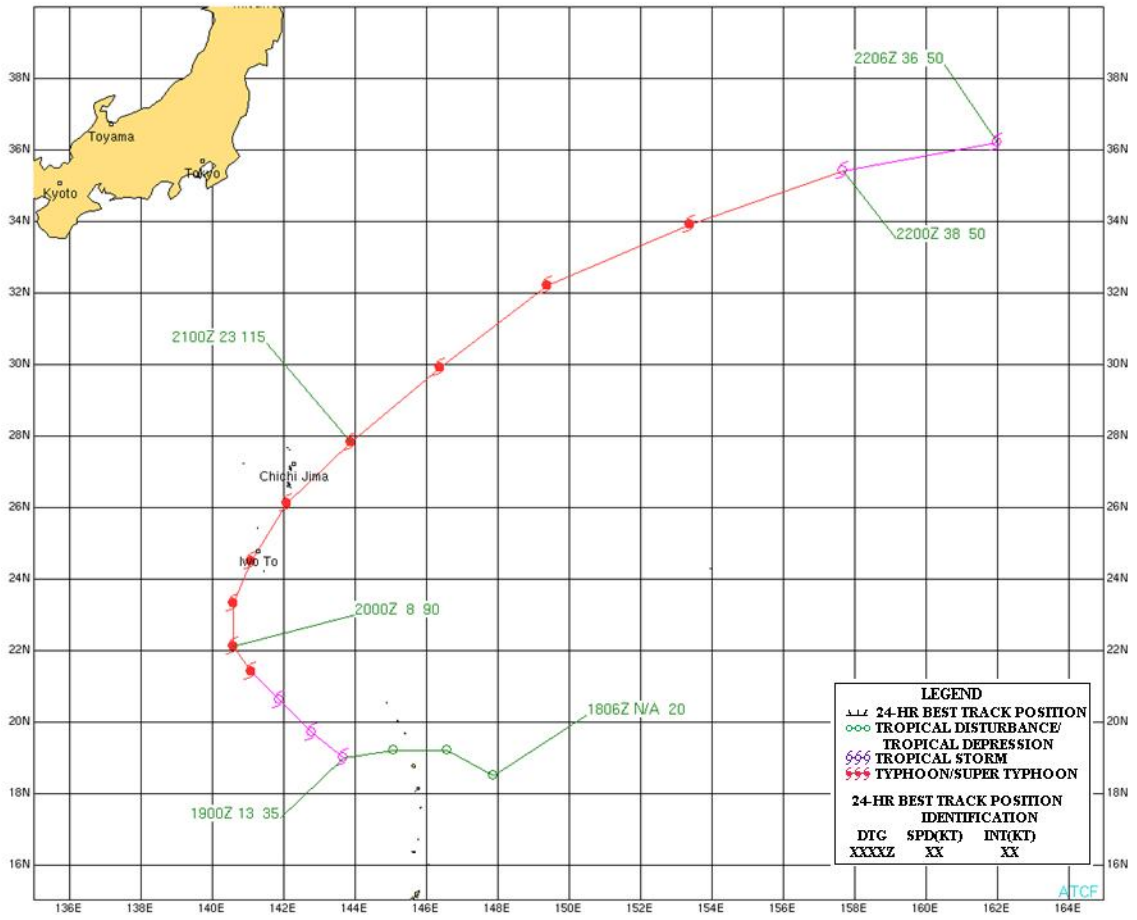
ISSUED POOR:	11 Oct 0600Z
ISSUED FAIR:	None.
FIRST TCFA:	11 Oct 2000Z
FIRST WARNING:	12 Oct 0600Z
LAST WARNING:	13 Oct 1800Z
LANDFALL:	None.
MAX INTENSITY:	40 knots
NUMBER OF WARNINGS:	7

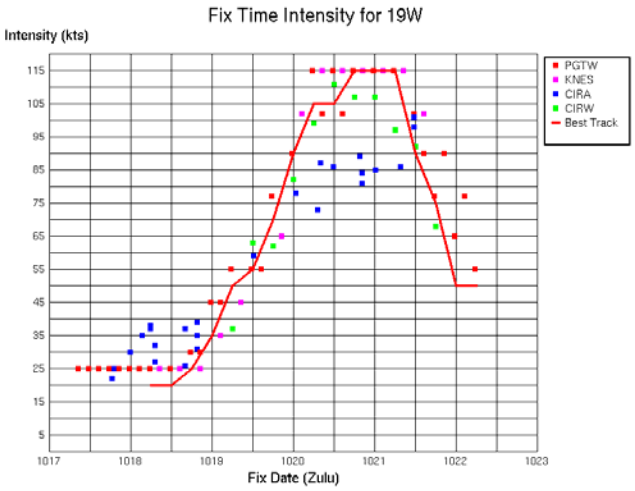




TYPHOON 19W (Kajiki)

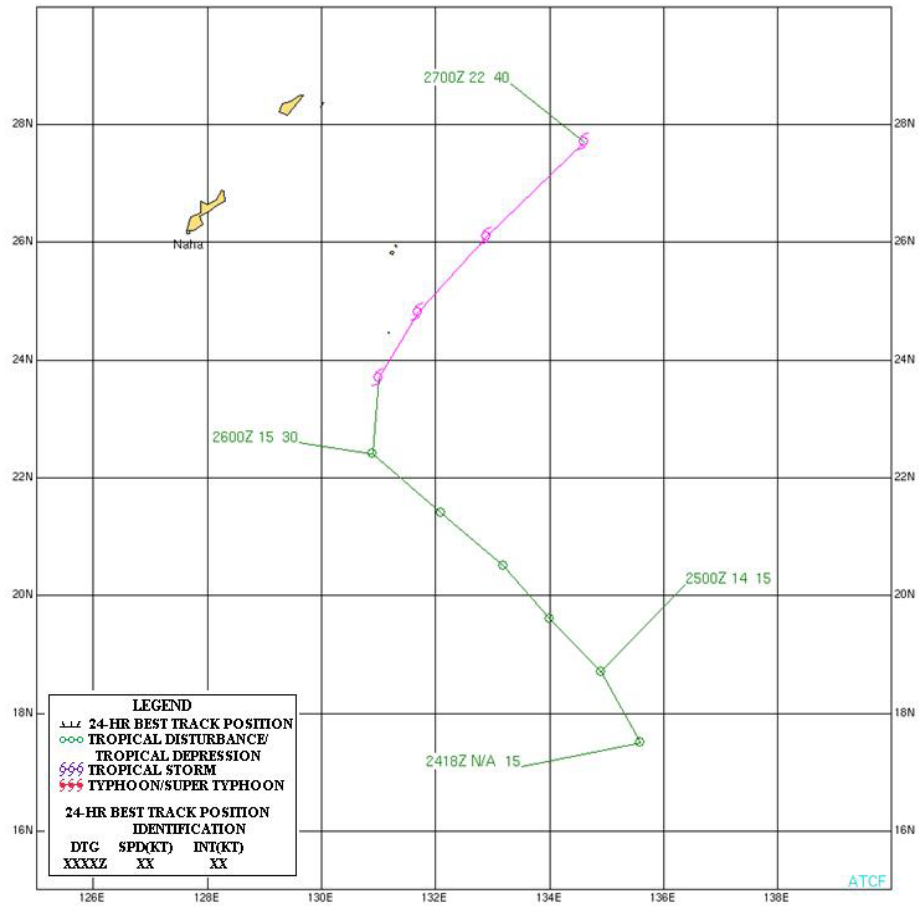
ISSUED POOR:	17 Oct 10000Z
ISSUED FAIR:	18 Oct 0300Z
FIRST TCFA:	18 Oct 2000Z
FIRST WARNING:	19 Oct 0000Z
LAST WARNING:	21 Oct 1200Z
LANDFALL:	None.
MAX INTENSITY:	115 knots
NUMBER OF WARNINGS:	11

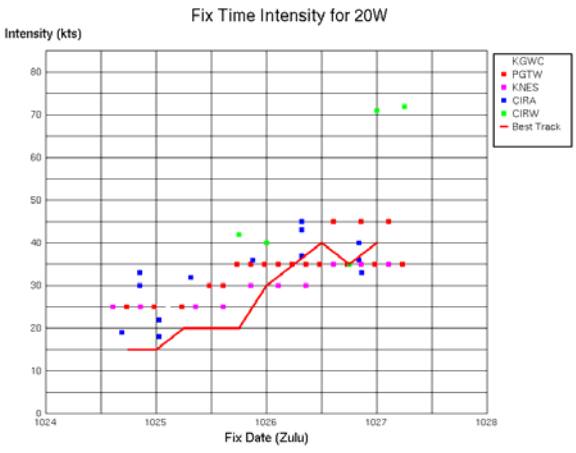




TROPICAL STORM 20W (Faxai)

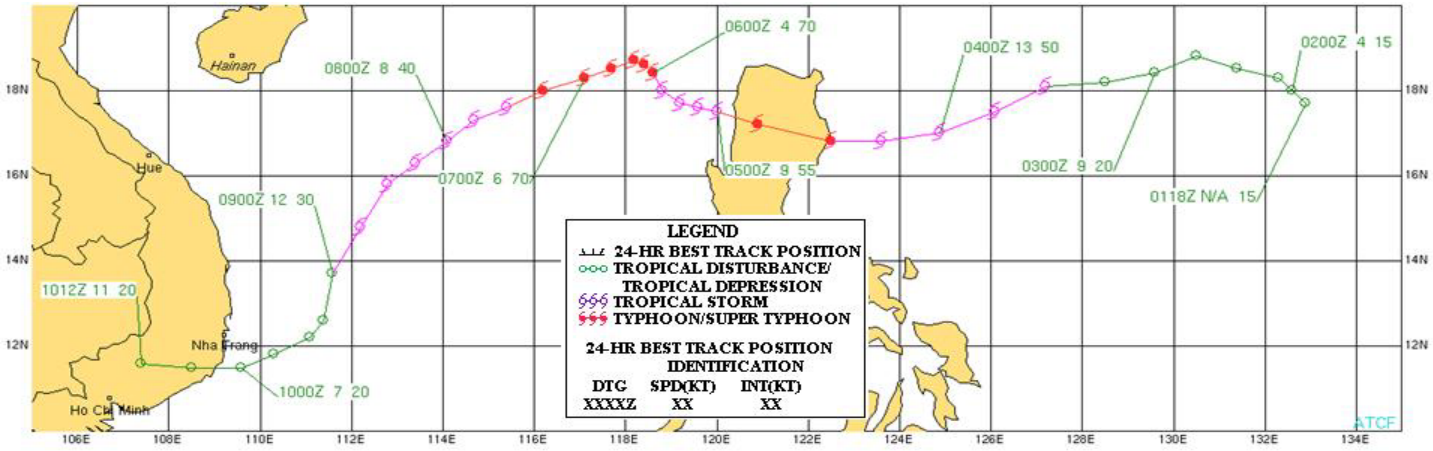
ISSUED POOR:	None.
ISSUED FAIR:	24 Oct 1530Z
FIRST TCFA:	25 Oct 1330Z
FIRST WARNING:	26 Oct 0000Z
LAST WARNING:	27 Oct 0000Z
LANDFALL:	None.
MAX INTENSITY:	40 knots
NUMBER OF WARNINGS:	5

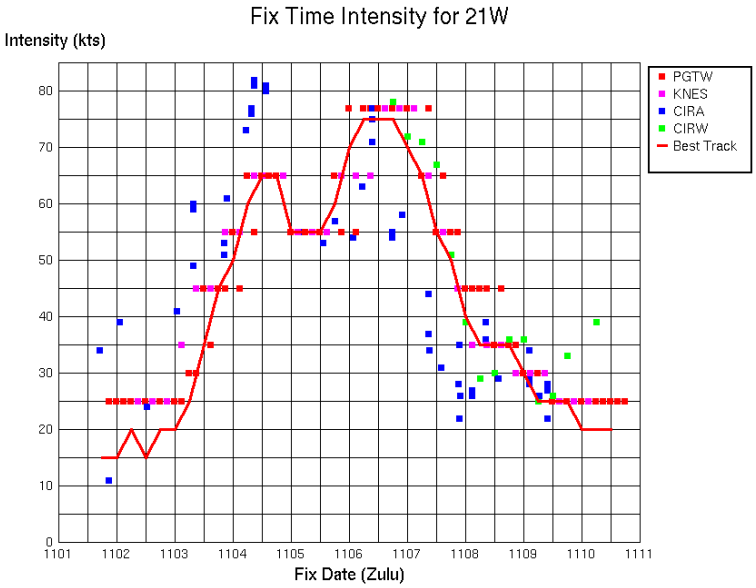




TYPHOON 21W (Peipah)

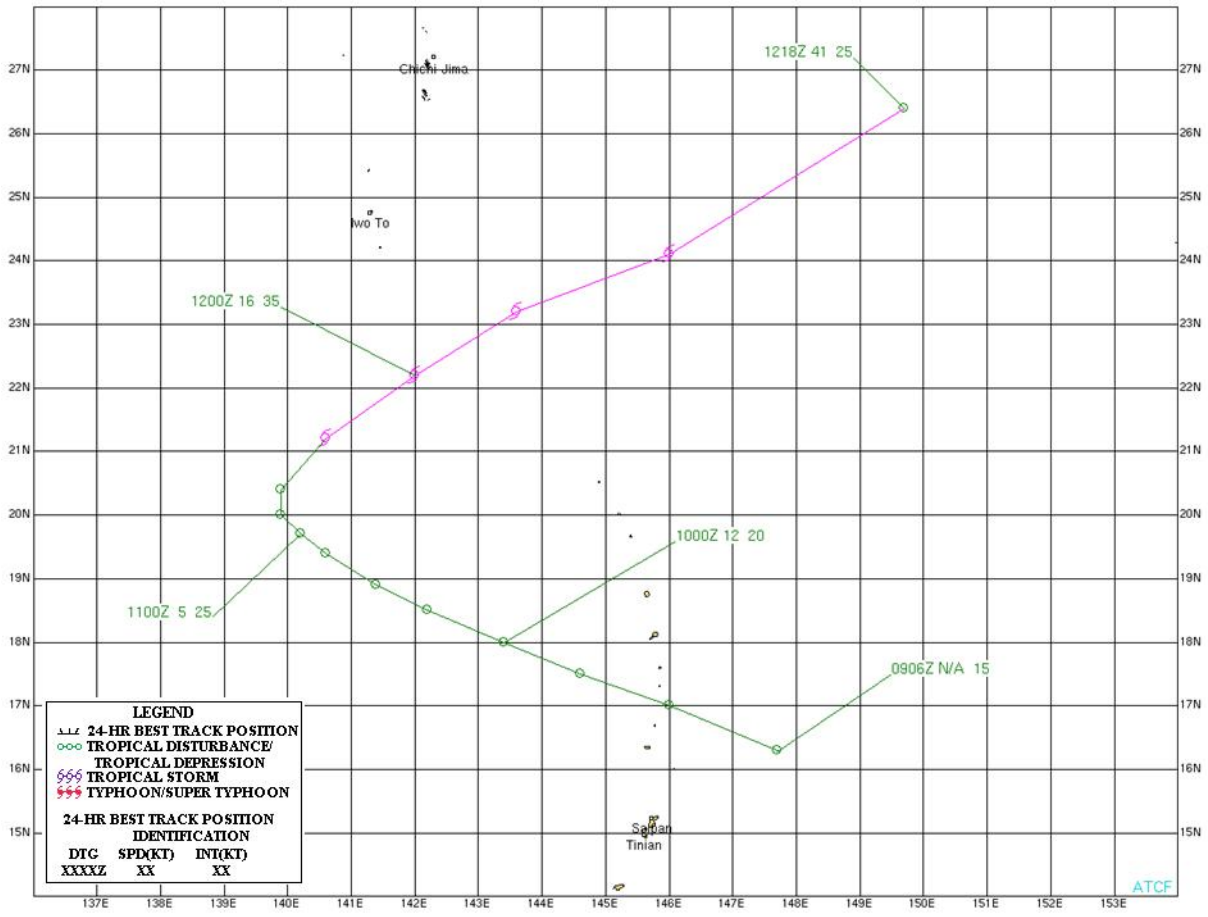
ISSUED POOR:	02 Nov 0000Z
ISSUED FAIR:	02 Nov 1830Z
FIRST TCFA:	03 Nov 0100Z
FIRST WARNING:	03 Nov 0600Z
LAST WARNING:	09 Nov 1200Z
LANDFALL:	Near Palanan, Philippines 04 Nov 1200Z, near Cam Ranh, Vietnam 10 Nov near 0600Z
MAX INTENSITY:	75 knots
NUMBER OF WARNINGS:	26

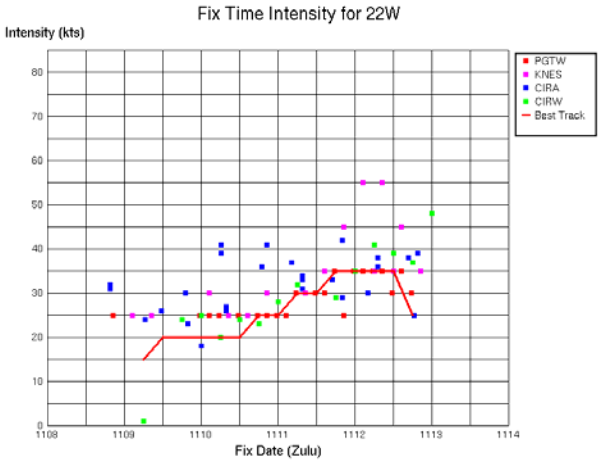




TROPICAL STORM 22W (Tapah)

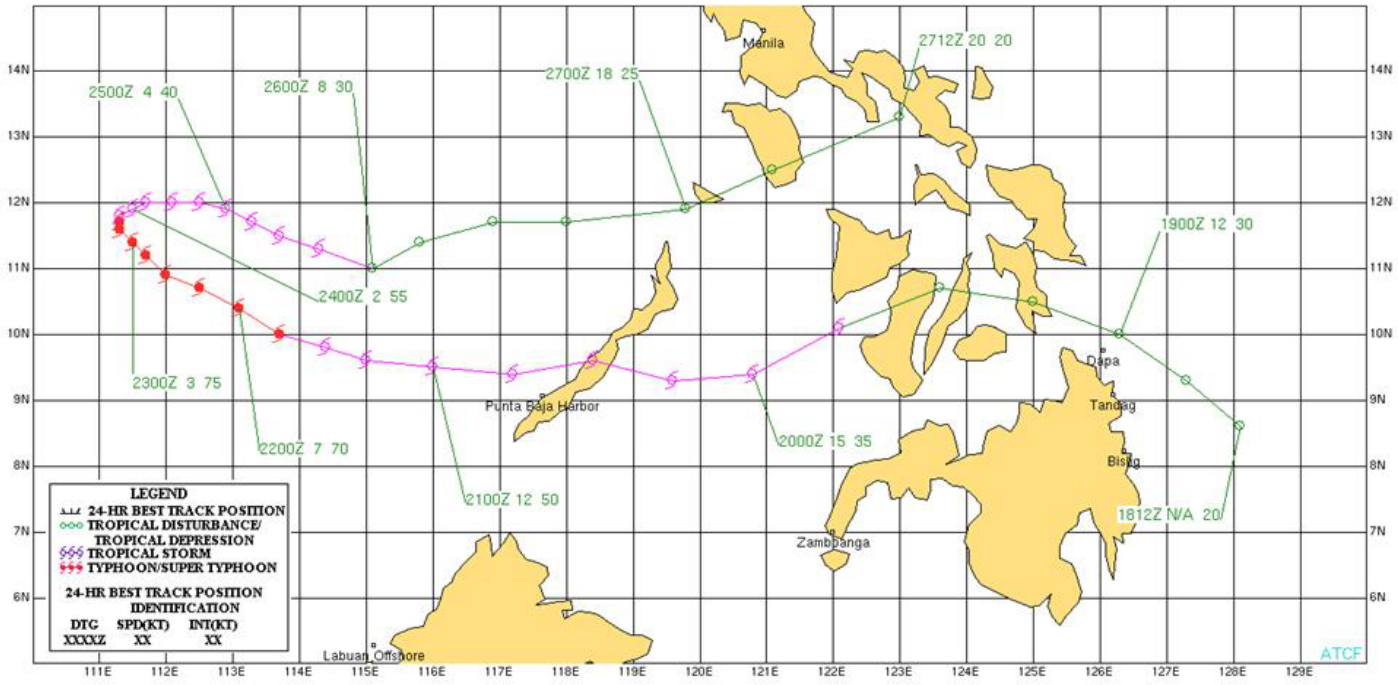
ISSUED POOR:	08 Nov 0600Z
ISSUED FAIR:	08 Nov 2200Z
FIRST TCFA:	11 Nov 0400Z
FIRST WARNING:	11 Nov 1200Z
LAST WARNING:	12 Nov 1800Z
LANDFALL:	None.
MAX INTENSITY:	35 knots
NUMBER OF WARNINGS:	6

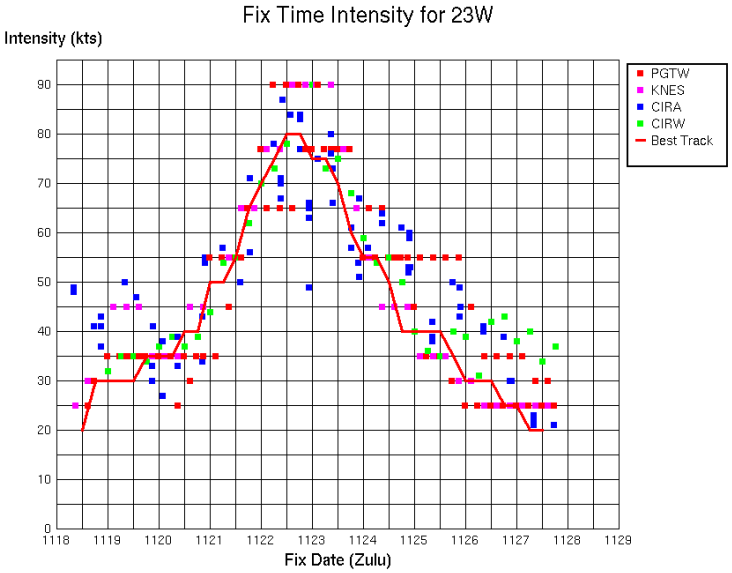




TYPHOON 23W (Hagibis)

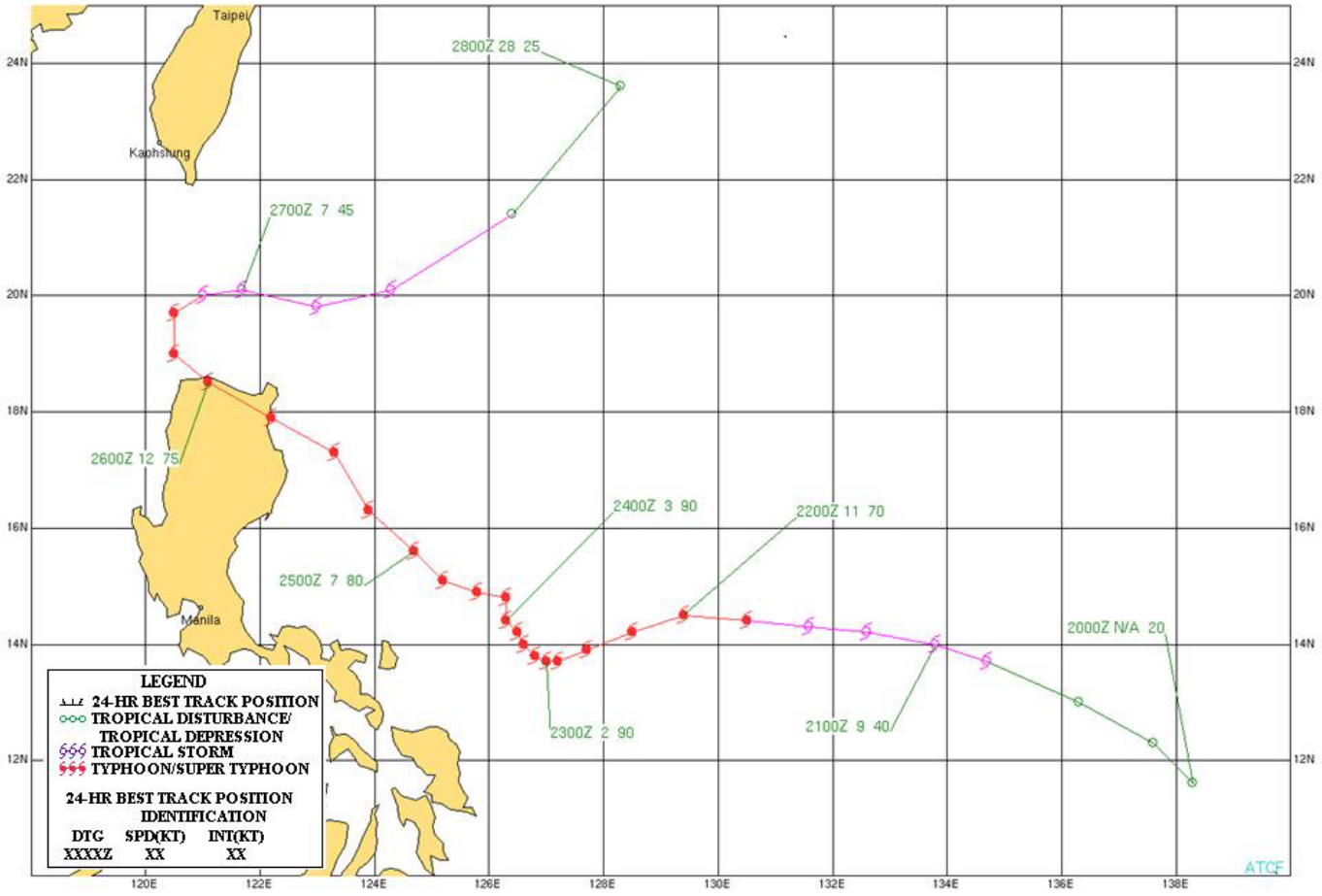
ISSUED POOR:	None.
ISSUED FAIR:	None.
FIRST TCFA:	18 Nov 1700Z
FIRST WARNING:	18 Nov 1800Z
LAST WARNING:	27 Nov 0000Z
LANDFALL:	Near Sogod, Philippines 19 Nov near 0600Z, near Puerto Princesa, Palawan, 20 Nov near 1200Z, and near San Jose, Philippines 27 Nov near 0600Z
MAX INTENSITY:	80 knots
NUMBER OF WARNINGS:	34

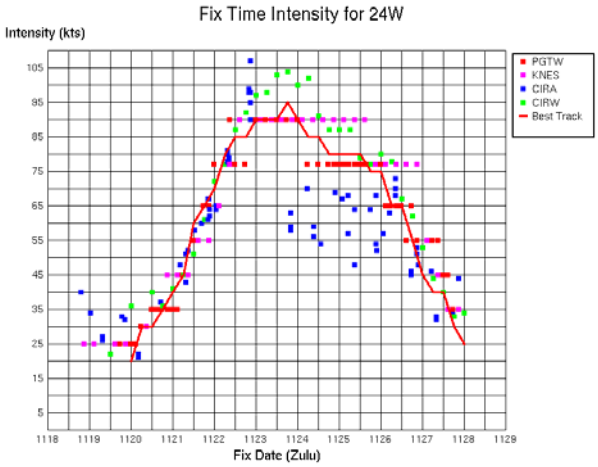




TYPHOON 24W (Mitag)

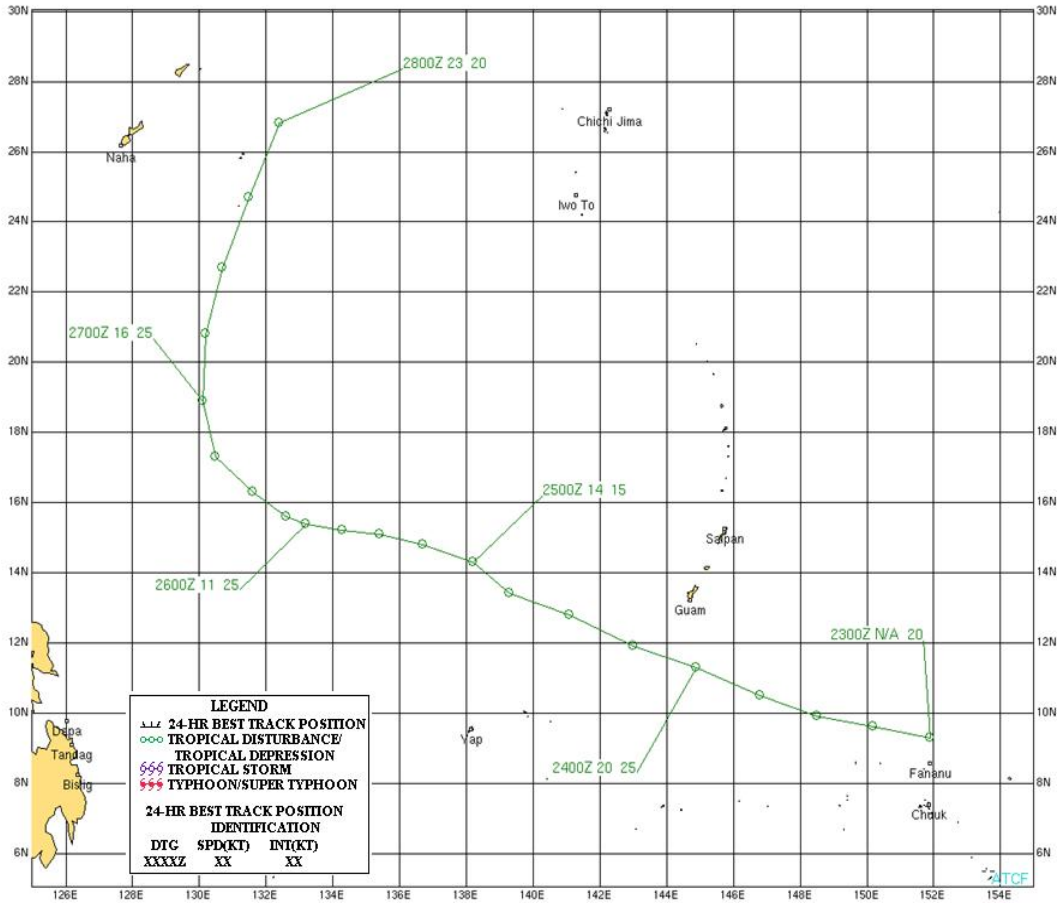
ISSUED POOR:	19 Nov 0600Z
ISSUED FAIR:	19 Nov 2030Z
FIRST TCFA:	20 Nov 0300Z
FIRST WARNING:	20 Nov 0600Z
LAST WARNING:	27 Nov 1800Z
LANDFALL:	Near Aparri, Philippines, 25 Nov near 1800Z
MAX INTENSITY:	95 knots
NUMBER OF WARNINGS:	31

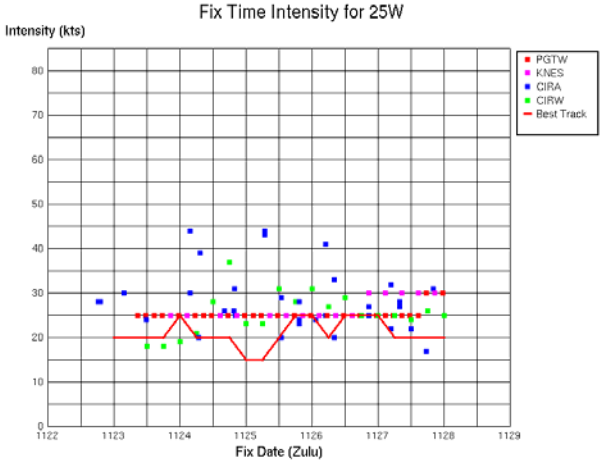




TROPICAL DEPRESSION 25W

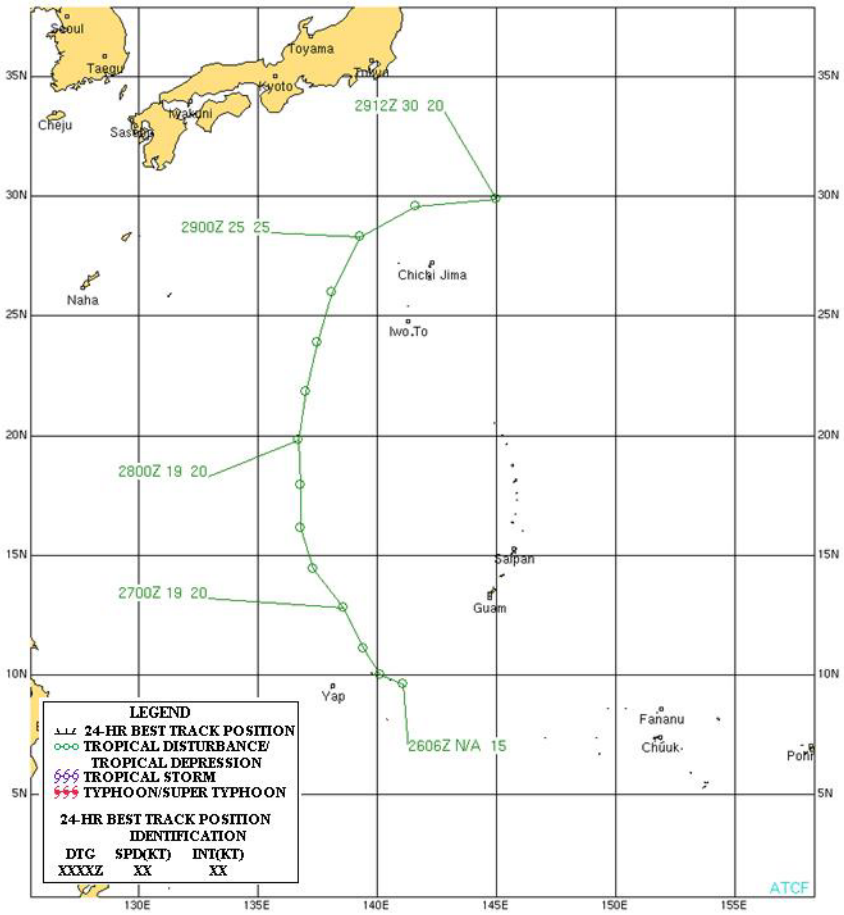
ISSUED POOR:	23 Nov 0600Z
ISSUED FAIR:	24 Nov 0600Z
FIRST TCFA:	25 Nov 0500Z
FIRST WARNING:	26 Nov 0600Z
LAST WARNING:	27 Nov 1800Z
LANDFALL:	None.
MAX INTENSITY:	25 knots
NUMBER OF WARNINGS:	7

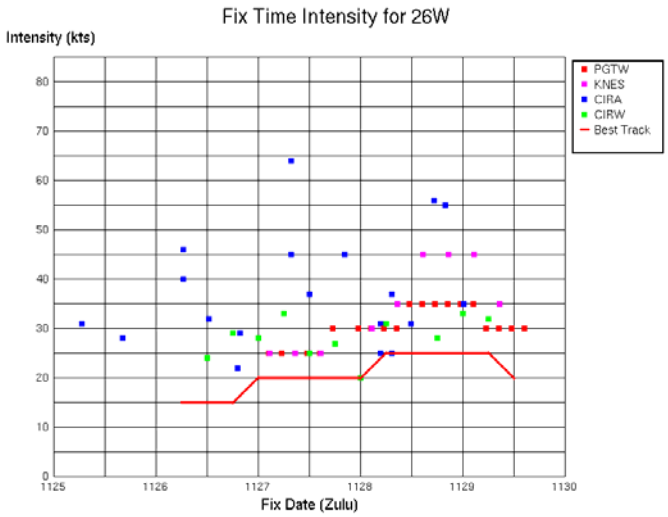




TROPICAL DEPRESSION 26W

ISSUED POOR:	None.
ISSUED FAIR:	26 Nov 2300Z
FIRST TCFA:	27 Nov 0530Z
FIRST WARNING:	28 Nov 1200Z
LAST WARNING:	28 Nov 1800Z
LANDFALL:	None.
MAX INTENSITY:	25 knots
NUMBER OF WARNINGS:	2

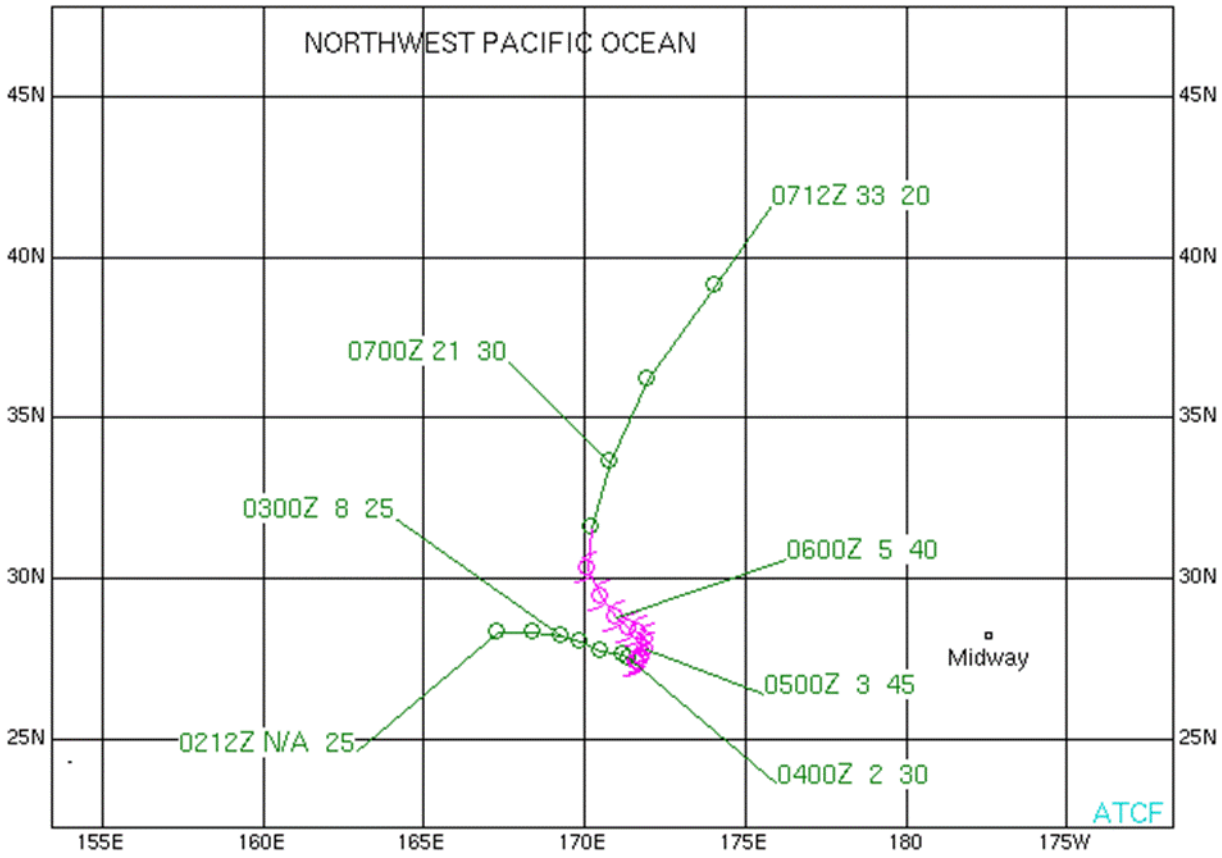


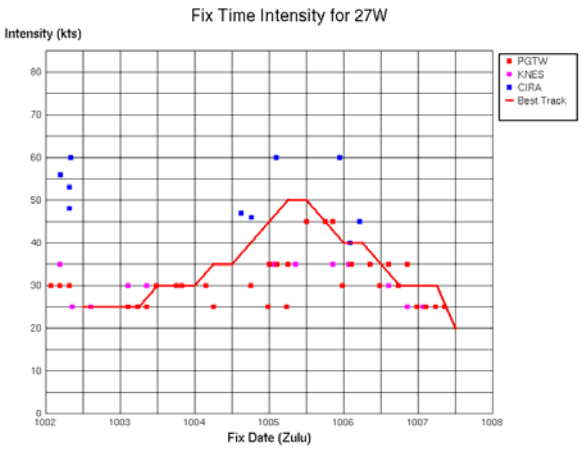


TROPICAL STORM 27W (Haiyan)**

ISSUED POOR:	None.
ISSUED FAIR:	None.
FIRST TCFA:	None.
FIRST WARNING:	None.
LAST WARNING:	None.
LANDFALL:	None.
MAX INTENSITY:	50 knots
NUMBER OF WARNINGS:	0

** JTWC did not issue warnings on TS 27W. Intensity information is based on post season reanalysis.





Section 3 Detailed Cyclone Reviews

Three cyclones were deemed to be either meteorologically or operationally significant for 2007. Super Typhoon Krosa experienced an unusually long period of rapid intensification early in its life cycle. Typhoon Hagibis followed an unusual track and JTWC experienced very large track errors with this system. Tropical Storm Haiyan developed as a midlatitude cold-core system then became a warm-core tropical storm, though no warnings were issued by JTWC on this system.

Super Typhoon 17W (Krosa)

Super Typhoon (STY) 17W (Krosa) formed in the Philippine Sea and experienced rapid intensification (40kts/24hrs) for 2 consecutive days during the early period of its track. This intense, slow-moving cyclone disrupted military operations for seven days in the Philippine Sea, East China Sea, and over western Japan as it moved northwestward then northeastward (See Figure 1-7). STY 17W was also noted as a cyclone in which track forecasts (numerical model and JTWC) were accurate, but for which intensity was severely under forecast.

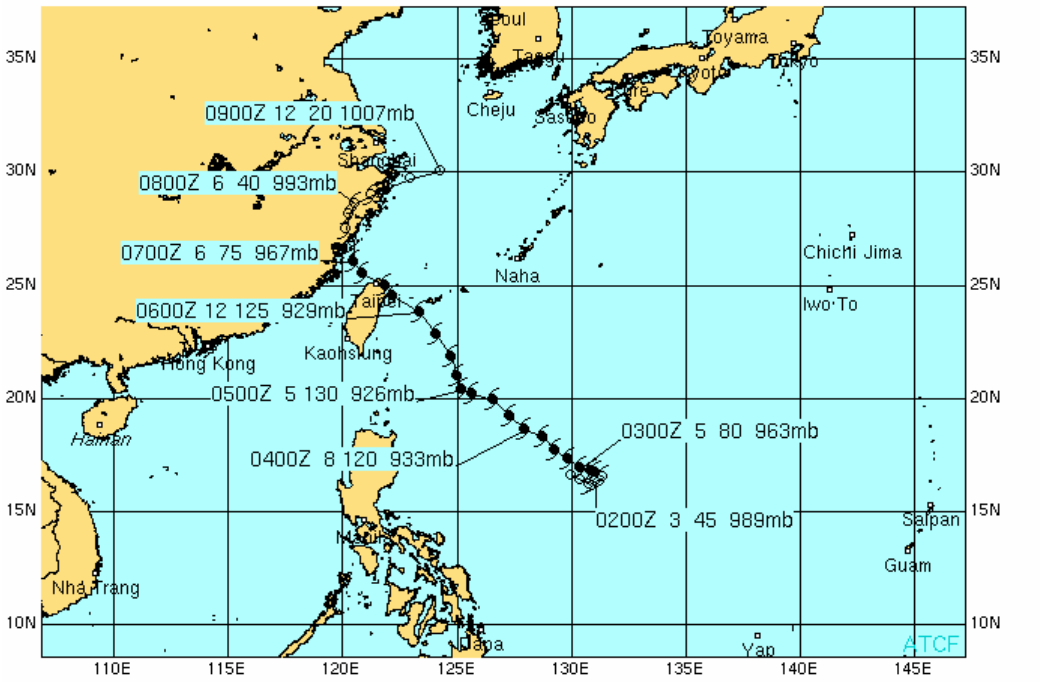


Figure 1-7 STY 17W (Krosa) Best Track

JTWC analysis of satellite derived intensity estimates indicated that ST 17W rapidly intensified from a 25kt TD to a 100kt TY between 1 Oct and 3 Oct (Figure 1-8). JTWC records indicate that most tropical cyclones intensify at a much slower rate than occurred for ST 17W even during October in the Northwest Pacific Ocean. JTWC's most reliable intensity guidance, ST10 and ST11, failed to capture this significant intensification (Figure 1-8 and 1-9). The model intensity guidance and JTWC forecast a much lower intensification rate in the early stage of this cyclone (Figure 1-10).

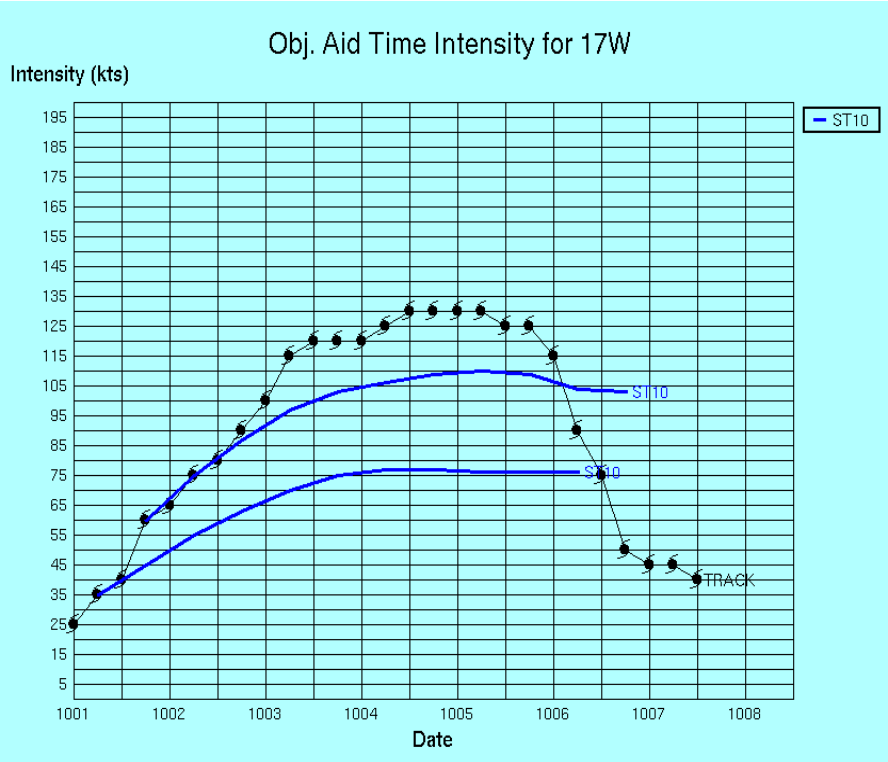


Figure 1-8 STY 17W Objective Aid Intensity Graph Showing ST10 Intensity Model Guidance (01 Oct - 2 Oct) versus final best track intensity

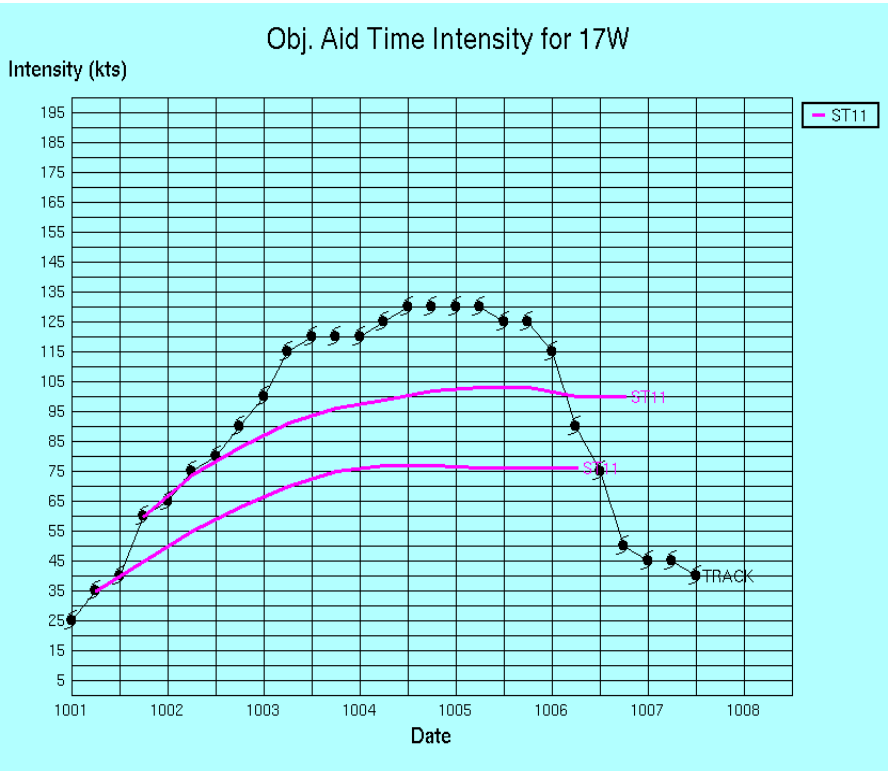


Figure 1-9 STY 17W Objective Aid Intensity Graph Showing ST11 Intensity Model Guidance (01 Oct - 02 Oct) versus final best track intensity

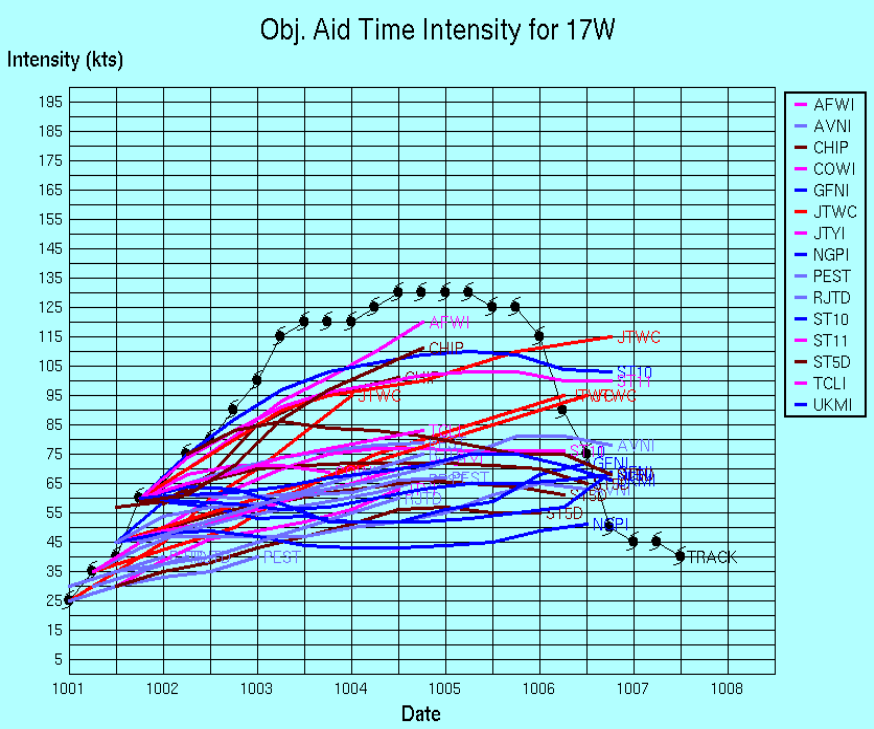


Figure 1-10 STY 17W Objective Aid Intensity Graph Showing Intensity Model Guidance (01 Oct - 02 Oct) versus final best track intensity

Overall (Table 1-5), the track errors were low and surpassed the JTWC goals and the model consensus. JTWC and the models, however, did not forecast the rapid intensification phase well. The ST10/ST11 absolute intensity errors were very large after Tau 24--the bulk of these large errors occurred during the initial forecasts.

	Tau 24	Tau 48	Tau 72	Tau 96	Tau 120
JTWC Forecast Track Error (nm)	41	60	97	155	201
Model Consensus (nm)	43	76	111	168	258
JTWC Track Forecast Goals (nm)	50	100	150	200	250
Forecast Track Error Cases	25	21	18	13	9
JTWC Intensity Error (knots)	16	24	34	44	64
ST10 (knots)	14	21	28	41	55
ST11 (knots)	14	22	29	40	52
Intensity Error Cases	23	19	16	12	8

Table 1-5 Average Forecast Track Error and Absolute Intensity Error (Homogeneous Comparison)

Post analysis indicates that there were only minor impacts to DoD assets with one ship diverted. The poor performance of available intensity forecast tools and the JTWC intensity forecasts, highlight the need for improvements in forecasting TC intensity.

Typhoon 23W (Hagabis)

Typhoon (TY) 23W (Hagabis) formed over the southern Philippines, tracked westward over the South China Sea then stalled east of Vietnam for 24 hours before turning east and dissipating over Luzon. Two U.S. Navy ships were advised based on JTWC warnings and one was diverted. JTWC forecast landfall over Vietnam and was slow to predict the turn back to the east, resulting in some of the largest track errors for 2007.

Prior to 21 November, TY 23W moved northwestward along the southern periphery of the subtropical ridge and extended model forecasts indicated that the cyclone would cross over southern Vietnam. By 21 November 00Z, the numerical forecasts began to change with EGR2 and AVNI indicating that TY 23W would turn back to the east and NGPI, GFN2, and WBAI continued to predict the Vietnam landfall scenario for almost 36 more hours (Figure 1-11).

ECMWF numerical analyses indicate that a mid-latitude trough extending into the Bay of Bengal weakened the subtropical ridge over Thailand and the western South China Sea. The absence of this ridge weakened and then eliminated the westward steering component for TY 23W. Subsequently, the cyclone, which had previously been moving northwestward at 3-4 knots, slowed to 1 knot by 23 November 1200Z, and began drifting slowly northward. After 23 November, equatorial westerly flow then caused the cyclone to begin moving eastward at around 4 knots.

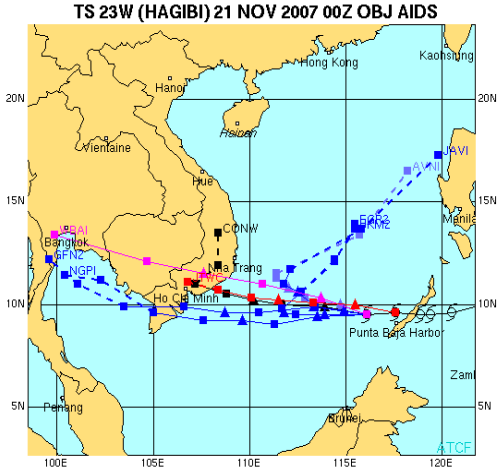


Figure 1-11 Diverging objective aids trackers for 21 November 0000Z forecast, with the EGRR (EGR2) and GFS (AVNI) trackers forecasting a turn back to the east.

JTWC forecasters did not detect the weakening of the subtropical ridge near TY 23W by the midlatitude trough thus discounted the influence of the equatorial westerly flow and were slow to change the forecast even after the cyclone began to move eastward.

Subjective infrared and visible satellite fixes around 21 November indicated 23W continuing to track westward toward Vietnam, as forecast by NOGAPS and GFDN. This apparent westward movement of the convection was later discounted by microwave imagery which indicated that the low level circulation was moving eastward.

The largest track error (658 nm at tau 72; Figure 1-12) occurred from the 23 November 1800Z forecast. Additionally, post analysis indicated that the initial position of TY 23W for this forecast was over the 50 nm west of the final best track position. The low level circulation center was obscured by cirrus in infrared imagery, but, a 23 November 1815Z AMSRE microwave pass (not available at time of warning or forecast development) clearly shows the center, with the deep convection displaced to the west (Figure 1-13). This microwave pass indicated that the cyclone center was over 100 nm from both the PGTW and RJTD conventional satellite fixes (Figure 1-14).

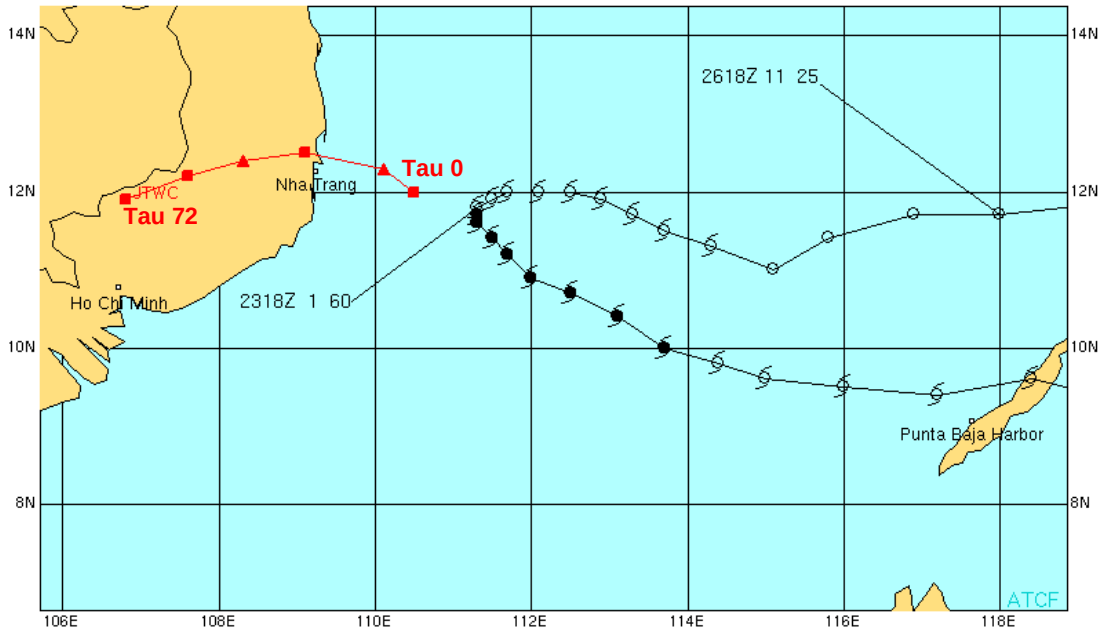


Figure 1-12 23 November 1815Z JTWC forecast (red) compared with best track data (black)

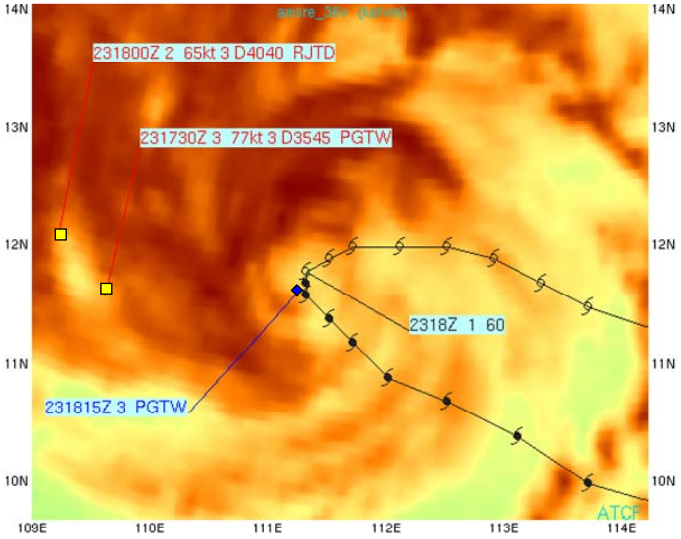


Figure 1-13 23 November 1815Z 37 GHz AMSRE image compared with PGTW and RJTD Dvorak fixes (in yellow).

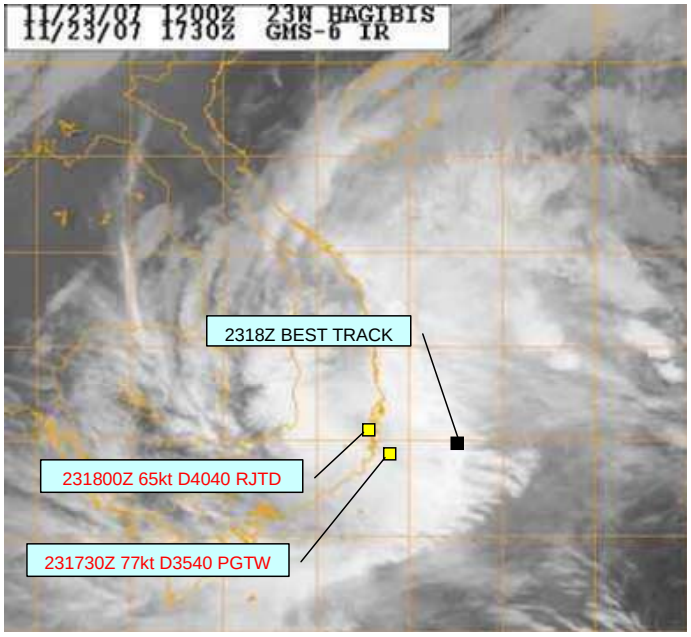
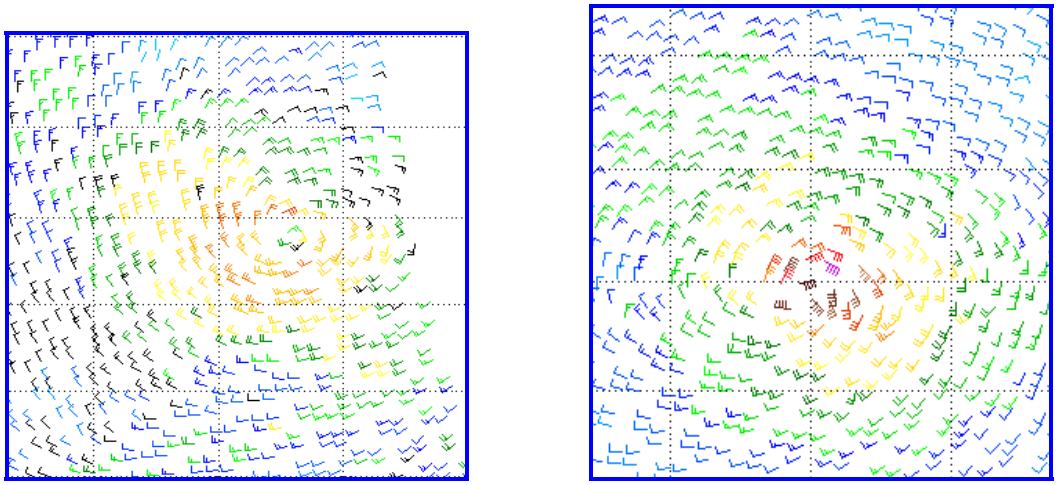


Figure 1-14 23 November 1730Z infrared image and corresponding PGTW and RJTD fixes (in yellow) compared with 23 November 1800Z best track position.

Ultimately, conflicting numerical model guidance and misdiagnosis of both the synoptic environment and the cyclone's vertical structure led to the large track errors for TY 23W. The bifurcation in forecast models also contributed to track forecast uncertainty. Model fields through tau 120 were only available for NOGAPS and GFS, with fields available to tau 72 for EGRR and JGSM. This event illustrates the need for forecasters to conduct a thorough synoptic analysis of all available data, including the model fields to understand forecast model divergence and differences.

Tropical Storm 27W (Haiyan)

Tropical Storm (TS) 27W (Haiyan) was initially evaluated by JTWC to be a subtropical low. However, post analysis of available data shows the system transitioned from a mid-latitude low into a tropical cyclone as deep convection consolidated and the wind increased closer to the center. Analysis of scatterometry data between 03/18Z and 05/12Z supports this evolution. In figure 1-15a, a 03/1850Z QUIKSCAT image shows an expanded wind field with stronger winds away from the center of circulation and lighter winds at the core, typical of a subtropical cyclone. However, a subsequent QUIKSCAT image from approximately 36 hours later (05/0645Z) indicated a tighter wind field with 40-45 knot winds around the center of circulation (Figure 1-15b).



03/1850Z QUIKSCAT 05/0645Z QUIKSCAT

Figure 1-15a and 1-15b Scatterometry data illustrating the consolidation and strengthening of the wind field.

Analysis of AMSU-A derived temperature anomaly cross-sections indicate that the system completed this transition between 04/18Z to 05/00Z. A warm anomaly of 2° C first appeared in the mid- and upper-levels on a 04/1819Z AMSU-A derived temperature anomaly cross-section (Figure 1-16).

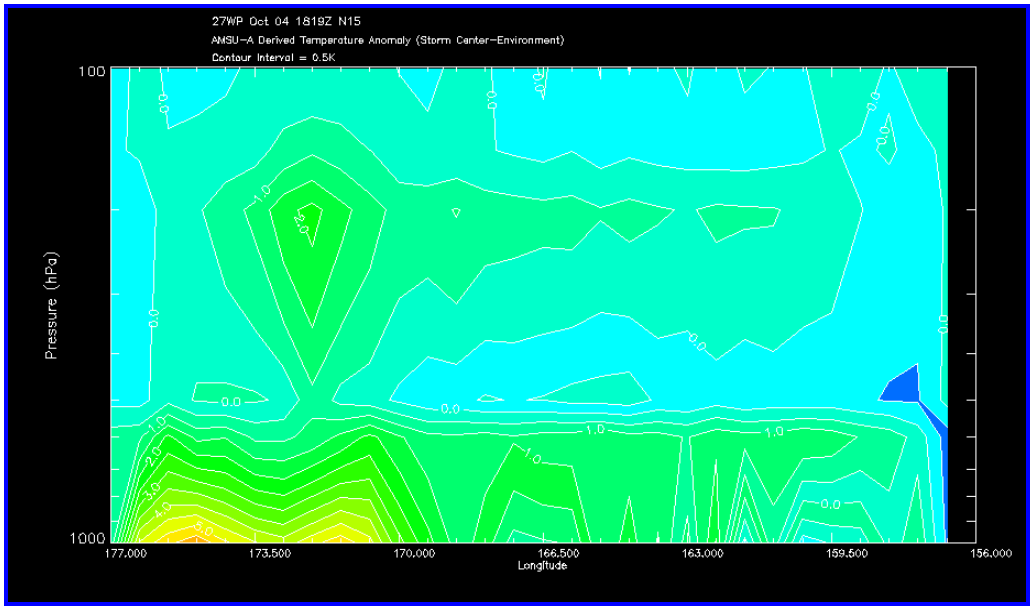
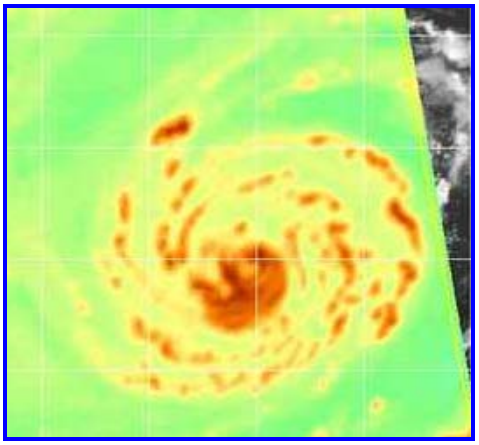
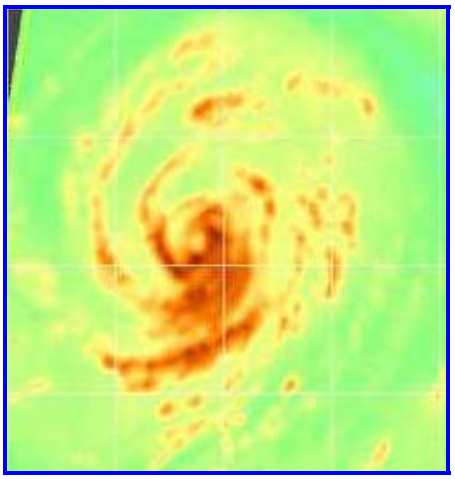


Figure 1-16 04 Oct 1819Z AMSU-A Derived Temperature Anomaly

AMSR-E 36 GHz microwave imagery from 05/0204Z and 05/1410Z also indicated tropical cyclone characteristics; a well-defined low-level circulation center with deep convection and an apparent eye signature (Figures 1-17a and 1-17b).



05/0204Z AQUA-1 36V Image



05/1410Z AQUA-1 36V Image

Figure 1-17a and 1-17b AMSR-E 36 GHz (Vertical) showing apparent eye signature.

Post analysis of high-resolution MODIS visible imagery at 05/0205Z (Figure 1-18) shows a possible incipient, cloud-filled eye with an associated -37C warm spot in IR imagery (not shown). Additionally, infrared satellite imagery from 05/06 to 05/12Z indicate an eye temperature of approximately -34C. Re-assessment of Dvorak estimates ranged from 45-55 knots from 05/06-12Z, supporting a peak best track intensity of 50 knots.

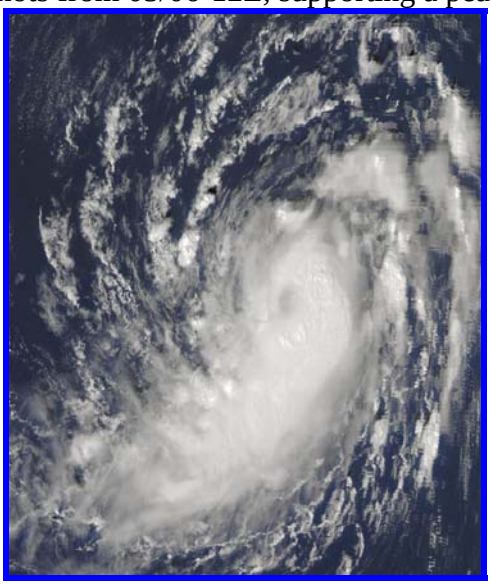


Figure 1-18 05 Oct 0205Z MODIS Visible Imagery (250m) showing possible cloud filled eye.

TS 27W had no significant impacts on DoD assets and occurred during the life cycle of Super Typhoon 17W (Krosa). Based on the described re-analysis, TS 27W was added to the JTWC best track cyclone database.

Chapter 2 North Indian Ocean Tropical Cyclones

This chapter contains information on north Indian Ocean tropical cyclone activity during 2007 and the monthly distribution of Tropical Cyclone activity summarized for 1975 - 2007. North Indian Ocean tropical cyclone best tracks appear following Table 2-2.

Section 1 Informational Tables

Table 2-1 is a summary of Tropical Cyclone activity in the north Indian Ocean during the 2007 season. Six cyclones occurred in 2007, with two cyclones attaining maximum intensities of 140 knots or more, TC 02A (Gonu) in the north Arabian Sea and TC 06B (Sidr) in the Bay of Bengal. Table 2-2 shows the monthly distribution of Tropical Cyclone activity for 1975 - 2007.

Table 2-1

NORTH INDIAN OCEAN SIGNIFICANT TROPICAL CYCLONES FOR 2006

(01 JAN 2006 - 31 DEC 2006)

TC	NAME*	PERIOD**	WARNINGS ISSUED	EST MAX SFC WINDS KTS	MSLP (MB)***
01B	AKASH	13 MAY - 15 MAY	4	65	974
02A	GONU	02 JUN - 07 JUN	21	145	914
03B	-	21 JUN - 22 JUN	2	30	1000
03B#	-	25 JUN - 26 JUN	8	50	985
04B	-	28 JUN - 29 JUN	3	45	988
05A	-	28 OCT - 02 NOV	18	40	992
06B	SIDR	11 NOV - 16 NOV	15	140	918

* As Designated by RSMC New Delhi

** Dates are based on Issuance of JTWC warnings on system.

*** MSLP converted from estimated maximum surface winds using Knaff-Zehr wind-pressure relationship

TC 03B was warned on in two distinct periods first in the Bay of Bengal (21-22 Jun) and second in the Arabian Sea (25-26 Jun). Based on post-cyclone reanalysis peak intensity reached in the Bay of Bengal was 30 knots.

Table 2-1 Significant north Indian Ocean Tropical Cyclones, 2007

Table 2 - 2

DISTRIBUTION OF NORTH INDIAN OCEAN TROPICAL CYCLONES

FOR 1975 - 2006

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTALS
1975	1	0	0	0	2	0	0	0	0	1	2	0	6
	010	000	000	000	200	000	000	000	000	100	020	000	330
1976	0	0	0	1	0	1	0	0	1	1	0	1	5
	000	000	000	010	000	010	000	000	010	010	000	010	050
1977	0	0	0	0	1	1	0	0	0	1	0	2	5
	000	000	000	000	010	010	000	000	000	010	000	110	140
1978	0	0	0	0	1	0	0	0	0	1	2	0	4
	000	000	000	000	010	000	000	000	000	010	200	000	220
1979	0	0	0	0	1	1	0	0	2	1	2	0	7
	000	000	000	000	100	010	000	000	011	010	011	000	142
1980	0	0	0	0	0	0	0	0	0	0	1	1	2
	000	000	000	000	000	000	000	000	000	000	010	010	020
1981	0	0	0	0	0	0	0	0	1	0	1	1	3
	000	000	000	000	000	000	000	000	010	000	100	100	210
1982	0	0	0	0	1	1	0	0	0	2	1	0	5
	000	000	000	000	100	010	000	000	000	020	100	000	230
1983	0	0	0	0	0	0	0	1	0	1	1	0	3
	000	000	000	000	000	000	000	010	000	010	010	000	030
1984	0	0	0	0	1	0	0	0	0	1	2	0	4
	000	000	000	000	010	000	000	000	000	010	200	000	220
1985	0	0	0	0	2	0	0	0	0	2	1	1	6
	000	000	000	000	020	000	000	000	000	020	010	010	060
1986	1	0	0	0	0	0	0	0	0	0	2	0	3
	010	000	000	000	000	000	000	000	000	000	020	000	030
1987	0	1	0	0	0	2	0	0	0	2	1	2	8
	000	010	000	000	000	020	000	000	000	020	010	020	080
1988	0	0	0	0	0	1	0	0	0	1	2	1	5
	000	000	000	000	000	010	000	000	000	010	110	010	140
1989	0	0	0	0	1	1	0	0	0	0	1	0	3
	000	000	000	000	010	010	000	000	000	000	100	000	120
1990	0	0	0	1	1	0	0	0	0	0	1	1	4
	000	000	000	001	100	000	000	000	000	000	001	010	112
1991	1	0	0	1	0	1	0	0	0	0	1	0	4
	010	000	000	100	000	010	000	000	000	000	100	000	220
1992	0	0	0	0	1	2	1	0	1	3	3	2	13
	000	000	000	000	100	020	010	000	001	021	210	020	382
1993	0	0	0	0	0	0	0	0	0	0	2	0	2
	000	000	000	000	000	000	000	000	000	000	200	000	200
1994	0	0	1	1	0	1	0	0	0	1	1	0	5
	000	000	010	100	000	010	000	000	000	010	010	000	140
1995	0	0	0	0	0	0	0	0	1	1	2	0	4
	000	000	000	000	000	000	000	000	010	010	200	000	220
1996	0	0	0	0	1	3	0	0	0	2	2	0	8
	000	000	000	000	010	120	000	000	000	110	200	000	440

1997	0	0	0	0	1	0	0	0	1	1	1	0	4
	0 0 0	0 0 0	0 0 0	0 0 0	1 0 0	0 0 0	0 0 0	0 0 0	1 0 0	0 1 0	0 1 0	0 0 0	2 2 0
1998	0	0	0	0	2	1	0	0	1	1	2	1	8
	0 0 0	0 0 0	0 0 0	0 0 0	1 1 0	1 0 0	0 0 0	0 0 0	0 1 0	0 1 0	2 0 0	1 0 0	5 3 0
1999	0	1	0	0	1	1	0	0	0	2	0	0	5
	0 0 0	0 1 0	0 0 0	0 0 0	1 0 0	0 1 0	0 0 0	0 0 0	0 0 0	2 0 0	0 0 0	0 0 0	3 2 0
2000	0	0	0	0	0	0	0	0	0	2	1	1	4
	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 2 0	1 0 0	0 1 0	1 3 0
2001	0	0	0	0	1	0	0	0	1	1	1	0	4
	0 0 0	0 0 0	0 0 0	0 0 0	1 0 0	0 0 0	0 0 0	0 0 0	0 1 0	0 1 0	0 0 1	0 0 0	1 2 1
2002	0	0	0	0	2	0	0	0	0	0	2	1	5
	0 0 0	0 0 0	0 0 0	0 0 0	0 2 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 2 0	0 1 0	0 5 0
2003	0	0	0	0	1	0	0	0	0	0	1	1	3
	0 0 0	0 0 0	0 0 0	0 0 0	1 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	1 0 0	0 1 0	2 1 0
2004	0	0	0	0	2	0	0	0	0	2	1	0	5
	0 0 0	0 0 0	0 0 0	0 0 0	0 2 0	0 0 0	0 0 0	0 0 0	0 0 0	0 2 0	1 0 0	0 0 0	1 4 0
2005	2	0	0	0	0	0	0	0	0	2	1	2	7
	0 1 1	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 2 0	0 1 0	0 2 0	0 6 1
2006	1	0	0	1	0	0	1	0	2	0	1	0	6
	0 1 0	0 0 0	0 0 0	1 0 0	0 0 0	0 0 0	0 1 0	0 0 0	0 2 0	0 0 0	0 1 0	0 0 0	1 5 0
2007	0	0	0	0	1	3	0	0	0	1	1	0	6
	0 0 0	0 0 0	0 0 0	0 0 0	1 0 0	1 2 0	0 0 0	0 0 0	0 0 0	0 1 0	1 0 0	0 0 0	3 3 0
(1975-2006)													
MEAN	0.2	0.1	0.0	0.2	0.7	0.6	0.1	0.0	0.3	1.0	1.3	0.5	5.0
CASES	6	2	1	5	24	20	2	1	11	33	43	18	166

The criteria used in TABLE 2-2 are as follows:

1) If a tropical cyclone was first warned on during the last two days of a particular month and continued into the next month for longer than two days, then that system was attributed to the second month.

2) If a tropical cyclone was warned on prior to the last two days of a month, it was attributed to the first month, regardless of how long the system lasted.

3) If a tropical cyclone began on the last day of the month and ended on the first day of the next month, that system was attributed to the first month. However, if a tropical cyclone began on the last day of the month and continued into the next month for only two days, then it was attributed to the second month.

Table 2-2 Monthly distribution of north Indian Ocean Tropical Cyclones, 1975 – 2007

TABLE 2-2 Legend		
Total month/year		
GTE 64 knots (Typhoon)	34 to 63 knots (Tropical Storm)	LTE 33 knots (Tropical Depression)

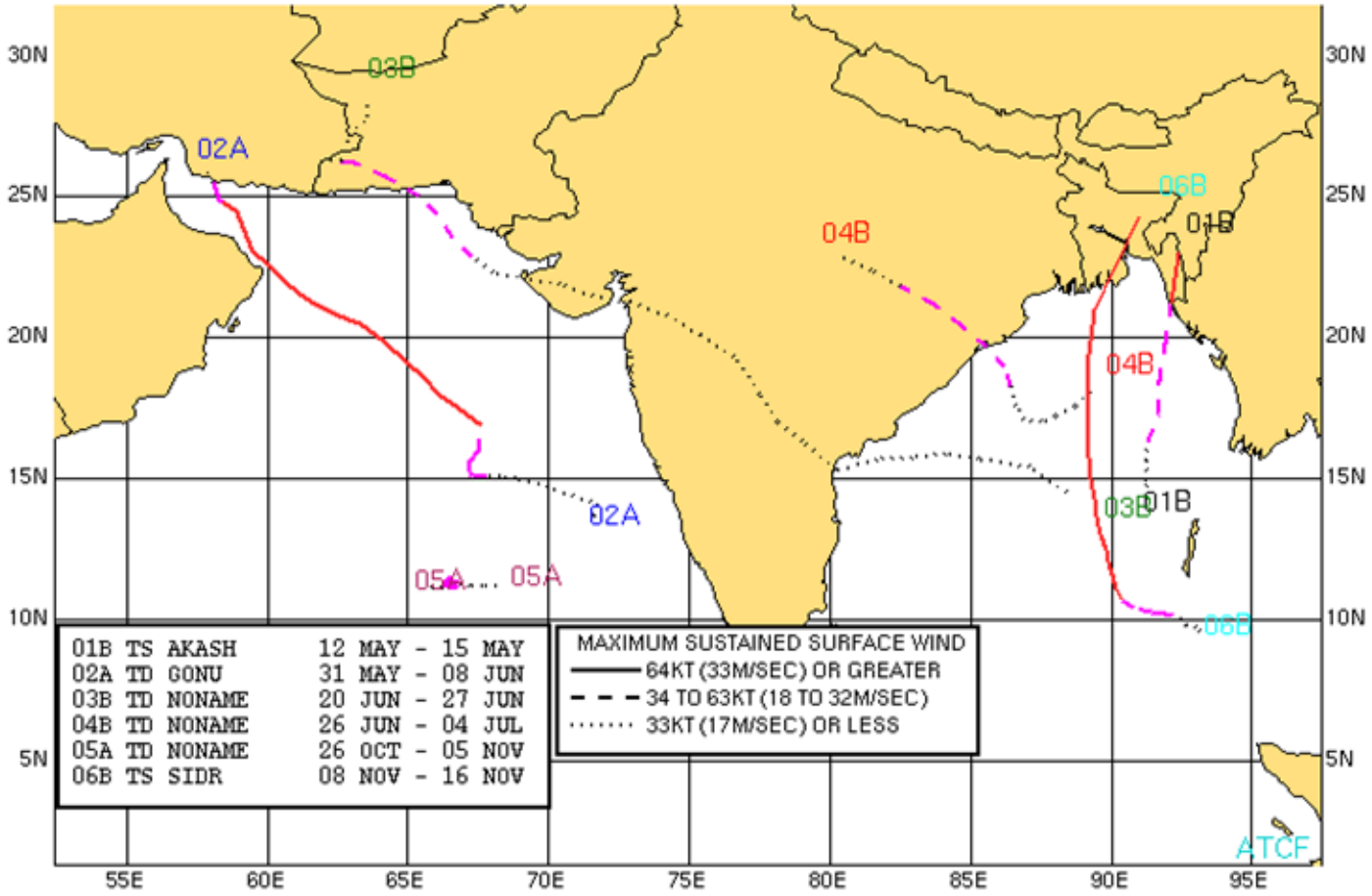


Figure 2-1 North Indian Ocean Tropical Cyclones 12 May - 16 Nov

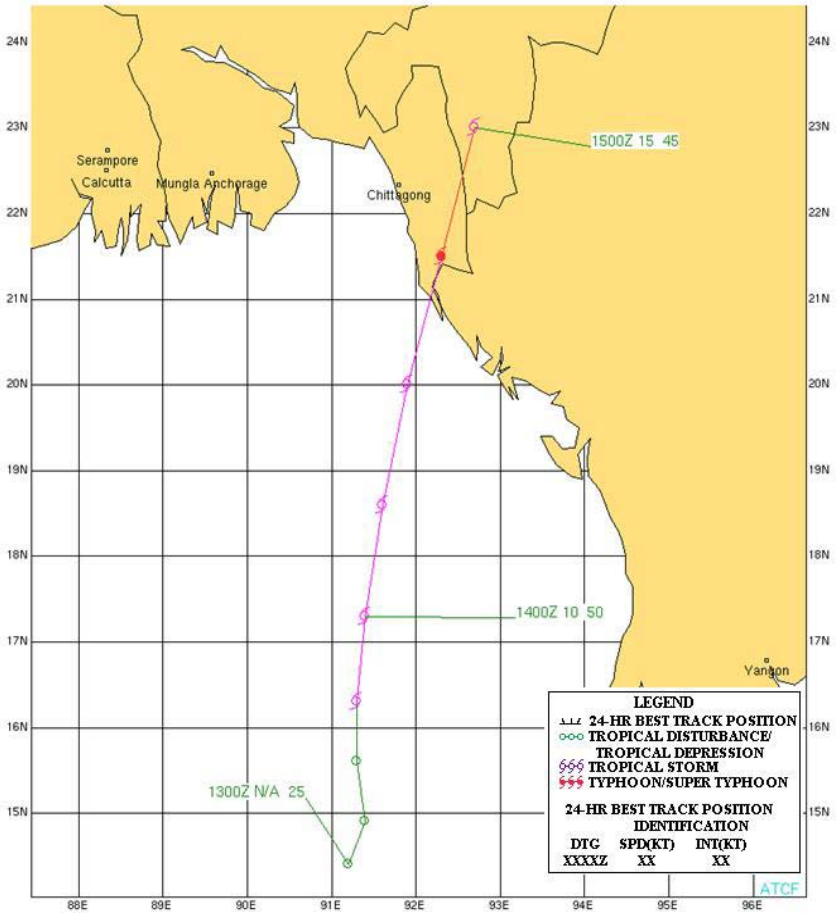
Section 2 Cyclone Summaries

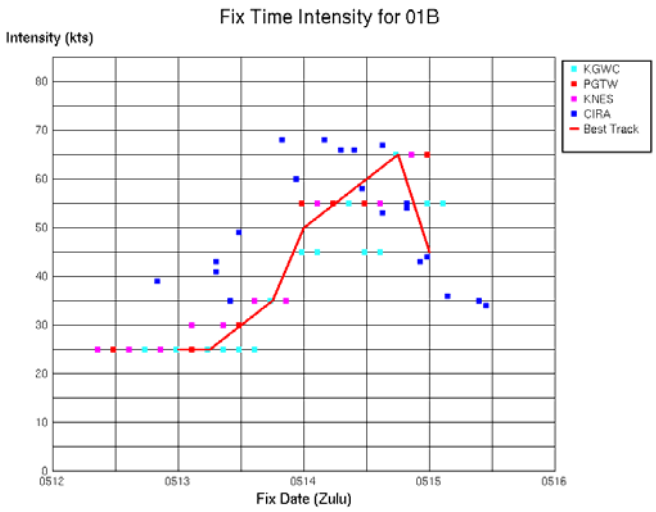
Each cyclone is presented, with the number and basin identifier assigned by JTWC, along with the RSMC assigned cyclone name. Dates are also listed when JTWC first designated various stages of development; as an area of interest (Poor classification), increased potential for development (Fair classification) and development/TC expected (Good classification). Furthermore, the first Tropical Cyclone Formation Alert (TCFA), and the first and final warnings dates are also presented with the number of warnings issued by JTWC. Maximum intensity and the number of warnings issued by JTWC are included as well. Landfall over major landmasses and approximate locations and times are presented as well.

The JTWC post-event reanalysis best track is also provided for each cyclone. Data included on the best track are position and intensity noted with cyclone symbols and color coded track. Best track positions are marked by date at 0000 UTC, as well as the beginning and end points. Best track position labels include the date-time, track speed in knots, and maximum wind speed in knots. A graph of best track intensity versus time is presented. Fix plots on this graph are color coded by fixing agency.

TROPICAL CYCLONE 01B (Akash)

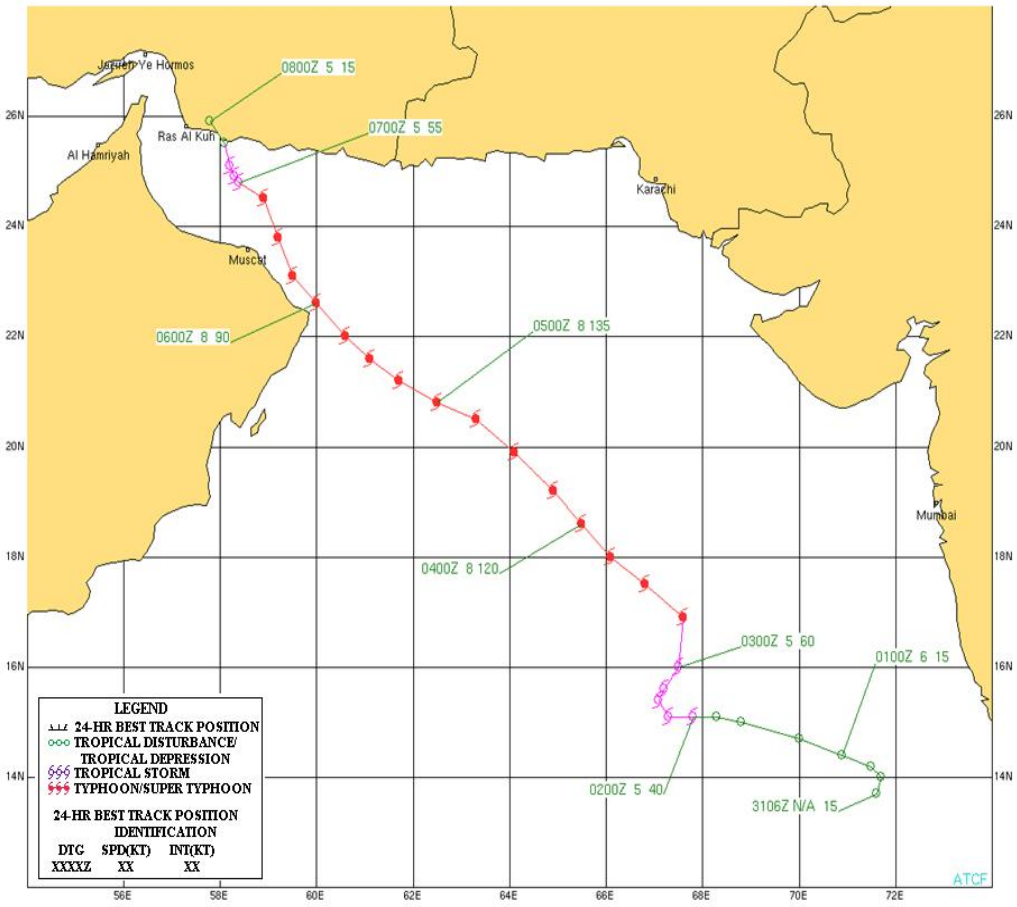
ISSUED POOR:	12 May 1000Z
ISSUED FAIR:	12 May 1800Z
FIRST TCFA:	13 May 1130Z
FIRST WARNING:	13 May 1800Z
LAST WARNING:	15 May 0000Z
LANDFALL:	Near Cox's Bazar, Bangladesh 14 May near 1800Z
MAX INTENSITY:	65 knots
NUMBER OF WARNINGS:	4

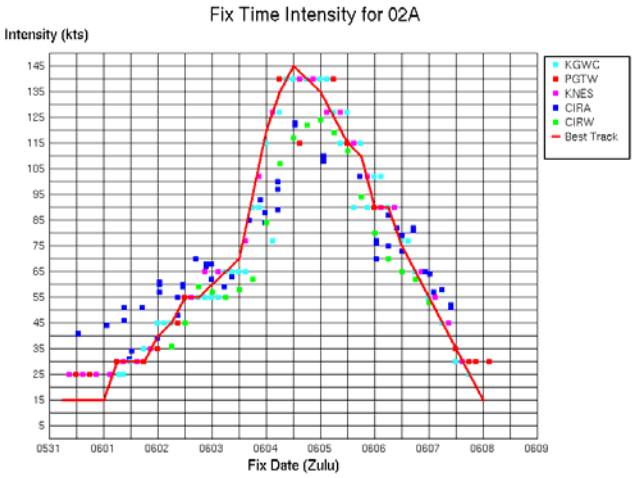




TROPICAL CYCLONE 02A (Gonu)

ISSUED POOR:	31 May 1130Z
ISSUED FAIR:	01 Jun 0100Z
FIRST TCFA:	01 Jun 1030Z
FIRST WARNING:	02 Jun 0000Z
LAST WARNING:	07 Jun 0600Z
LANDFALL:	Near Ras Al Kuh, Iran 07 Jun near 1800Z
MAX INTENSITY:	145 knots
NUMBER OF WARNINGS:	21

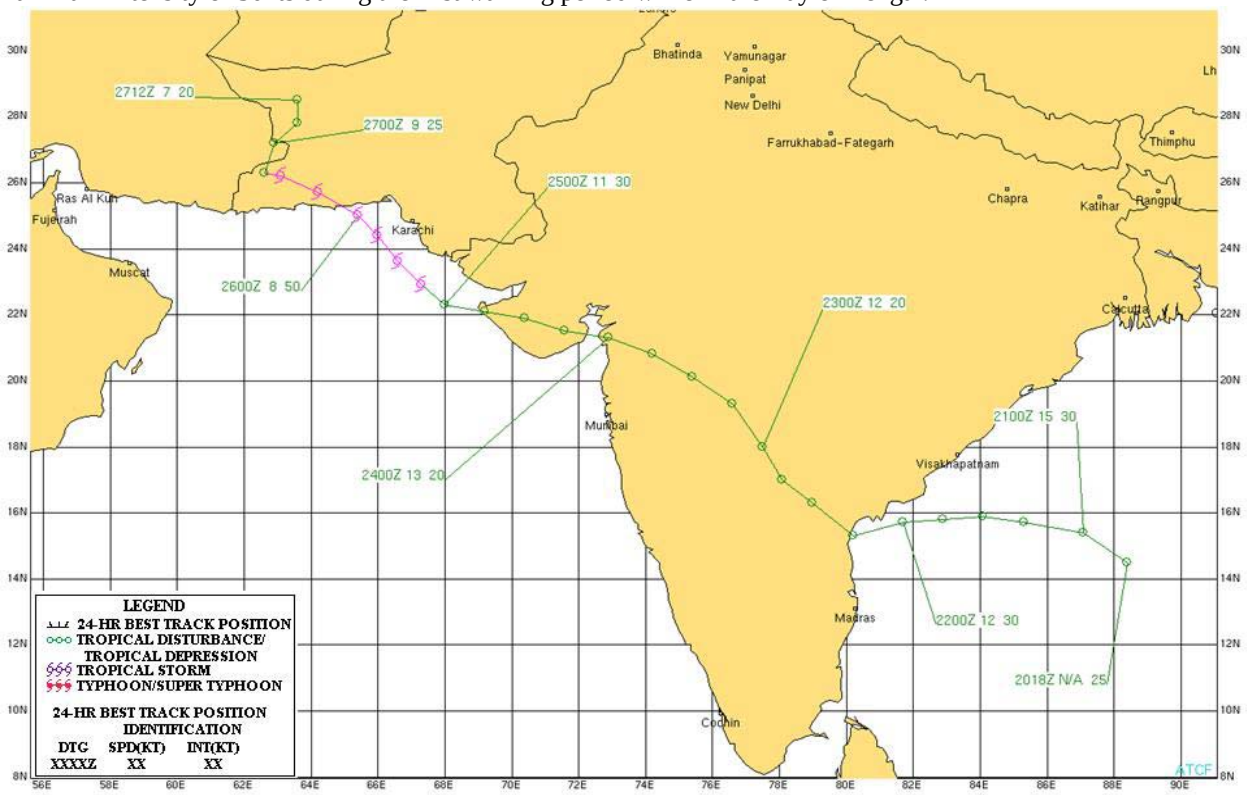


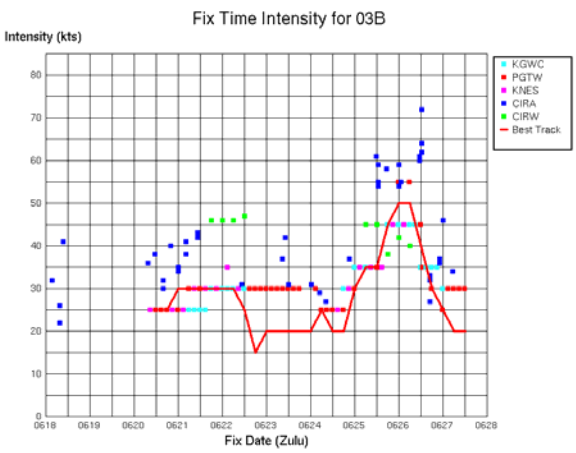


TROPICAL CYCLONE 03B

ISSUED POOR:	18 Jun 1400Z
ISSUED FAIR:	20 Jun 1200Z
FIRST TCFA:	21 Jun 0730Z
	25 Jun 0000Z**
FIRST WARNING:	21 Jun 1200Z
	25 Jun 0600Z
LAST WARNING:	22 Jun 0600Z
	26 Jun 1800Z
LANDFALL:	Near Machilipatnam, India 22 Jun near 0600Z
	Near Pasni, Pakistan 26 Jun near 0600Z
MAX INTENSITY:	50 knots
NUMBER OF WARNINGS:	10

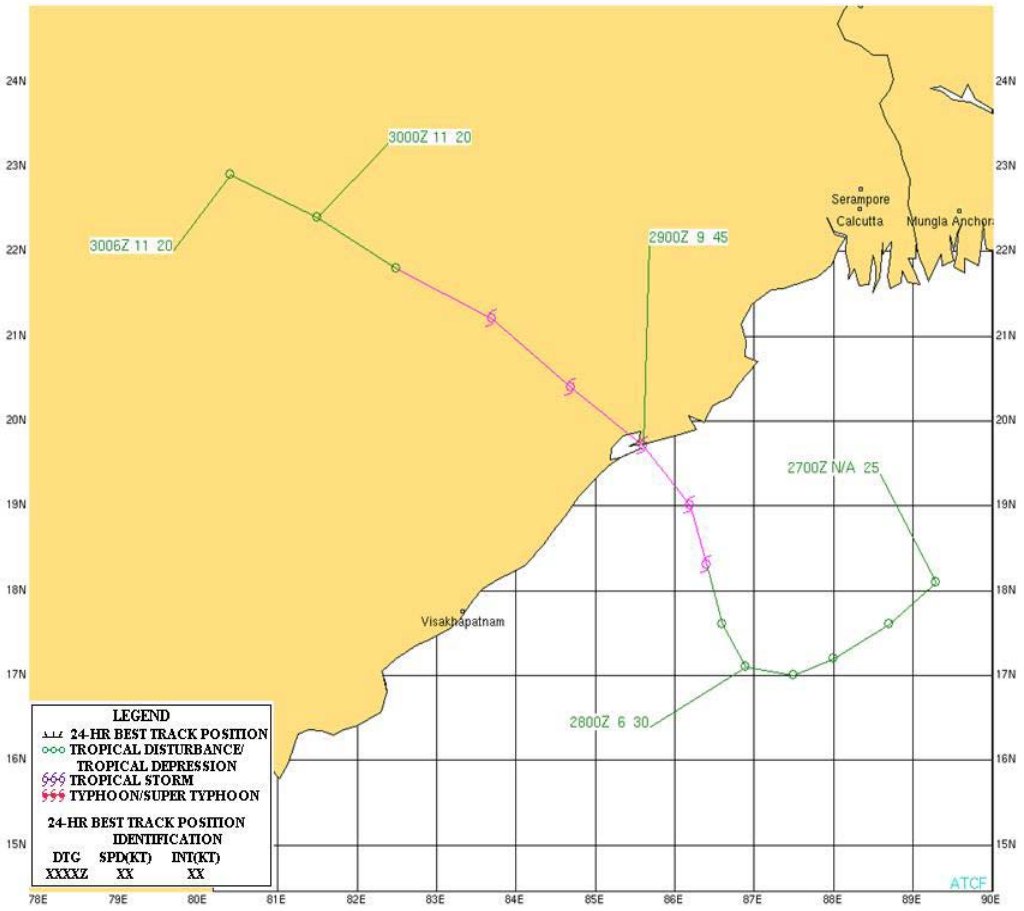
** This cyclone had two periods of warnings; from 21 Jun to 22 Jun and 25 Jun to 26 Jun. Post-analysis indicates that the cyclone attained maximum intensity of 30kts during the first warning period while in the Bay of Bengal.

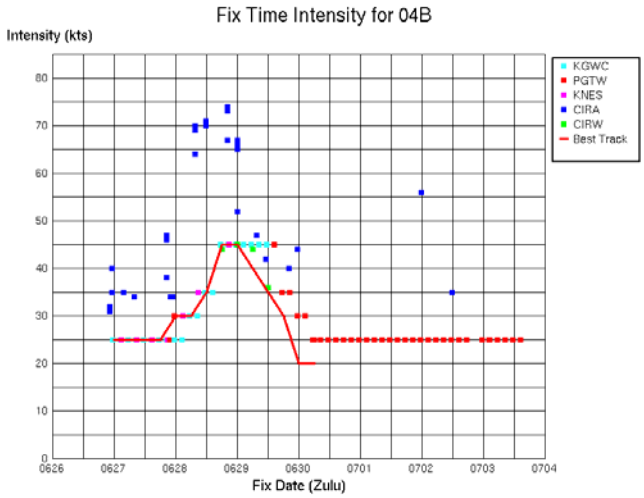




TROPICAL CYCLONE 04B

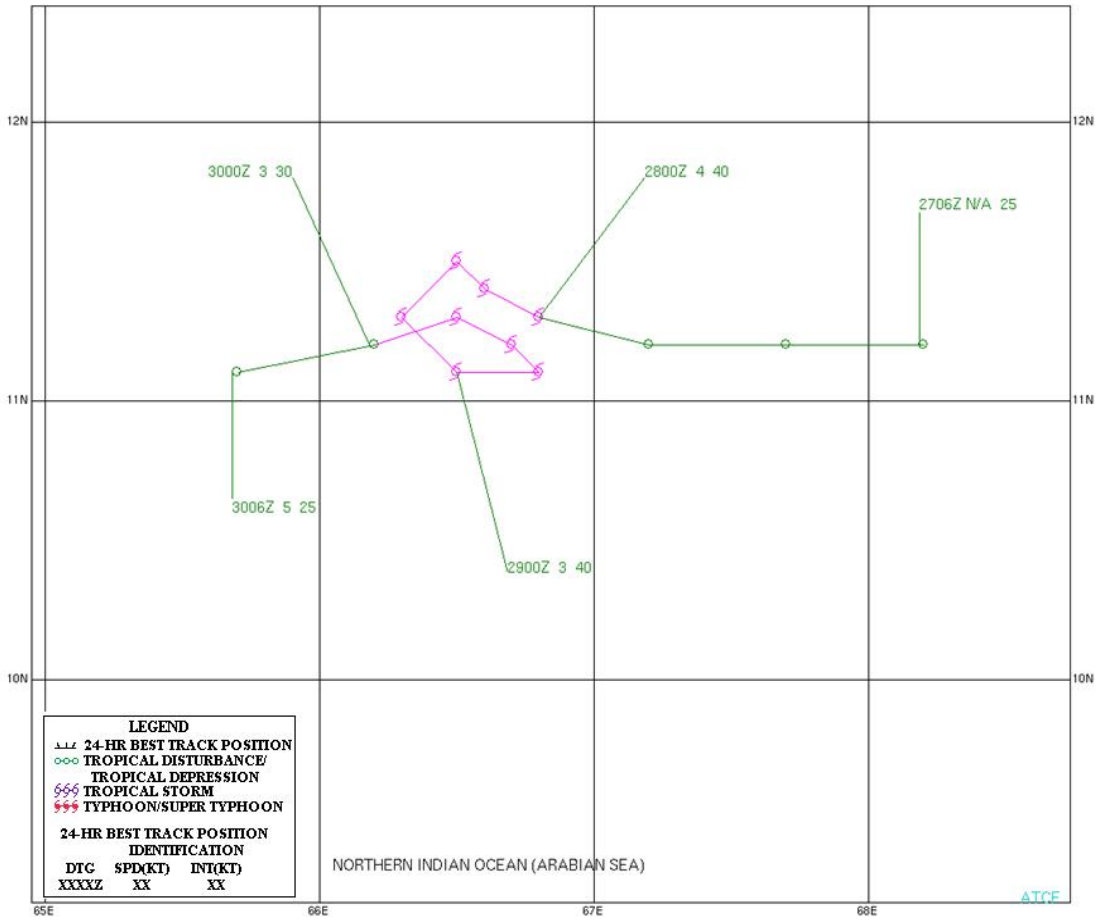
ISSUED POOR:	27 Jun 0000Z
ISSUED FAIR:	27 Jun 0300Z
FIRST TCFA:	28 Jun 0730Z
FIRST WARNING:	28 Jun 1200Z
LAST WARNING:	29 Jun 1200Z
LANDFALL:	Near Puri, India 29 Jun near 0000Z
MAX INTENSITY:	45 knots
NUMBER OF WARNINGS:	3

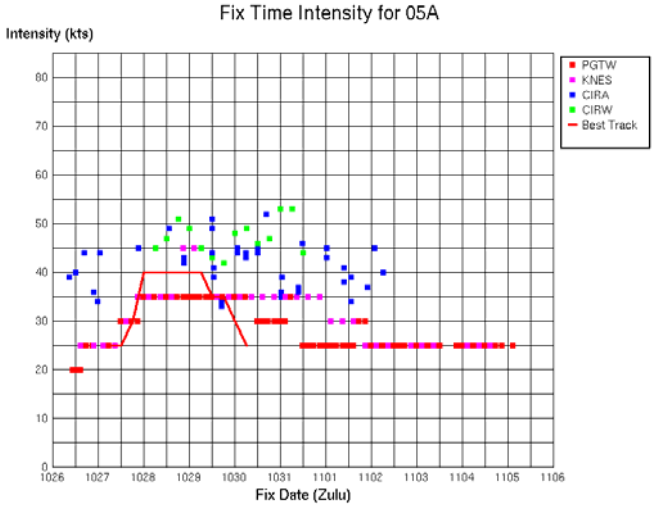




TROPICAL CYCLONE 05A

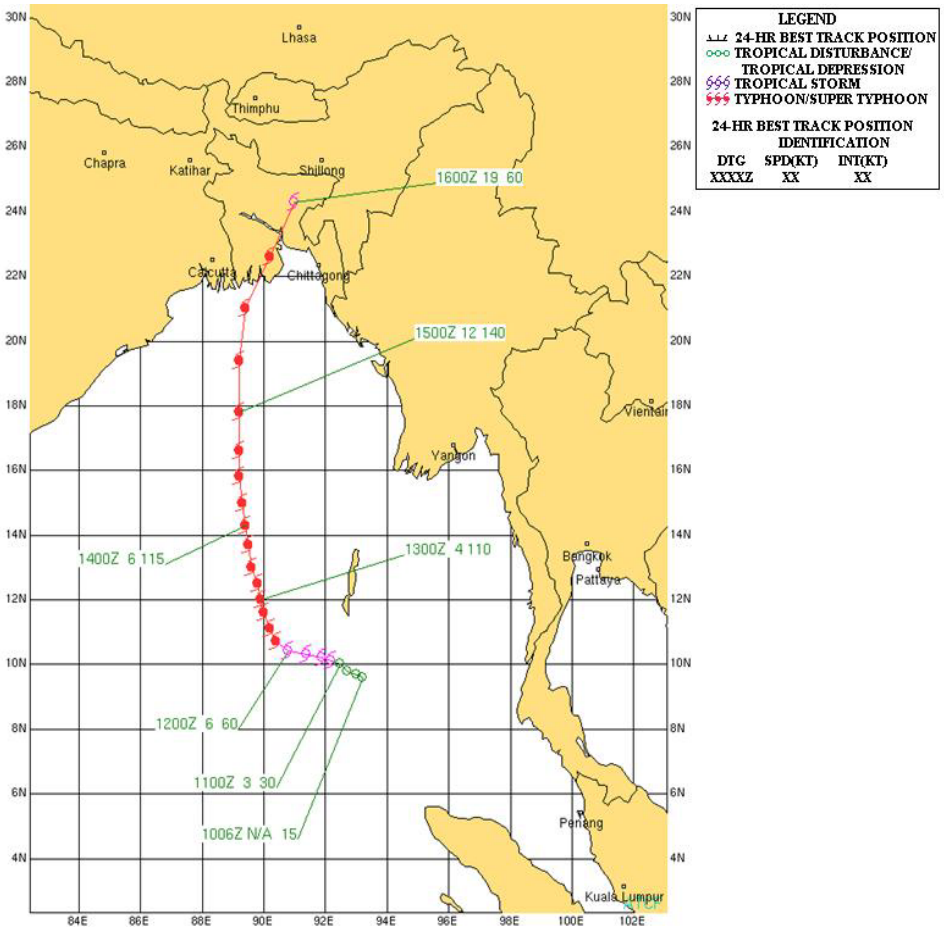
ISSUED POOR:	26 Oct 0600Z
ISSUED FAIR:	26 Oct 1800Z
FIRST TCFA:	27 Oct 1400Z
FIRST WARNING:	28 Oct 0000Z
LAST WARNING:	02 Nov 0000Z
LANDFALL:	None.
MAX INTENSITY:	40 knots
NUMBER OF WARNINGS:	18

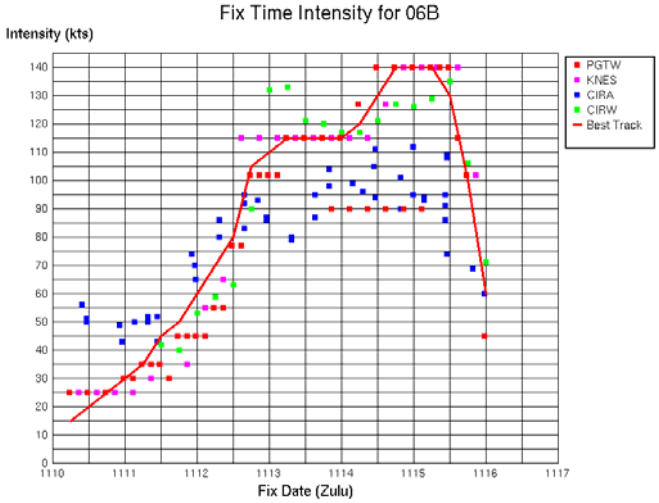




TROPICAL CYCLONE 06B (Sidr)

ISSUED POOR:	09 Nov 2030Z
ISSUED FAIR:	10 Nov 1400Z
FIRST TCFA:	10 Nov 2130Z
FIRST WARNING:	11 Nov 0600Z
LAST WARNING:	16 Nov 0000Z
LANDFALL:	Near Patuakhali, Bangladesh, 15 Nov near 1800Z
MAX INTENSITY:	140 knots
NUMBER OF WARNINGS:	15





Section 3 Detailed Cyclone Reviews

TC 02A (GONU)

JTWC data indicates that TC 02A (Gonu) was one of the most intense tropical cyclones to occur in the Northern Indian Ocean (Arabian Sea). The initial warning issued by JTWC on 2 June 2007 at 00Z, designated the system as a 40 knot TC. By 12Z on 4 June 2007, only 60 hours later, the cyclone reached a maximum intensity of 145 knots. While track forecasts were accurate (see Figure 2-1) and overall track errors were well below JTWC goals (see Table 2-3), early intensity forecast errors were very high due to the cyclone's unexpected rapid intensification. Numerical model guidance indicated the cyclone would weaken over the central Arabian Sea due to dry air entrained from the Arabian Peninsula. Post analysis, however, revealed that this dry air did not affect the cyclone as forecast by the models. The resulting higher moisture levels in the central Arabian Sea, combined with unusually low vertical wind shear and enhanced divergence aloft ahead of a mid-latitude trough, allowed TC 02A to intensify from 70 knots to 145 knots in a 24 hour period. JTWC data indicates TC Gonu also maintained intensity farther north and west than typically observed in the Arabian Sea during early June. The cyclone generated significant interest due to its intensity and potential for impact to DoD activity near and around the strategic Strait of Hormuz (seven ships were diverted). Even as TC 02A weakened as it approached the Arabian Peninsula and prior to making landfall in Iran, it was still the strongest documented TC to affect the Arabian Peninsula, as well as one of few cyclones to enter the Gulf of Oman. According to news reports, this cyclone caused widespread damage throughout Oman ($4 billion U.S.) and Southern Iran ($216 million U.S.).

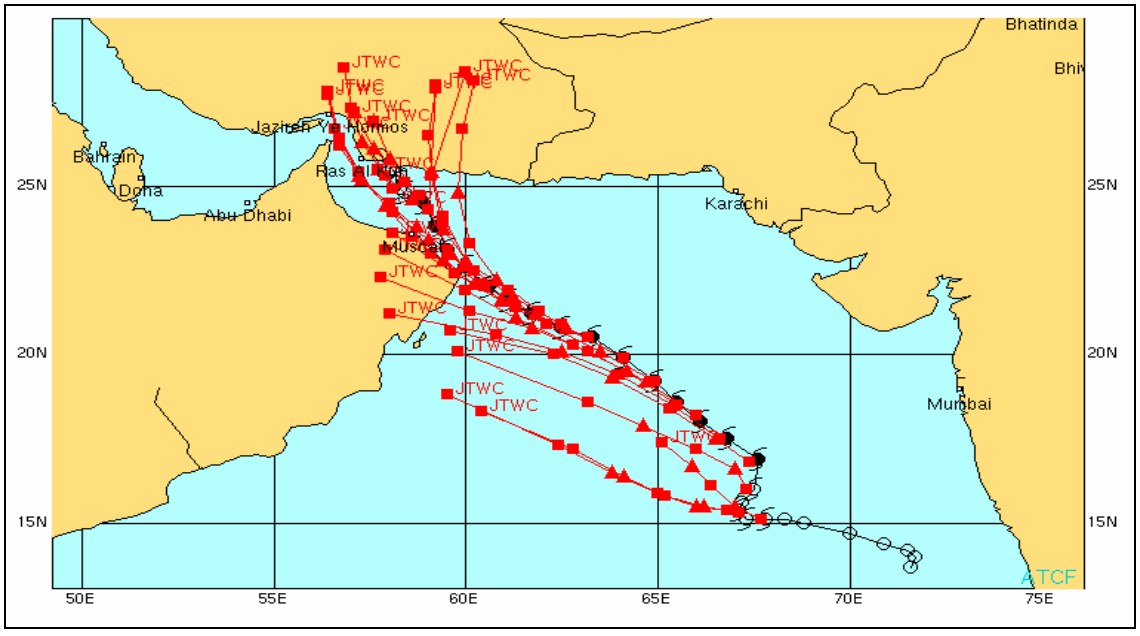


Figure 2-2 Best Track with JTWC forecasts overlaid.

	Tau 24	Tau 48	Tau 72
JTWC Forecast Track Error (nm)	**49**	**84**	**140**
Model Consensus (nm)	**54**	**96**	**130**
JTWC Forecast Goals (nm)	**50**	**100**	**150**
Forecast Track Error Cases	**19**	**15**	**10**
JTWC Intensity Error (knots)	**26**	**43**	**38**
CHIP (knots)	**21**	**18**	**13**
AVNO (knots)	**75**	**93**	**83**
NGPS (knots)	**60**	**73**	**62**
Intensity Error Cases	**14**	**9**	**4**

Table 2-3 Average Forecast Track Error and Absolute Intensity Error (Homogeneous Comparison).

Although well forecast in the later time periods, the rapid intensification of TC 02A resulted in large intensity forecast errors during the early stages of the cyclone, which affected the overall intensity forecast statistics (see Table 2-3). The intensity forecast versus time plots depicted in Figures 2-3 and 2-4 indicates the only intensity forecast guidance to identify significant intensification was the Coupled Hurricane Intensity Prediction System (CHIPS) model, and even this model under forecast the degree of intensification (24 hour intensity error at 12Z on 3 June 2007 was -40 knots) and the rapid rate of intensification. In-house data review also indicated that the models tended to maintain current intensity and then weaken the cyclone over time rather than intensify this cyclone. Furthermore, the GFS (AVNO) and NOGAPS (NGPS) models appeared to have had the most difficulty in correctly initializing the cyclone and therefore did not forecast any significant intensification of the cyclone.

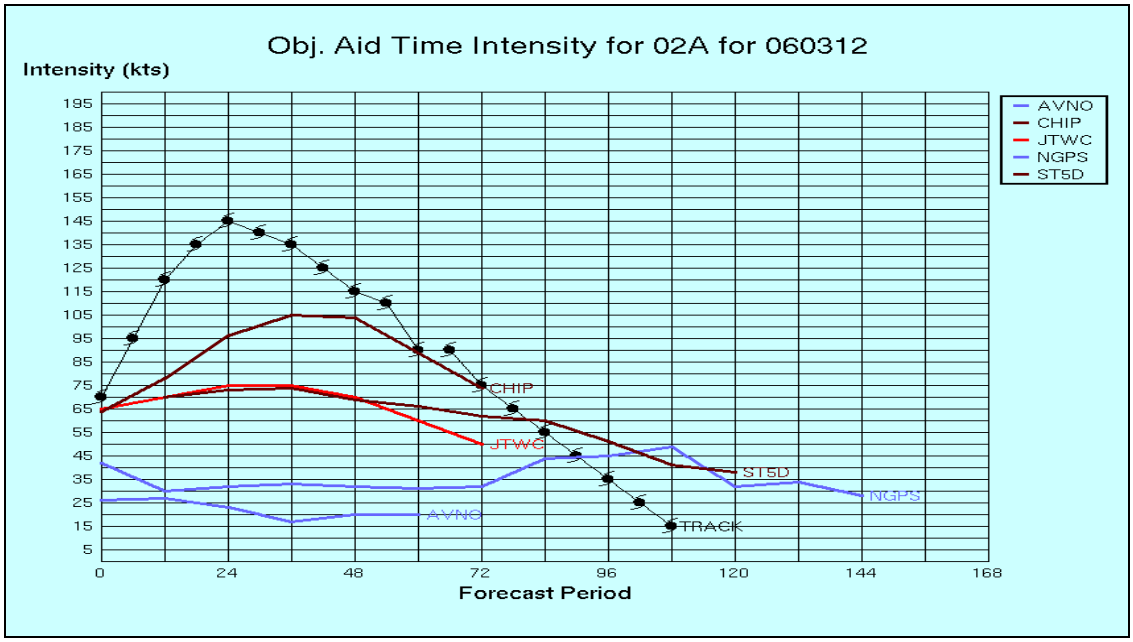


Figure 2-3 Objective Intensity Aids for TC 02A (Gonu) from the forecast period 24 hours prior to peak intensity.

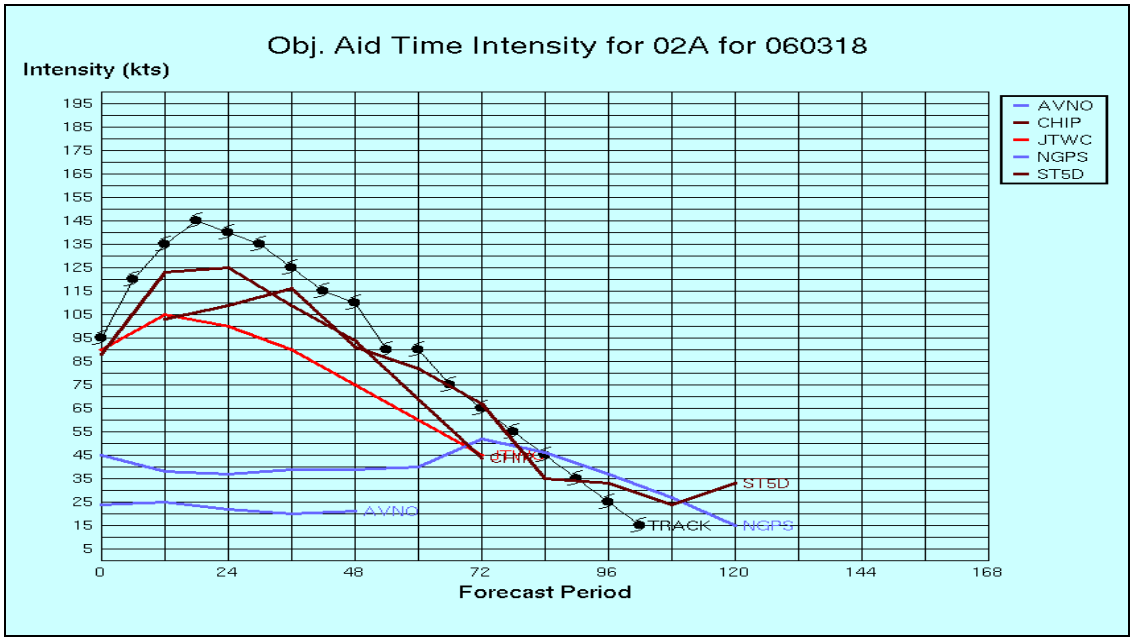


Figure 2-4 Objective Intensity Aids for TC 02A (Gonu) from the forecast period 18 hours prior to peak intensity.

The events associated with TC 02A indicates that increased research is needed to improve the understanding and numerical modeling of subtle changes in structure and intensity which lead to rapid intensification. Poor intensity performance by numerical models is a major shortfall clearly illustrated by the large intensity forecast errors associated with TC 02A. Had this rapid intensification occurred closer to the Arabian Peninsula or the Gulf of Oman, the cyclone's impact could have been even more devastating to DoD assets and operations.

Chapter 3 South Pacific and South Indian Ocean Tropical Cyclones

This chapter contains information on south Pacific and south Indian Ocean tropical cyclone activity that occurred during 2007 tropical cyclone season (1 July 2006 – 30 June 2007) and the monthly distribution of Tropical Cyclone activity summarized for 1975 - 2007. 2007 tropical cyclone best tracks for this region appear following Table 3-3.

Section 1 Informational Tables

Table 3-1 is a summary of Tropical Cyclone activity in the Southern Hemisphere during the 2007 season. Table 3-2 provides the monthly distribution of Tropical Cyclone activity summarized for 1975 - 2007. Table 3-3 depicts the annual variation of Tropical Cyclone activity by basin.

Table 3-1
SOUTHERN HEMISPHERE TROPICAL CYCLONES FOR 2007
(01 JULY 2006 - 30 JUNE 2007)

TC	NAME	PERIOD	WARNINGS ISSUED	EST MAX SFC WINDS KTS	MSLP (MB)**
01P	Xavier	22 OCT - 26 OCT	9	115	936
02P	Yani	22 NOV - 25 NOV	7	70	970
03S	Anita	29 NOV - 02 DEC	6	45	988
04P	-	30 NOV - 2 DEC	5	35	996
05S	Bondo	18 DEC - 26 DEC	17	135	921
06S	Clovis	31 DEC - 04 JAN	9	65	974
07S	Isobel	02 JAN - 03 JAN	4	40	992
08P	Zita	22 JAN - 24 JAN	4	60	977
09P	Arthur	24 JAN - 26 JAN	5	65	974
10S	Dora	28 JAN - 09 FEB	24	115	936
11P	-	04 FEB - 05 FEB	3	35	996
12P	Nelson	06 FEB - 07 FEB	3	50	985
13S	Enok	09 FEB - 11 FEB	5	55	981
14S	Favio	14 FEB - 23 FEB	18	120	933
15S	Gamede	21 FEB - 02 MAR	19	105	944
16S	Humba	21 FEB - 26 FEB	11	80	963
17S	George	03 MAR - 09 MAR	15	110	940
18S	Jacob	07 MAR - 12 MAR	18	75	966
19S	Indlada	12 MAR - 16 MAR	9	120	933
20S	Kara	25 MAR - 27 MAR	6	105	944
21P	Becky	26 MAR - 29 MAR	7	70	970
22S	Jaya	30 MAR - 04 APR	12	110	940
23P	Cliff	04 APR - 06 APR	5	55	981
24P	Pierre	17 MAY - 18 MAY	4	30	1000

**MSLP converted from estimated maximum winds using Knaff-Zehr wind pressure relationship. Number of warnings includes amended warnings.

Table 3-1 Significant Tropical Cyclones for the Southern Hemisphere, July 2006 - June 2007

Table 3-2
DISTRIBUTION OF SOUTH PACIFIC AND SOUTH INDIAN OCEAN TROPICAL CYCLONES
FOR 1981 - 2007

YEAR	JUL(1,2,3)	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTALS
1981 - 2007													
1981	0	0	0	1	3	2	6	5	3	3	1	0	24
1982	1	0	0	1	1	3	9	4	2	3	1	0	25
1983	1	0	0	1	1	3	5	6	3	5	0	0	25
1984	1	0	0	1	2	5	5	10	4	2	0	0	30
1985	0	0	0	0	1	7	9	9	6	3	0	0	35
1986	0	0	1	0	1	1	9	9	6	4	2	0	33
1987	0	1	0	0	1	3	6	8	3	4	1	1	28
1988	0	0	0	0	2	3	5	5	3	1	2	0	21
1989	0	0	0	0	2	1	5	8	6	4	2	0	28
1990	2	0	1	1	2	2	4	4	10	2	1	0	29
1991	0	0	1	1	1	3	2	5	5	2	1	1	22
1992	0	0	1	1	2	5	4	11	3	2	1	0	30
1993	0	0	1	1	0	5	7	7	2	2	2	0	27
1994	0	0	0	0	2	4	8	4	9	3	0	0	30
1995	0	0	0	0	2	2	5	4	5	4	0	0	22
1996	0	0	0	0	1	3	7	6	6	4	1	0	28
1997	1	1	1	2	2	6	9	8	3	1	3	1	38
1998	1	0	0	3	2	3	7	9	6	6	0	0	37
1999	1	0	1	1	1	6	6	8	7	2	0	0	33
2000	0	0	0	0	0	3	6	5	7	6	0	0	27
2001	0	1	0	0	1	1	4	6	2	5	0	1	21
2002	0	0	0	2	4	1	4	5	4	2	3	0	25
2003	0	0	1	0	2	5	5	7	5	2	1	1	29
2004	0	0	0	1	1	3	6	3	7	1	1	0	23
2005	0	0	1	1	2	2	7	7	4	2	0	0	26
2006	6	5	5	3	0	0	0	0	0	1	2	1	23
2007	0	0	0	0	1	2	2	5	6	6	1	1	24
(1981 - 2007)													
MEAN	0.5	0.3	0.5	0.8	1.5	3.1	5.6	6.2	4.7	3.0	1.0	0.3	27.5
CASES	14	8	14	21	40	84	152	168	127	82	26	7	743

1) If a tropical cyclone was first warned on during the last two days of a particular month and continued into the next month for longer than two days, then that system was attributed to the second month

2) If a tropical cyclone was warned on prior to the last two days of a month, it was attributed to the first month, regardless of how long the system lasted.

3) If a tropical cyclone began on the last day of the month and ended on the first day of the next month, that system was attributed to the first month. However, if a tropical cyclone began on the last day of the month and continued into the next month for only two days, then it was attributed to the second month.

Table 3-2 Monthly distribution of Southern Hemisphere Tropical Cyclone activity, 1981 - 2007

Table 3-3
ANNUAL VARIATION OF SOUTHERN HEMISPHERE TROPICAL CYCLONES BY OCEAN BASIN
1958 - 2007

	SOUTH INDIAN (WEST OF 105°E)	AUSTRALIAN (105°E - 165°E)	SOUTH PACIFIC (EAST OF 165°E)	TOTAL
1981 - 2007				
1981	13	8	3	24
1982	12	11	2	25
1983	7	6	12	25
1984	14	14	2	30
1985	14	15	6	35
1986	14	16	3	33
1987	9	8	11	28
1988	14	2	5	21
1989	12	9	7	28
1990	18	8	3	29
1991	11	10	1	22
1992	11	6	13	30
1993	10	16	1	27
1994	16	10	4	30
1995	11	7	4	22
1996	13	11	4	28
1997	17	5	16	38
1998	12	10	15	37
1999	13	16	4	33
2000	10	12	5	27
2001	10	8	3	21
2002	14	7	4	25
2003	14	6	9	29
2004	13	7	3	23
2005	12	8	6	26
2006	9	11	3	23
2007	10	9	5	24
1981 – 2007				
MEAN	12.3	9.5	5.7	27.5
CASES	333	256	154	743

Table 3-3 Distribution of Southern Hemisphere Tropical Cyclone activity by Basin, 1981 - 2007

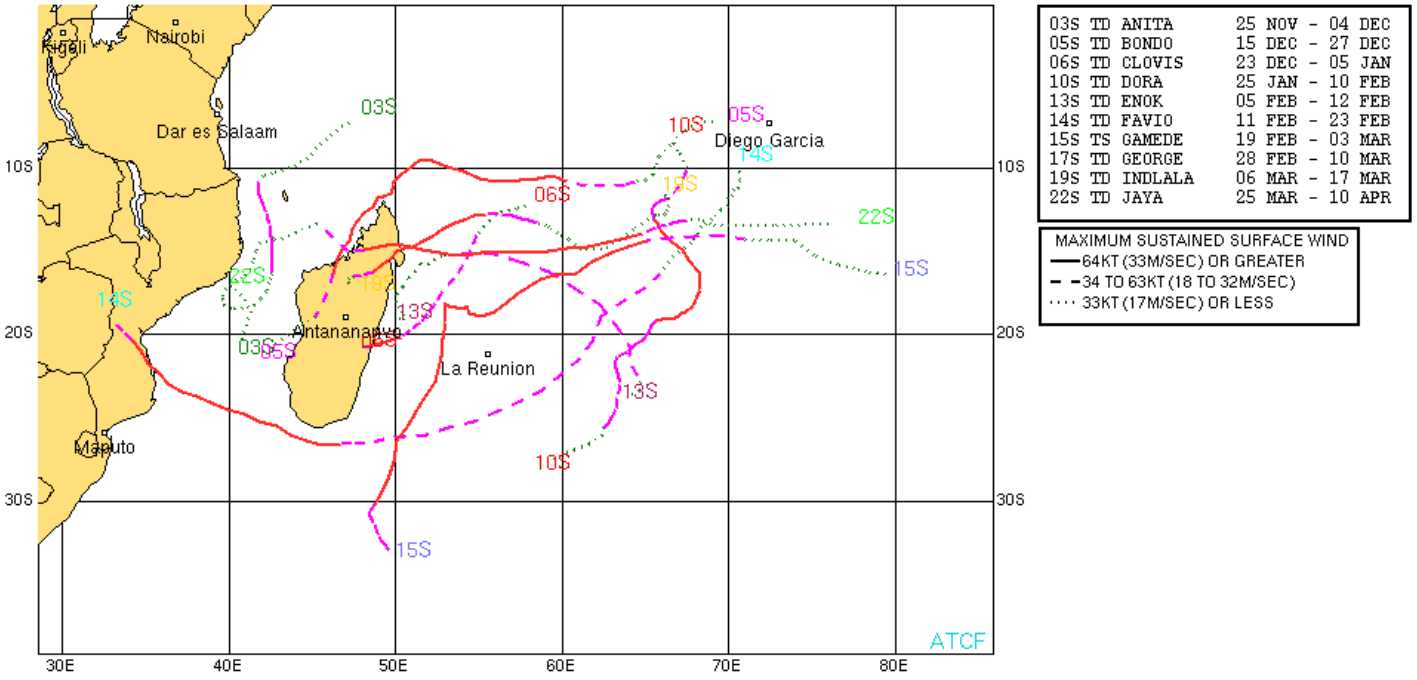


Figure 3-1 Southern Hemisphere Cyclones 25 Nov 2006 - 10 Apr 2007

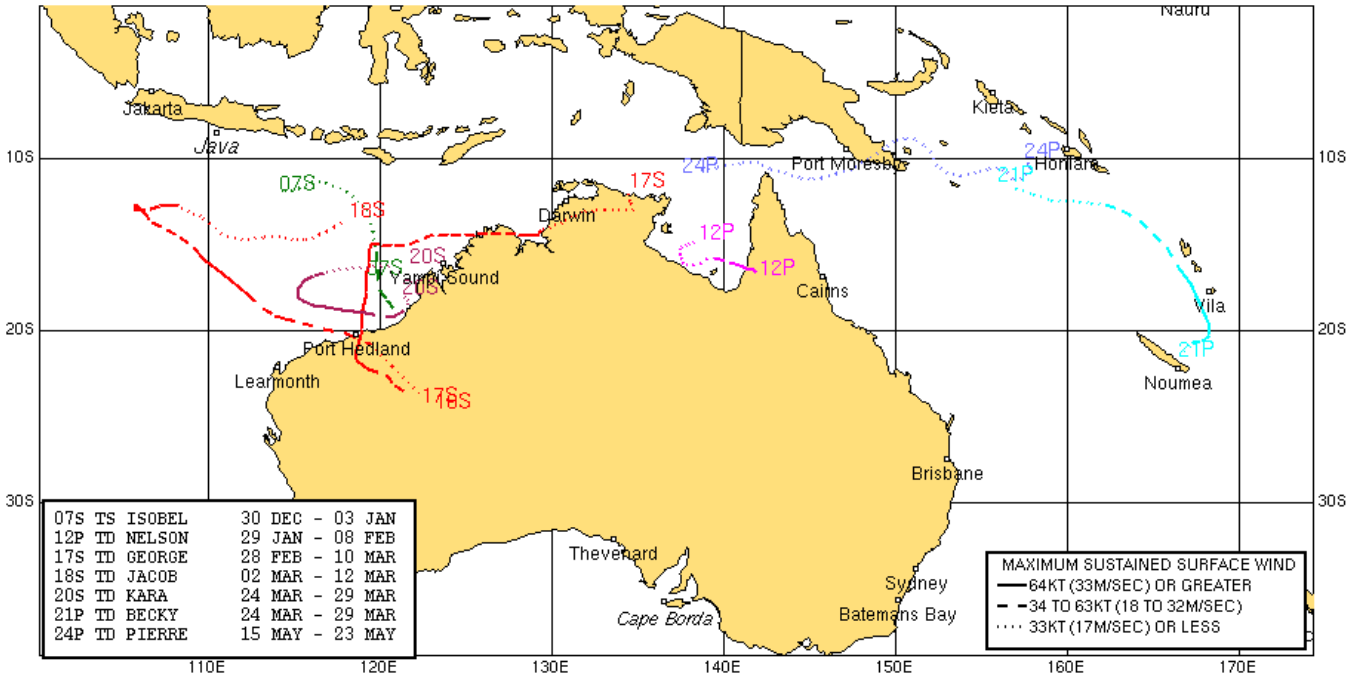


Figure 3-2 Southern Hemisphere Tropical Cyclones 30 Dec 2006 - 23 May 2007

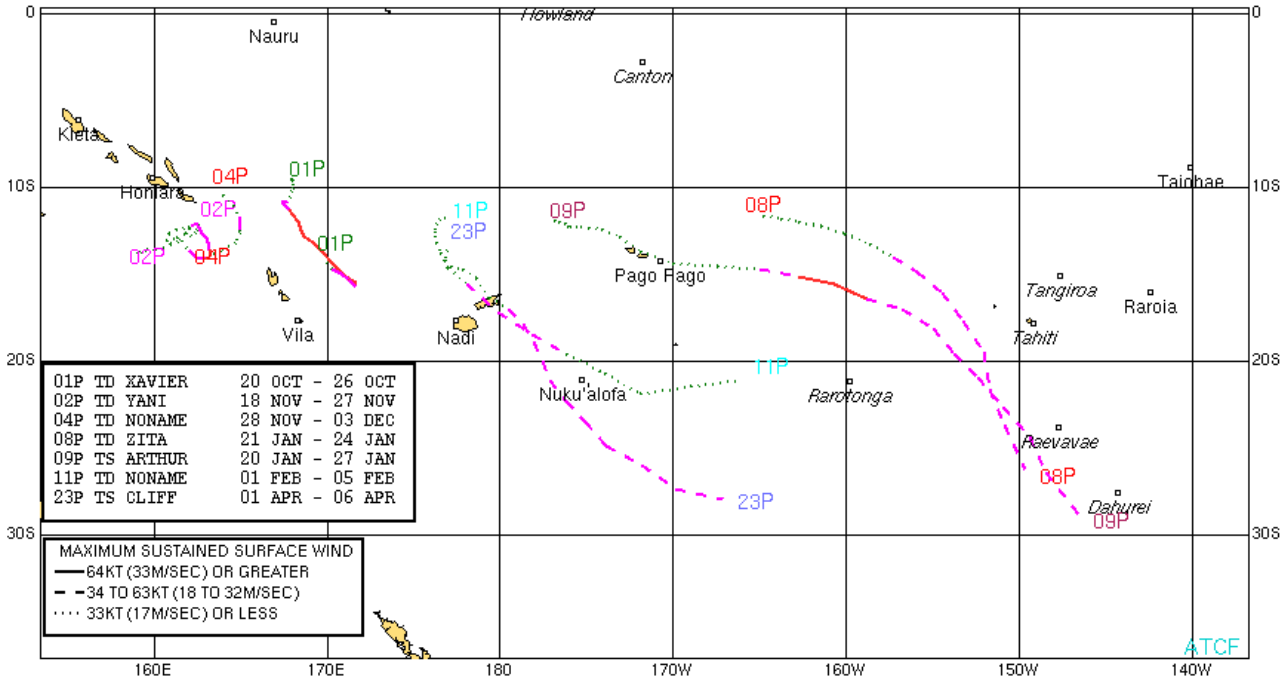


Figure 3-3 Southern Hemisphere Tropical Cyclones 20 Oct 2006 - 6 Apr 2007

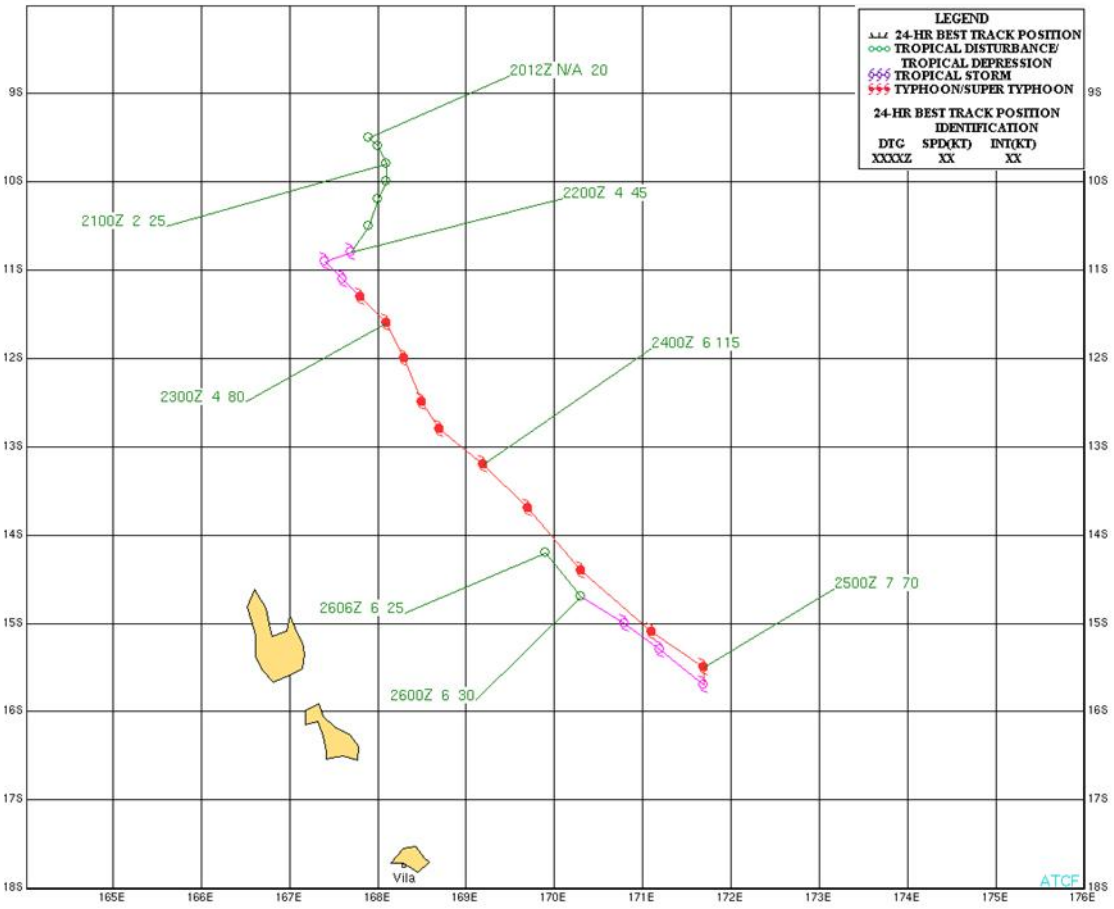
Section 2 Cyclone Summaries

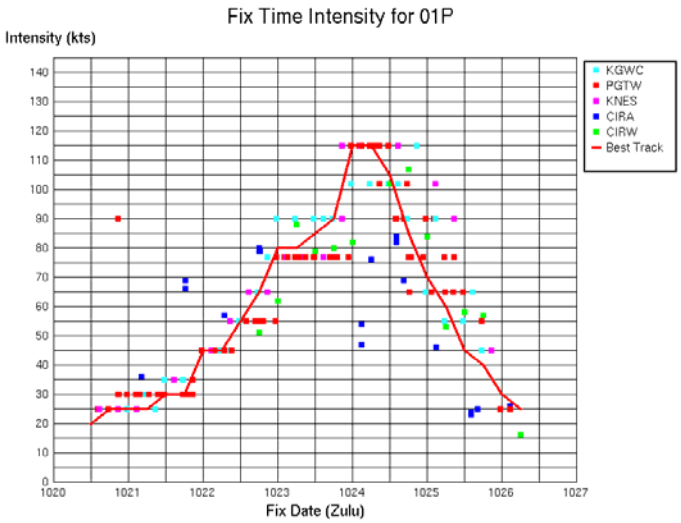
Each cyclone is presented, with the number and basin identifier assigned by JTWC, along with the RSMC assigned cyclone name. Dates are also listed when JTWC first designated various stages of development; as an area of interest (Poor classification), increased potential for development (Fair classification) and development/TC expected (Good classification). Furthermore, the first Tropical Cyclone Formation Alert (TCFA), and the first and final warnings dates are also presented with the number of warnings issued by JTWC. Maximum intensity and the number of warnings issued by JTWC are included as well. Landfall over major landmasses and approximate locations and times are presented as well.

The JTWC post-event reanalysis best track is also provided for each cyclone. Data included on the best track are position and intensity noted with cyclone symbols and color coded track. Best track positions are marked by date at 0000 UTC, as well as the beginning and end points. Best track position labels include the date-time, track speed in knots, and maximum wind speed in knots. A graph of best track intensity versus time is presented. Fix plots on this graph are color coded by fixing agency

TROPICAL CYCLONE 01P (Xavier)

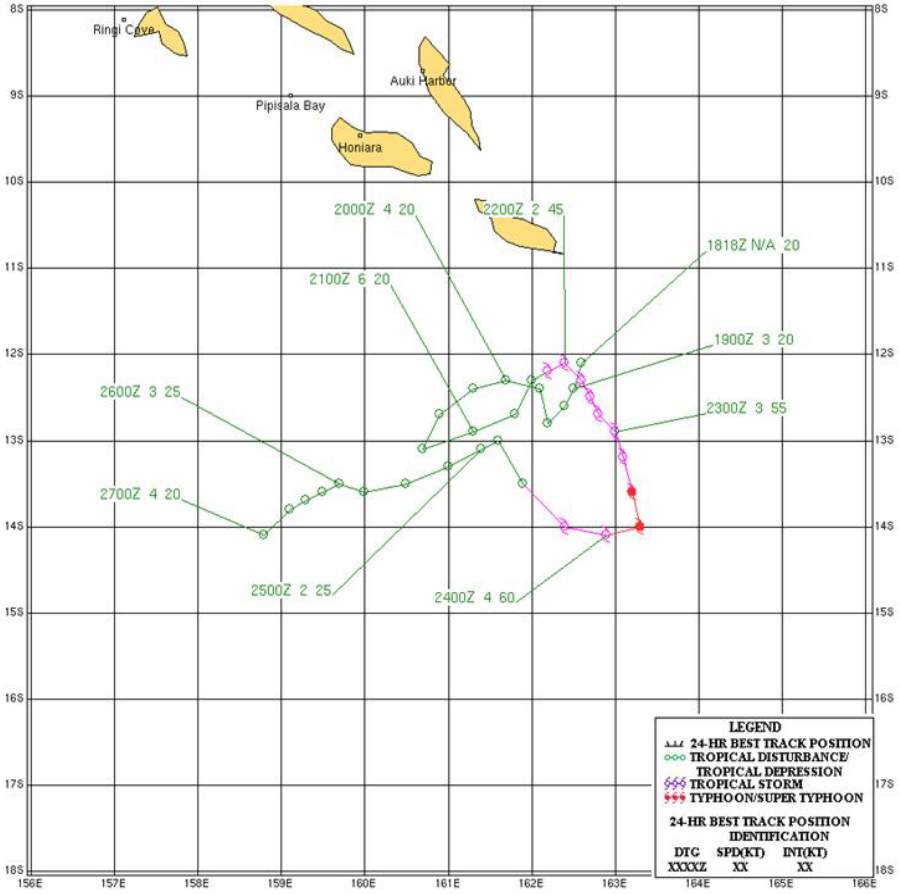
ISSUED POOR:	20 Oct 2006/1230Z
ISSUED FAIR:	20 Oct 2006/1700Z
FIRST TCFA:	21 Oct 2006/2200Z
FIRST WARNING:	22 Oct 2006/0000Z
LAST WARNING:	22 Oct 2006/0000Z
LANDFALL:	None.
MAX INTENSITY:	115 knots
NUMBER OF WARNINGS:	9

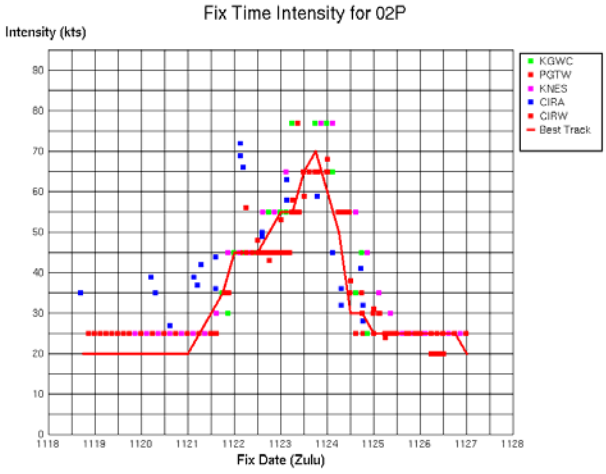




TROPICAL CYCLONE 02P (Yani)

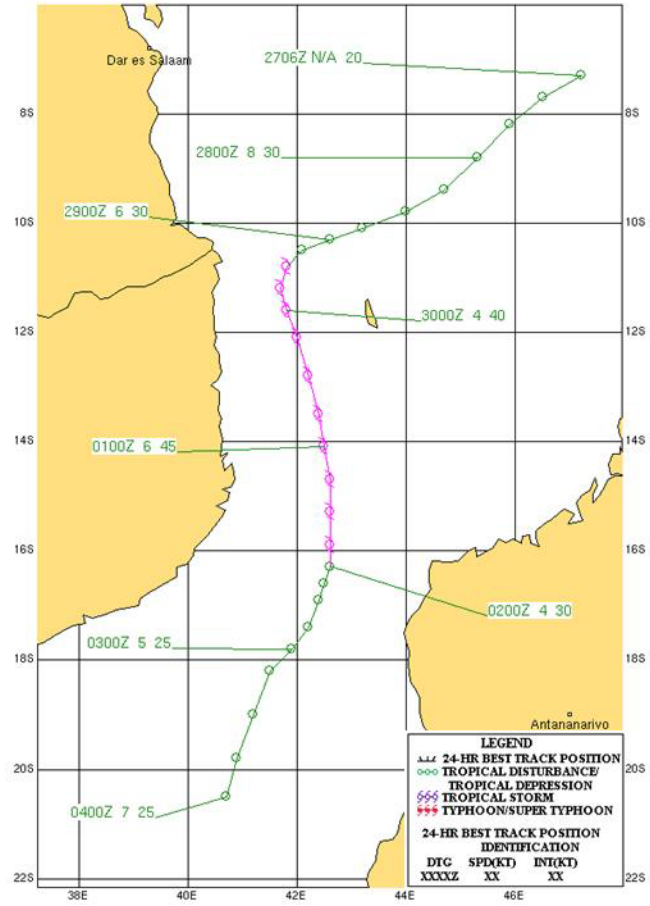
ISSUED POOR:	18 Nov 2006/2200Z
ISSUED FAIR:	21 Nov 2006/0600Z
FIRST TCFA:	21 Nov 2006/1700Z
FIRST WARNING:	22 Nov 2006/0000Z
LAST WARNING:	25 Nov 2006/0000Z
LANDFALL:	None.
MAX INTENSITY:	70 knots
NUMBER OF WARNINGS:	7

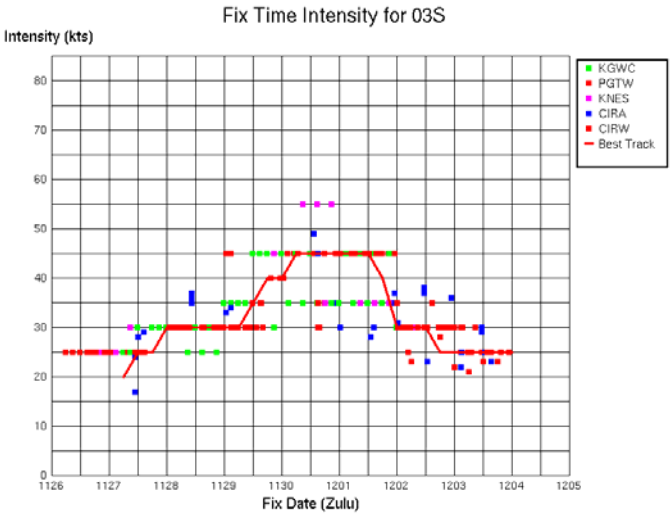




TROPICAL CYCLONE 03S (Anita)

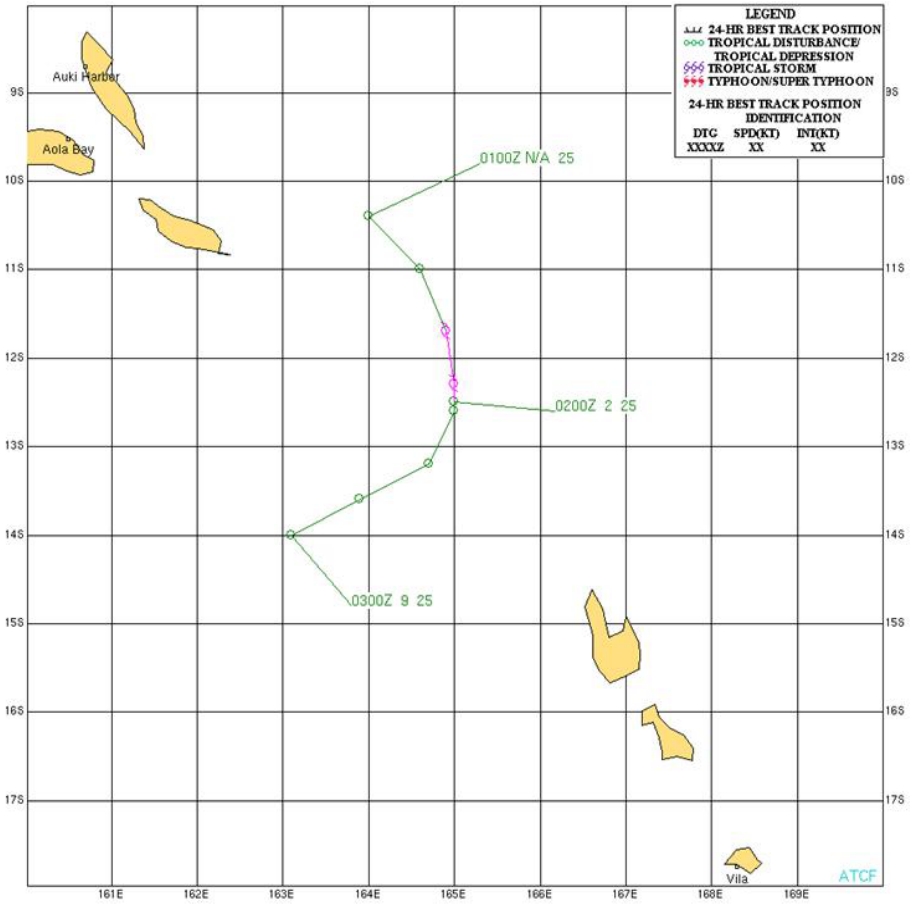
ISSUED POOR:	None.
ISSUED FAIR:	27 Nov 2006/ 0230Z
FIRST TCFA:	29 Nov 2006 / 0000Z
FIRST WARNING:	29 Nov 2006/ 1200Z
LAST WARNING:	02 Dec 2006 / 0000Z
LANDFALL:	None.
MAX INTENSITY:	45 knots
NUMBER OF WARNINGS:	6

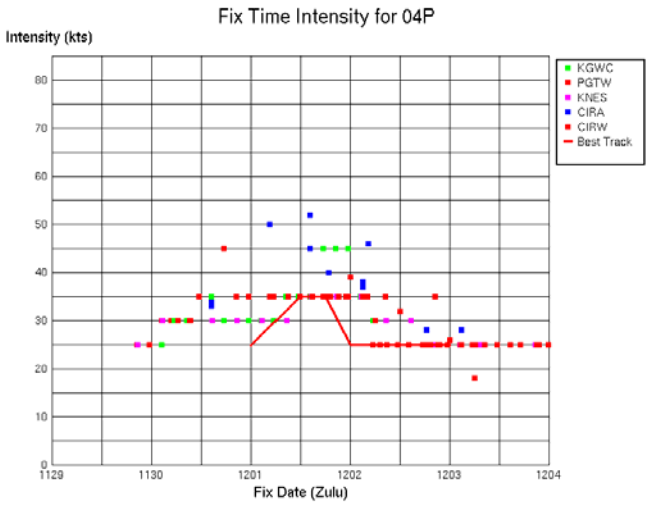




TROPICAL CYCLONE 04P

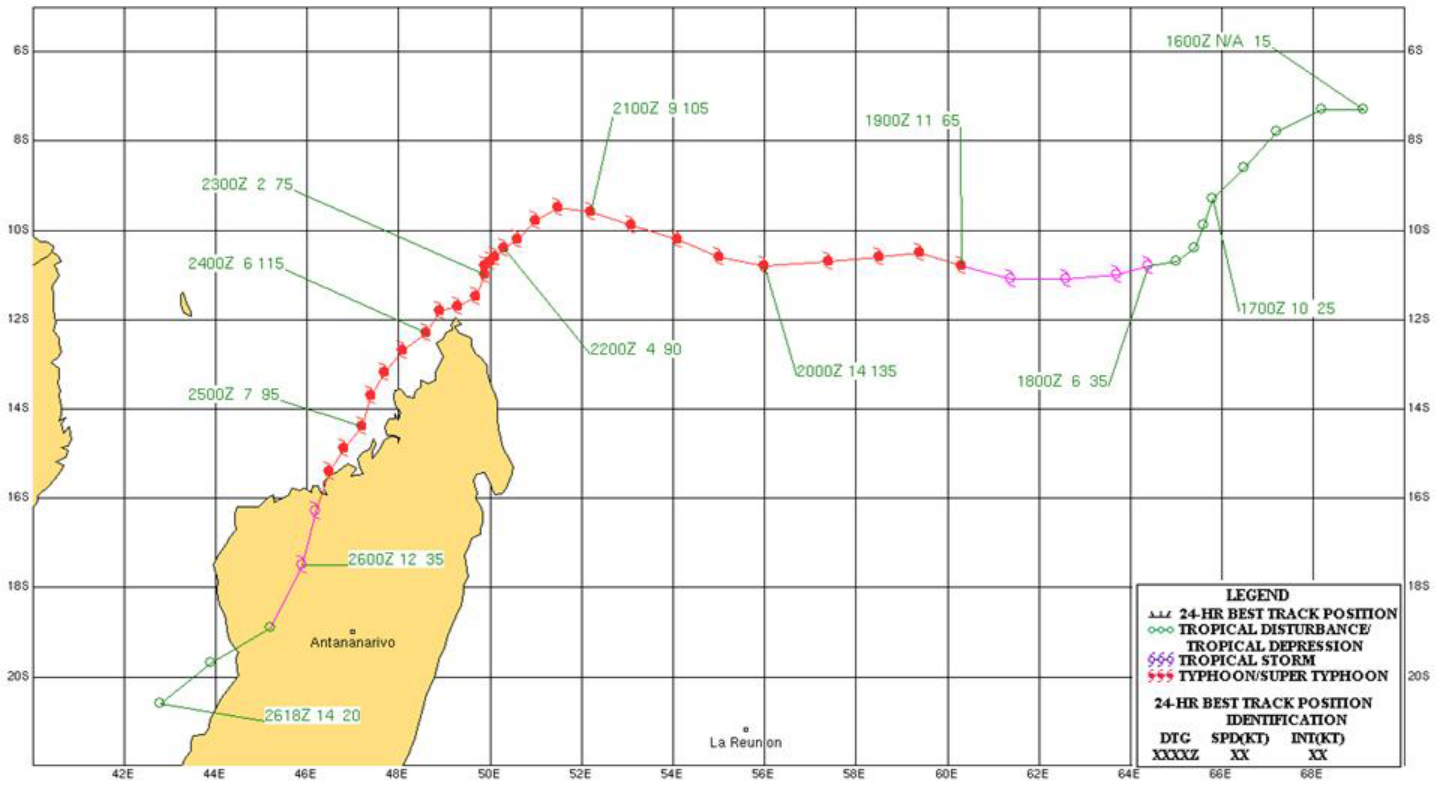
ISSUED POOR:	None.
ISSUED FAIR:	29 NOV 2006 / 2130Z
FIRST TCFA:	30 NOV 2006 / 0600Z
FIRST WARNING:	30 NOV / 1200Z
LAST WARNING:	2 DEC 0600Z
LANDFALL:	None.
MAX INTENSITY:	35 knots
NUMBER OF WARNINGS:	5

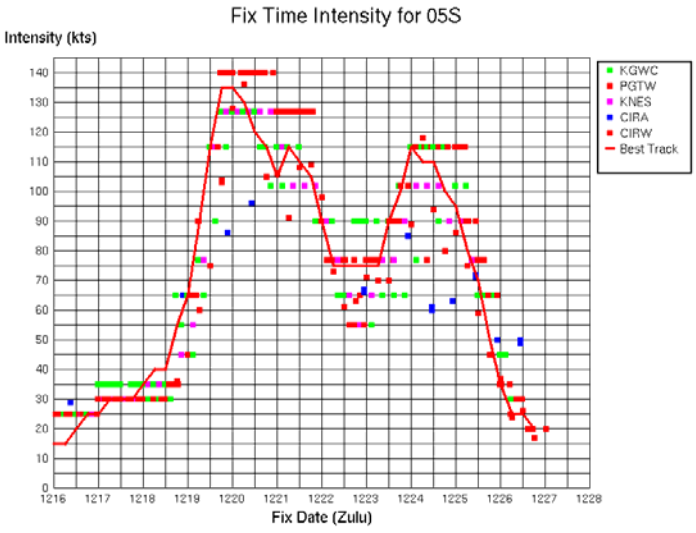




TROPICAL CYCLONE 05S (Bondo)

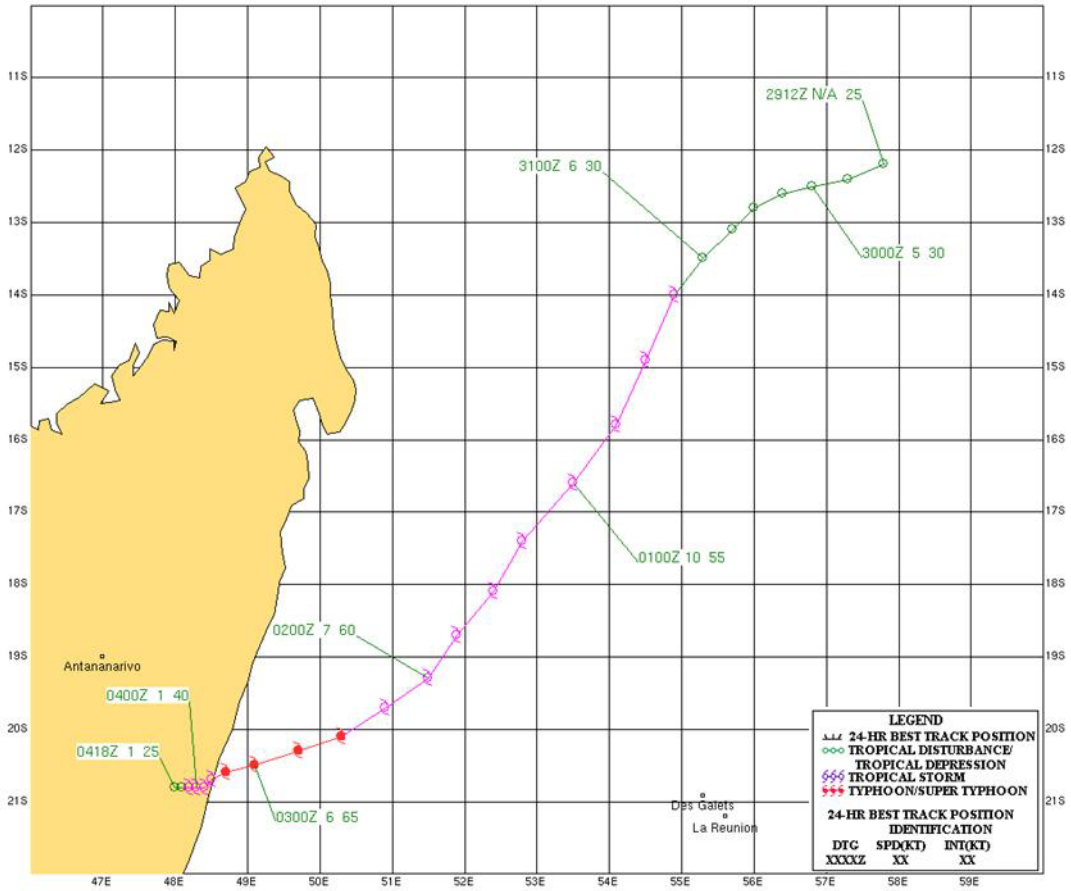
ISSUED POOR:	16 DEC 2006/ 0300Z
ISSUED FAIR:	16 DEC 2006/ 1800Z
FIRST TCFA:	17 DEC 2006/ 0200Z
FIRST WARNING:	18 DEC 2006/ 1200Z
LAST WARNING:	26 DEC 2006/ 0000Z
LANDFALL:	Near Mahajanga, Madagascar 25 Dec near 1200Z
MAX INTENSITY:	135 knots
NUMBER OF WARNINGS:	17

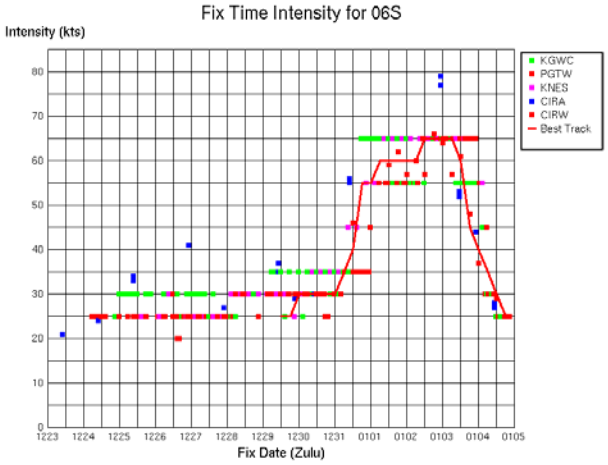




TROPICAL CYCLONE 06S (Clovis)

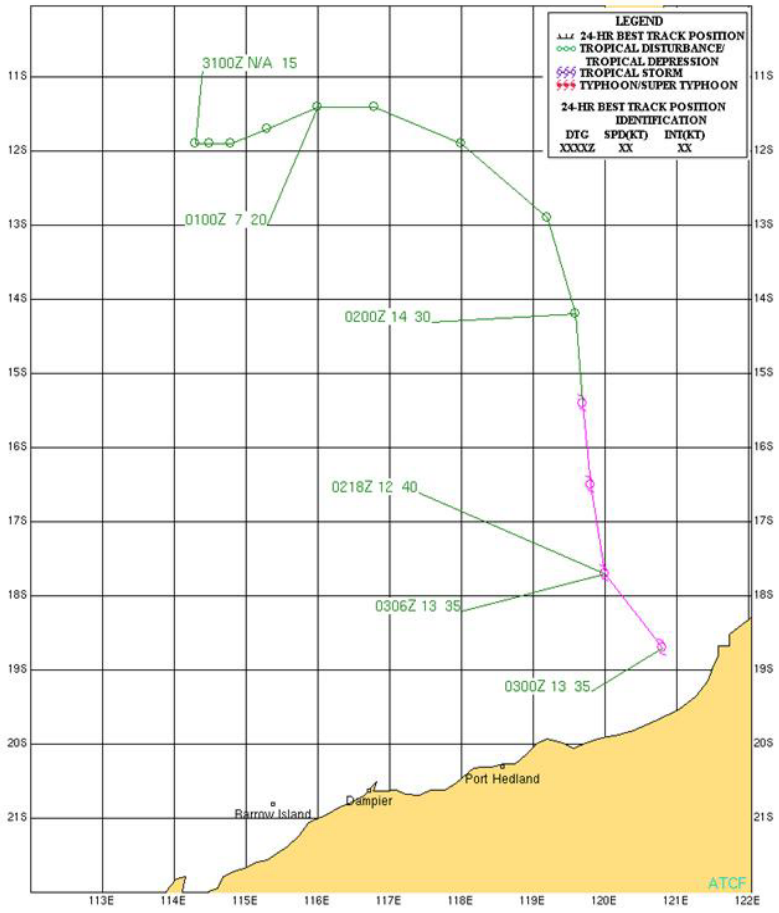
ISSUED POOR:	24 DEC 2006/ 0930Z
ISSUED FAIR:	24 DEC 2006/ 1800Z
FIRST TCFA:	26 DEC 2006/ 2300Z
FIRST WARNING:	31 DEC 2006/ 0600Z
LAST WARNING:	4 JAN 2007/ 0600Z
LANDFALL:	Near Mananjary, Madagascar, 03 Jan, near 0600Z
MAX INTENSITY	65 knots
NUMBER OF WARNINGS:	9

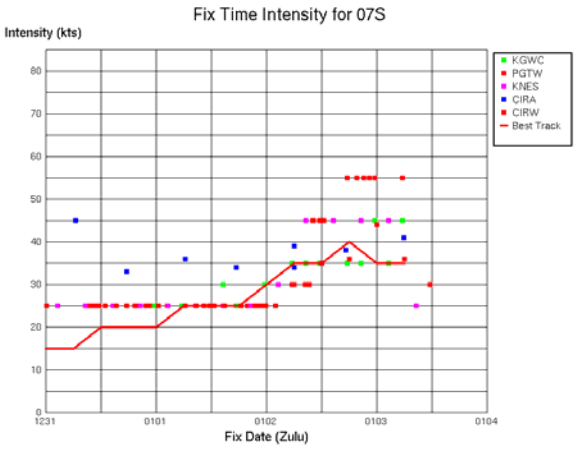




TROPICAL CYCLONE 07S (Isobel)

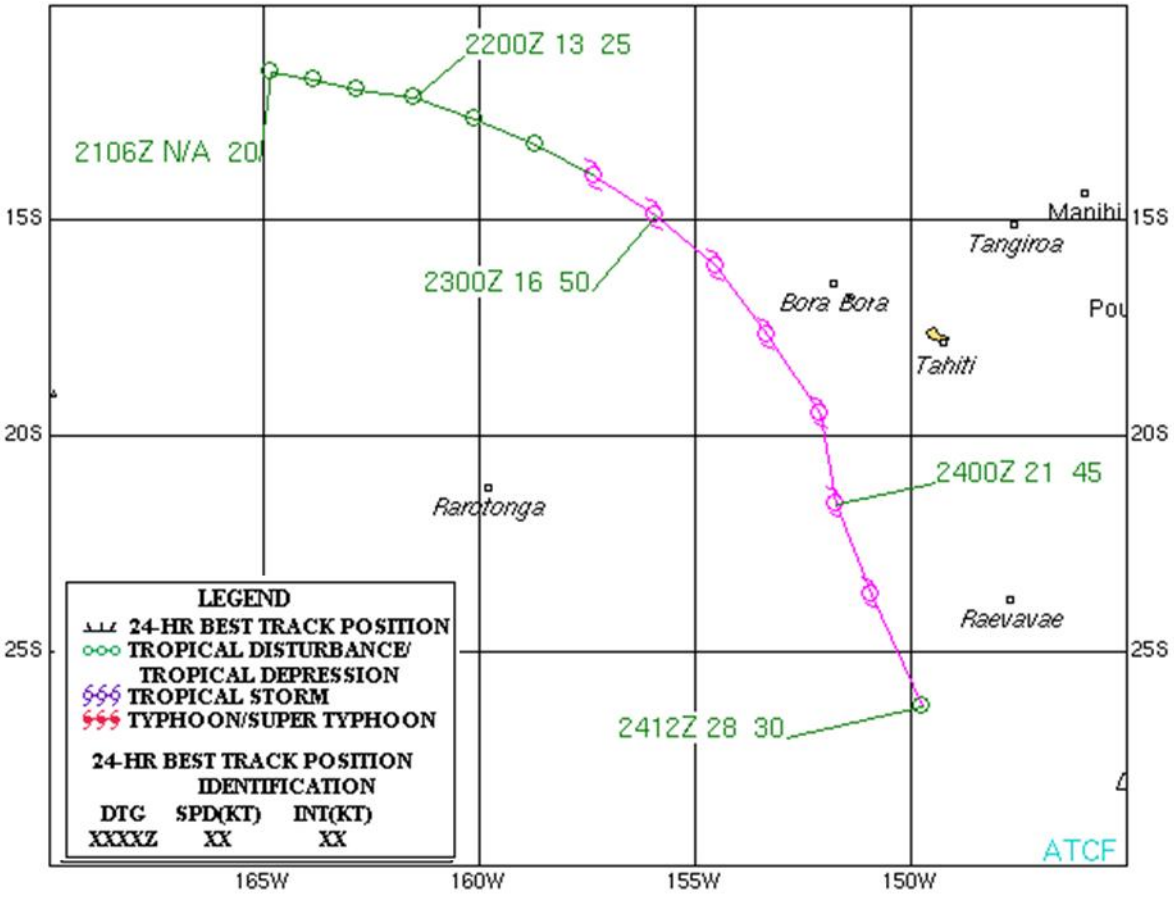
ISSUED POOR:	None.
ISSUED FAIR:	30 DEC 2006/ 1800Z
FIRST TCFA:	02 JAN 2007/ 0130Z
FIRST WARNING:	02 JAN 2007/ 0600Z
LAST WARNING:	03 JAN 2007/ 1200Z
LANDFALL:	None.
MAX INTENSITY	40 knots
NUMBER OF WARNINGS:	4

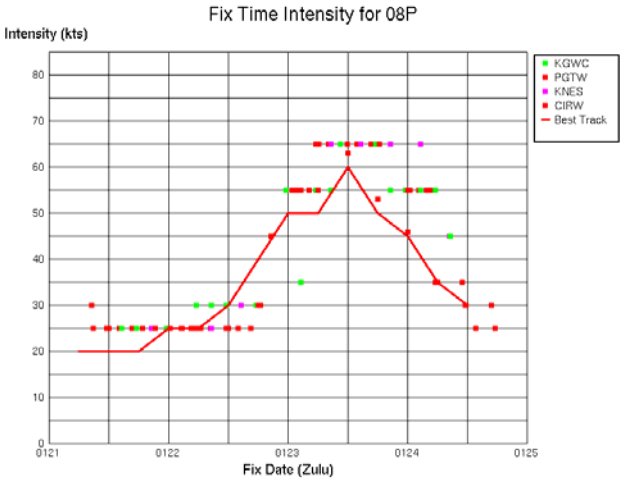




TROPICAL CYCLONE 08P (Zita)

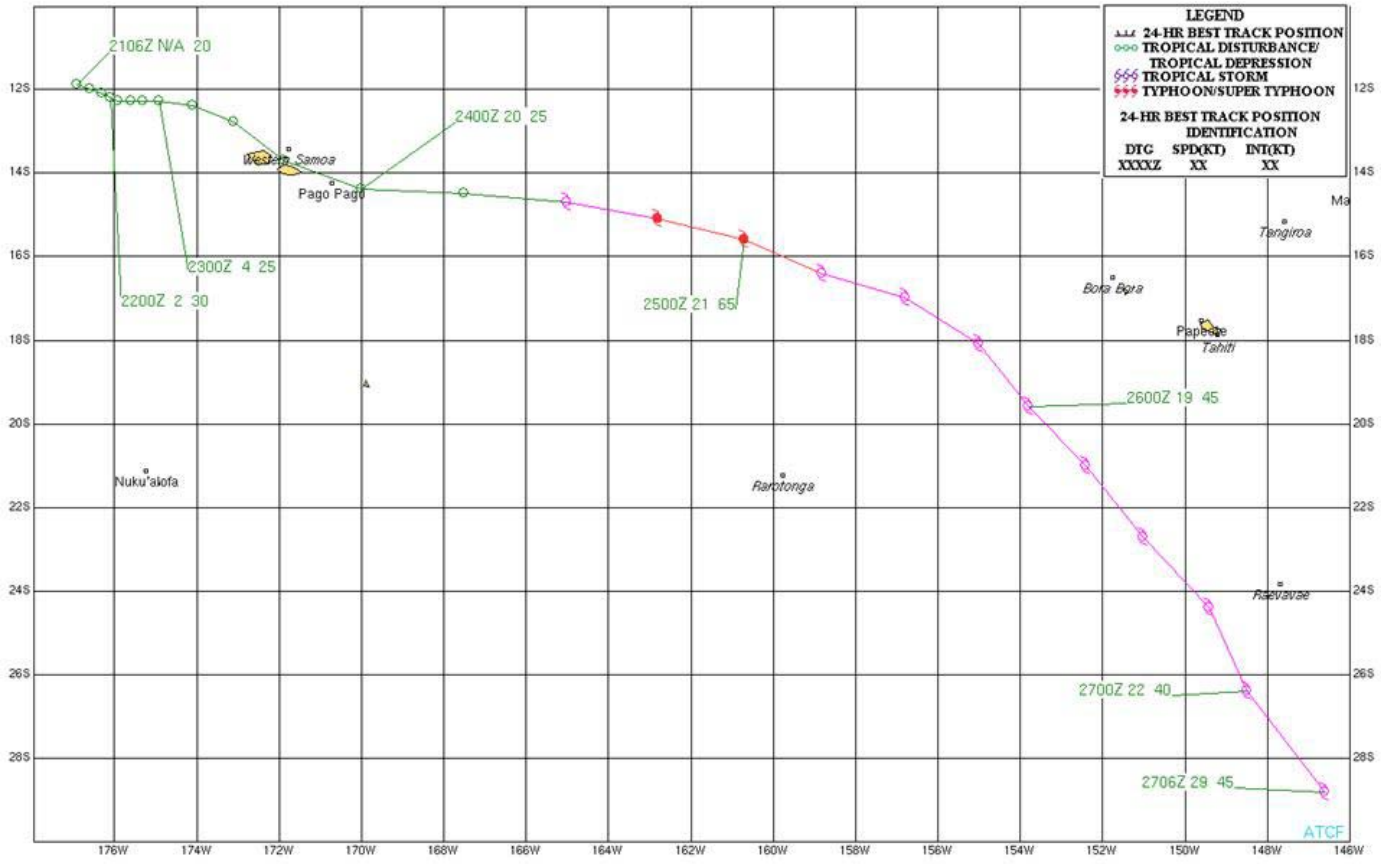
ISSUED POOR:	22 Jan 2007 / 0600Z
ISSUED FAIR:	None.
FIRST TCFA:	22 Jan 2007 / 1700Z
FIRST WARNING:	22 Jan 2007 / 1800Z
LAST WARNING:	24 Jan 2007 / 0600Z
LANDFALL:	None.
MAX INTENSITY	60 knots
NUMBER OF WARNINGS:	4





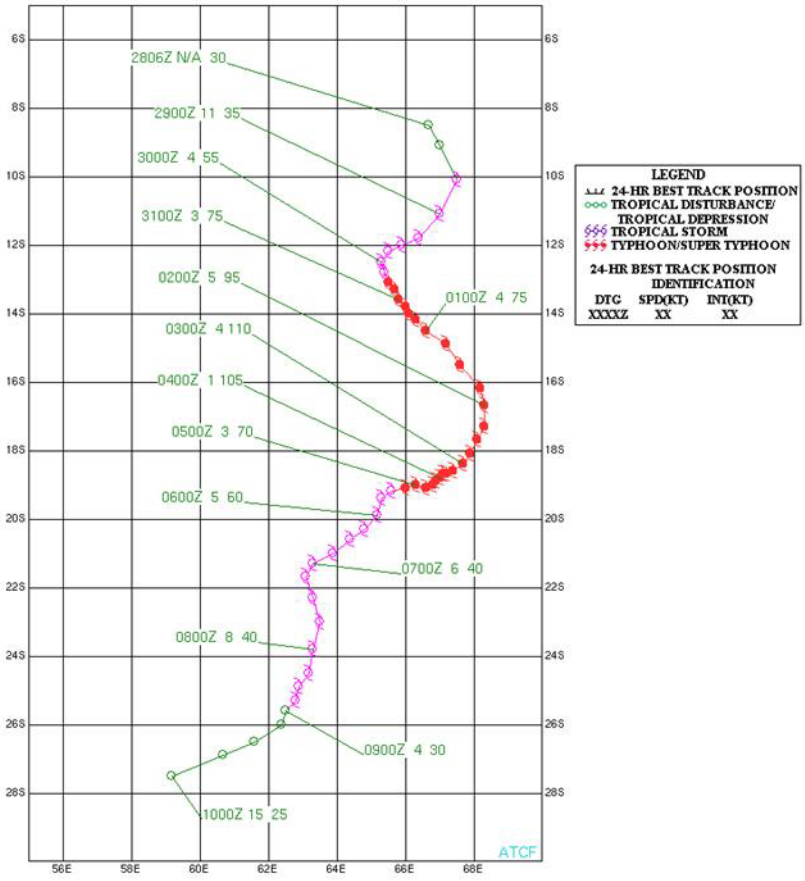
TROPICAL CYCLONE 09P (Arthur)

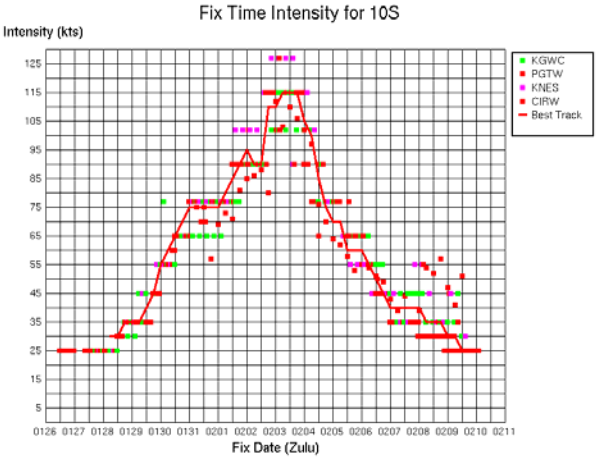
ISSUED POOR:	20 JAN 2007/ 1930Z
ISSUED FAIR:	21 JAN 2007/ 1500Z
FIRST TCFA:	21 JAN 2007/ 2030Z
FIRST WARNING:	24 JAN 2007/ 1200Z
LAST WARNING:	26 JAN 2007/ 1800Z
LANDFALL:	Western Samoa, 23 Jan, near 1800Z
MAX INTENSITY	65 knots
NUMBER OF WARNINGS:	5



TROPICAL CYCLONE 10S (Dora)

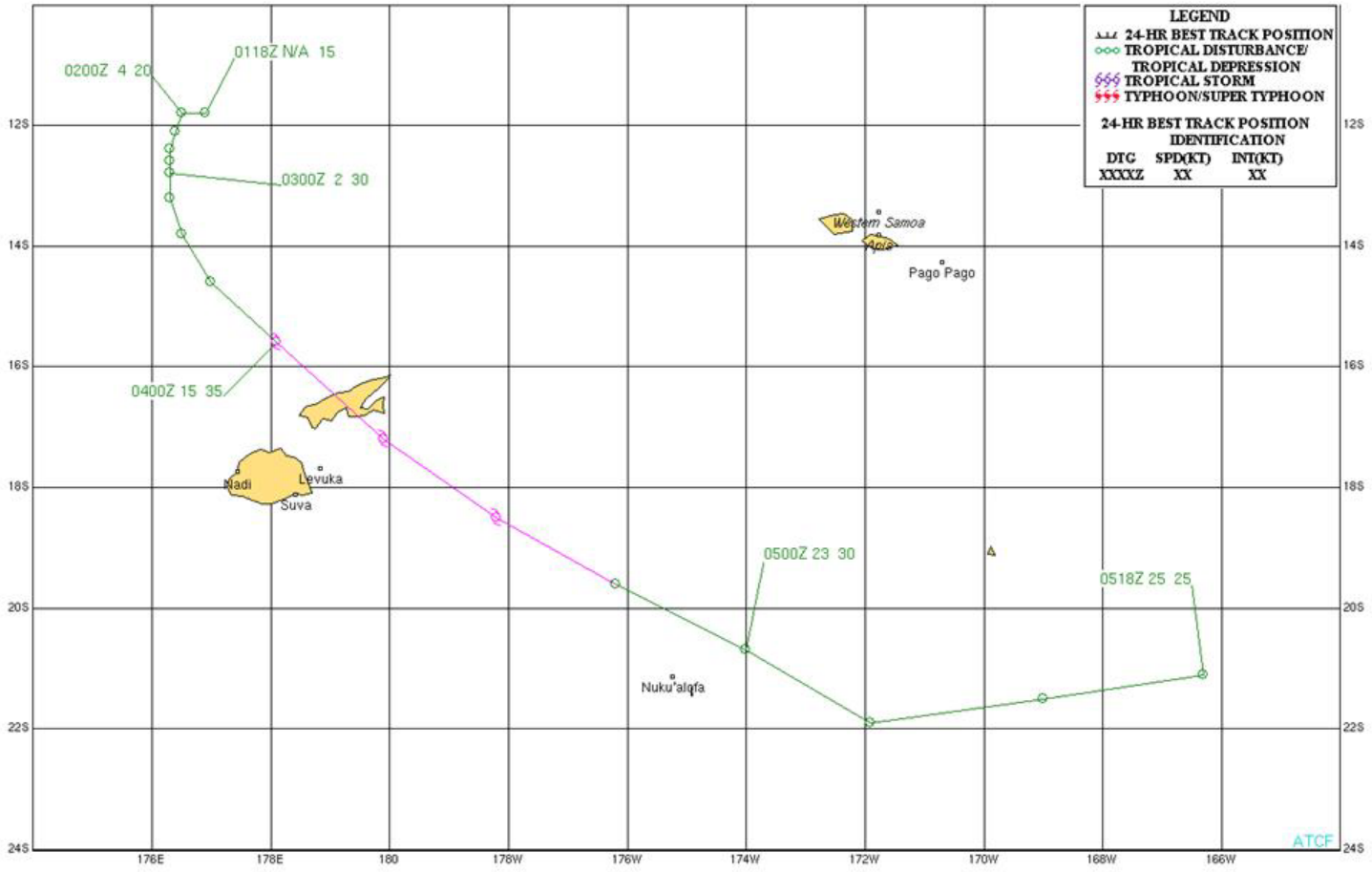
ISSUED POOR:	None.
ISSUED FAIR:	26 JAN 2007/ 0700Z
FIRST TCFA:	28 JAN 2007/ 1100Z
FIRST WARNING:	28 JAN 2007/ 1800Z
LAST WARNING:	09 FEB 2007/ 0600Z
LANDFALL:	None.
MAX INTENSITY	115 knots
NUMBER OF WARNINGS:	24

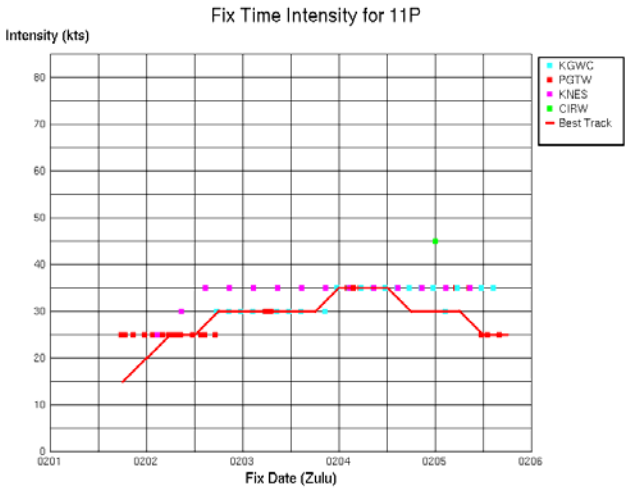




TROPICAL CYCLONE 11P

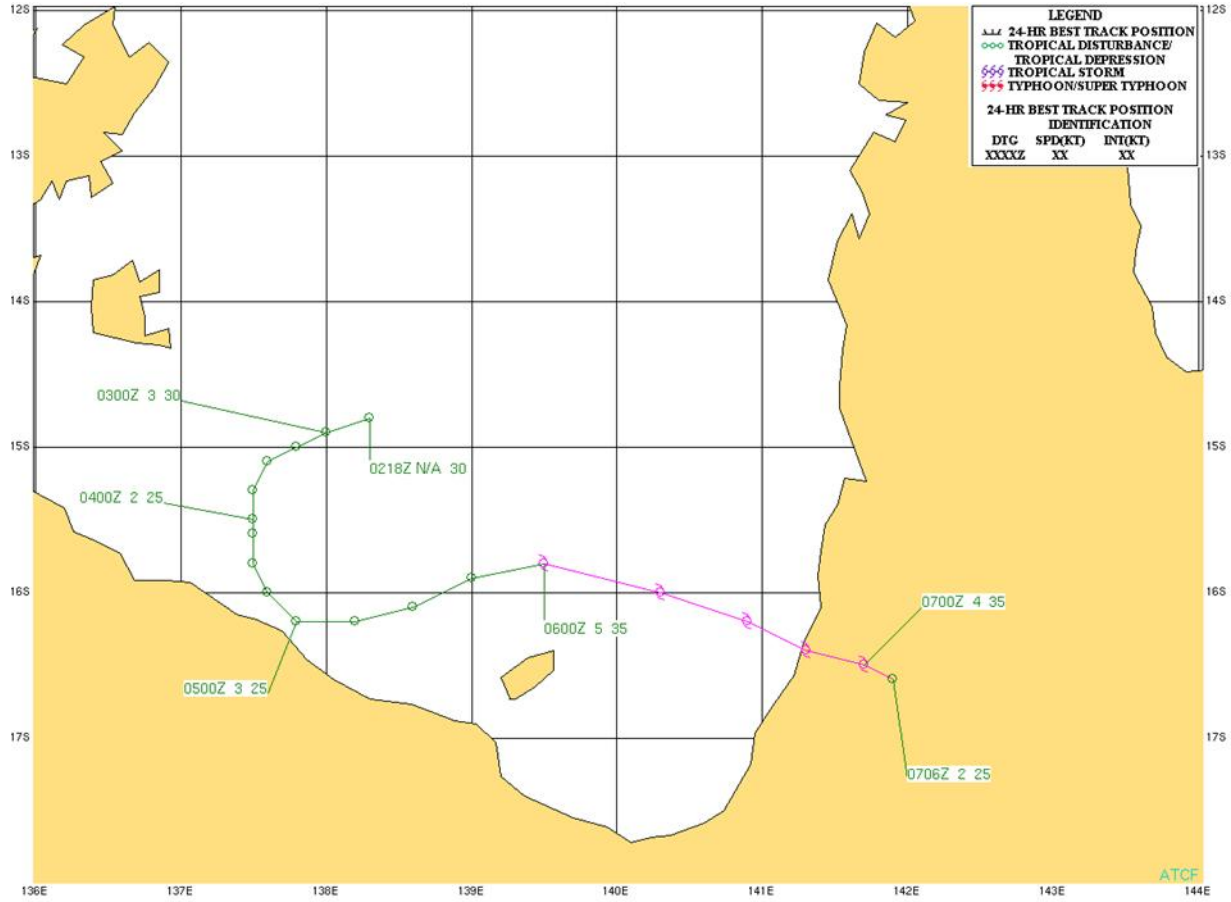
ISSUED POOR:	None.
ISSUED FAIR:	02 FEB 2007/ 0600Z
FIRST TCFA:	03 FEB 2007/ 0230Z
FIRST WARNING:	04 FEB 2007/ 0000Z
LAST WARNING:	05 FEB 2007/ 0300Z
LANDFALL:	Vanua Levu Island, Fiji, 04 Feb, near 0000Z
MAX INTENSITY	35 knots
NUMBER OF WARNINGS:	3

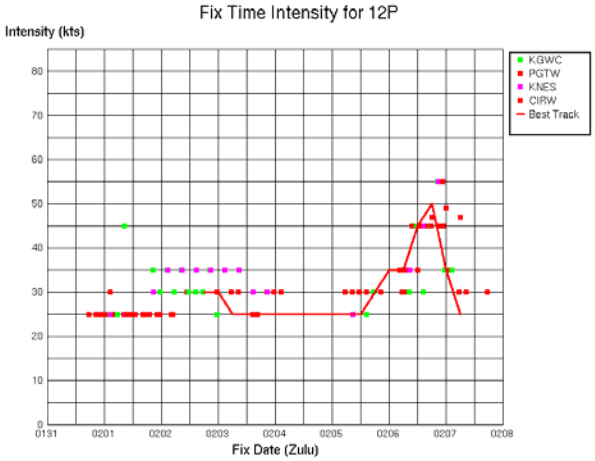




TROPICAL CYCLONE 12P (Nelson)

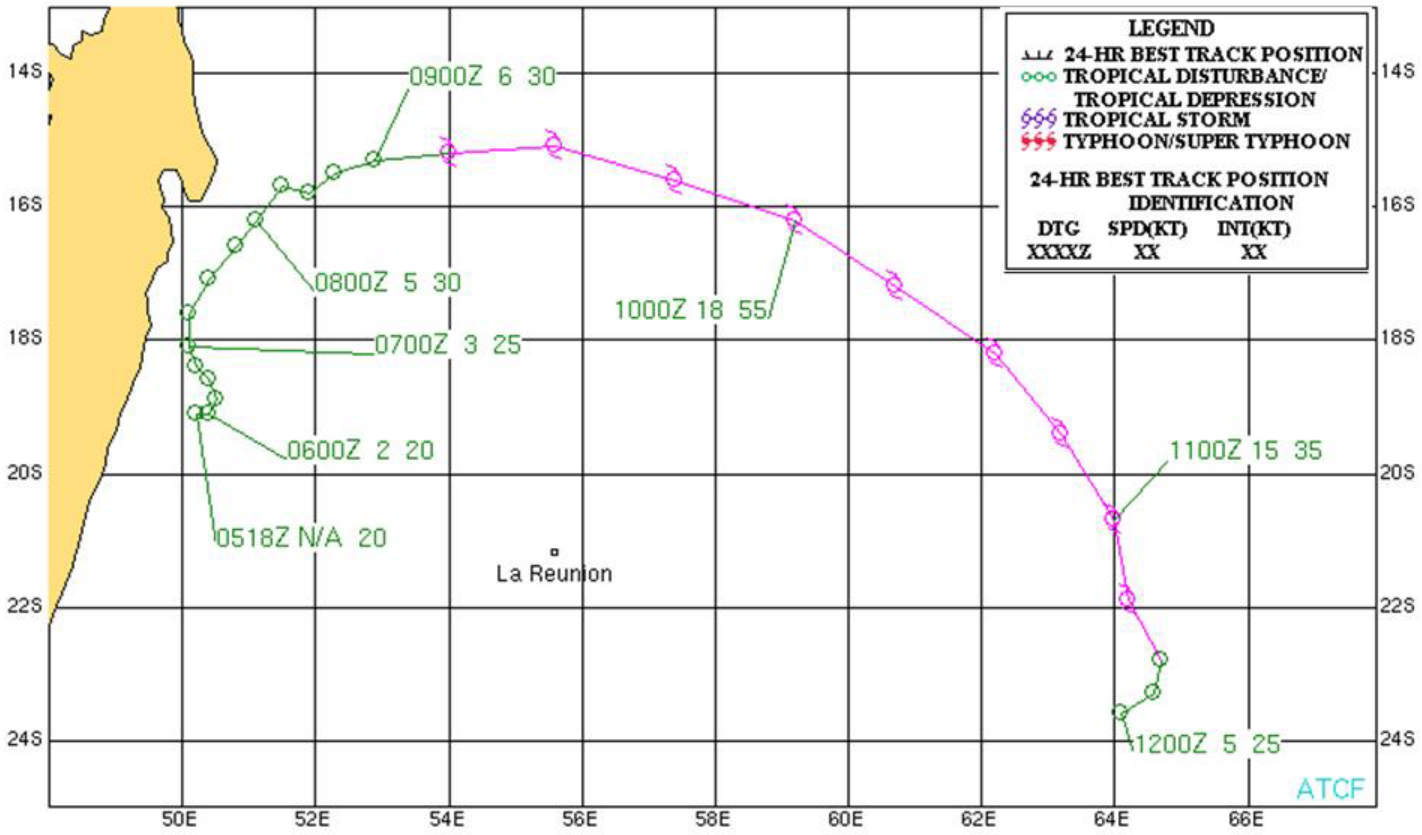
ISSUED POOR:	03 FEB 2007/ 0200Z
ISSUED FAIR:	05 FEB 2007/ 0600Z
FIRST TCFA:	05 FEB 2007/ 2000Z
FIRST WARNING:	06 FEB 2007/ 0000Z
LAST WARNING:	07 FEB 2007/ 0000Z
LANDFALL:	Near Inkerman, Australia, 06 Feb 1800Z
MAX INTENSITY	50 knots
NUMBER OF WARNINGS:	3

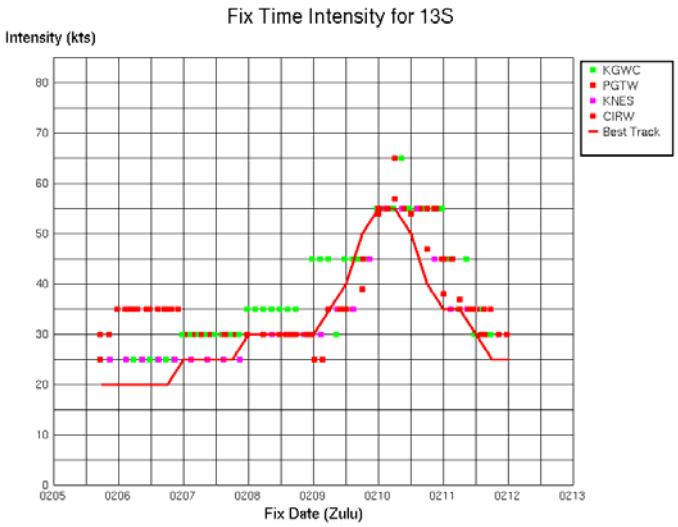




TROPICAL CYCLONE 13S (Enok)

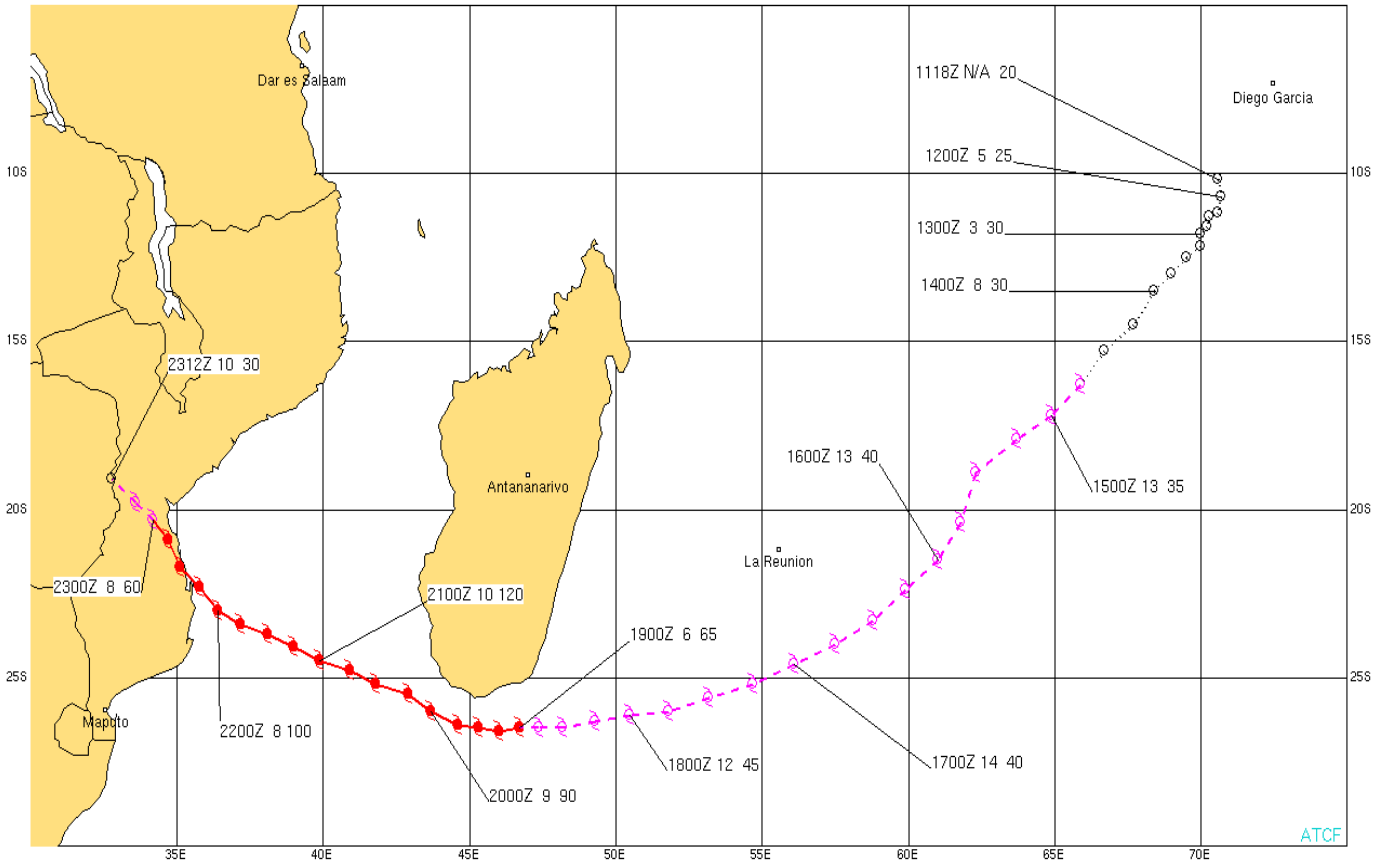
ISSUED POOR:	None.
ISSUED FAIR:	5 FEB 2007/ 2230Z
FIRST TCFA:	06 FEB 2007/ 1000Z
FIRST WARNING:	09 FEB 2007/ 0600Z
LAST WARNING:	11 FEB 2007/ 0600Z
LANDFALL:	None.
MAX INTENSITY	55 knots
NUMBER OF WARNINGS:	5

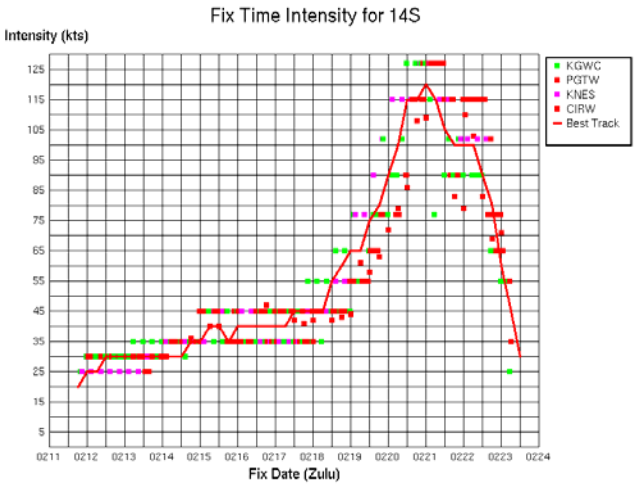




TROPICAL CYCLONE 14S (Favio)

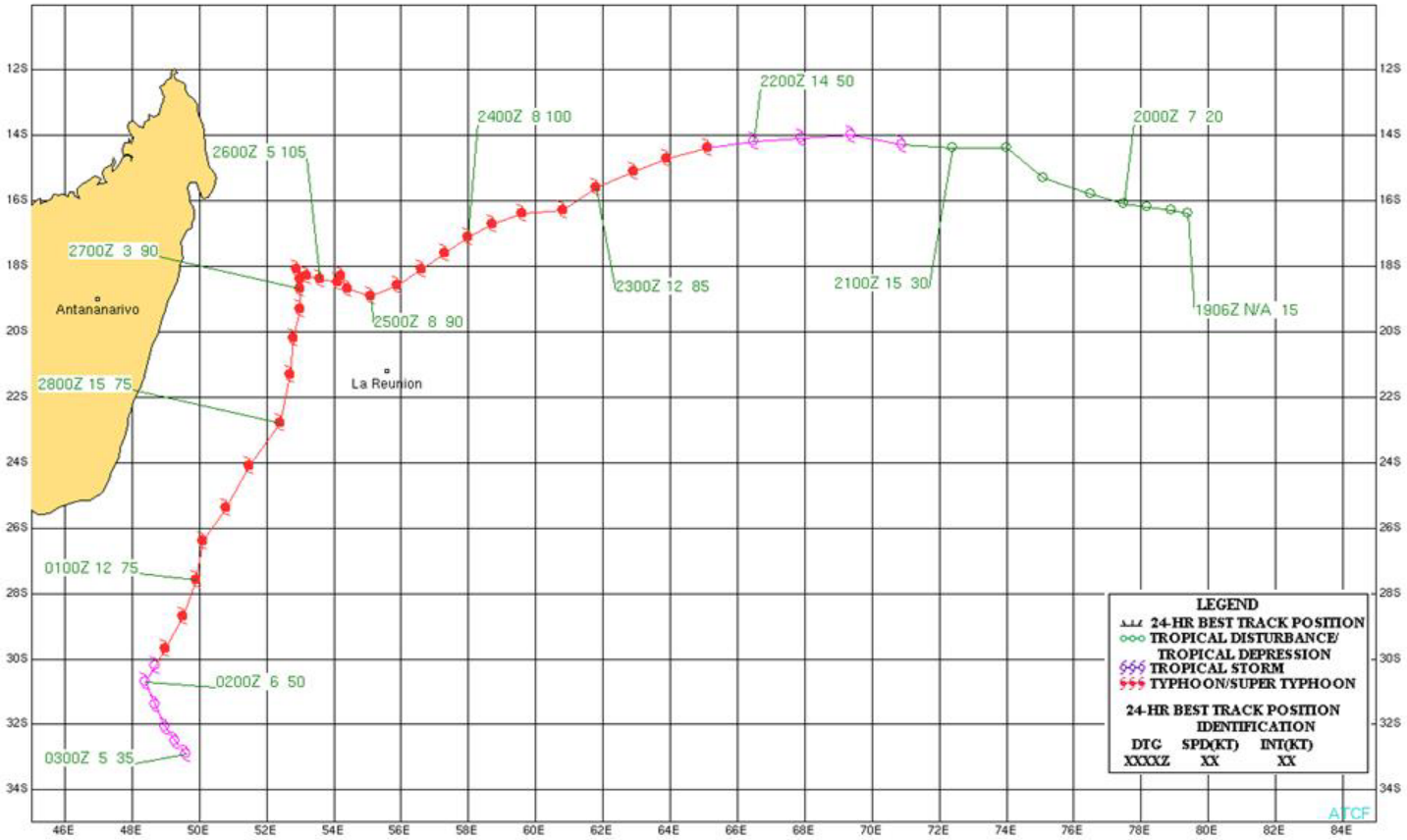
ISSUED POOR:	11 FEB 2007/ 1800Z
ISSUED FAIR:	12 FEB 2007/ 1330Z
FIRST TCFA:	13 FEB 2007/ 2130Z
FIRST WARNING:	14 FEB 2007/ 1200Z
LAST WARNING:	23 FEB 2007/ 0000Z
LANDFALL:	Near Vilanculos, Mozambique 22 Feb, near 1200Z
MAX INTENSITY	120 knots
NUMBER OF WARNINGS:	18

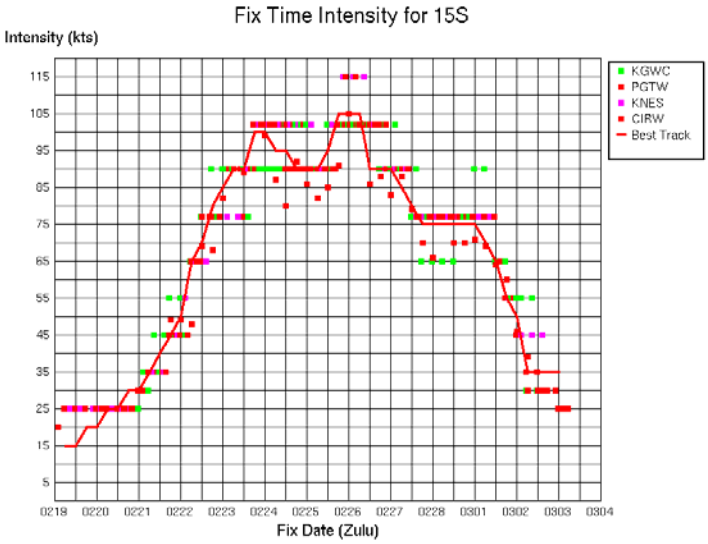




TROPICAL CYCLONE 15S (Gamede)

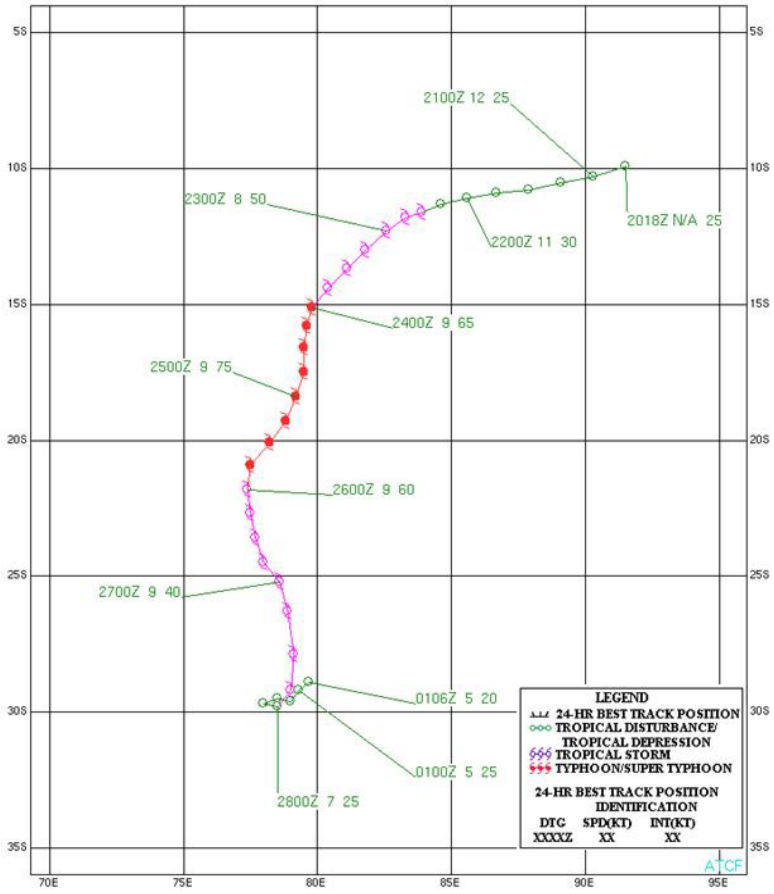
ISSUED POOR:	19 FEB 2007/ 1800Z
ISSUED FAIR:	20 FEB 2007/ 1800Z
FIRST TCFA:	20 FEB 2007/ 2000Z
FIRST WARNING:	21 FEB 2007/ 0600Z
LAST WARNING:	02 MAR 2007/ 0600Z
LANDFALL:	None.
MAX INTENSITY	105 knots
NUMBER OF WARNINGS:	19

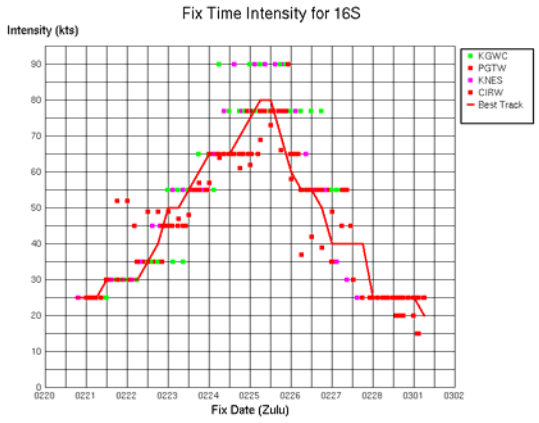




TROPICAL CYCLONE 16S (Humba)

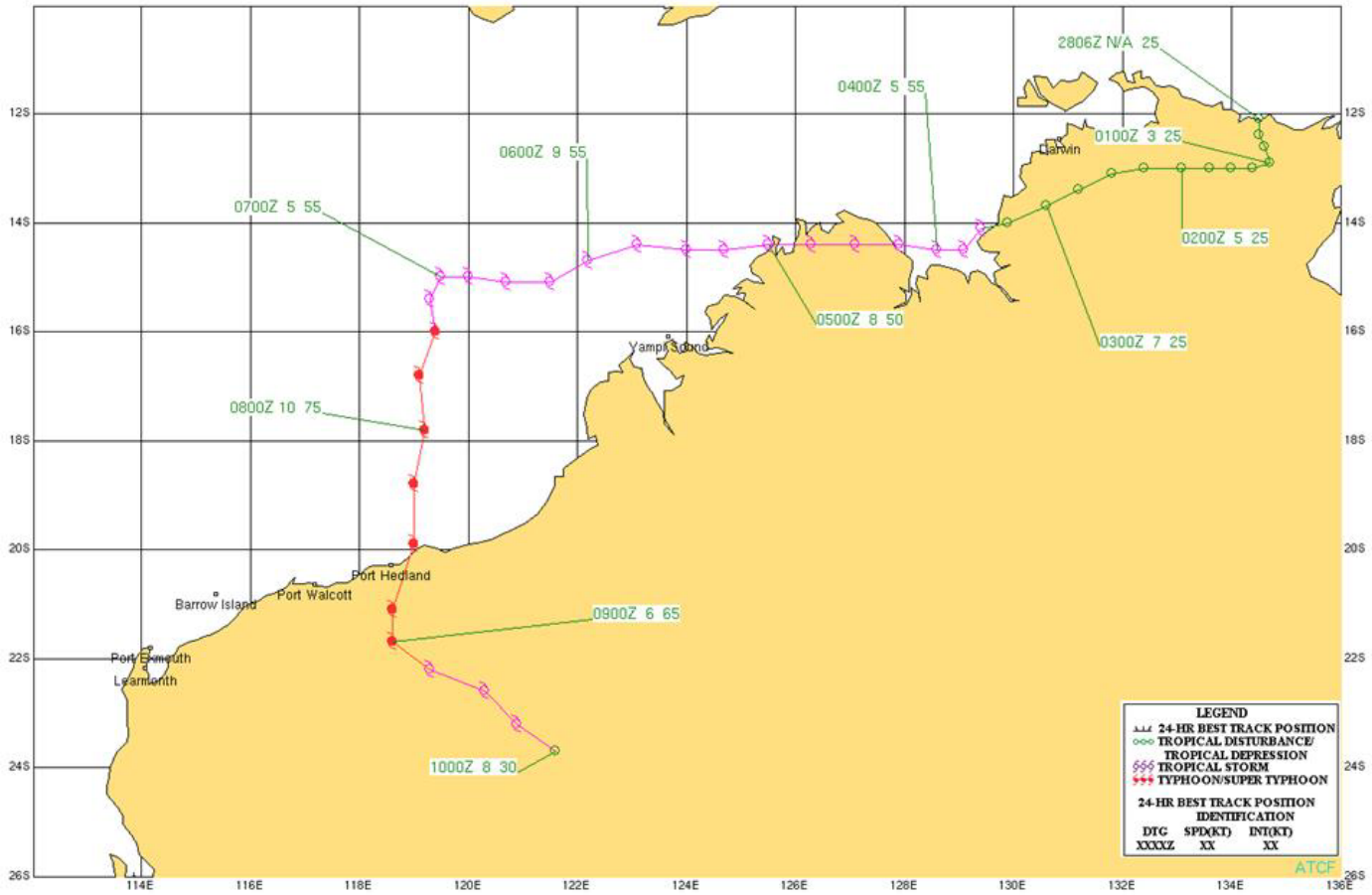
ISSUED POOR:	19 FEB 2007/ 1800Z
ISSUED FAIR:	20 FEB 2007/ 1800Z
FIRST TCFA:	20 FEB 2007/ 2030Z
FIRST WARNING:	21 FEB 2007/ 1500Z
LAST WARNING:	26 FEB 2007/ 1500Z
LANDFALL:	None.
MAX INTENSITY	80 knots
NUMBER OF WARNINGS:	11

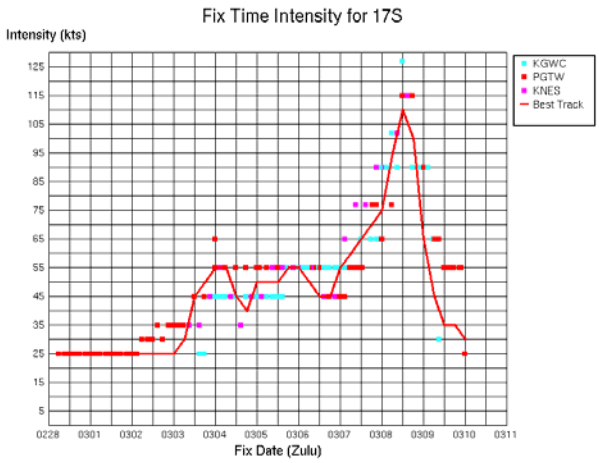




TROPICAL CYCLONE 17S (George)

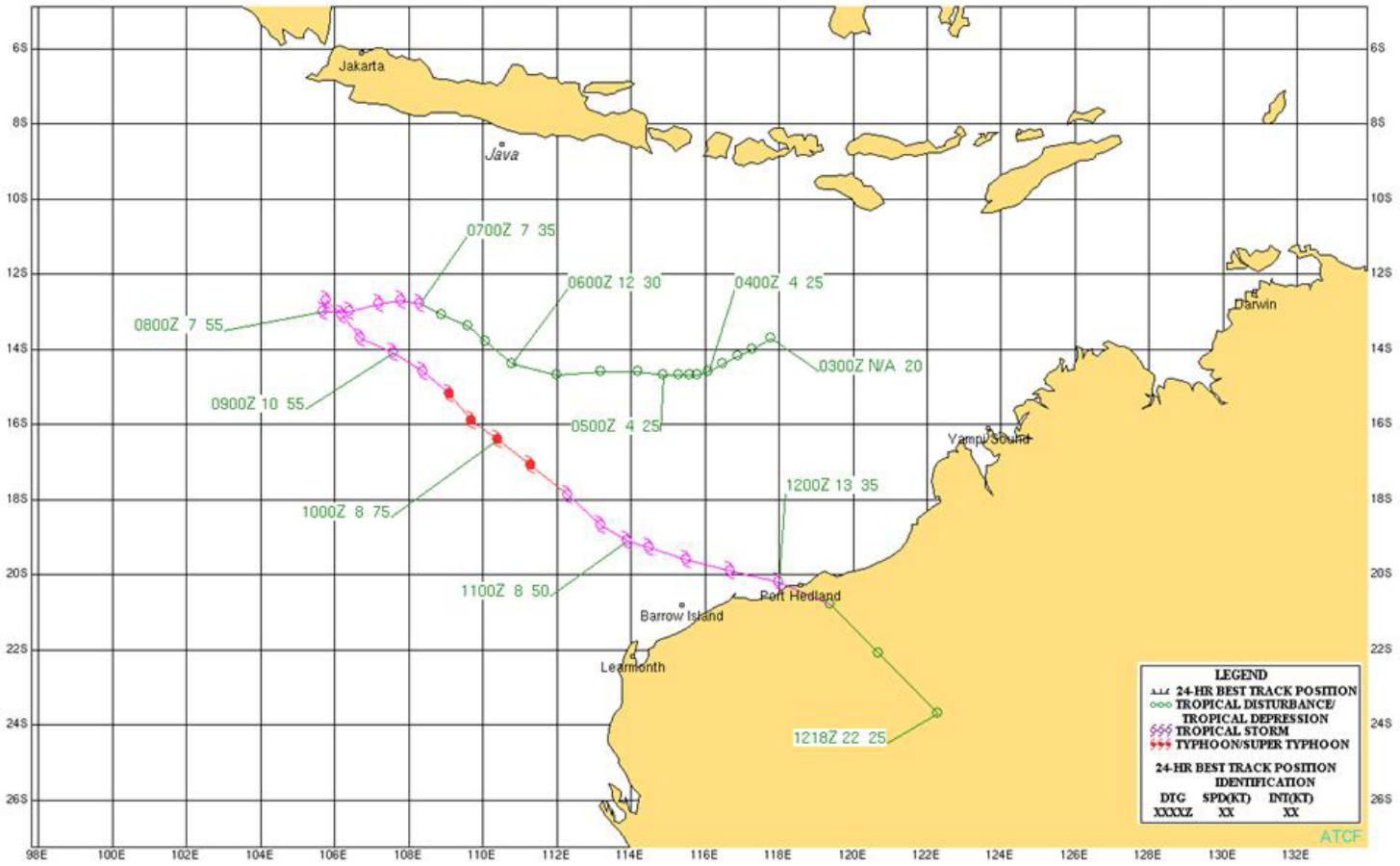
ISSUED POOR:	27 FEB 2007/ 1800Z
ISSUED FAIR:	02 MAR 2007/ 0300Z
FIRST TCFA:	02 MAR 2007/ 2230Z
FIRST WARNING:	03 MAR 2007/ 1200Z
LAST WARNING:	09 MAR 2007/ 0000Z
LANDFALL:	Near Forrest River, Australia 04 Mar, near 0600Z, near Port Hedland, Australia, 08 Mar near 1200Z
MAX INTENSITY	120 knots
NUMBER OF WARNINGS:	15

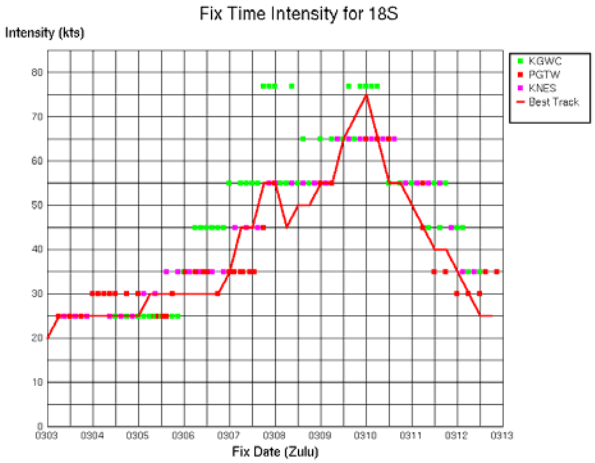




TROPICAL CYCLONE 18S (Jacob)

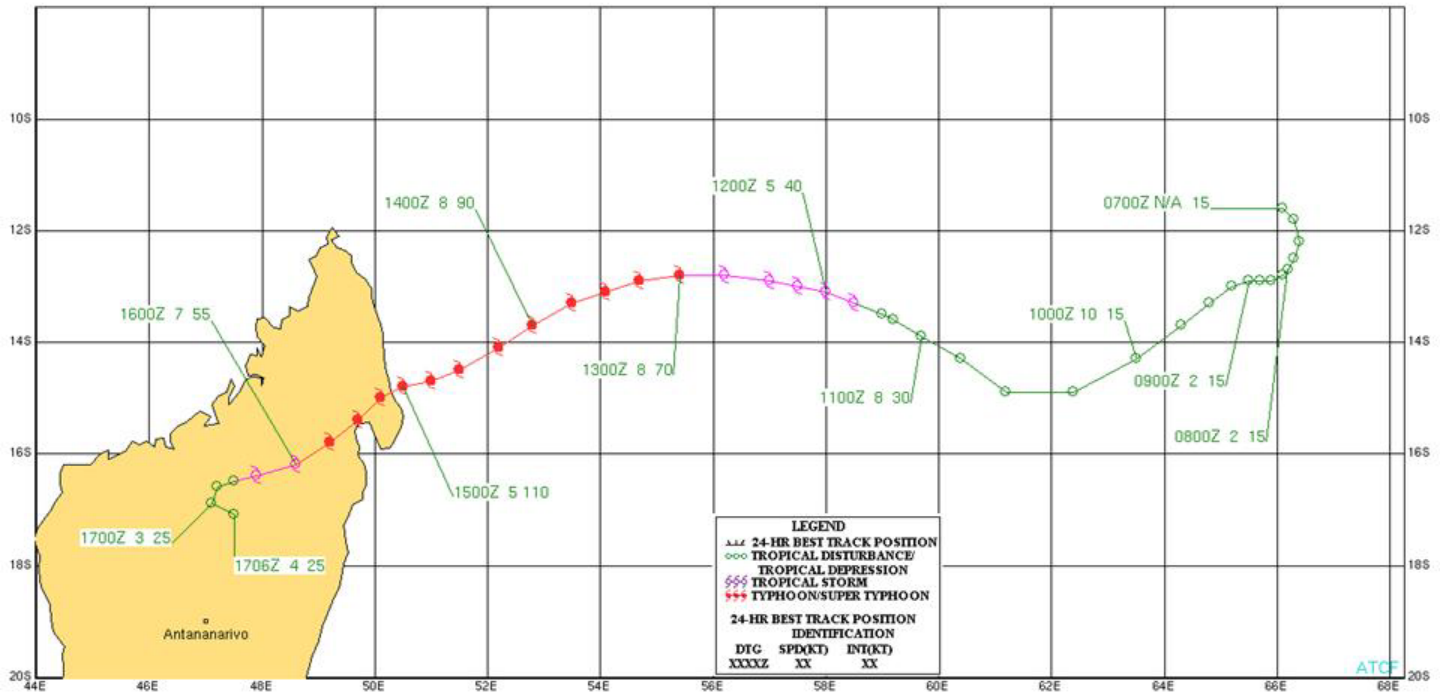
ISSUED POOR:	04 MAR 2007/ 1800Z
ISSUED FAIR:	06 MAR 2007/ 0300Z
FIRST TCFA:	None.
FIRST WARNING:	07 MAR 2007/ 0000Z
LAST WARNING:	12 MAR 2007/ 0600Z
LANDFALL:	Near Port Hedland, Australia, 12 Mar 0000Z
MAX INTENSITY	75 knots
NUMBER OF WARNINGS:	18

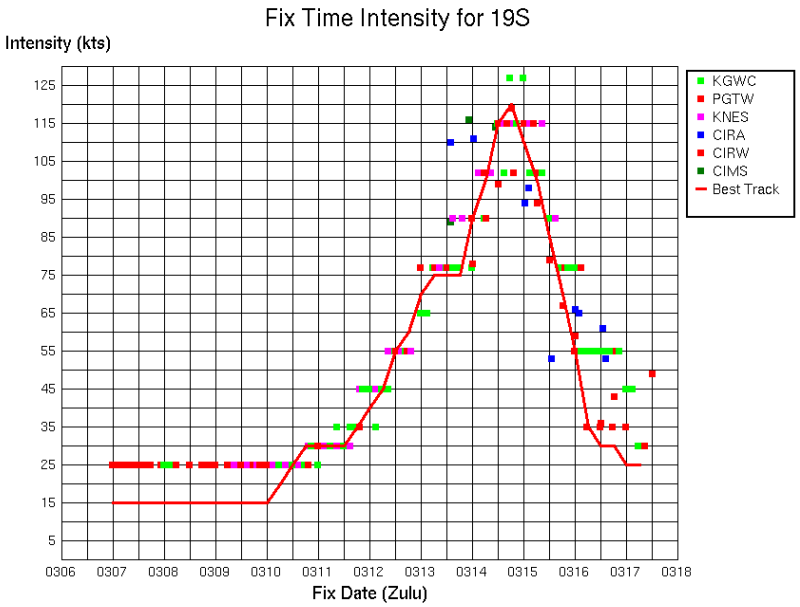




TROPICAL CYCLONE 19S (Indlada)

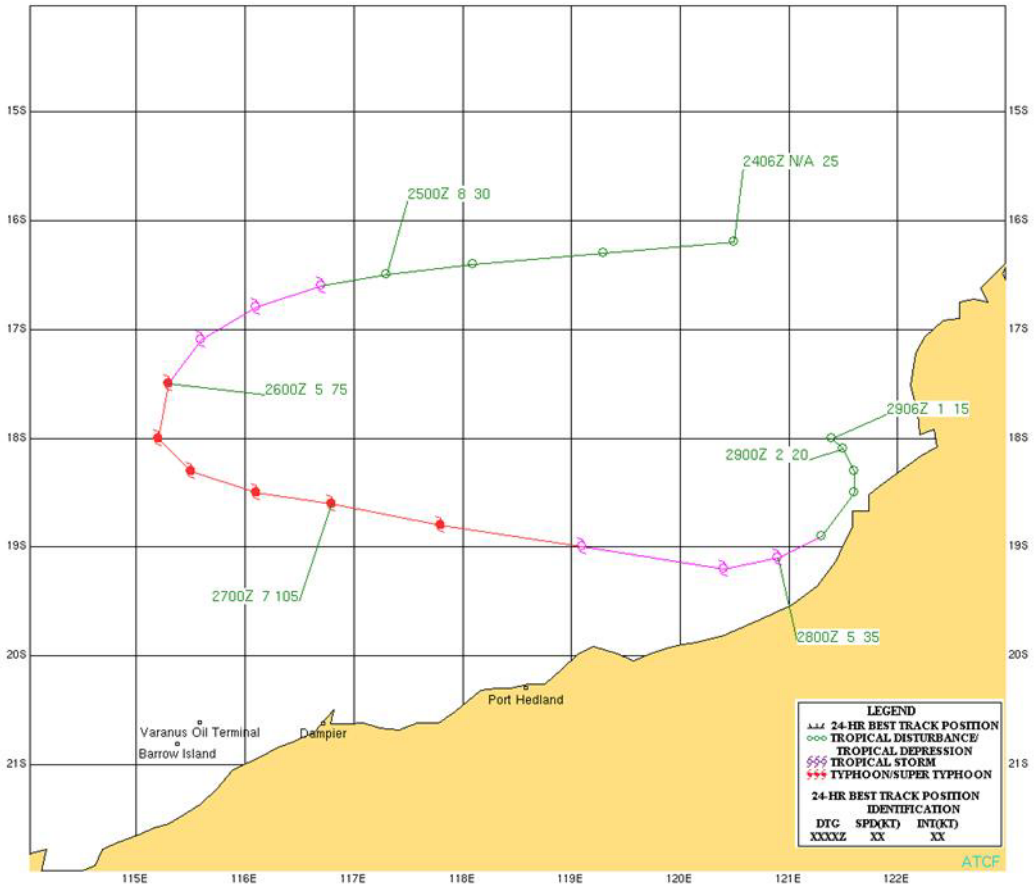
ISSUED POOR:	09 MAR 2007/ 1800Z
ISSUED FAIR:	10 MAR 2007/ 1230Z
FIRST TCFA:	10 MAR 2007/ 2300Z
FIRST WARNING:	12 MAR 2007/ 0000Z
LAST WARNING:	16 MAR 2007/ 0000Z
LANDFALL:	Near Antalaha, Madagascar, 15 Mar near 0000Z
MAX INTENSITY	120 knots
NUMBER OF WARNINGS:	9

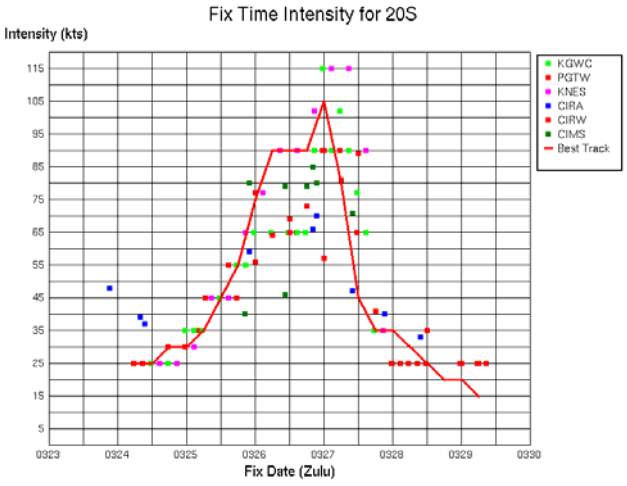




TROPICAL CYCLONE 20S (Kara)

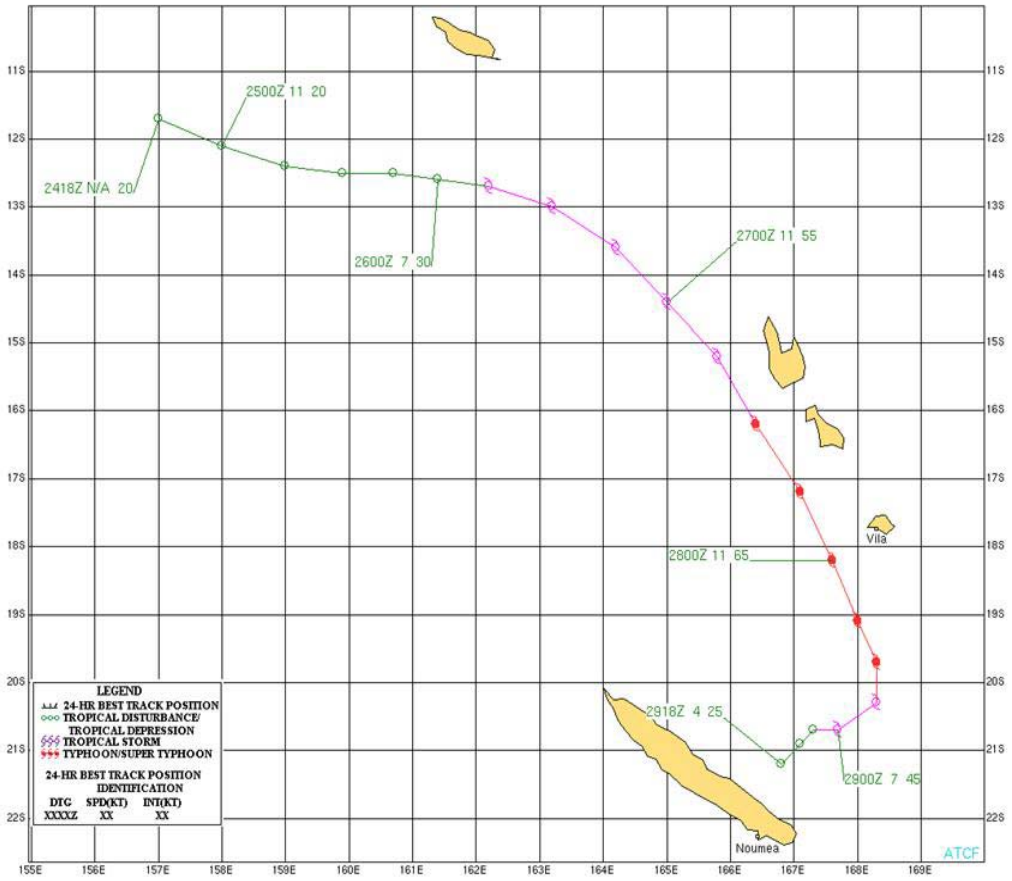
ISSUED POOR:	None.
ISSUED FAIR:	23 MAR 2007/ 0430Z
FIRST TCFA:	25 MAR 2007/ 0230Z
FIRST WARNING:	25 MAR 2007/ 0600Z
LAST WARNING:	27 MAR 2007/ 2100Z
LANDFALL:	None.
MAX INTENSITY	105 knots
NUMBER OF WARNINGS:	6

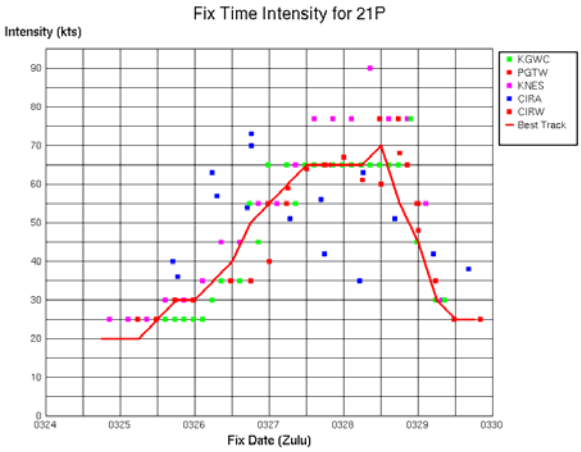




TROPICAL CYCLONE 21P (Becky)

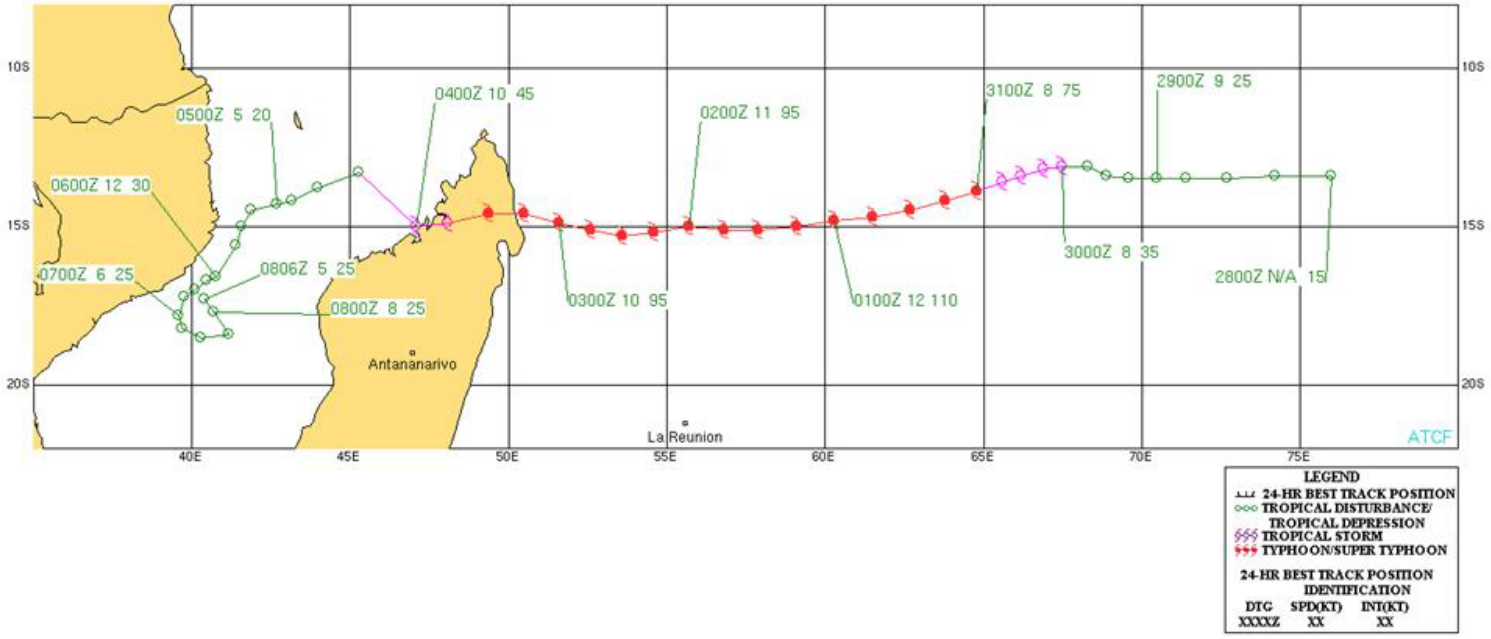
ISSUED POOR:	25 Mar 2007/ 0600Z
ISSUED FAIR:	25 Mar 2007/ 1500Z
FIRST TCFA:	None.
FIRST WARNING:	26 Mar 2007/ 1200Z
LAST WARNING:	29 Mar 2007/ 1200Z
LANDFALL:	None.
MAX INTENSITY:	70 knots
NUMBER OF WARNINGS:	7

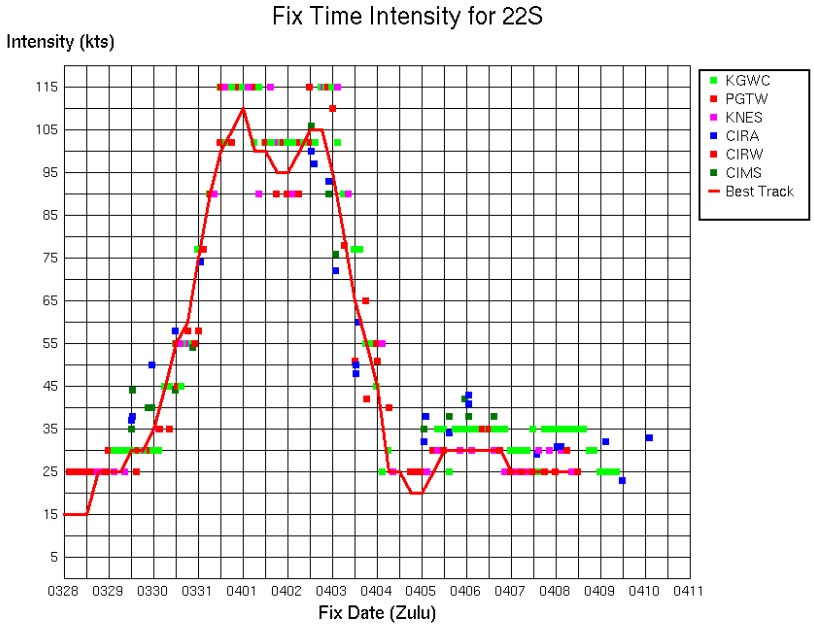




TROPICAL CYCLONE 22S (Jaya)

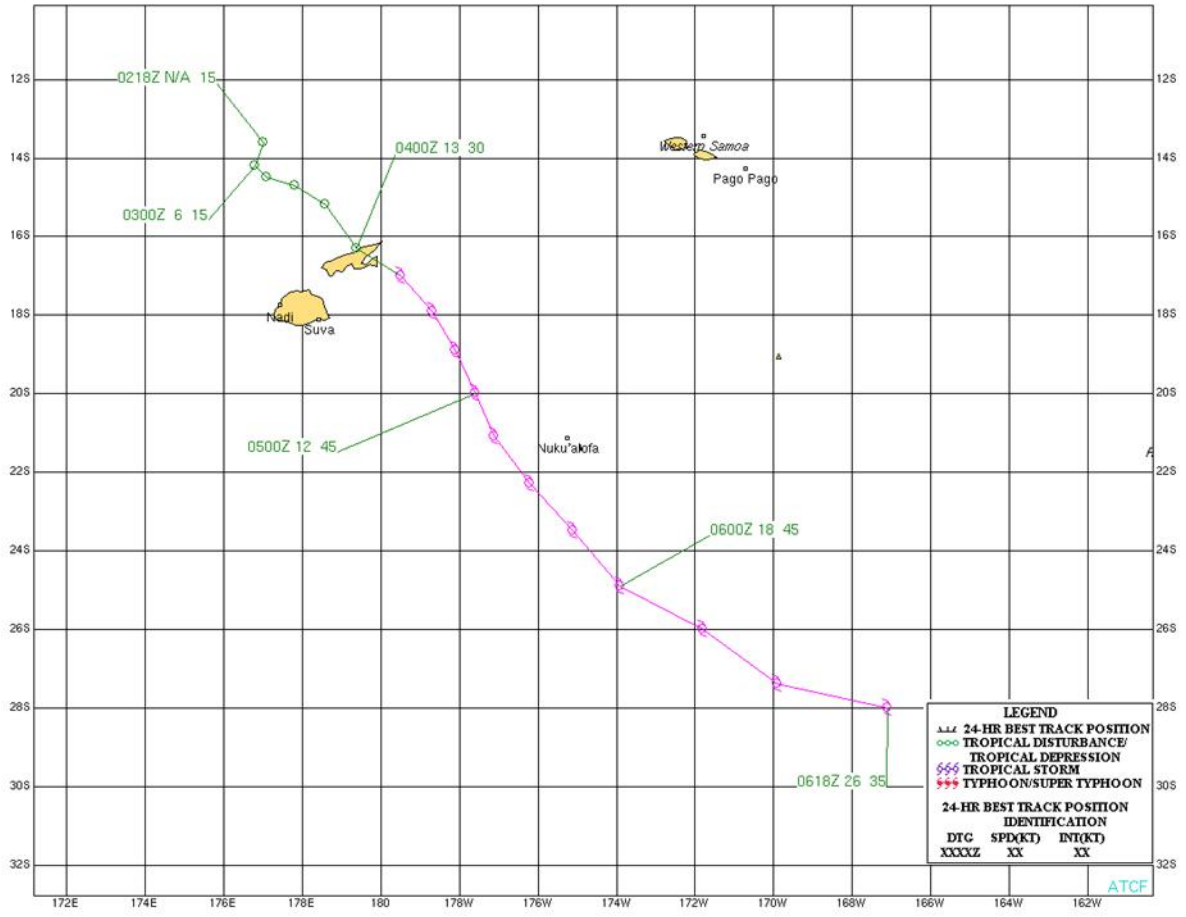
ISSUED POOR:	28 MAR 2007/ 0300Z
ISSUED FAIR:	29 MAR 2007/ 0230Z
FIRST TCFA:	30 MAR 2007/ 0130Z
FIRST WARNING:	30 MAR 2007/ 0600Z
LAST WARNING:	04 APR 2007/ 0600Z
LANDFALL:	Near Sambava, Madagascar, 03 Apr near 0600Z
MAX INTENSITY	120 knots
NUMBER OF WARNINGS:	12

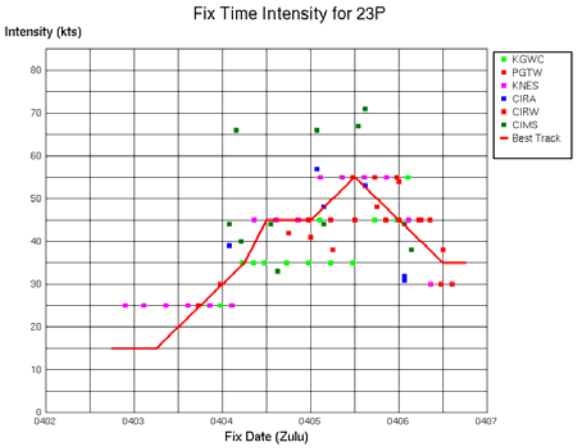




TROPICAL CYCLONE 23P (Cliff)

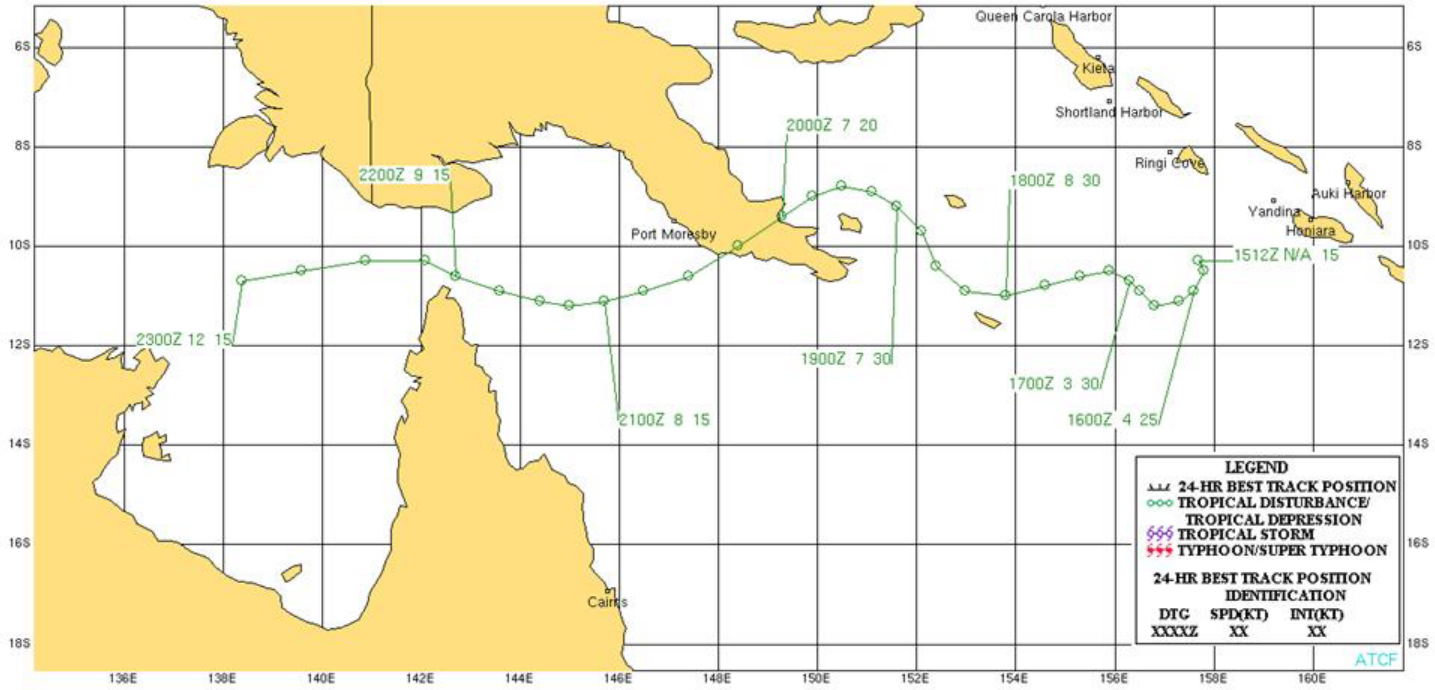
ISSUED POOR:	03 APR 2007/ 1700Z
ISSUED FAIR:	03 APR 2007/ 2230Z
FIRST TCFA:	04 APR 2007/ 0330Z
FIRST WARNING:	04 APR 2007/ 0600Z
LAST WARNING:	06 APR 2007/ 0600Z
LANDFALL:	Vanua Levu Island, Fiji, 04 Apr, 0000Z
MAX INTENSITY	55 knots
NUMBER OF WARNINGS:	5

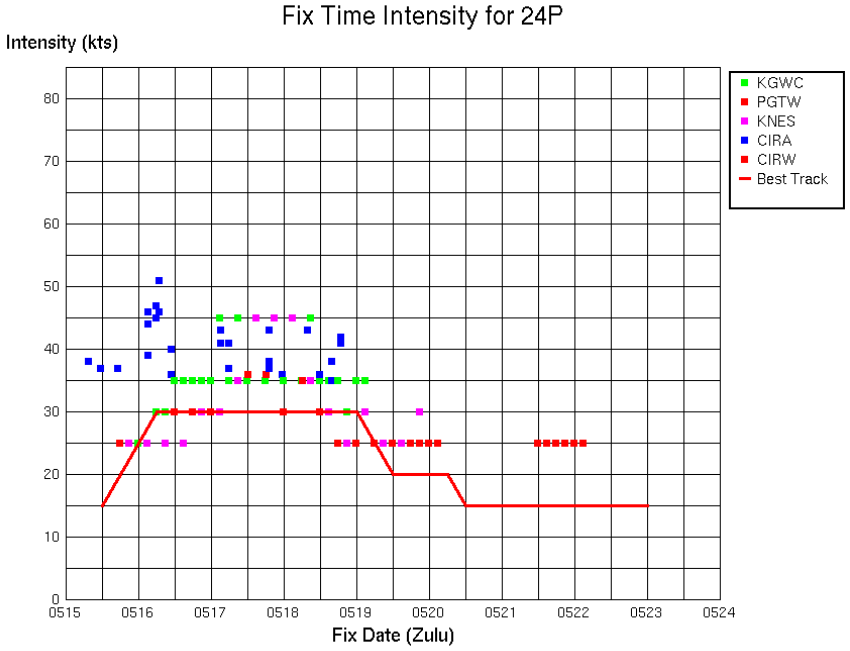




TROPICAL CYCLONE 24P (Pierre)

ISSUED POOR:	None.
ISSUED FAIR:	15 MAY 2007/ 1700Z
FIRST TCFA:	16 MAY 2007/ 0200Z
FIRST WARNING:	17 MAY 2007/ 0600Z
LAST WARNING:	18 MAY 2007/ 1800Z
LANDFALL:	Near Wanigela, Papua New Guinea, 20 May 0000Z
MAX INTENSITY	30 knots
NUMBER OF WARNINGS:	4





Chapter 4 Tropical Cyclone Fix Data

TABLE 4-1 WESTERN NORTH PACIFIC OCEAN FIX SUMMARY FOR 2007					
Tropical Cyclone		**Satellite**	**Radar**	**Synoptic**	**Total**
TY 01W	Kong-Rey	221	0	0	221
STY 02W	Yutu	324	0	0	324
TS 03W	Toraji	71	0	0	71
TY 04W	Man-Yi	311	25	10	346
TY 05W	Usagi	250	29	7	286
TD 06W	No Name	155	0	0	155
TY 07W	Pabuk	167	10	0	177
TD 08W	Wutip	82	0	0	82
STY 09W	Sepat	270	1	0	271
TY 10W	Fitow	370	30	6	406
TY 11W	Danas	191	0	0	191
TY 12W	Nari	185	27	7	219
STY 13W	Wipha	180	44	0	224
TD 14W	No Name	48	0	0	48
TS 15W	Francisco	94	0	0	94
TY 16W	Lekima	184	0	0	184
STY 17W	Krosa	202	80	4	286
TS 18W	Lingling	182	0	0	182
TY 19W	Kajiki	141	0	0	141
TS 20W	Faxai	62	0	0	62
TY 21W	Peipah	258	0	0	258
TS 22W	Tapah	86	0	0	86
TY 23W	Hagibis	279	0	0	279
TY 24W	Mitag	266	14	0	280
TD 25W	No Name	101	0	0	101
TD 26W	No Name	65	0	0	65
TS 27W	Haiyan	97	0	0	97
-	Total	4842	260	34	5136
Percentage of Total		94.28%	5.06%	0.66%	100

Table 4-1 Western North Pacific Fixes, 2007

TABLE 4-2 NORTHERN INDIAN OCEAN FIX SUMMARY FOR 2007					
Tropical Cyclone		Satellite	Radar	Synoptic	Total
TC 01B	Akash	99	0	0	99
TC 02A	Gonu	282	0	0	282
TC 03B	No Name	170	0	0	170
TC 04B	No Name	135	0	0	135
TC 05A	No Name	239	0	0	239
TC 06B	Sidr	97	0	0	97
-	Totals	1022	0	0	1022
Percentage of Total		100.00%	0	0	100

Table 4-2 North Indian Ocean Fixes, 2007

TABLE 4-3 SOUTH PACIFIC & SOUTH INDIAN OCEAN FIX SUMMARY FOR 2007					
Tropical Cyclone		**Satellite**	**Radar**	**Synoptic**	**Total**
TC 01P	Xavier	194	0	0	194
TC 02P	Yani	173	0	0	173
TC 03S	Anita	238	0	0	238
TC 04P	No Name	128	0	0	128
TC 05S	Bondo	361	0	0	361
TC 06S	Clovis	347	0	0	347
TC 07S	Isobel	116	0	0	116
TC 08P	Zita	122	0	0	122
TC 09P	Arthur	236	0	1	237
TC 10S	Dora	523	0	0	523
TC 11P	No Name	112	0	0	112
TC 12P	Nelson	147	0	0	147
TC 13S	Enok	214	0	0	214
TC 14S	Favio	433	0	0	433
TC 15S	Gamede	455	0	0	455
TC 16S	Humba	297	0	0	297
TC 17P	George	280	0	0	280
TC 18S	Jacob	335	0	0	335
TC 19S	Indlala	307	0	0	307
TC 20S	Kara	140	0	0	140
TC 21P	Becky	175	0	0	175
TC 22S	Jaya	373	0	0	373
TC 23P	Cliff	118	0	0	118
TC 24P	Pierre	145	0	0	145
-	Totals	5969	0	1	5970
Percentage of Total		99.98%	0.00%	0.02%	100

Table 4-3 Southern Hemisphere Fixes, 2007

TABLE 4-4 FIXES BY OCEANIC BASIN FOR 2007	
Oceanic Basin	**Total Fixes**
Northwest Pacific	5136
Southern Hemisphere	5970
Northern Indian Ocean	1022
Total	12128

Table 4-4 Fix totals by Basin

Chapter 5 Summary of Forecast Verification

Verification of warning position and intensities at initial, 12-, 24-, 48-, and 72-hour forecast periods are made against the final best track. The (scalar) track forecast, along-track and cross track errors (illustrated in Figure 5-1) were calculated for each verifying JTWC forecast. These data are included in this chapter. This section summarizes verification data for the 2007 season, and contrasts it with annual verification statistics from previous years.

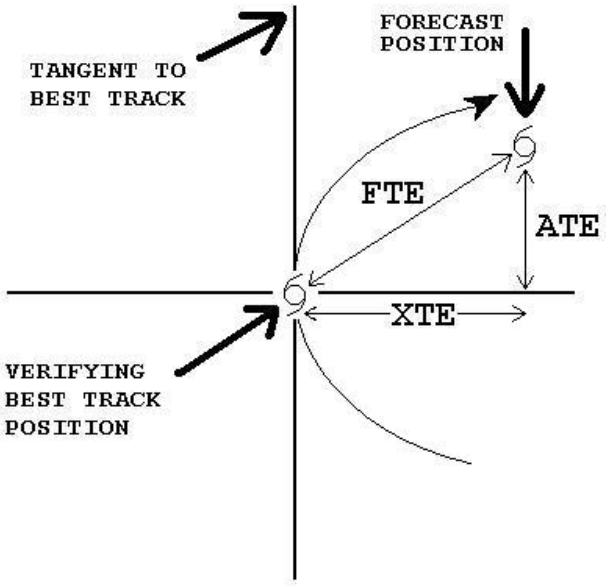


Figure 5-1 Definition of cross-track error (XTE), along track error (ATE), and forecast track error (FTE). In this example, the forecast position is ahead of and to the right of the verifying best track position. Therefore, the XTE is positive (to the right of the best track) and the ATE is positive (ahead of the best track). Adapted from Tsui and Miller, 1988.

SECTION 1 ANNUAL FORECAST VERIFICATION

TABLE 5-1
MEAN FORECAST ERRORS (NM) FOR WESTERN NORTH PACIFIC TROPICAL CYCLONES FROM 1959 – 2007

	24-Hour					48-Hour					72-Hour				
Year (Notes)	Cases (1)	TY (2)	TC (4)	Cross Track (3)	Along Track (3)	Cases (1)	TY (2)	TC (4)	Cross Track (3)	Along Track (3)	Cases (1)	TY (2)	TC (4)	Cross Track (3)	Along Track (3)
1959		117					267								
1960		177					354								
1961		136					274								
1962		144					287					476			
1963		127					246					374			
1964		133					284					429			
1965		151					303					418			
1966		136					280					432			
1967		125					276					414			
1968		105					229					337			
1969		111					237					349			

1970		98	104				181	190				272	279		
1971		99	111	64			203	212	118			308	317	177	
1972		116	117	72			245	245	146			382	381	210	
1973		102	108	74			193	197	134			245	253	162	
1974		114	120	78			218	226	157			256	348	245	
1975		129	138	84			279	288	181			442	450	290	
1976		117	117	71			232	230	132			336	338	202	
1977		140	148	83			266	283	157			290	407	228	
1978		120	127	71	87		241	271	151	194		459	410	218	296
1979		113	124	76	81		219	226	138	146		319	316	182	214
1980		116	126	76	86		221	243	147	165		362	389	230	266
1981		117	124	77	80		215	221	131	146		342	334	219	206
1982		114	113	70	74		229	238	142	162		337	342	211	223
1983		110	117	73	76		247	260	164	169		384	407	263	259
1984		110	117	64	84		228	232	131	163		361	363	216	238
1985		112	117	68	80		228	231	138	153		355	367	227	230
1986		117	126	70	85		261	261	151	183		403	394	227	276
1987		101	107	64	71		211	204	127	134		318	303	186	198
1988	353	107	114	58	85	255	222	216	103	170	183	327	315	159	244
1989	585	107	120	69	83	458	214	231	127	162	343	325	350	177	265
1990	551	98	103	60	72	453	191	203	110	148	334	299	310	168	225
1991	673	93	96	53	69	570	187	185	97	137	467	298	287	146	229
1992	890	97	107	59	77	739	194	205	116	143	610	295	305	172	210
1993	744	102	112	63	79	596	205	212	117	151	469	320	321	173	226
1994	920	96	105	56	76	762	172	186	105	131	623	244	258	152	176
1995	521	105	123	67	89	409	200	215	117	159	315	311	325	167	240
1996	868	85	105	56	76	707	157	178	89	134	604	252	272	137	203
1997	905	86	93	55	76	783	159	164	87	134	665	251	245	120	202
1998	354	127	124	58	98	257	263	239	127	178	189	392	370	201	274
1999	433	88	106	59	74	300	150	176	102	119	191	225	234	139	155
2000	605	75	81	45	57	467	136	142	80	98	363	205	209	118	144
2001	627	66	73	42	49	512	114	122	75	78	395	169	180	110	120
2002	657	50	66	37	47	535	94	116	67	79	421	144	166	88	120
2003	602	59	73	41	52	495	119	128	68	94	397	186	186	89	147
2004	766	52	70	41	48	646	94	122	69	84	537	180	173	95	121
2005	507	41	61	38	38	407	81	102	59	72	316	138	156	76	120
2006	512	47	62	39	40	405	85	104	61	73	327	133	151	77	112
2007	343	45	61	24	42	260	72	100	58	69	189	89	148	83	102
Averages (1978-2007)	621	92	102	58	71	501	180	191	108	134	397	281	286	161	201

Table 5-1 Forecast Track errors, Western North Pacific 1959 - 2007

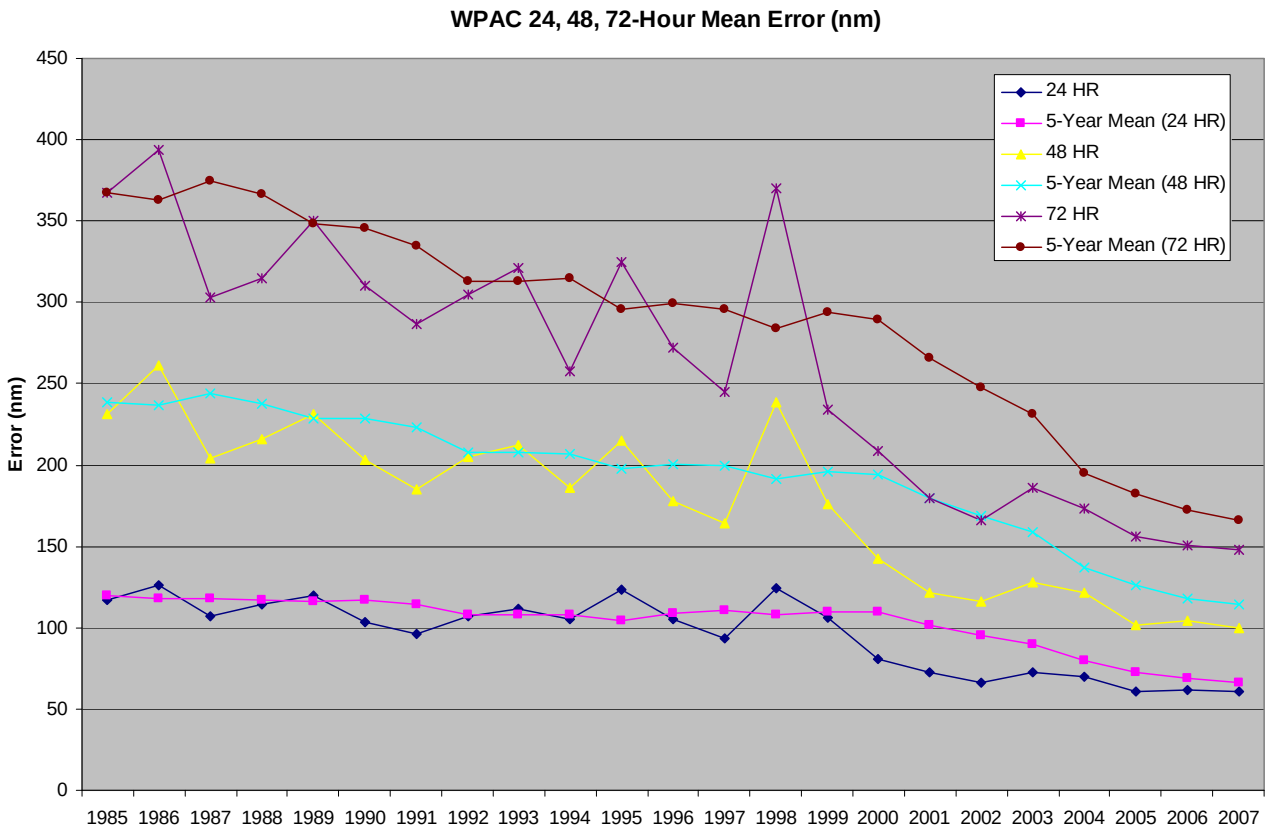


Figure 5-2 Forecast Track Error with 5 year running mean, Western North Pacific, 1959 - 2007

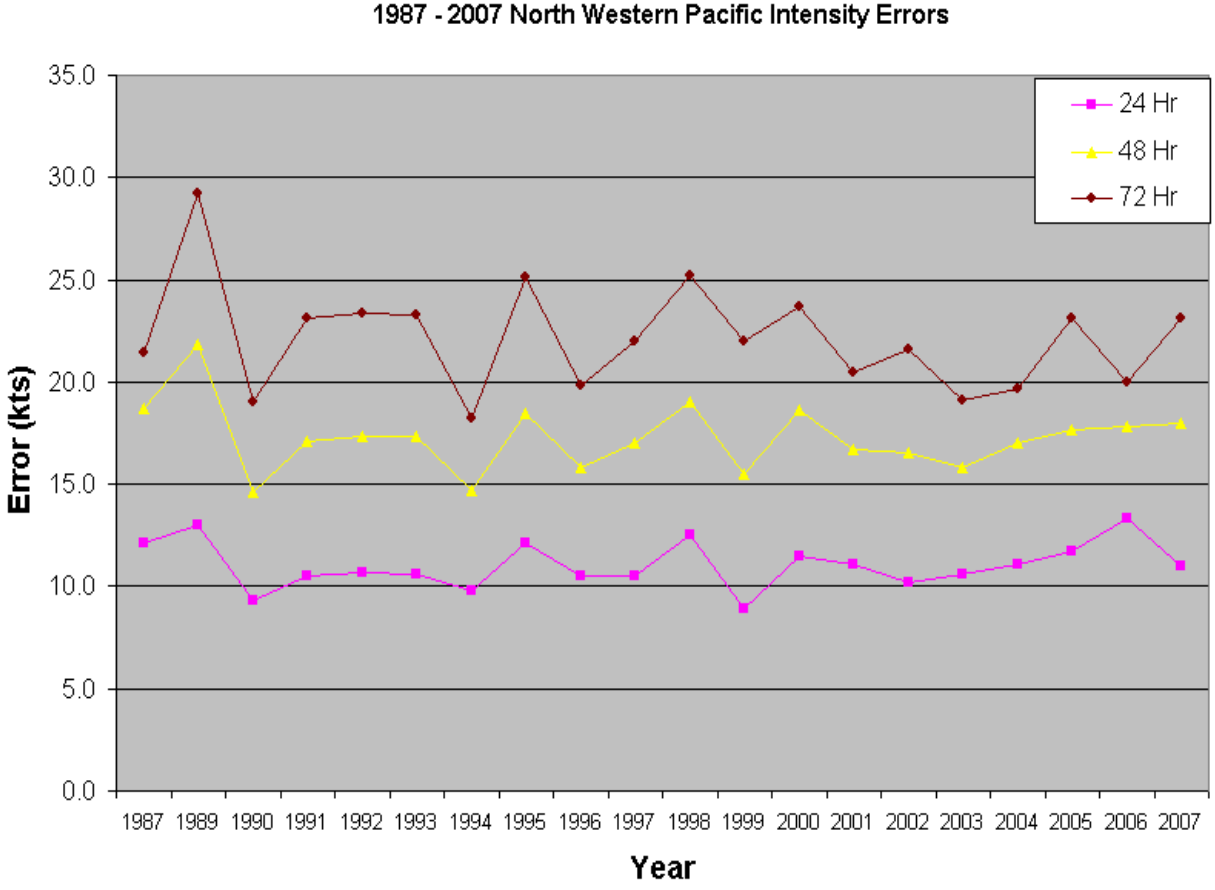


Figure 5-3 Mean Forecast Intensity Error, Western North Pacific, 1987 - 2007

Table 5-2

MEAN FORECAST TRACK ERRORS (NM) FOR NORTH INDIAN OCEAN

TROPICAL CYCLONES FROM 1985-2007

	24-HOUR				48-HOUR				72-HOUR			
YEAR (Notes)	Cases	Track	CROSS TRACK	ALONG TRACK	Cases	Track	CROSS TRACK	ALONG TRACK	Cases	Track	CROSS TRACK	ALONG TRACK
1985	30	122	102	53	8	242	119	194	0			
1986	16	134	118	53	7	168	131	80	5	269	189	180
1987	54	144	97	100	25	205	125	140	21	305	219	188
1988	30	120	89	63	18	219	112	176	12	409	227	303
1989	33	88	62	50	17	146	94	86	12	216	164	11
1990	36	101	85	43	24	146	117	67	17	185	130	104
1991	43	129	107	54	27	235	200	89	14	450	356	178
1992	149	128	73	86	100	244	141	166	62	398	276	218
1993	28	125	87	79	20	198	171	74	12	231	176	116
1994	44	97	80	44	28	153	124	63	13	213	177	92
1995	47	138	119	58	32	262	247	77	20	342	304	109
1996	123	134	94	80	85	238	181	127	58	311	172	237
1997	42	119	87	49	29	201	168	92	17	228	195	110
1998	55	106	84	51	34	198	135	106	17	262	188	144
1999	41	79	59	38	22	184	130	116	10	374	309	177
2000	24	61	47	26	16	85	69	37	1	401	399	38
2001	41	61	40	37	31	115	71	71	22	166	44	154
2002	30	84	41	63	18	137	92	83	10	185	92	133
2003	37	108	66	69	31	196	115	132	7	354	210	252
2004	46	81	53	52	36	140	95	85	9	173	144	86
2005	67	62	41	40	49	116	71	73	18	118	35	109
2006	19	64	37	44	13	92	58	60	0	-	-	-
2007	38	61	38	36	23	94	56	65	10	140	92	93
Averages (1985-2007)	47	104	55	77	30	177	98	126	18	277	141	204

Table 5-2 Forecast Track Error, North Indian Ocean, 1985 - 2007

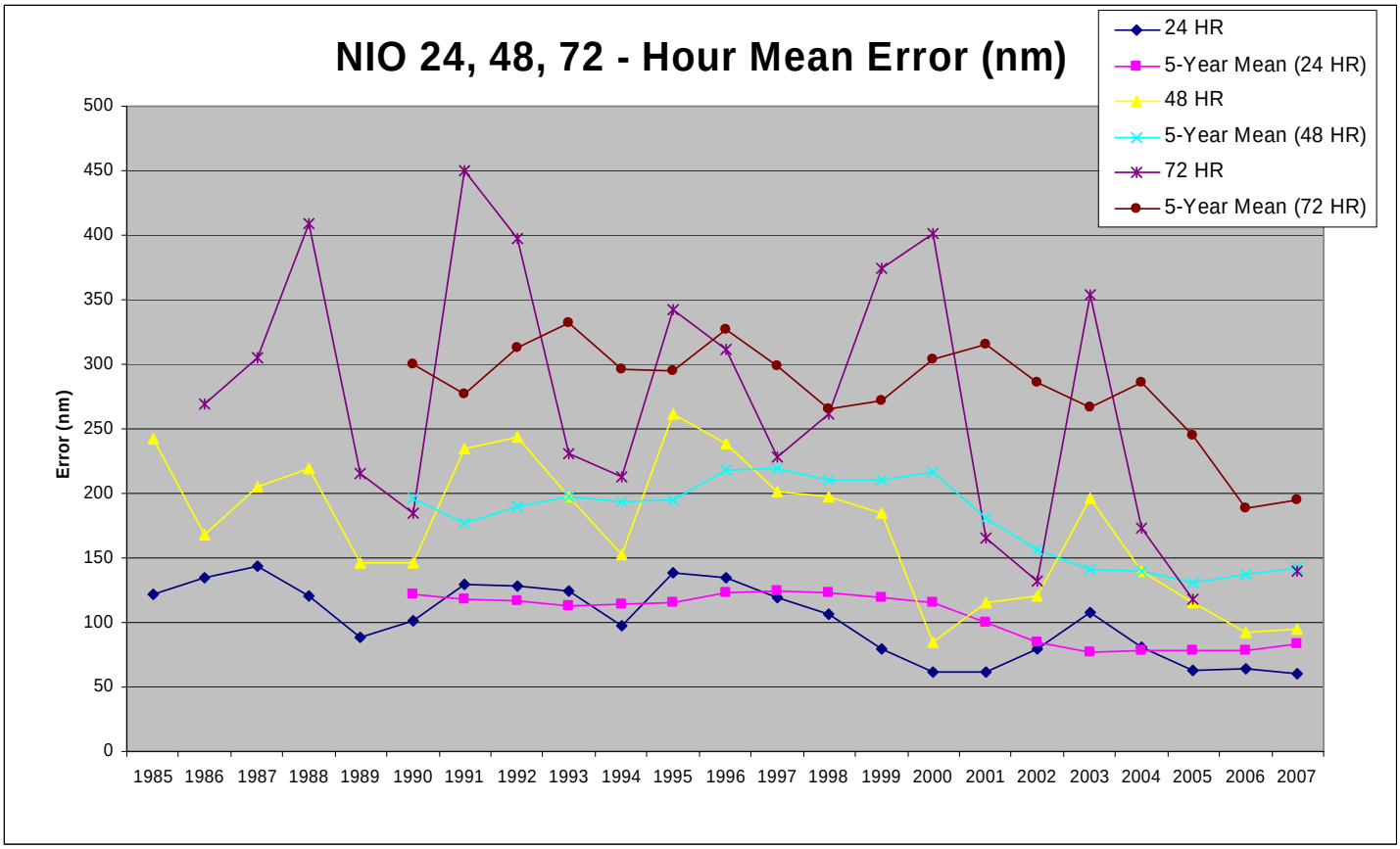


Figure 5-4 Forecast Track Error with 5 year running mean, North Indian Ocean, 1985 - 2007

TABLE 5-3 MEAN FORECAST ERRORS (NM) FOR SOUTHERN HEMISPHERE TROPICAL CYCLONES 1985 - 2007												
	24-Hour				48-Hour				72-Hour			
Year (Notes)	Cases	Track	Cross	Along	Cases	Track	Cross	Along	Cases	Track	Cross	Along
1985	257	134	79	92	193	236	132	169				
1986	227	129	77	86	171	262	164	169				
1987	138	145	90	94	101	280	138	153				
1988	99	146	83	98	48	290	144	246				
1989	242	124	73	84	186	240	136	166				
1990	228	143	74	105	177	263	152	178				
1991	231	115	69	75	185	220	129	152				
1992	230	124	64	91	208	240	129	177				
1993	225	102	57	74	176	199	114	142				
1994	345	115	68	77	282	224	134	147				
1995	222	108	55	82	175	198	108	144	53	291	190	169
1996	298	125	67	90	237	240	129	174	46	277	133	221
1997	499	109	72	82	442	210	135	163	150	288	175	248
1998	305	111	52	85	245	219	108	169	81	349	171	261
1999	322	113	64	80	245	226	132	159	59	286	164	198
2000	313	72	45	47	245	135	86	84	58	180	139	94
2001	147	84	44	61	113	148	86	105	11	248	197	133
2002	200	82	43	60	146	133	75	93	5	102	41	91
2003	279	74	37	57	221	127	68	90	37	123	54	99
2004	277	77	45	52	233	142	89	92	47	210	102	162
2005	214	70	44	44	170	116	77	72	41	199	117	136
2006	191	65	37	46	140	116	69	79	32	201	101	151
2007	186	74.9	41	52	131	147.2	80	105	3	173.1	146	73
Averages (1985-2007)	247	106	60	75	194	200	114	140	48	225	133	157

Table 5-3 Mean Forecast Error, Southern Hemisphere, 1985 - 2007

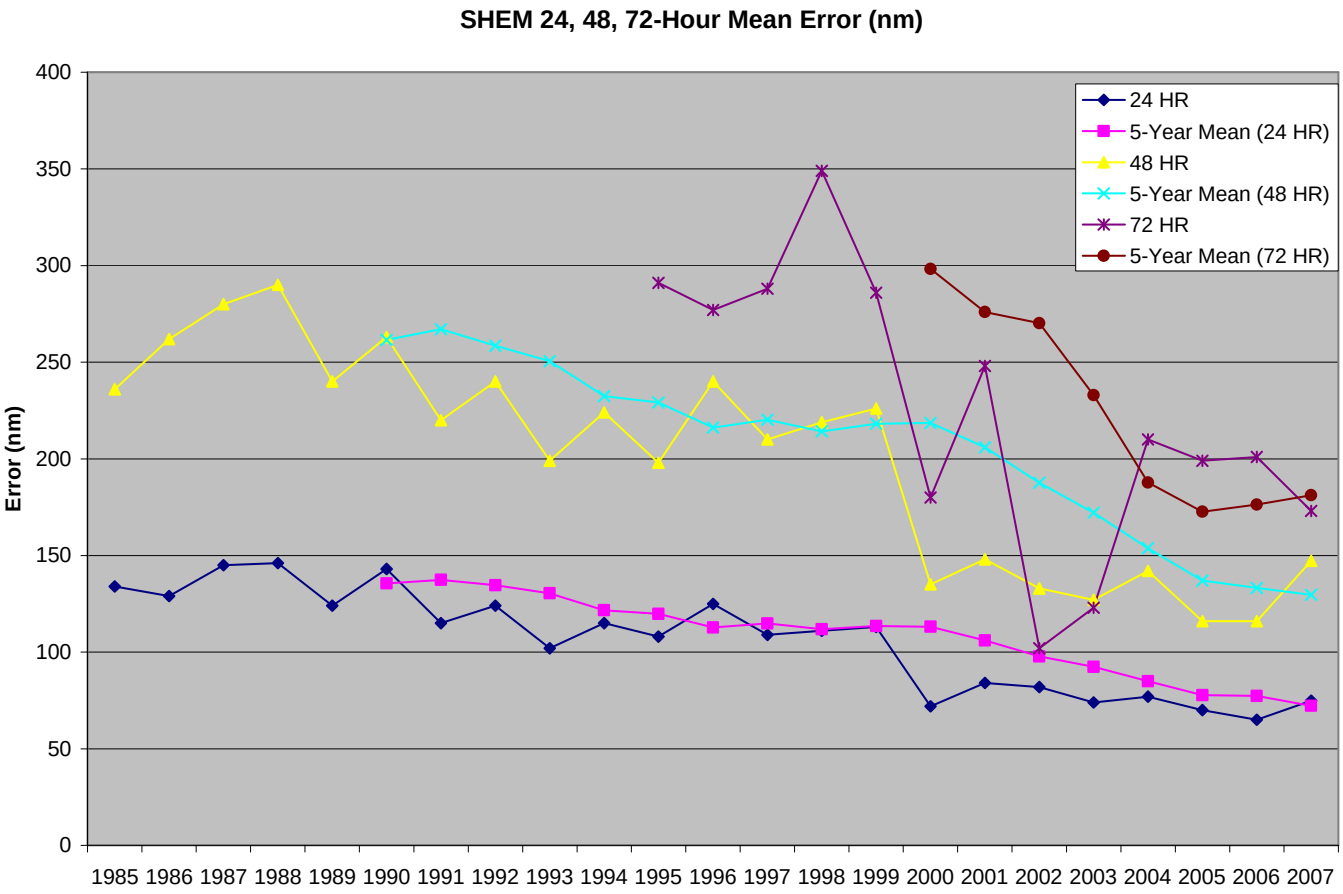


Figure 5-5 Forecast Track Error with 5 year running mean, Southern Hemisphere, 1985 - 2007

SECTION 2 OBJECTIVE AID COMPARISON

A comparison of the JTWC forecast, the multi-model consensus forecast (CONW) and the members of the CONW are provided in Table 5-4 for all western North Pacific tropical cyclones, Table 5-5 for north Indian Ocean tropical cyclones, and Table 5-6 for Southern Hemisphere tropical cyclones. For example, in Table 5-4 for the homogeneous comparison of the 12-hour mean forecast error between JTWC and CONW, 386 cases were available. The average forecast error at 12 hours was 39 nm for CONW and 40 nm for JTWC. The difference of 1 nm is shown in the lower right. Due to computational round-off, differences are not always exact.

TABLE 5-4
ERROR STATISTICS FOR SELECTED OBJECTIVE TECHNIQUES WESTERN NORTH PACIFIC OCEAN

12-OUR MEAN FORECAST ERROR (NM)

	JTWC		CONW		AVNI		EGRI		ECMI		GFNI		JGSI		JTYI		NGPI		TCLI		WBAI	
JTWC	389	40																				
	40	0																				
CONW	386	40	399	40																		
	39	-1	40	0																		
AVNI	300	36	300	35	300	37																
	37	1	37	2	37	0																
EGRI	153	38	154	37	121	34	154	48														
	48	10	48	11	45	11	48	0														
ECMI	1	19	1	22	0	0	1	19	1	25												
	25	6	25	3	0	0	25	6	25	0												
GFNI	302	36	303	36	271	37	126	45	0	0	303	46										
	46	10	46	10	45	8	41	-4	0	0	46	0										
JGSI	163	38	163	37	135	35	127	48	0	0	141	44	163	38								
	38	0	38	1	33	-2	38	-10	0	0	35	-9	38	0								
JTYI	140	35	140	34	114	35	16	50	0	0	114	39	13	27	140	42						
	42	7	42	8	40	5	46	-4	0	0	39	0	32	5	42	0						
NGPI	353	38	363	38	293	37	145	47	0	0	300	46	155	37	129	41	363	45				
	44	6	45	7	43	6	41	-6	0	0	43	-3	43	6	41	0	45	0				
TCLI	122	35	122	33	104	34	100	44	0	0	108	39	105	34	15	44	117	39	122	49		
	49	14	49	16	49	15	48	4	0	0	49	10	49	15	48	4	49	10	49	0		
WBAI	357	39	368	40	288	37	141	48	0	0	290	46	152	37	129	41	342	45	113	48	369	54
	53	14	54	14	52	15	51	3	0	0	52	6	55	18	45	4	53	8	52	4	54	0

24-HOUR MEAN FORECAST ERROR (NM)																						
	JTWC		**CONW**		**AVNI**		**EGRI**		**ECMI**		**GFNI**		**JGSI**		**JTYI**		**NGPI**		**TCLI**		**WBAI**	
JTWC	343	61																				
	61	0																				
CONW	340	60	353	62																		
	59	-1	62	0																		
AVNI	257	55	257	53	257	55																
	55	0	55	2	55	0																
EGRI	141	58	142	56	110	54	142	75														
	75	17	75	19	72	18	75	0														
ECMI	1	46	1	56	0	0	1	53	1	66												
	66	20	66	10	0	0	66	13	66	0												
GFNI	267	56	268	55	232	56	116	74	0	0	268	76										
	76	20	76	21	74	18	69	-5	0	0	76	0										
JGSI	148	57	148	55	122	53	116	75	0	0	129	74	148	55								
	55	-2	55	0	50	-3	56	-19	0	0	53	-21	55	0								
JTYI	124	54	124	55	96	55	15	70	0	0	101	65	13	42	124	64						
	64	10	64	9	59	4	68	-2	0	0	59	-6	44	2	64	0						
NGPI	310	58	317	57	251	56	134	74	0	0	266	76	142	54	114	62	317	71				
	70	12	71	14	67	11	67	-7	0	0	69	-7	66	12	70	8	71	0				
TCLI	103	54	103	50	89	53	89	70	0	0	92	64	93	53	13	64	100	62	103	77		
	77	23	77	27	76	23	78	8	0	0	79	15	80	27	73	9	78	16	77	0		
WBAI	317	61	328	62	248	56	130	75	0	0	259	76	139	54	117	63	302	72	97	76	329	94
	93	32	94	32	90	34	90	15	0	0	93	17	96	42	80	17	93	21	93	17	94	0

36-HOUR MEAN FORECAST ERROR (NM)

	JTWC		CONW		AVNI		EGRI		ECMI		GFNI		JGSI		JTYI		NGPI		TCLI		WBAI	
JTWC	300	80																				
	80	0																				
CONW	298	79	309	80																		
	77	-2	80	0																		
AVNI	221	71	221	69	221	72																
	72	1	72	3	72	0																
EGRI	125	73	126	71	96	67	126	91														
	91	18	91	20	86	19	91	0														
ECMI	1	66	1	99	0	0	1	59	1	119												
	119	53	119	20	0	0	119	60	119	0												
GFNI	233	74	234	72	199	71	101	91	0	0	234	101										
	101	27	101	29	96	25	90	-1	0	0	101	0										
JGSI	131	75	131	73	106	70	104	93	0	0	113	100	131	73								
	73	-2	73	0	68	-2	75	-18	0	0	70	-30	73	0								
JTYI	108	71	108	72	81	68	13	76	0	0	88	85	12	52	108	86						
	86	15	86	14	76	8	94	18	0	0	82	-3	67	15	86	0						
NGPI	271	77	277	76	215	71	119	90	0	0	232	101	125	73	98	84	277	96				
	95	18	96	20	88	17	87	-3	0	0	92	-9	88	15	96	12	96	0				
TCLI	88	69	88	64	75	67	77	85	0	0	78	88	79	67	11	81	85	83	88	110		
	110	41	110	46	110	43	112	27	0	0	115	27	114	47	103	22	112	29	110	0		
WBAI	279	80	288	80	214	72	116	91	0	0	228	102	124	73	102	85	265	96	84	110	289	135
	134	54	134	54	130	58	127	36	0	0	136	34	140	67	113	28	134	38	132	22	135	0

48-HOUR MEAN FORECAST ERROR (NM)

	JTWC		CONW		AVNI		EGRI		ECMI		GFNI		NGPI		TCLI		WBAI					
JTWC	260	100																				
	100	0																				
CONW	258	99	267	99																		
	96	-3	99	0																		
AVNI	182	89	183	82	183	86																
	87	-2	86	4	86	0																
EGRI	107	89	108	83	79	83	108	109														
	109	20	109	26	104	21	109	0														
ECMI	1	71	1	107	0	0	1	53	1	142												
	142	71	142	35	0	0	142	89	142	0												
GFNI	200	95	202	88	168	87	86	109	0	0	202	129										
	129	34	129	41	124	37	110	1	0	0	129	0										
NGPI	233	98	237	92	179	86	101	107	0	0	198	130	237	118								
	117	19	118	26	106	20	102	-5	0	0	112	-18	118	0								
TCLI	74	85	75	77	62	80	65	105	0	0	67	114	72	99	75	134						
	133	48	134	57	132	52	135	30	0	0	139	25	133	34	134	0						
WBAI	240	101	247	97	177	87	99	109	0	0	197	130	226	116	72	131	248	181				
	180	79	180	83	173	86	166	57	0	0	188	58	183	67	181	50	181	0				

72-HOUR MEAN FORECAST ERROR (NM)

	JTWC		CONW		AVNI		EGRI		ECMI		GFNI		NGPI		TCLI		WBAI					
JTWC	189	148																				
	148	0																				
CONW	187	147	194	141																		
	137	-10	141	0																		
AVNI	123	139	124	125	124	112																
	112	-27	112	-13	112	0																
EGRI	75	132	76	124	50	109	76	168														
	168	36	168	44	174	65	168	0														
ECMI	1	112	1	167	0	0	1	144	1	66												
	66	-46	66	-101	0	0	66	-78	66	0												
GFNI	137	143	139	131	113	112	59	173	0	0	139	202										
	200	57	202	71	201	89	185	12	0	0	202	0										
NGPI	161	147	165	137	121	109	70	165	0	0	134	203	165	172								
	172	25	172	35	157	48	157	-8	0	0	163	-40	172	0								
TCLI	50	124	50	111	38	103	43	164	0	0	44	174	47	152	50	182						
	182	58	182	71	180	77	179	15	0	0	185	11	175	23	182	0						
WBAI	173	148	178	139	121	111	69	170	0	0	135	202	158	171	48	182	180	286				
	282	134	287	148	264	153	267	97	0	0	299	97	295	124	285	103	286	0				

96-HOUR MEAN FORECAST ERROR (NM)

	JTWC		CONW		AVNI		EGRI		ECMI		GFNI		NGPI		TCLI							
JTWC	105	189																				
	189	0																				
CONW	103	187	122	195																		
	185	-2	195	0																		
AVNI	68	168	75	167	75	143																
	145	-23	143	-24	143	0																
EGRI	45	176	50	181	28	135	51	219														
	224	48	221	40	217	82	219	0														
ECMI	1	215	1	352	0	0	1	248	1	33												
	33	-182	33	-319	0	0	33	-215	33	0												
GFNI	81	167	88	162	70	141	39	222	0	0	88	298										
	271	104	298	136	311	170	269	47	0	0	298	0										
NGPI	92	181	105	174	74	144	44	210	0	0	85	291	106	242								
	241	60	243	69	239	95	224	14	0	0	226	-65	242	0								
TCLI	2	179	2	236	2	173	2	167	0	0	2	331	2	264	2	520						
	520	341	520	284	520	347	520	353	0	0	520	189	520	256	520	0						

120-HOUR MEAN FORECAST ERROR (NM)																						
	JTWC		**CONW**		**AVNI**		**EGRI**		**ECMI**		**GFNI**		**NGPI**		**TCLI**							
JTWC	63	215																				
	215	0																				
CONW	62	215	79	257																		
	233	18	257	0																		
AVNI	31	183	38	211	38	198																
	196	13	198	-13	198	0																
EGRI	26	207	29	241	13	202	30	294														
	296	89	297	56	248	46	294	0														
ECMI	1	301	1	611	0	0	1	513	1	91												
	91	-210	91	-520	0	0	91	-422	91	0												
GFNI	45	160	53	207	36	197	21	261	0	0	53	354										
	274	114	354	147	354	157	306	45	0	0	354	0										
NGPI	48	178	59	203	36	196	23	247	0	0	48	324	60	316								
	261	83	319	116	329	133	253	6	0	0	280	-44	316	0								
TCLI	1	245	1	272	1	208	1	221	0	0	1	204	1	473	1	500						
	500	255	500	228	500	292	500	279	0	0	500	296	500	27	500	0						

Table 5-4 Comparison of Selected techniques, Western North Pacific, 2007

ERROR STATISTICS LEGEND		
	JTWC	
CONW	nr cases	avg error JTWC
	avg error CONW	Differential error

TABLE 5-5
ERROR STATISTICS FOR SELECTED OBJECTIVE TECHNIQUES NORTH INDIAN OCEAN

12-HOUR MEAN FORECAST ERROR (NM)

	JTWC		CONW		AVNI		EGRI		ECMI		GFNI		NGPI		TCLI		WBAI	
JTWC	51	38																
	38	0																
CONW	49	37	74	45														
	42	5	45	0														
AVNI	36	35	43	39	43	46												
	45	10	46	7	46	0												
EGRI	22	32	27	40	18	47	28	46										
	40	8	46	6	40	-7	46	0										
ECMI	1	27	2	51	1	54	1	45	2	36								
	25	-2	36	-15	25	-29	25	-20	36	0								
GFNI	46	37	59	42	42	47	21	40	1	25	59	55						
	56	19	55	13	54	7	49	9	19	-6	55	0						
NGPI	48	38	72	45	43	46	27	46	2	36	58	55	72	48				
	48	10	48	3	47	1	43	-3	40	4	49	-6	48	0				
TCLI	7	22	7	28	7	24	7	36	0	0	7	35	7	30	7	53		
	53	31	53	25	53	29	53	17	0	0	53	18	53	23	53	0		
WBAI	34	30	54	38	28	38	20	44	1	47	42	46	52	41	7	53	54	57
	51	21	57	19	51	13	55	11	109	62	50	4	56	15	51	-2	57	0

24 HOUR MEAN FORECAST ERROR (NM)

	JTWC		CONW		AVNI		EGRI		ECMI		GFNI		NGPI		TCLI		WBAI	
JTWC	40	61																
	61	0																
CONW	38	60	60	72														
	68	8	72	0														
AVNI	24	50	28	58	28	77												
	81	31	77	19	77	0												
EGRI	19	49	24	65	14	81	25	72										
	64	15	69	4	56	-25	72	0										
ECMI	1	29	2	87	1	92	1	81	2	69								
	36	7	69	-18	36	-56	36	-45	69	0								
GFNI	35	60	44	63	27	79	18	60	1	36	44	80						
	86	26	80	17	76	-3	78	18	17	-19	80	0						
NGPI	37	60	57	70	28	77	24	69	2	69	43	78	57	76				
	77	17	76	6	73	-4	72	3	57	-12	78	0	76	0				
TCLI	6	38	6	55	5	63	6	69	0	0	6	68	6	57	6	108		
	108	70	108	53	80	17	108	39	0	0	108	40	108	51	108	0		
WBAI	26	53	45	63	18	77	18	63	1	102	32	70	42	64	6	108	45	110
	108	55	110	47	96	19	112	49	220	118	97	27	108	44	102	-6	110	0

36 HOUR MEAN FORECAST ERROR (NM)																		
	JTWC		**CONW**		**AVNI**		**EGRI**		**ECMI**		**GFNI**		**NGPI**		**TCLI**		**WBAI**	
JTWC	30	74																
	74	0																
CONW	28	70	48	84														
	79	9	84	0														
AVNI	21	64	25	78	25	118												
	119	55	118	40	118	0												
EGRI	16	56	21	84	13	123	22	88										
	86	30	83	-1	86	-37	88	0										
ECMI	1	29	1	40	1	126	1	74	1	51								
	51	22	51	11	51	-75	51	-23	51	0								
GFNI	26	68	35	76	24	120	15	86	1	51	35	94						
	96	28	94	18	100	-20	94	8	37	-14	94	0						
NGPI	28	70	46	82	25	118	21	83	1	51	35	94	46	90				
	93	23	90	8	96	-22	93	10	60	9	93	-1	90	0				
TCLI	5	52	5	88	5	128	5	102	0	0	5	107	5	87	5	149		
	149	97	149	61	149	21	149	47	0	0	149	42	149	62	149	0		
WBAI	19	67	37	83	16	125	16	73	0	0	26	87	35	86	5	149	37	150
	140	73	150	67	148	23	157	84	0	0	132	45	150	64	140	-9	150	0

48 HOUR MEAN FORECAST ERROR (NM)

	JTWC		CONW		AVNI		EGRI		ECMI		GFNI		NGPI		TCLI		WBAI	
JTWC	23	94																
	94	0																
CONW	23	94	41	117														
	107	13	117	0														
AVNI	17	88	22	114	22	171												
	169	81	171	57	171	0												
EGRI	13	80	17	118	10	182	17	116										
	108	28	116	-2	122	-60	116	0										
ECMI	1	43	1	58	1	174	1	82	1	77								
	77	34	77	19	77	-97	77	-5	77	0								
GFNI	22	97	31	112	21	174	12	114	1	77	31	144						
	129	32	144	32	161	-13	143	29	90	13	144	0						
NGPI	23	94	38	111	21	172	17	116	1	77	30	130	38	117				
	119	25	117	6	112	-60	119	3	30	-47	117	-13	117	0				
TCLI	4	90	4	132	4	246	4	167	0	0	4	180	4	98	4	193		
	193	103	193	61	193	-53	193	26	0	0	193	13	193	95	193	0		
WBAI	14	95	30	122	13	195	12	116	0	0	22	146	27	118	4	193	30	193
	182	87	193	71	202	7	200	84	0	0	186	40	183	65	156	-37	193	0

72 HOUR MEAN FORECAST ERROR (NM)

	JTWC		CONW		AVNI		EGRI		ECMI		GFNI		NGPI		TCLI		WBAI	
JTWC	10	140																
	140	0																
CONW	10	140	27	149														
	130	-10	149	0														
AVNI	5	174	13	195	13	243												
	167	-7	243	48	243	0												
EGRI	4	163	9	159	5	258	9	191										
	104	-59	191	32	234	-24	191	0										
ECMI	1	79	1	37	0	0	0	0	1	171								
	171	92	171	134	0	0	0	0	171	0								
GFNI	10	140	21	160	10	267	7	186	1	171	21	239						
	229	89	239	79	305	38	254	68	324	53	239	0						
NGPI	10	140	25	152	11	268	9	191	1	171	21	239	25	181				
	168	28	181	29	218	-50	209	18	54	-117	191	-48	181	0				
TCLI	0	0	2	256	2	340	2	352	0	0	2	360	2	287	2	479		
	0	0	479	223	479	139	479	127	0	0	479	119	479	192	479	0		
WBAI	1	161	16	168	7	314	5	251	0	0	12	252	15	200	2	479	16	191
	160	-1	191	23	271	-43	165	-86	0	0	170	-82	167	-33	162	-317	191	0

96 HOUR MEAN FORECAST ERROR (NM)																			
	CONW		**AVNI**		**EGRI**		**GFNI**		**NGPI**										
CONW	18	184																	
	184	0																	
AVNI	5	141	5	281															
	281	140	281	0															
EGRI	4	206	1	382	4	308													
	308	102	513	131	308	0													
GFNI	13	199	3	329	3	331	13	234											
	234	35	262	-67	302	-29	234	0											
NGPI	15	201	3	329	3	331	13	234	15	250									
	250	49	290	-39	313	-18	260	26	250	0									

Table 5-5 Comparison of Selected techniques, North Indian Ocean, 2007

ERROR STATISTICS LEGEND		
	JTWC	
CONW	nr cases	avg error JTWC
	avg error CONW	Differential error

TABLE 5-6
ERROR STATISTICS FOR SELECTED OBJECTIVE TECHNIQUES SOUTHERN HEMISPHERE

12-HOUR MEAN FORECAST ERROR (NM)

	JTWC		CONW		AVNI		EGRI		ECMI		GFNI		JGSI		NGPI		TCLI		WBAI	
JTWC	208	41																		
	41	0																		
CONW	208	41	470	47																
	43	2	47	0																
AVNI	148	40	277	40	277	50														
	49	9	50	10	50	0														
EGRI	84	38	174	44	117	43	174	53												
	49	11	53	9	49	6	53	0												
ECMI	1	67	5	42	3	57	3	44	5	38										
	78	11	38	-4	46	-11	35	-9	38	0										
GFNI	182	40	387	44	262	49	152	54	5	38	387	52								
	49	9	52	8	48	-1	52	-2	58	20	52	0								
JGSI	5	55	15	55	8	43	14	66	0	0	12	71	15	57						
	49	-6	57	2	52	9	55	-11	0	0	59	-12	57	0						
NGPI	190	40	394	44	275	50	155	51	5	38	358	49	14	55	394	51				
	50	10	51	7	46	-4	48	-3	55	17	50	1	67	12	51	0				
TCLI	19	49	42	53	28	58	36	55	1	46	37	63	13	54	39	65	42	64		
	64	15	64	11	61	3	64	9	48	2	64	1	62	8	62	-3	64	0		
WBAI	177	41	398	46	242	51	147	50	5	38	333	53	15	57	339	52	40	64	399	57
	54	13	57	11	57	6	53	3	73	35	56	3	66	9	57	5	71	7	57	0

24-HOUR MEAN FORECAST ERROR (NM)																				
	JTWC		**CONW**		**AVNI**		**EGRI**		**ECMI**		**GFNI**		**JGSI**		**NGPI**		**TCLI**		**WBAI**	
JTWC	184	74																		
	74	0																		
CONW	184	74	425	78																
	77	3	78	0																
AVNI	126	66	238	63	238	77														
	79	13	77	14	77	0														
EGRI	77	72	162	75	103	70	162	97												
	89	17	97	22	87	17	97	0												
ECMI	1	116	5	58	2	95	3	64	5	40										
	53	-63	40	-18	40	-55	28	-36	40	0										
GFNI	158	72	342	74	226	77	139	101	5	40	342	89								
	89	17	89	15	79	2	89	-12	98	58	89	0								
JGSI	5	95	14	101	6	70	13	131	0	0	11	126	14	111						
	110	15	111	10	85	15	105	-26	0	0	110	-16	111	0						
NGPI	166	70	353	72	237	77	143	94	5	40	321	85	13	108	353	85				
	87	17	85	13	75	-2	85	-9	85	45	83	-2	125	17	85	0				
TCLI	17	88	38	101	21	102	34	104	1	61	33	122	12	112	35	124	362	106		
	119	31	123	22	111	9	129	25	30	-31	122	0	133	21	120	-4	123	0		
WBAI	156	73	357	75	206	76	136	89	5	40	291	89	14	111	302	86	36	122	362	106
	104	31	106	31	105	29	97	8	159	119	106	17	128	17	107	21	153	31	106	0

36-HOUR MEAN FORECAST ERROR (NM)

	JTWC		CONW		AVNI		EGRI		ECMI		GFNI		JGSI		NGPI		TCLI		WBAI	
JTWC	156	107																		
	107	0																		
CONW	156	107	379	106																
	106	-1	106	0																
AVNI	105	92	207	86	207	100														
	101	9	100	14	100	0														
EGRI	67	111	147	106	94	97	147	142												
	137	26	142	36	121	24	142	0												
ECMI	0	0	4	68	2	78	2	92	4	48										
	0	0	48	-20	33	-45	28	-64	48	0										
GFNI	134	105	306	103	198	101	126	146	4	48	306	122								
	125	20	122	19	106	5	117	-29	83	35	122	0								
JGSI	4	150	11	162	3	93	10	212	0	0	9	200	11	198						
	193	43	198	36	190	97	193	-19	0	0	194	-6	198	0						
NGPI	140	102	313	98	206	101	128	132	4	48	287	117	10	195	313	120				
	118	16	120	22	103	2	113	-19	109	61	117	0	199	4	120	0				
TCLI	13	124	31	151	16	153	29	158	1	48	27	176	10	193	28	183	31	189		
	169	45	189	38	162	9	194	36	56	8	183	7	217	24	182	-1	189	0		
WBAI	131	105	317	101	178	96	124	131	4	48	259	121	11	198	267	121	29	189	322	153
	149	44	152	51	156	60	140	9	181	133	154	33	197	-1	157	36	233	44	153	0

48-HOUR MEAN FORECAST ERROR (NM)

	JTWC		CONW		AVNI		EGRI		ECMI		GFNI		JGSI		NGPI		TCLI		WBAI	
JTWC	130	147																		
	147	0																		
CONW	130	147	333	136																
	135	-12	136	0																
AVNI	84	123	168	111	168	117														
	113	-10	117	6	117	0														
EGRI	57	156	128	136	76	112	128	181												
	188	32	181	45	168	56	181	0												
ECMI	0	0	3	97	0	0	2	133	3	71										
	0	0	71	-26	0	0	49	-84	71	0										
GFNI	111	141	268	135	161	118	110	188	3	71	268	154								
	161	20	154	19	134	16	151	-37	94	23	154	0								
JGSI	2	214	9	226	2	89	7	264	0	0	8	266	9	280						
	281	67	280	54	281	192	284	20	0	0	274	8	280	0						
NGPI	115	140	267	131	167	117	110	176	3	71	248	152	8	274	267	154				
	151	11	154	23	126	9	143	-33	138	67	152	0	250	-24	154	0				
TCLI	9	181	25	204	8	128	24	210	0	0	21	238	8	287	21	239	25	289		
	266	85	289	85	238	110	286	76	0	0	281	43	330	43	281	42	289	0		
WBAI	110	148	281	130	144	110	109	173	3	71	230	156	9	280	228	155	24	287	286	206
	201	53	204	74	193	83	191	18	229	158	207	51	290	10	213	58	324	37	206	0

72-HOUR MEAN FORECAST ERROR (NM)

	JTWC		CONW		AVNI		EGRI		ECMI		GFNI		JGSI		NGPI		TCLI		WBAI	
JTWC	3	173																		
	173	0																		
CONW	3	173	253	194																
	167	-6	194	0																
AVNI	2	173	118	162	118	156														
	178	5	156	-6	156	0														
EGRI	2	177	89	194	52	160	89	282												
	202	25	282	88	273	113	282	0												
ECMI	0	0	2	167	0	0	1	182	2	118										
	0	0	118	-49	0	0	67	-115	118	0										
GFNI	2	177	196	191	110	154	76	289	2	118	196	218								
	309	132	218	27	195	41	224	-65	182	64	218	0								
JGSI	0	0	7	300	2	380	7	413	0	0	6	328	7	433						
	0	0	433	133	413	33	433	20	0	0	419	91	433	0						
NGPI	3	173	198	190	115	156	77	282	2	118	180	218	6	419	198	217				
	214	41	217	27	181	25	210	-72	252	134	217	-1	371	-48	217	0				
TCLI	1	179	12	280	4	354	11	324	0	0	10	258	5	454	10	368	12	397		
	300	121	397	117	349	-5	396	72	0	0	375	17	449	-5	375	7	397	0		
WBAI	3	173	216	194	98	153	76	272	2	118	167	225	7	433	223	12	397	222	222	309
	186	13	306	112	280	127	279	7	417	299	296	71	392	-41	314	91	530	133	309	0

96-HOUR MEAN FORECAST ERROR (NM)

	CONW		AVNI		EGRI		ECMI		GFNI		NGPI									
CONW	171	243																		
	243	0																		
AVNI	71	209	71	179																
	179	-30	179	0																
EGRI	59	255	31	183	60	381														
	385	130	405	222	381	0														
ECMI	2	191	0	0	1	209	2	82												
	82	-109	0	0	57	-152	82	0												
GFNI	139	241	69	180	50	396	2	82	139	284										
	284	43	279	99	283	-113	244	162	284	0										
NGPI	137	230	70	178	51	387	1	57	125	279	138	274								
	275	45	260	82	276	-111	136	79	278	-1	274	0								

120-HOUR MEAN FORECAST ERROR (NM)																				
	CONW		**AVNI**		**EGRI**		**GFNI**		**NGPI**											
CONW	116	284																		
	284	0																		
AVNI	49	244	49	199																
	199	-45	199	0																
EGRI	39	313	20	195	39	456														
	456	143	452	257	456	0														
GFNI	94	266	48	196	31	455	95	353												
	354	88	384	188	359	-96	353	0												
NGPI	89	248	48	196	30	443	84	348	90	332										
	331	83	358	162	357	-86	342	-6	332	0										

Table 5-6 Comparison of Selected techniques, Southern Hemisphere, 2007.

ERROR STATISTICS LEGEND		
	JTWC	
CONW	nr cases	avg error JTWC
	avg error CONW	Differential error