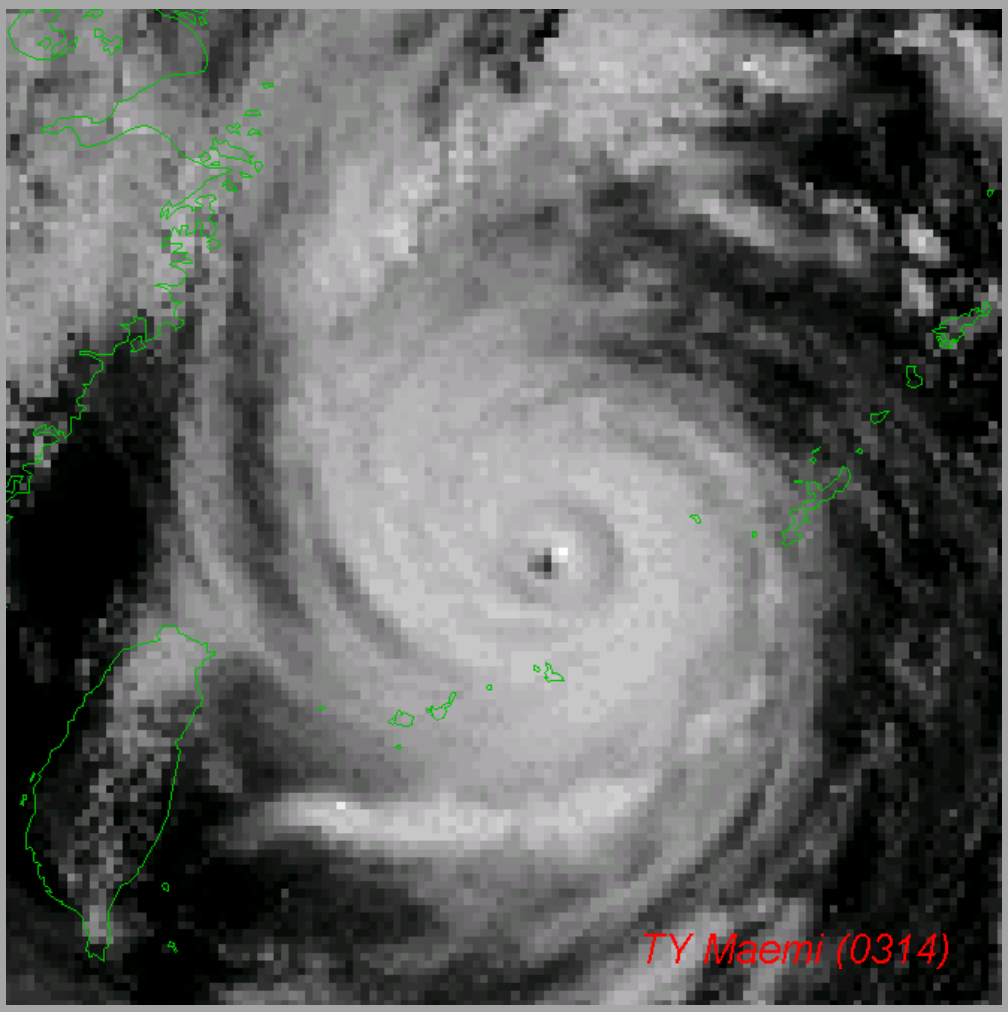
Annual Report on Activities of the RSMC Tokyo - Typhoon Center 2003



Japan Meteorological Agency

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Introduction

The RSMC Tokyo - Typhoon Center (hereinafter referred to as "the Center") is the Regional Specialized Meteorological Centre (RSMC) with activity specialization in analysis, tracking and forecasting of western North Pacific tropical cyclones within the framework of the World Weather Watch (WWW) Programme of the World Meteorological Organization (WMO). The Center was established at the Headquarters of the Japan Meteorological Agency (JMA) in July 1989, following the designation by the WMO Executive Council at its 40th session held in Geneva in June 1988.

The Center conducts the following operations on a routine basis:

(1) Preparation of information on the formation, movement and development of tropical cyclones and associated meteorological phenomena;
(2) Preparation of information on synoptic scale atmospheric situations that affect the behavior of tropical cyclones; and
(3) Dissemination of the above information to National Meteorological Centers (NMCs), in particular to the Members of the ESCAP/WMO Typhoon Committee, in appropriate formats for operational processing.

In addition to the routine services mentioned above, the Center distributes a series of reports entitled “Annual Report on Activities of the RSMC Tokyo - Typhoon Center” to serve as operational references for the NMCs concerned. This report aims at summarizing the activities of the Center and reviewing tropical cyclones of the year.

In this 2003 issue, the outline of routine operations at the Center and its operational products are presented in Chapter 1. Chapter 2 reports the major activities of the Center in 2003. Chapter 3 describes atmospheric and oceanic conditions in the tropics and gives the highlights of tropical cyclone (TC) activities in 2003. In Chapter 4, verification statistics of operational forecasts and predictions of the two numerical weather prediction (NWP) models of the Center are presented. The best track data for the TCs in 2003 are shown in table and chart forms in appendices. Six-hourly intensity estimations of TCs with tropical storm intensity or higher by the Center from satellite images (Dvorak CI-number) are newly added to them after TS Morakot (0309). All the texts, tables, charts and appendices are included in the CD-ROM attached to this report.

The CD-ROM contains 3-hourly cloud images of all the tropical cyclones in 2003 of TS intensity or higher in the area of responsibility of the Center, and software to view them. The software has various functions for analyzing satellite imagery such as animation of images, which facilitates efficient post-analysis of tropical cyclones and their environments. A setup program and a users' manual for the software are also included in the CD-ROM. Appendix 7 shows an outline of the CD-ROM and how to use the software.

Chapter 1

Operations at the RSMC Tokyo - Typhoon Center in 2003

The area of responsibility of the Center covers the western North Pacific and the South China Sea (0° - 60°N, 100°E - 180°) including the marginal seas and adjacent land areas (see Figure 1.1). The Center makes analyses and forecasts of tropical cyclones when they are in or expected to move into the area and provides the National Meteorological Services (NMSs) concerned with the RSMC products through the GTS, the AFTN and the JMA radio facsimile broadcast (JMH).

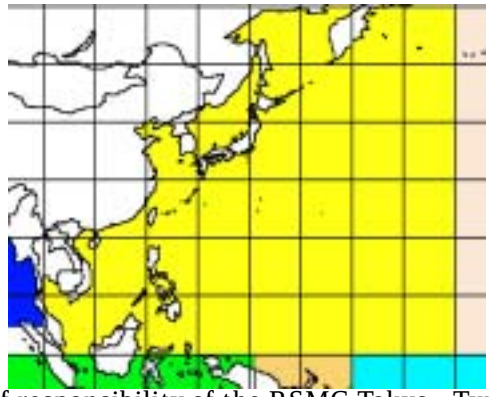


Figure 1.1 Area of responsibility of the RSMC Tokyo - Typhoon Center (yellow)

1.1 Analysis

Surface analyses are performed four times a day, at 00, 06, 12 and 18 UTC. The tropical cyclone analysis begins with the determination of the center position of a tropical cyclone. Cloud images from the Geostationary Meteorological Satellite (GMS)* are the principal source for the determination of the center position, especially of tropical cyclones migrating over the data-sparse ocean area. The direction and speed of the movement of a tropical cyclone are determined primarily from the six-hourly displacement vectors of the center position.

The central pressure of a tropical cyclone is determined mainly from the CI-number, which is derived from satellite imagery using Dvorak's method. The CI-number also gives the maximum sustained wind speed in the vicinity of the center. Radii of circles for the gale-force wind and the storm-force wind are determined from surface observations and low-level cloud motion winds (LCW) derived from cloud motion vectors of satellite images in the vicinity of the tropical cyclone and so on.

*GOES-9 is carrying out the back-up operation of GMS-5 from May 2003.

1.2 Forecast

Predictions of the two NWP models of JMA, Typhoon Model (TYM) and Global Spectral Model (GSM), are the primary bases for the forecast of tropical cyclone tracks. The

Persistence-Climatology method (PC method) that uses statistical techniques on the basis of linear extrapolation and climatological properties of tropical cyclone movements is also adopted for tropical cyclones particularly in lower latitudes. The central pressure and the maximum sustained wind speed are forecast based on the results of Dvorak's method, the PC method and NWP.

The range into which the center of a tropical cyclone is expected to move with 70% probability at each validation time is shown as the probability circle. The radius of the circle is statistically determined according to the speed of tropical cyclone movement.

1.3 Provision of RSMC Products

The Center prepares and disseminates the following RSMC bulletins and charts via the GTS, the AFTN or the JMH when:

- a tropical cyclone of tropical storm (TS) intensity or higher exists in the area of responsibility of the Center;
- a tropical cyclone is expected to reach TS intensity or higher in the area within 24 hours; or
- a tropical cyclone of TS intensity or higher is expected to move into the area within 24 hours.

The RSMC products are continually issued as long as the tropical cyclone keeps TS intensity or higher within the area of responsibility. Appendix 5 denotes the code forms of the bulletins transmitted through the GTS.

RSMC Tropical Cyclone Advisory (WTPQ20-25 RJTD: via GTS)

The RSMC Tropical Cyclone Advisory reports the following elements in the analysis, 24-hour, 48-hour and 72-hour forecasts of a tropical cyclone, respectively:

Analysis	Center position of a tropical cyclone Accuracy of determination of the center position Direction and speed of the movement Central pressure Maximum sustained wind speed (10-minute averaged) Radii of over 50- and 30-knot wind areas
24-, 48- and 72-hour forecasts	Center position and radius of the probability circle* Direction and speed of the movement Central pressure Maximum sustained wind speed (10-minute averaged)

* A circular range into which the tropical cyclone is expected to move with the probability of 70% at each validation time.

In June 2003, the forecast period of tropical cyclone intensity was extended from 48 hours to 72 hours based on the improvement of its numerical prediction models.

RSMC Guidance for Forecast (FXPQ20-25 RJTD: via GTS)

The RSMC Guidance for Forecast reports the results of predictions of GSM and TYM: GSM is run twice a day with initial analyses at 00 and 12 UTC and TYM four times a day with initial analyses at 00, 06, 12 and 18 UTC. The Guidance presents GSM's six-hourly predictions of a tropical cyclone up to 90 hours for 00 and 12 UTC and TYM's six-hourly predictions up to 84 hours for 00, 06, 12 and 18 UTC. It includes:

NWP prediction (T=06 to 84 or 90)
- Center position of a tropical cyclone
- Central pressure*
- Maximum sustained wind speed*

* Predictions of these parameters are given as deviations from those at the initial time.

SAREP (TCNA20/21 RJTD: via GTS)

The SAREP reports a tropical cyclone analysis using satellite imagery including intensity information (CI-number) based on Dvorak's method. It is issued a half to one hour after observations at 00, 03, 06, 09, 12, 15, 18 and 21 UTC and contains:

GMS imagery analysis
- Center position of a tropical cyclone
- Accuracy of determination of the center position
- Mean diameter of the cloud system
- CI-number**
- Apparent change in intensity in the last 24 hours**
- Direction and speed of the movement

** These parameters are reported at 00, 06, 12, 18 UTC while not at other times.

RSMC Prognostic Reasoning (WTPQ30-35 RJTD: via GTS)

The RSMC Prognostic Reasoning provides a brief reasoning for a tropical cyclone forecast. It is issued at 00 and 06 UTC following the issuance of the RSMC Tropical Cyclone Advisory. In the bulletin, general comments on the forecasting method, synoptic situation of the subtropical ridge, movement and intensity of the tropical cyclone, and some relevant remarks are given in plain language.

RSMC Tropical Cyclone Best Track (AXPQ20 RJTD: via GTS)

The RSMC Tropical Cyclone Best Track gives post-analyzed data of tropical cyclones. It contains the center position, central pressure and maximum sustained wind. The Best Track for a tropical cyclone is finalized usually one and a half months after the termination of issuance of the above RSMC bulletins for the tropical cyclone.

Tropical Cyclone Advisory for SIGMET (FKPQ30-35 RJTD: via AFTN)

The Center, as one of the Tropical Cyclone Advisory Centres under the framework of the International Civil Aviation Organization (ICAO), provides the Tropical Cyclone Advisory for SIGMET for Meteorological Watch Offices (MWOs) concerned to support the preparation of SIGMET information on a tropical cyclone. It includes the following elements in the analysis, 12-hour, 24-hour forecasts of a tropical cyclone:

Analysis	Center position of a tropical cyclone Direction and speed of the movement Central pressure Maximum sustained wind speed (ten-minute averaged)
12- and 24-hour forecasts	Center position of the tropical cyclone (forecast) Maximum sustained wind speed (ten-minute averaged)

Prognostic Charts of 850-hPa and 200-hPa Streamline
(FUXT852/202, FUXT854/204: via JMH)

Analysis and 24- and 48-hour prognostic charts of 850-hPa and 200-hPa streamlines are broadcast via the JMA's HF radio facsimile (JMH). These prognoses are produced with GSM at 00 and 12 UTC over the area spanning from 20°S to 60°N in latitude and from 80°E to 160°W in longitude.

1.4 RSMC Data Serving System

JMA has been operating the RSMC Data Serving System that allows NMCs concerned to retrieve NWP products such as predicted fields in grid-point-value (GPV) form and observational data through the Internet or the Integrated Service Digital Network (ISDN) since 1995. JMA enhanced the service by adding high-density wave model products and by increasing GSM products for Asia region in July 2003. The products and data provided through the system are listed in Appendix 6.

Tropical Cyclone Web Site:

Tropical cyclone advisories are available on a real time basis through the Internet at:
http://www.jma.go.jp/JMA_HP/en/typh/typh.all.html

Chapter 2

Major Activities of the RSMC Tokyo - Typhoon Center in 2003

2.1 Dissemination of RSMC Products

In 2003, the Center provided operational products for tropical cyclone forecasting to NMCs via the GTS, the AFTN and the JMA radio facsimile broadcast (JMH). Monthly and

annual total numbers of issuance of the products are listed in Table 2.1.

2.2 Publication

The Center published:

1) "Technical Review (No.6)" that contains a paper entitled "The Development of Guidance for Forecast of Maximum Precipitation Amount" in March 2003; and
2) "Annual Report on Activities of the RSMC Tokyo-Typhoon Center in 2003" in November 2003.

2.3 Monitoring of Observational Data Availability

The Center carried out regular monitoring of the information exchange for enhanced observations of tropical cyclones in accordance with the standard procedures stipulated in Section 6.2, Chapter 6 of "The Typhoon Committee Operational Manual (TOM) - Meteorological Component." The monitoring for this season was conducted for the following two periods:

1. from 00UTC 8 September to 18UTC 12 September (for TY Maemi (0314))
2. from 00UTC 13 November to 18UTC 17 November (for TY Nepartak (0320))

The results were distributed to all the Typhoon Committee Members in March 2004, and are available on the Distributed Database of JMA at:

ftp://ddb.kishou.go.jp/pub/monitoring/

Table 2.1 Monthly and annual total number of products issued by the RSMC Tokyo – Typhoon Center in 2003

TCNA20	9	0	0	57	48	37	49	73	73	77	75	6	504
TCNA21	16	0	0	60	46	40	60	84	98	81	93	15	593
WTPQ20-25	33	0	0	126	105	81	119	170	195	166	186	29	1210
WTPQ30-35	9	0	0	31	24	21	30	43	46	43	49	8	304
FXPQ20-25	23	0	0	92	77	61	89	124	143	122	137	21	889
FKPQ30-35	16	0	0	65	53	41	61	84	96	82	95	15	608
AXPQ20	3	1	0	0	1	1	3	3	3	2	4	2	23
AUXT85/20	62	56	62	60	62	60	62	62	60	62	60	62	730
FUXT852/854	62	56	62	60	62	60	62	62	60	62	60	62	730
FUXT202/204	62	56	62	60	62	60	62	62	60	62	60	62	730

Notes: - via the GTS or the AFTN -

SAREP	TCNA20/21 RJTD
RSMC Tropical Cyclone Advisory	WTPQ20-25 RJTD
RSMC Prognostic Reasoning	WTPQ30-35 RJTD
RSMC Guidance for Forecast	FXPQ20-25 RJTD
Tropical Cyclone Advisory for SIGMET	FKPQ30-35 RJTD
RSMC Tropical Cyclone Best Track	AXPQ20 RJTD

- via the JMH Meteorological Radio Facsimile -

Analysis of 850 and 200 hPa Streamline	AUXT85/AUXT20
Prognosis of 850 hPa Streamline	FUXT852/FUXT854
Prognosis of 200 hPa Streamline	FUXT202/FUXT204

Chapter 3

Atmospheric and Oceanographic Conditions in the Tropics and Tropical Cyclones in 2003

3.1 Summary of Atmospheric and Oceanographic Conditions in the Tropics

Sea surface temperatures (SSTs) were above normal in the western equatorial Pacific almost throughout the year 2003. In the South China Sea, positive SST anomalies were also widely observed throughout the year. The SST anomalies for a monitoring region (NINO.WEST: 0°-14°N, 130°E-150°E) were above normal all the year round.

Areas of active convention areas in the low latitudes, appeared around the Philippines from May to October, and over the waters east of the Philippines in every month of the year. At 850 hPa, there was large-scale convergence over the northern South China Sea in May, and east of the Philippines from May to November.

In May, anticyclonic circulation at 200hPa over the Indochina Peninsula was more apparent than normal. There was also large-scale divergence over east of the Philippines or south of Japan from April to December.

Consequently, most of the tropical cyclones were generated around and over the sea east of the Philippines.

Monthly mean streamlines at 850hPa and tropical cyclone tracks in August are presented in Figure 3.1 and Appendix 3, respectively.

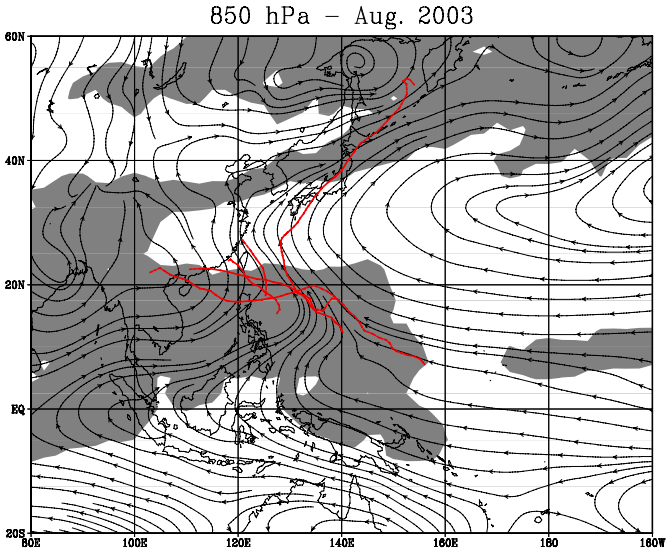


Figure 3.1 Monthly mean streamline at 850 hPa (lines with arrows) and area of less than 230 w/m^2 of OLR (shaded) in August 2003. Tracks of the tropical cyclones formed in August are superimposed (red lines).

Charts of monthly mean SST anomalies for the western North Pacific, monthly mean streamlines at 850 hPa and 200 hPa, and outgoing longwave radiation (OLR), which indicates active convection in the low latitudes, for the months from January to December are included in the attached files (Streamline_2003 and SST Anomaly_2003).

3.2 Tropical Cyclones in 2003

In 2003, 21 tropical cyclones of tropical storm (TS) intensity or higher were tracked in the western North Pacific and the South China Sea. The total number is below normal compared to the thirty-year average of 26.7 for 1971-2000. Fourteen cyclones out of them (66% of the total) reached typhoon (TY) intensity. The percentage of 66% is larger than normal (54%; 24-year average for 1977-2000). Four out of the remainder attained severe tropical storm (STS) intensity and the others TS intensity (see Table 3.1).

The tropical cyclone season of this year began in the middle of January with the development of TS Yanyan (0301). Tropical cyclone formation was not active in the first quarter of the year. No tropical cyclone of TS intensity or higher formed for about three months until the generation of TY Kujira (0302) in middle April.

From May to June, tropical cyclone formation became active and four tropical cyclones of TS intensity or higher formed in total. Three out of the four tropical cyclones hit or approached Japan. Tropical cyclone formation was inactive in July, and its number of two was below normal compared with the thirty-year average of 4.1 for 1971-2000.

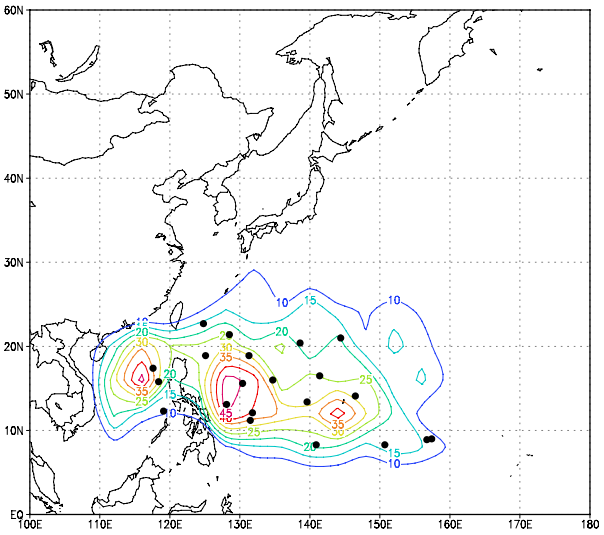


Figure 3.2 Genesis points of 21 TCs in 2003 (dots) and number of accumulated TC geneses per 4°x4° grid box for 1951-2001 (contours).

In August, tropical cyclone formation became active again and the monthly formation was normal in August. TY Etau (0310) hit Japan and brought heavy damage from floods and landslides.

Tropical cyclone formation was slightly below normal after September. Among them TY Maemi (0314), which is one of the most intense typhoons in the year 2003, made a landfall on the southern coast of the Korean Peninsula.

The other feature of this tropical cyclone season was that mean formation latitude* and longitude* of 15.0°N, 135.1°E was southwestern compared with the 30-year (1971-2000) average of 16.2°N, 136.9°E. (see the distribution of their formation points in Figure 3.2.)

*Mean formation latitude (longitude) here is defined as arithmetic average of latitudes (longitudes) of formation points of all the tropical cyclones of TS intensity or higher in the year.

RSMC best track data for the tropical cyclones in 2003 and maps of their tracks are shown in Appendix 1 and Appendix 3, respectively. Appendix 4 indicates the monthly and annual frequency of tropical cyclones that attained TS intensity or higher in the western North Pacific and the South China Sea for 1951- 2003.

Table 3.1 List of the tropical cyclones which attained TS intensity or higher in 2003

Tropical Cyclone			Duration (UTC)					Minimum Pressure & Max. Wind (UTC)	(N)	(E)	(hPa)	(kt)
TS	YANYAN	(0301)	180600	Jan	-	201200	Jan	180600	14.1	146.5	1000	35
TY	KUJIRA	(0302)	110000	Apr	-	250300	Apr	151800	12.7	138.3	930	90
TY	CHAN-HOM	(0303)	201200	May	-	270600	May	231800	17.4	151.5	940	85
STS	LINFA	(0304)	260000	May	-	310000	May	291800	24.3	129.1	980	55
STS	NANGKA	(0305)	010000	Jun	-	031200	Jun	011800	19.5	118.7	985	50
TY	SOUDELOR	(0306)	130600	Jun	-	191500	Jun	180600	26.4	124.5	955	80
TY	IMBUDO	(0307)	170600	Jul	-	250000	Jul	201200	12.5	130.7	935	90
STS	KONI	(0308)	180600	Jul	-	221800	Jul	201800	18.1	112.1	975	60
TS	MORAKOT	(0309)	020600	Aug	-	041200	Aug	021800	20.1	122.9	992	45
TY	ETAU	(0310)	030600	Aug	-	091800	Aug	070600	27.5	128.5	945	85
TS	VAMCO	(0311)	190600	Aug	-	200000	Aug	190600	22.7	124.8	996	35
TY	KROVANH	(0312)	201200	Aug	-	260600	Aug	220000	17.6	124.6	970	65
TY	DUJUAN	(0313)	291800	Aug	-	030000	Sep	010000	20.8	125.3	950	80
TY	MAEMI	(0314)	060600	Sep	-	132100	Sep	100600	24.0	126.6	910	105
TY	CHOI-WAN	(0315)	180000	Sep	-	230000	Sep	210600	31.0	137.0	955	70
TY	KOPPU	(0316)	261800	Sep	-	300600	Sep	290600	28.3	141.9	960	70
TY	KETSANA	(0317)	190000	Oct	-	260600	Oct	211200	17.0	131.2	940	90
TY	PARMA	(0318)	210000	Oct	-	311200	Oct	240000	29.2	154.1	930	95
STS	MELOR	(0319)	301200	Oct	-	031800	Nov	311800	16.3	122.9	980	50
TY	NEPARTAK	(0320)	121800	Nov	-	190600	Nov	161800	15.5	111.3	970	65
TY	LUPIT	(0321)	211200	Nov	-	021200	Dec	261800	13.9	135.4	915	100

Chapter 4

Verification of Forecasts in 2003

4.1 Operational Forecast

Operational forecasts of the tropical cyclones of TS intensity or higher in 2003 were verified with best track data. Verified elements are 24-, 48- and 72-hour forecasts of the center position, central pressure and maximum sustained wind. Position and intensity errors of operational forecasts for each tropical cyclone in 2003 are indicated in Appendix 2.

4.1.1 Center Position

Figure 4.1 shows annual mean errors of 24-hour (1982 - 2003), 48-hour (1988 - 2003) and 72-hour (1997 - 2003) forecasts of the center position. Annual mean position errors in 2003 were 120km for 24-hour forecast, 222km for 48-hour forecast and 349km for 72-hour forecast. Annual mean position errors for operational 24-, 48- and 72-hour track forecasts for 2003 were all the smallest after each forecast started operationally.

Position errors of 24-, 48- and 72-hour track forecasts for each tropical cyclone in this season are summarized in Table 4.1. The forecast scores of TY Maemi, which moved northward over the East China Sea and made a landfall on the Korean Peninsula, and TY Kujira, which moved northward the East China Sea, contributed to the scores to no small extent. On the other hand, the forecasts of TY Chan-hom and TY Parma, which moved northeastward far east of Japan, had rather large distance errors.

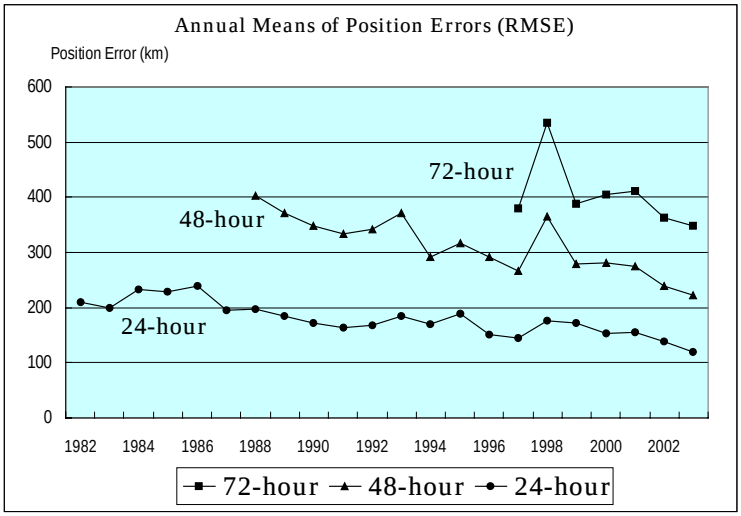


Figure 4.1 Annual means of position errors of 24-, 48- and 72-hour operational track forecasts.

Position errors were also compared with those by the persistency (PER) method. The ratios of EO (position errors of operational forecasts) to EP (position errors of PER-method forecasts) in percentage are described in Table 4.1. EO/EP smaller (greater) than 100% means that operational forecasts are better (worse) than PER-method forecasts. Annual mean EO/EPs for the 24-, 48- and 72-hour forecasts in 2003 were 49% (56% in 2002), 37% (43%) and 34% (42%), respectively. Operational 24-, 48- and 72-hour forecasts were all better than PER-method forecasts in 2003.

Table 4.1 Mean position errors of 24-, 48- and 72-hour operational forecasts for each tropical cyclone in 2003

Tropical Cyclone		24-hour Forecast				48-hour Forecast				72-hour Forecast			
		Position Error & Number of Forecast				Position Error & Number of Forecast				Position Error & Number of Forecast			
		Mean (km)	S.D. (km)	Num.	EO/EP (%)	Mean (km)	S.D. (km)	Num.	EO/EP (%)	Mean (km)	S.D. (km)	Num	EO/EP (%)
TS YANYAN	(0301)	309	88	5	125	349	-	1	-	-	-	0	-
TY KUJIRA	(0302)	97	51	53	62	142	54	46	48	215	88	45	47
TY CHAN-HOM	(0303)	152	52	23	77	299	80	19	63	471	148	15	59
STS LINFA	(0304)	192	122	16	55	350	163	12	56	656	175	8	49
STS NANGKA	(0305)	112	82	6	22	347	243	2	-	-	-	0	-
TY SOUDELOR	(0306)	122	78	22	42	232	131	17	38	362	223	13	38
TY IMBUDO	(0307)	127	66	27	83	265	117	23	86	431	126	19	79
STS KONI	(0308)	126	74	14	67	230	80	10	65	204	111	6	41
TS MORAKOT	(0309)	166	22	5	115	310	-	1	-	-	-	0	-
TY ETAU	(0310)	104	65	22	39	208	83	18	28	292	133	14	22
TS VAMCO	(0311)	-	-	0	-	-	-	0	-	-	-	0	-
TY KROVANH	(0312)	128	43	19	118	221	67	15	65	229	118	11	32
TY DUJUAN	(0313)	109	82	13	44	306	179	9	40	665	288	5	35
TY MAEMI	(0314)	73	37	27	26	161	84	23	22	288	177	19	26
TY CHOI-WAN	(0315)	115	81	16	33	327	168	12	33	781	311	8	43
TY KOPPU	(0316)	117	46	10	59	128	147	6	79	308	114	2	-
TY KETSANA	(0317)	93	46	25	44	188	70	21	51	427	204	16	69
TY PARMA	(0318)	126	69	38	27	260	149	34	20	463	314	30	22
STS MELOR	(0319)	157	103	13	85	401	212	9	81	628	251	5	67
TY NEPARTAK	(0320)	104	50	22	56	155	81	18	32	195	66	14	22
TY LUPIT	(0321)	119	58	40	52	169	87	36	30	200	99	32	21
Annual Mean (Total)		120	73	416	49	222	131	332	37	349	237	262	34

Figure 4.2 presents the histograms of 24-, 48- and 72-hour forecast position errors. The ratio of 24-hour forecast errors smaller than 150 km was 71% (62% in 2002), the ratio of 48-hour forecast errors smaller than 300 km was 79% (74%) and the ratio of 72-hour forecast errors smaller than 450 km was 75% (74%).

Figure 4.2 Histogram of 24-hour forecast position errors in 2003 (those for 48- and 72 hour forecasts are shown in the attached file).

Table 4.2 presents mean hitting ratios and radii of 70% probability circles of operational forecasts for each tropical cyclone in 2003. The annual mean radius of 70% probability circles issued with 24-hour position forecasts was 189km, and their hitting ratio was 85% (in 355 out of 416 cases, a tropical cyclone actually located within the issued probability circle). As for 48-hour forecasts, those are 342km and 83% (in 275 out of 332 cases), and for 72-hour forecasts, 502km and 79% (in 206 out of 262 cases), respectively. These hitting ratios for 2003 were all better than those for 2002.

Table 4.2 Mean hitting ratios (%) and radii (km) of 70% probability circles issued for 24-, 48- and 72-hour operational forecasts for each tropical cyclone in 2003

Tropical Cyclone			24-hour Forecast			48-hour Forecast			72-hour Forecast		
			Ratio (%)	Num.	Radius (km)	Ratio (%)	Num.	Radius (km)	Ratio (%)	Num.	Radius (km)
TS	YANYAN	(0301)	0	5	170	100	1	371	-	0	-
TY	KUJIRA	(0302)	96	53	186	100	46	325	98	45	481
TY	CHAN-HOM	(0303)	87	23	191	74	19	356	60	15	540
STS	LINFA	(0304)	50	16	182	42	12	341	0	8	473
STS	NANGKA	(0305)	83	6	195	50	2	361	-	0	-
TY	SOUDELOR	(0306)	82	22	192	76	17	329	69	13	510
TY	IMBUDO	(0307)	85	27	195	70	23	333	74	19	480
STS	KONI	(0308)	71	14	187	90	10	317	100	6	463
TS	MORAKOT	(0309)	100	5	185	100	1	315	-	0	-
TY	ETAU	(0310)	86	22	196	83	18	354	93	14	543
TS	VAMCO	(0311)	-	0	-	-	0	-	-	0	-
TY	KROVANH	(0312)	95	19	198	93	15	327	100	11	463
TY	DUJUAN	(0313)	77	13	191	56	9	327	20	5	463
TY	MAEMI	(0314)	100	27	192	96	23	360	84	19	520
TY	CHOI-WAN	(0315)	81	16	188	58	12	380	38	8	586
TY	KOPPU	(0316)	100	10	193	83	6	346	100	2	463
TY	KETSANA	(0317)	92	25	175	90	21	335	75	16	469
TY	PARMA	(0318)	87	38	192	76	34	365	63	30	538
STS	MELOR	(0319)	46	13	180	44	9	329	20	5	508
TY	NEPARTAK	(0320)	95	22	187	100	18	321	100	14	463
TY	LUPIT	(0321)	88	40	192	94	36	353	100	32	513
Annual Mean (Total)			85	416	189	83	332	342	79	262	502

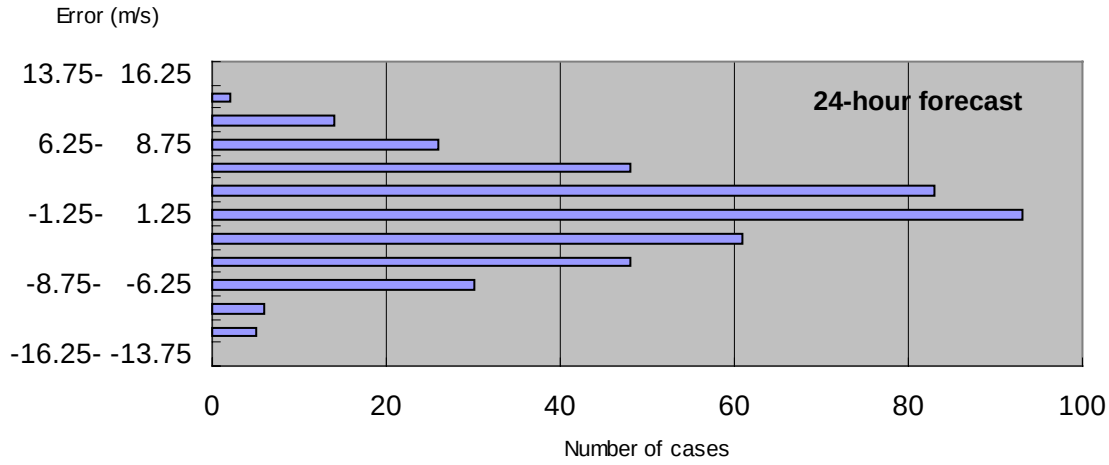
4.1.2 Central Pressure and Maximum Wind Speed

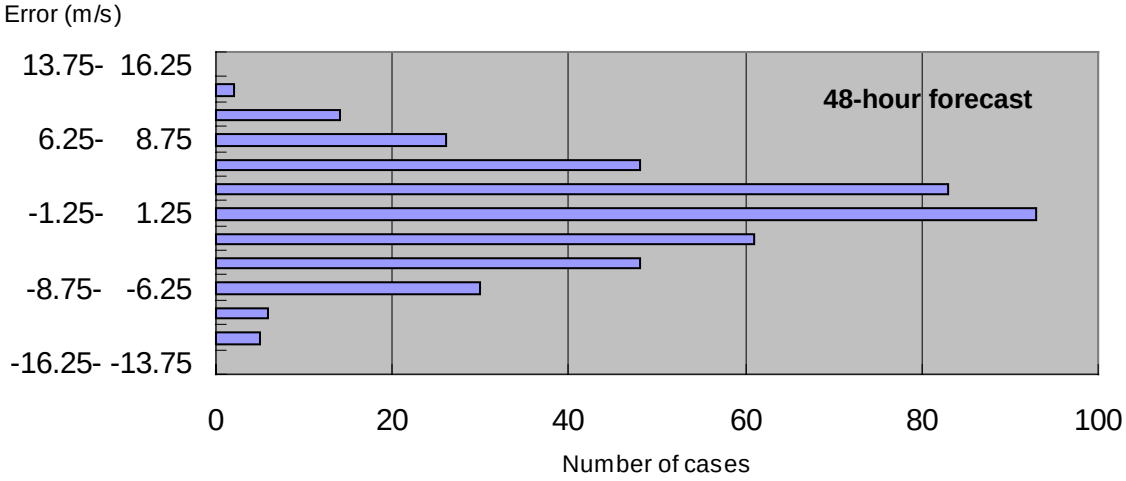
Table 4.3 gives root mean square errors (RMSEs) of 24-, 48- and 72-hour operational central pressure forecasts for each tropical cyclone in 2003. The RMSEs for maximum wind speed forecasts are included in the attached file. Annual mean RMSEs of the central pressure and the maximum wind speed for 24-hour forecasts were 11.0hPa (10.8hPa in 2002) and 4.9m/s (5.0 m/s in 2002), for 48-hour forecasts 15.3hPa (15.3hPa in 2002) and 6.5m/s (7.0m/s in 2002), and for 72-hour forecasts 18.5hPa and 7.6m/s.

Figure 4.3 presents the histogram of maximum wind speed errors for 24-, 48- and 72-hour forecasts. The ratio of absolute errors smaller than 3.75 m/s for 24-hour forecasts was 57% (59% in 2002), and 69% (69%) of total 48-hour forecasts had errors smaller than 6.25 m/s. The overall performance of intensity forecasts in 2003 was almost same as that in 2002. However, relatively large errors were seen in a few cases including TY Maemi and TY Parma, which made rapid development. (see Appendix 2 for individual cases).

Table 4.3 Mean intensity errors of 24-, 48- and 72-hour operational central pressure forecasts for each tropical cyclone in 2003.

Tropical Cyclone			24-hour Forecast			48-hour Forecast			72-hour Forecast		
			Error (hPa)	RMSE (hPa)	Num.	Error (hPa)	RMSE (hPa)	Num.	Error (hPa)	RMSE (hPa)	Num.
TS	YANYAN	(0301)	-4.0	4.0	5	-8.0	8.0	1	-	-	-
TY	KUJIRA	(0302)	0.6	10.2	53	0.4	15.4	46	-	-	-
TY	CHAN-HOM	(0303)	0.2	11.6	23	0.5	14.3	19	-	-	-
STS	LINFA	(0304)	-2.6	5.2	16	-3.8	5.2	12	-	-	-
STS	NANGKA	(0305)	-4.8	10.9	6	-5.5	6.5	2	-	-	-
TY	SOUDELOR	(0306)	-0.3	8.5	22	0.6	10.8	17	3.5	16.0	13
TY	IMBUDO	(0307)	2.6	11.5	27	3.1	14.1	23	6.5	15.5	19
STS	KONI	(0308)	1.9	6.4	14	4.0	10.5	10	6.2	9.0	6
TS	MORAKOT	(0309)	-4.6	5.6	5	-6.0	6.0	1	-	-	0
TY	ETAU	(0310)	-4.3	9.9	22	-3.9	10.4	18	-0.7	7.8	14
TS	VAMCO	(0311)	-	-	0	-	-	0	-	-	0
TY	KROVANH	(0312)	-3.2	10.2	19	-4.6	11.6	15	3.6	5.2	11
TY	DUJUAN	(0313)	1.5	9.2	13	3.3	18.0	9	-1.0	17.7	5
TY	MAEMI	(0314)	4.9	15.4	27	11.5	24.6	23	17.6	30.1	19
TY	CHOI-WAN	(0315)	4.4	10.9	16	7.1	8.8	12	10.6	12.6	8
TY	KOPPU	(0316)	0.5	7.2	10	4.2	7.9	6	10.0	11.2	2
TY	KETSANA	(0317)	4.0	9.9	25	6.8	14.1	21	1.2	11.5	16
TY	PARMA	(0318)	5.3	18.4	38	13.5	23.8	34	19.8	28.4	30
STS	MELOR	(0319)	-5.4	9.2	13	-14.1	15.1	9	-20.8	21.4	5
TY	NEPARTAK	(0320)	-4.3	6.4	22	-3.4	7.1	18	-0.6	6.4	14
TY	LUPIT	(0321)	2.4	9.4	40	6.0	12.9	36	9.5	15.0	32
Annual Mean (Total)			0.8	11.0	416	2.9	15.3	332	7.6	18.5	194





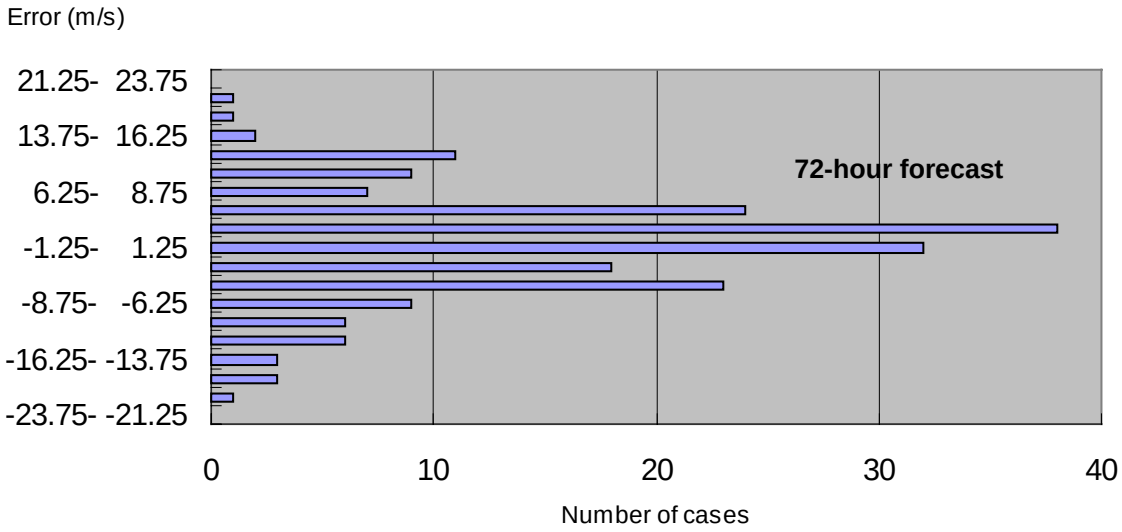


Figure 4.3 Histograms of maximum wind speed errors for 24-, 48- and 72- hour forecasts in 2003 (those of central pressure errors for 24-, 48- and 72-hour forecasts are included in the attached file)

4.2 TYM and GSM Predictions

JMA implemented the following changes to the JMA Global Spectral Model (GSM) and Typhoon Model (TYM) in 2003:

- Assimilation of QuickSCAT winds, direct assimilation of ATOVS radiance data, and revision of cumulus parameterization scheme were implemented in GSM in May 2003, and
- A new physical process package such as a prognostic cloud water scheme, a modified cumulus parameterization and a new radiation process was introduced into TYM in July 2003.

TYM and GSM provide primary information for forecasters for the RSMC Tokyo - Typhoon Center to make operational track and intensity forecasts. Track predictions by TYM and GSM up to 84 and 90 hours, respectively, were verified with the best track data and predictions by the persistency (PER) method*. 30-hour, 54-hour and 78-hour intensity predictions by TYM and GSM were also verified with these data.

Note: The PER-method assumes that a tropical cyclone holds the same movement throughout the forecast period and forecasts are based upon the linear extrapolation of the latest 6-hour track of a tropical cyclone. Prediction errors by the PER-method are used to evaluate the relative performance of model predictions.

4.2.1 TYM Prediction

1) Center Position

Annual mean position errors of TYM predictions from 1996 are indicated in Figure 4.4. Annual mean position errors for 30-hour*, 54-hour* and 78-hour* predictions in 2003 were 175km (166km in 2002), 287km (286km) and 415km (424km), respectively. The overall performance of the TYM track prediction in 2003 was almost same as the previous year. Mean position errors of 18-, 30-, 42-, 54-, 66- and 78-hour predictions for each tropical cyclone are also shown in Table 4.4.

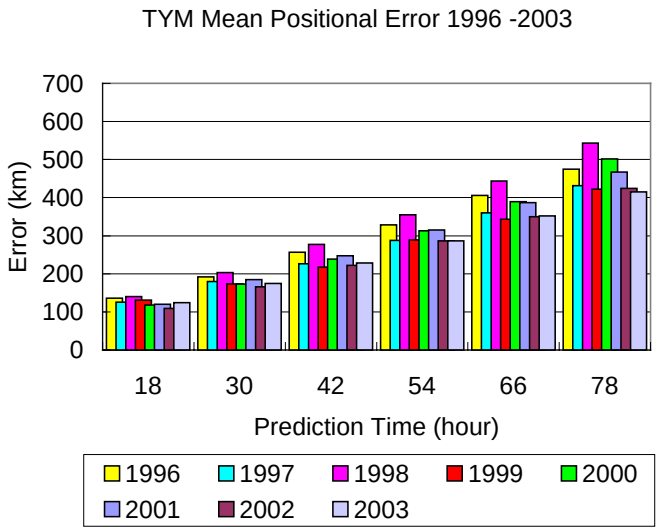


Figure 4.4 TYM annual mean position errors from 1996

Note: 30-, 54- and 78-hour predictions by TYM and GSM are the primary information for forecasters in preparing 24-, 48- and 72-hour operational forecasts, respectively.

Table 4.4 Mean position errors (km) of TYM for each tropical cyclone in 2003. Number of samples is given in parentheses.

Tropical Cyclone			T=18		T=30		T=42		T=54		T=66		T=78	
TS	0301	YANYAN	256.1	(14)	326.8	(12)	365.2	(10)	399.9	(8)	470.4	(6)	621.1	(4)
TY	0302	KUJIRA	90.2	(58)	119.5	(56)	148.3	(54)	168.0	(52)	209.0	(50)	259.7	(48)
TY	0303	CHAN-HOM	95.1	(26)	176.5	(24)	296.3	(22)	378.5	(20)	441.3	(18)	495.9	(16)
STS	0304	LINFA	135.0	(18)	202.4	(16)	274.3	(14)	343.7	(12)	419.2	(10)	504.9	(8)
STS	0305	NANGKA	103.2	(12)	117.6	(10)	142.7	(8)	184.4	(6)	302.5	(4)	364.3	(2)
TY	0306	SOUDELOR	153.4	(24)	188.4	(22)	244.0	(20)	334.9	(18)	409.6	(16)	554.5	(14)
TY	0307	IMBUDO	105.6	(30)	173.1	(28)	252.3	(26)	338.9	(24)	438.1	(22)	545.6	(20)
STS	0308	KONI	236.1	(24)	282.1	(21)	324.2	(18)	376.4	(16)	427.9	(14)	472.1	(12)
TS	0309	MORAKOT	107.7	(7)	212.3	(5)	356.4	(3)	-	(-)	-	(-)	-	(-)
TY	0310	ETAU	104.4	(24)	140.3	(22)	210.8	(20)	272.3	(18)	311.4	(16)	345.6	(14)
TS	0311	VAMCO	22.7	(1)	-	(-)	-	(-)	-	(-)	-	(-)	-	(-)
TY	0312	KROVANH	118.7	(21)	161.7	(19)	189.9	(18)	230.1	(16)	264.6	(14)	278.3	(12)
TY	0313	DUJUAN	89.6	(18)	121.9	(16)	192.9	(14)	308.5	(12)	458.6	(10)	579.7	(8)
TY	0314	MAEMI	165.1	(34)	244.4	(32)	307.7	(30)	381.1	(28)	461.6	(26)	515.0	(24)
TY	0315	CHOI-WAN	153.7	(25)	264.1	(23)	370.7	(20)	559.3	(18)	792.0	(16)	1008.7	(14)
TY	0316	KOPPU	96.5	(19)	171.9	(17)	242.3	(15)	212.8	(13)	228.1	(11)	149.2	(9)
TY	0317	KETSANA	88.4	(27)	112.5	(25)	148.8	(23)	206.5	(21)	311.0	(19)	431.1	(17)
TY	0318	PARMA	98.3	(42)	129.5	(40)	170.7	(38)	224.5	(36)	309.8	(34)	385.4	(32)
STS	0319	MELOR	106.5	(17)	183.6	(15)	275.7	(13)	444.6	(11)	556.9	(9)	674.1	(7)
TY	0320	NEPARTAK	104.6	(26)	146.0	(24)	169.9	(22)	199.4	(20)	204.9	(18)	223.8	(16)
TY	0321	LUPIT	142.8	(52)	178.4	(50)	212.2	(48)	244.3	(46)	254.4	(44)	282.1	(42)
Annual Mean			124.5	(519)	174.7	(477)	228.3	(436)	286.7	(395)	351.8	(357)	415.2	(319)

Table 4.5 gives TYM's relative performance compared to the PER-method. In this comparison, life stages of tropical cyclones were classified into three categories, "Before", "During" and "After" recurvature. Each stage is defined with the direction of movement of each tropical cyclone at each prediction time concerned. This table indicates that TYM outperformed the PER-method throughout the whole forecast period beyond 18 hours from the initial time, and improvement rates were roughly 30% for 18-hour, 45% for 30-hour, 50% for 42-hour, 55% for 54-hour, and 60% for 66- and 78-hour predictions. While the rates for 18-hour to 42-hour prediction in 2003 were lower than those in 2002, the rates for 54-hour to 78-hour prediction were higher. Looking at the results of respective stages, improvement rates were relatively higher in "After" stage in which position errors of PER-methods were larger compared with other two stages.

Figure 4.5 (in the attached file) presents histograms of position errors of 30-, 54- and 78-hour predictions of TYM. The ratio of 30-hour prediction errors smaller than 150km was 56% (55% in 2002), the ratio of 54-hour prediction errors smaller than 300km was 66% (60%) and the ratio of 78-hour prediction errors smaller than 450km was 66% (61%).

Table 4.5 Mean position errors (km) of TYM and PER predictions for the tropical cyclones in 2003 in each stage of motion. Number of samples is given in parentheses.

TIME	MODEL	Before (180 - 320)	During (320 - 10)	After (10 - 180)	All (0 - 360)
(moving direction)					
T=18	TYM	139.2 (235)	118.0 (95)	109.6 (189)	124.5 (519)
	PER	155.8 (235)	150.5 (95)	214.8 (189)	176.3 (519)
	IMPROV	10.7 %	21.6 %	49.0 %	29.4 %
T=30	TYM	185.7 (211)	175.5 (85)	161.5 (181)	174.7 (477)
	PER	259.0 (211)	265.6 (85)	407.1 (181)	316.4 (477)
	IMPROV	28.3 %	33.9 %	60.3 %	44.8 %
T=42	TYM	231.8 (195)	227.5 (74)	224.5 (167)	228.3 (436)
	PER	402.7 (195)	348.9 (74)	622.7 (167)	477.8 (436)
	IMPROV	42.4 %	34.8 %	63.9 %	52.2 %
T=54	TYM	276.5 (169)	290.8 (71)	295.9 (155)	286.7 (395)
	PER	556.2 (169)	494.4 (71)	847.9 (155)	659.6 (395)
	IMPROV	50.3 %	41.2 %	65.1 %	56.5 %
T=66	TYM	338.5 (153)	347.0 (59)	367.8 (145)	351.8 (357)
	PER	747.8 (153)	580.9 (59)	1060.2 (145)	847.1 (357)
	IMPROV	54.7 %	40.3 %	65.3 %	58.5 %
T=78	TYM	385.6 (137)	415.6 (47)	445.1 (135)	415.2 (319)
	PER	927.7 (137)	775.8 (47)	1222.1 (135)	1029.9 (319)
	IMPROV	58.4 %	46.4 %	63.6 %	59.7 %

2) Central Pressure and Maximum Wind Speed

Mean errors of 30-, 54- and 78-hour central pressure predictions by TYM were +3.1hPa (+3.9hPa in 2002), +3.8hPa (+2.1hPa) and +6.8hPa (+0.3hPa), respectively in 2003. Their root mean square errors (RMSEs) were 13.2hPa (15.6hPa in 2002) for 30-hour predictions, 15.8hPa (17.0hPa) for 54-hour predictions, 18.4hPa (17.6hPa) for 78-hour Prediction. The bias for 30-, 54-, and 78-hour maximum wind speed predictions was –1.6m/s (–2.4m/s in 2002) with a RMSE of 6.3m/s (7.2m/s), –2.1m/s (–2.2m/s) with a RMSE of 7.3m/s (7.5m/s), and –3.6m/s (–2.5m/s) with a RSME of 8.3m/s (7.7m/s), respectively.

Figure 4.6 shows histograms of the errors of 30-hour central pressure and maximum wind speed predictions. About 53% (43% in 2002) of the central pressure predictions had errors with absolute values less than 7.5hPa, while 43% (37%) of the maximum wind speed predictions with absolute values less than 3.75m/s. As for 54-hour ones, these ratios were 59% (57%) with absolute values less than 12.5hPa and 61% (62%) with absolute values less than 6.25m/s, respectively. These ratios for 78-hour ones were 69% (71%) with absolute values less than 17.5hPa and 72% (78%) with absolute values less than 8.75m/s. (Figures are shown in the attached file)

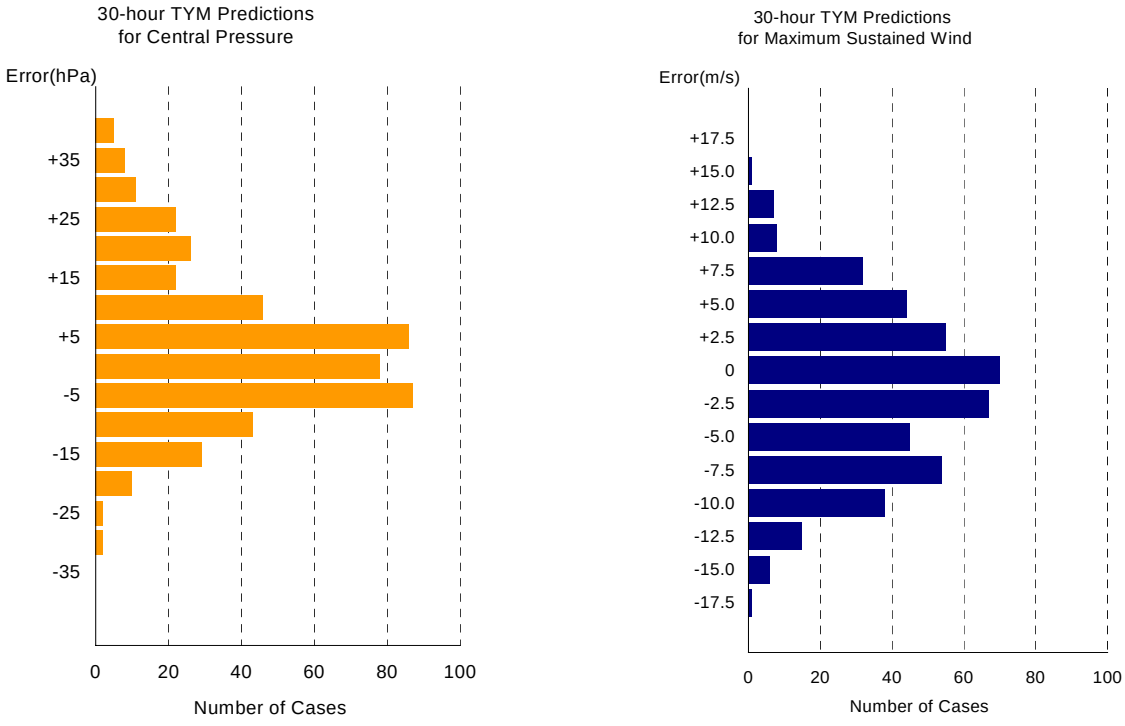


Figure 4.6 Error distribution of TYM 30-hour intensity predictions (left; for central pressure, right; for maximum wind speed, those for 54- and 78-hour predictions are included in the attached file).

4.2.2 GSM Prediction

1) Center Position

GSM annual mean position errors from 1996 are presented in Figure 4.7. In 2003, a total of 255 predictions were made by GSM and the errors for 30-hour, 54-hour and 78-hour predictions were 167km (156km in 2002), 277km (242km) and 418km (353km), respectively. The overall performance of GSM was worse than that in 2002. Mean position errors of the 18-, 30-, 42-, 54-, 66- and 78-hour predictions for each tropical cyclone are given in Table 4.6.

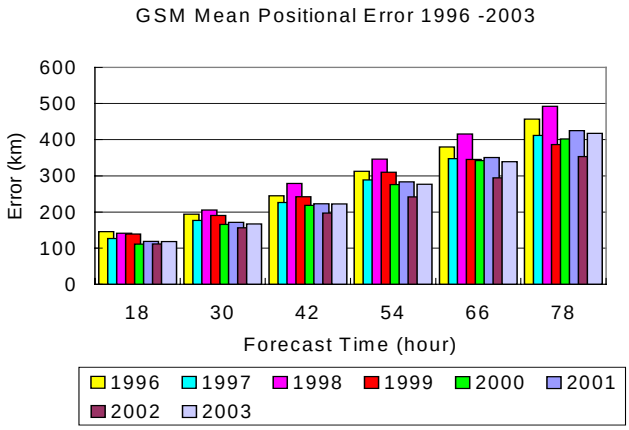


Figure 4.7 GSM annual mean position errors from 1996.

Table 4.6 Mean position errors (km) of GSM for each tropical cyclone in 2003

Tropical Cyclone			T=18		T=30		T=42		T=54		T=66		T=78	
TS	0301	YANYAN	288.0	(6)	391.6	(4)	419.9	(3)	413.8	(2)	404.7	(1)	-	(-)
TY	0302	KUJIRA	101.2	(28)	127.5	(27)	158.0	(24)	178.8	(23)	211.8	(22)	241.4	(21)
TY	0303	CHAN-HOM	128.2	(13)	170.5	(12)	226.6	(11)	317.6	(10)	372.3	(9)	512.7	(8)
STS	0304	LINFA	112.6	(9)	190.8	(8)	251.6	(7)	321.8	(6)	398.3	(5)	577.9	(4)
STS	0305	NANGKA	94.9	(6)	154.7	(5)	221.9	(4)	312.7	(3)	332.2	(2)	471.2	(1)
TY	0306	SOUDELOR	179.3	(12)	235.2	(11)	280.0	(10)	308.6	(9)	382.6	(8)	460.5	(7)
TY	0307	IMBUDO	85.9	(15)	154.1	(14)	215.7	(12)	285.2	(10)	326.8	(9)	377.8	(8)
STS	0308	KONI	186.2	(12)	234.9	(10)	313.2	(9)	399.7	(8)	456.0	(6)	630.3	(4)
TS	0309	MORAKOT	75.9	(4)	141.6	(2)	-	(-)	-	(-)	-	(-)	-	(-)
TY	0310	ETAU	61.2	(12)	76.6	(11)	124.9	(10)	172.0	(9)	220.7	(8)	271.2	(7)
TS	0311	VAMCO	-	(-)	-	(-)	-	(-)	-	(-)	-	(-)	-	(-)
TY	0312	KROVANH	117.3	(10)	151.4	(9)	208.4	(8)	233.9	(7)	264.7	(4)	187.6	(3)
TY	0313	DUJUAN	104.0	(9)	156.6	(8)	193.8	(7)	271.5	(6)	371.9	(5)	505.8	(4)
TY	0314	MAEMI	147.1	(17)	228.2	(16)	298.9	(15)	368.7	(14)	476.8	(13)	576.1	(12)
TY	0315	CHOI-WAN	136.3	(13)	225.2	(12)	352.0	(11)	508.4	(10)	739.7	(9)	1038.1	(8)
TY	0316	KOPPU	98.6	(9)	191.2	(8)	244.1	(7)	185.2	(6)	189.4	(5)	171.2	(4)
TY	0317	KETSANA	71.1	(14)	91.4	(13)	122.3	(12)	160.7	(11)	242.5	(10)	376.1	(9)
TY	0318	PARMA	119.0	(21)	180.6	(20)	260.9	(19)	355.4	(18)	463.2	(17)	567.2	(16)
STS	0319	MELOR	115.8	(7)	219.0	(7)	342.3	(6)	523.3	(5)	686.9	(4)	839.8	(3)
TY	0320	NEPARTAK	92.6	(12)	107.5	(11)	145.3	(11)	170.0	(9)	193.7	(9)	187.4	(8)
TY	0321	LUPIT	112.3	(26)	131.8	(25)	159.5	(24)	171.9	(23)	176.7	(22)	202.4	(21)
	Annual Mean		118.1	(255)	166.9	(233)	222.1	(210)	276.5	(189)	339.1	(168)	417.8	(148)

Table 4.7 gives GSM's relative performance compared to the PER-method. Improvement rates were roughly 35% (35% in 2002) for 18-hour, 50% (50%) for 30-hour, and 60% (60%) for 54-hour to 78-hour predictions. These improvement rates in 2003 were almost same as those in 2002. The percentage is relatively high in "Before" stage.

Figure 4.8 (in the attached file) presents histograms of the position errors of 30-, 54- and 78-hour predictions of GSM. The ratio of 30-hour prediction errors smaller than 150km was 54% (58% in 2002), the ratio of 54-hour prediction errors smaller than 300km was 69% (74%) and the ratio of 78-hour prediction errors smaller than 450km was 70% (75%).

Table 4.7 Mean position errors (km) of GSM and PER predictions for the tropical cyclones in 2003 in each stage of motion.

TIME	MODEL	Before (180 - 320)	During (320 - 10)	After (10 - 180)	All (0 - 360)
T=18	GSM	126.6 (121)	114.7 (41)	108.6 (93)	118.1 (255)
	PER	151.2 (121)	166.9 (41)	226.6 (93)	181.2 (255)
	IMPROV	16.2 %	31.3 %	52.1 %	34.8 %
T=30	GSM	172.4 (108)	174.1 (36)	157.2 (89)	166.9 (233)
	PER	265.1 (108)	296.1 (36)	414.4 (89)	326.9 (233)
	IMPROV	35.0 %	41.2 %	62.1 %	49.0 %
T=42	GSM	220.0 (95)	239.2 (33)	217.7 (82)	222.1 (210)
	PER	423.3 (95)	370.9 (33)	630.7 (82)	496.1 (210)
	IMPROV	48.0 %	35.5 %	65.5 %	55.2 %
T=54	GSM	263.8 (83)	289.6 (30)	285.1 (76)	276.5 (189)
	PER	590.8 (83)	570.0 (30)	860.8 (76)	696.1 (189)
	IMPROV	55.4 %	49.2 %	66.9 %	60.3 %
T=66	GSM	307.9 (72)	314.2 (24)	378.7 (72)	339.1 (168)
	PER	792.4 (72)	612.0 (24)	1106.5 (72)	901.3 (168)
	IMPROV	61.1 %	48.6 %	65.8 %	62.4 %
T=78	GSM	343.7 (62)	336.7 (21)	514.7 (65)	417.8 (148)
	PER	993.7 (62)	819.7 (21)	1305.0 (65)	1105.8 (148)
	IMPROV	65.4 %	58.9 %	60.6 %	62.2 %

2) Central Pressure and Maximum Wind Speed

Figure 4.9 shows histograms of central pressure errors and the maximum wind speed errors of 30-hour predictions of GSM. The histograms show that in almost all cases GSM underestimated the intensity of tropical cyclones in its 30-hour predictions and has a considerable positive bias in the central pressure prediction.

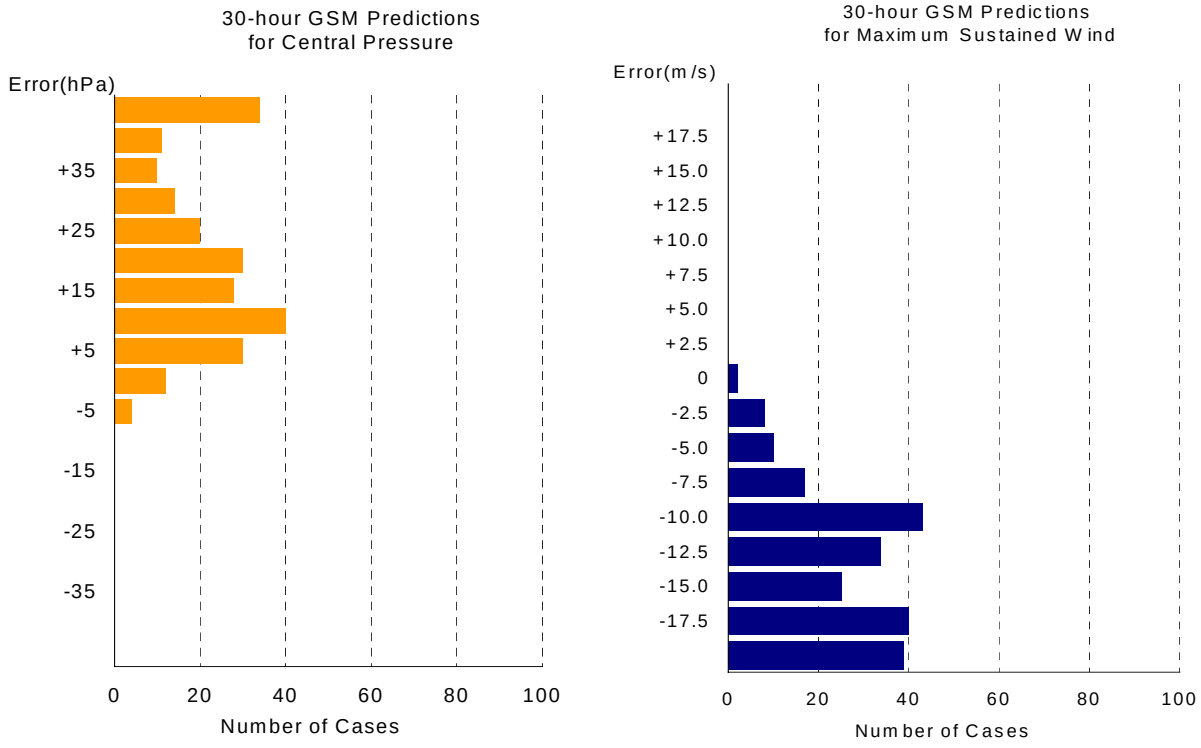
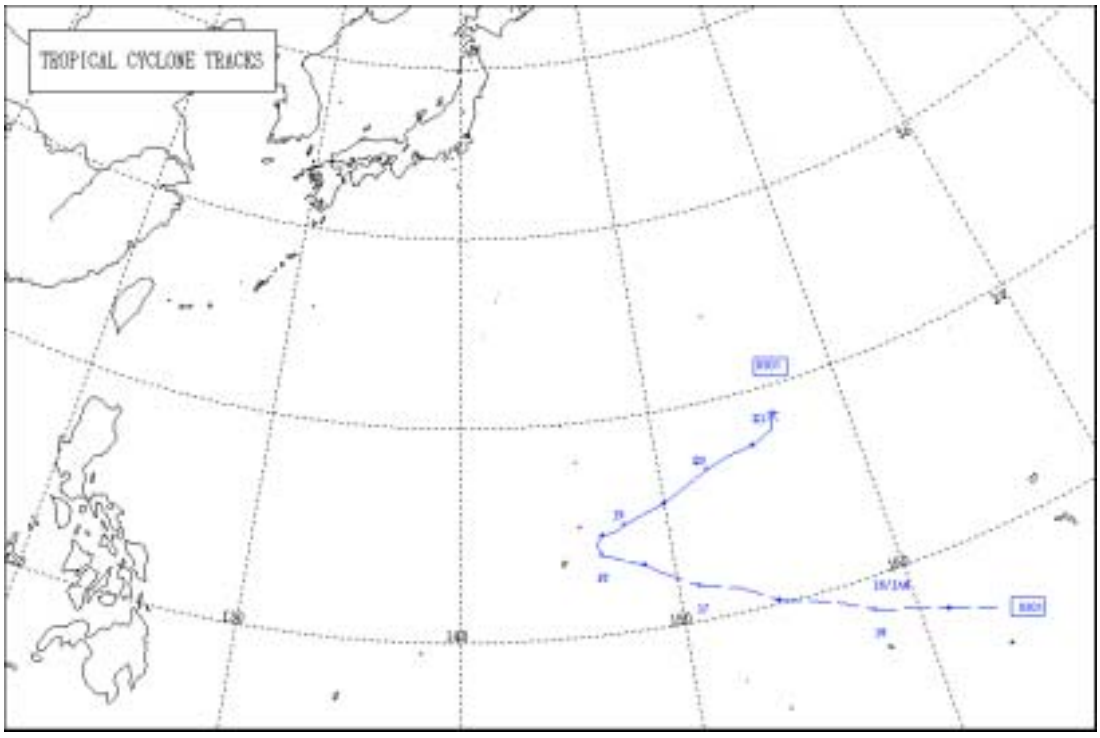


Fig.4.9 Error distribution of 30-hour GSM intensity predictions

TS YANYAN (0301)

Yanyan formed as a tropical depression (TD) west of the Marshall Islands at 06UTC 15 January 2003. Keeping almost the same intensity, it moved west-northwestwards until it made an abrupt turn towards the north-northwest over the waters east of Guam at 00UTC 18 January. It developed into a tropical storm (TS) and reached its peak intensity with maximum sustained wind of 35kt southeast of Saipan at 06UTC 18 January. With the same intensity, it turned to the east-northeast and kept moving east-northeastwards with a speed of 25kt. It weakened into a TD east of the Mariana Islands at 12UTC 20 January. It transformed into an extratropical cyclone at 00UTC 21 January and dissipated far east of the Mariana Islands at 06UTC on that day.

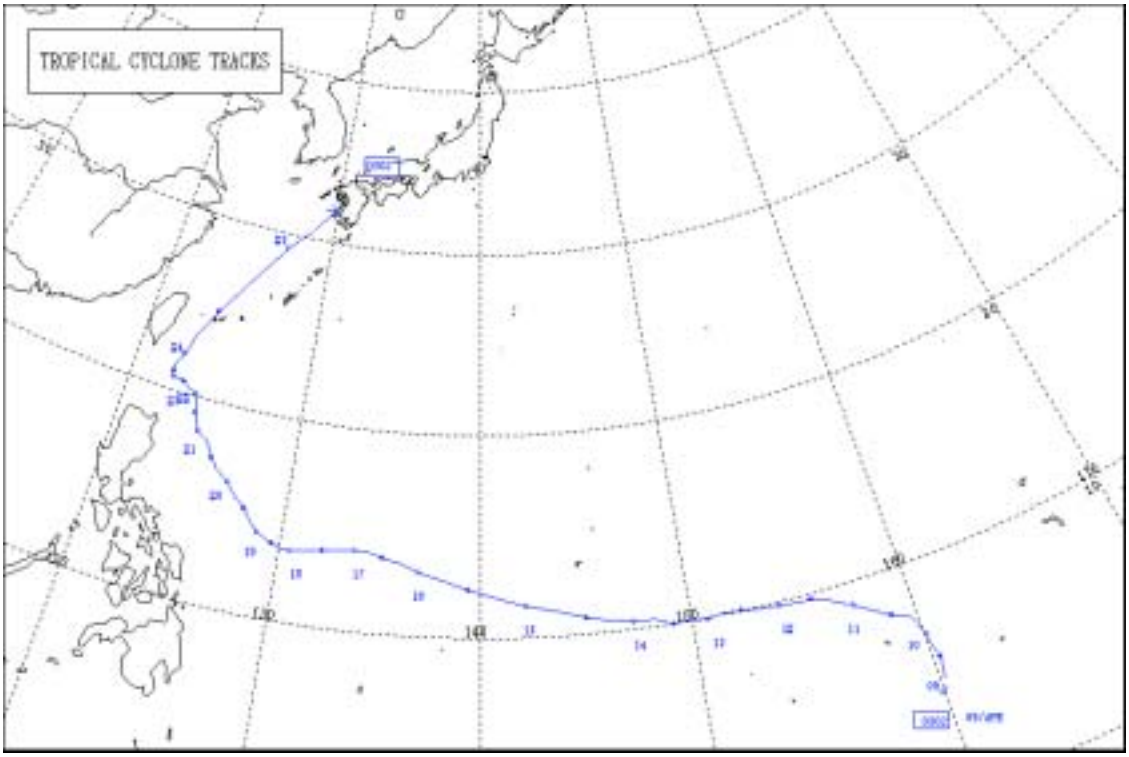
	Date/Time	Center Position		Central pressure	Max Wind	CI Number	Grade	Date/Time	Center Position		Central pressure	Max Wind	CI Number	Grade
	(UTC)	Lat (N)	Lon (E)	(hPa)	(kt)			(UTC)	Lat (N)	Lon (E)	(hPa)	(kt)		
Jan	15/06	6.9	163.1	1004	-	-	TD	18/12	14.5	146.8	1000	35	-	TS
	15/12	7.6	161.2	1004	-	-	TD	18/18	14.6	147.4	1000	35	-	TS
	15/18	8.2	159.6	1002	-	-	TD	19/00	14.9	147.9	1000	35	-	TS
	16/00	8.6	158.2	1004	-	-	TD	19/06	15.2	148.8	1000	35	-	TS
	16/06	9.4	156.7	1004	-	-	TD	19/12	15.6	150.0	1000	35	-	TS
	16/12	10.2	154.3	1004	-	-	TD	19/18	16.2	151.3	1000	35	-	TS
	16/18	11.1	152.7	1004	-	-	TD	20/00	16.8	152.4	1000	35	-	TS
	17/00	11.6	150.9	1004	-	-	TD	20/06	17.2	153.7	1000	35	-	TS
	17/06	12.5	149.3	1002	-	-	TD	20/12	17.4	154.9	1004	-	-	TD
	17/12	12.9	148.6	1004	-	-	TD	20/18	17.9	156.1	1004	-	-	TD
	17/18	13.2	147.8	1004	-	-	TD	21/00	18.7	156.3	1004	-	-	L



TY KUJIRA (0302)

Kujira formed as a tropical depression (TD) south-southeast of Pompei Island at 00UTC 9 April 2003. It moved to the north, then to the northwest and became a tropical storm (TS) north of Pompei Island at 00UTC 11 April. It moved to the west and developed into a typhoon (TY) over the waters southeast of Guam at 00UTC 14 April. Then, it changed its direction to the west-northwest and reached the peak intensity north of Yap Island at 18UTC 15 April. It changed the direction to the west again at 18UTC 16 April, then to the northwest at 12UTC 18 April and moved northwestward east of Luzon Island. After it downgraded to the TS intensity near the Batan Islands at 18UTC 22 April, it changed the direction to the northeast. Keeping the TS intensity, it passed near Iriomotejima at around 10UTC 24 April and advanced to the East China Sea. Kujira downgraded to a TD west of Yakushima at 03UTC 25 April and dissipated west of Kyushu at 12UTC on that day.

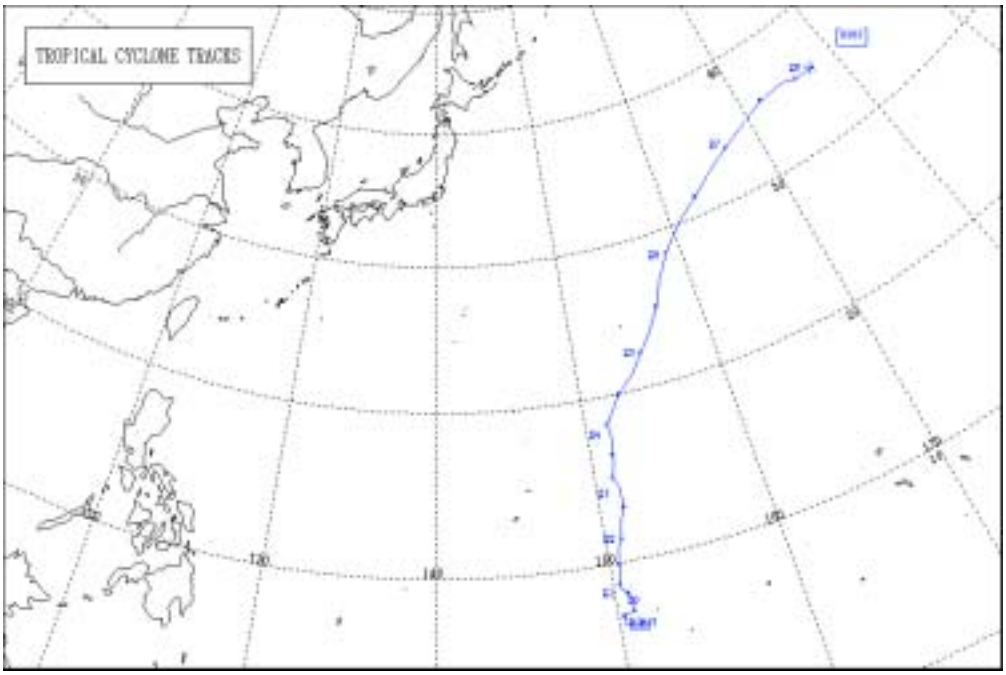
	Date/Time	Center Position		Central pressure	Max Wind	CI Number	Grade	Date/Time	Center Position		Central pressure	Max Wind	CI Number	Grade
	(UTC)	Lat (N)	Lon (E)	(hPa)	(kt)			(UTC)	Lat (N)	Lon (E)	(hPa)	(kt)		
Apr	09/00	4.1	159.9	1008	-	-	TD	17/12	13.7	132.2	945	85	-	TY
	09/06	4.3	160.1	1006	-	-	TD	17/18	13.6	131.4	945	85	-	TY
	09/12	5.6	160.3	1006	-	-	TD	18/00	13.5	130.6	940	85	-	TY
	09/18	6.4	160.1	1004	-	-	TD	18/06	13.5	130.0	940	85	-	TY
	10/00	6.7	160.1	1004	-	-	TD	18/12	13.7	129.6	945	80	-	TY
	10/06	7.7	159.7	1004	-	-	TD	18/18	13.9	129.1	945	80	-	TY
	10/12	8.0	158.9	1004	-	-	TD	19/00	14.1	128.8	945	80	-	TY
	10/18	8.6	158.0	1004	-	-	TD	19/06	14.6	128.3	945	80	-	TY
	11/00	9.0	157.4	1002	35	-	TS	19/12	15.1	127.9	950	80	-	TY
	11/06	9.5	156.4	1000	35	-	TS	19/18	15.7	127.2	950	75	-	TY
	11/12	9.8	155.6	996	35	-	TS	20/00	16.2	126.8	955	75	-	TY
	11/18	9.8	155.2	996	35	-	TS	20/06	16.8	126.0	955	75	-	TY
	12/00	9.9	154.1	992	40	-	TS	20/12	17.2	125.7	950	80	-	TY
	12/06	10.0	153.0	990	45	-	TS	20/18	18.0	125.2	950	80	-	TY
	12/12	10.1	152.3	990	45	-	TS	21/00	18.3	124.6	950	80	-	TY
	12/18	10.1	151.5	985	50	-	STS	21/06	18.8	124.4	955	75	-	TY
	13/00	10.0	150.7	980	55	-	STS	21/12	19.2	124.2	955	70	-	TY
	13/06	10.1	149.8	980	55	-	STS	21/18	19.6	124.1	960	70	-	TY
	13/12	10.0	149.1	980	55	-	STS	22/00	20.2	124.0	975	55	-	STS
	13/18	10.4	148.3	975	60	-	STS	22/06	20.4	123.4	980	55	-	STS
	14/00	10.4	147.3	965	70	-	TY	22/12	20.6	123.1	985	50	-	STS
	14/06	10.6	146.2	960	75	-	TY	22/18	20.7	123.0	990	45	-	TS
	14/12	10.8	145.1	950	80	-	TY	23/00	20.7	122.5	994	45	-	TS
	14/18	11.2	143.8	945	80	-	TY	23/06	20.8	122.4	994	45	-	TS
	15/00	11.5	142.3	945	80	-	TY	23/12	21.0	122.4	994	45	-	TS
	15/06	11.9	140.9	945	80	-	TY	23/18	21.3	122.3	994	45	-	TS
	15/12	12.3	139.5	940	85	-	TY	24/00	22.0	122.7	994	45	-	TS
	15/18	12.7	138.3	930	90	-	TY	24/06	23.2	123.0	994	45	-	TS
	16/00	13.1	137.0	930	90	-	TY	24/12	24.8	123.9	994	45	-	TS
	16/06	13.5	136.0	930	90	-	TY	24/18	26.8	125.3	996	40	-	TS
	16/12	13.7	135.2	935	85	-	TY	25/00	29.3	127.2	998	35	-	TS
	16/18	13.9	134.4	935	85	-	TY	25/03	30.6	128.6	1000	-	-	TD
	17/00	13.9	133.8	940	85	-	TY	25/06	32.1	129.9	1000	-	-	TD
	17/06	13.8	132.9	940	85	-	TY	25/12						Dissip


TROPICAL CYCLONE TRACKS

TY CHAN-HOM (0303)

Chan-hom formed as a tropical depression (TD) near the Truk Islands at 00UTC 19 May 2003. After stamping at the initial place for 18 hours, it began to take a counterclockwise course and developed into a tropical storm (TS) east of Ulul Island at 12UTC 20 May. It changed its direction to the north and developed into a typhoon over the sea east of Saipan at 06UTC 23 May, then it reached its peak intensity with maximum sustained wind of 85kt over the sea northeast of Saipan at 18TUC 23 May. Keeping the same intensity, it turned its track from north to northeast. After passing over the sea east of Minamitorishima on 25 May, it weakened into TS over the sea far east of Japan at 00UTC 27 May. Then it transformed into an extratropical cyclone at 06UTC 27 May over the same waters and dissipated over the sea south of the Aleutian Islands at 12UTC 28 May.

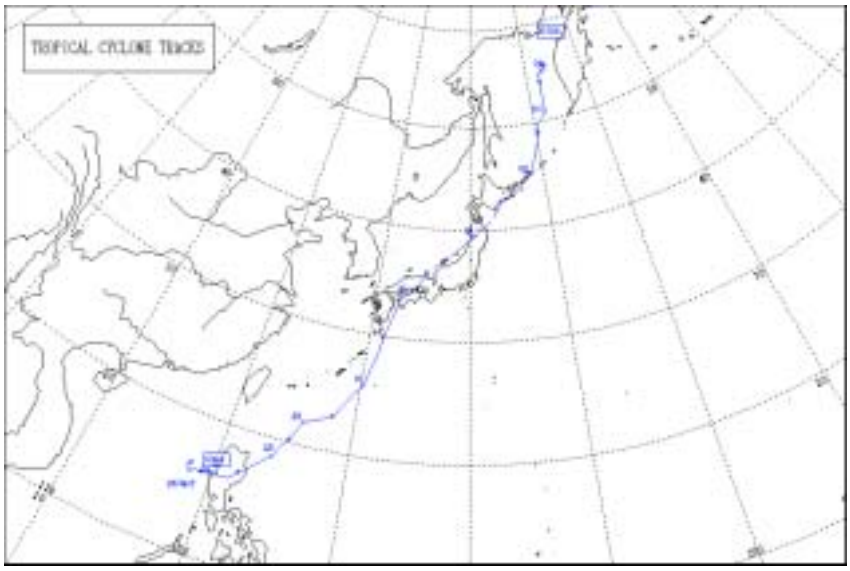
	Date/Time (UTC)	Center Position Lat (N)	Lon (E)	Central pressure (hPa)	Max Wind (kt)	CI Number	Grade	Date/Time (UTC)	Center Position Lat (N)	Lon (E)	Central pressure (hPa)	Max Wind (kt)	CI Number	Grade
May	19/00	7.1	150.3	1006	-	-	TD	24/00	18.3	151.4	940	85	-	TY
	19/06	7.1	150.3	1004	-	-	TD	24/06	19.3	152.1	940	85	-	TY
	19/12	7.1	150.3	1004	-	-	TD	24/12	20.0	152.6	940	85	-	TY
	19/18	7.2	150.3	1004	-	-	TD	24/18	21.1	153.8	940	85	-	TY
	20/00	7.3	150.9	1004	-	-	TD	25/00	22.3	154.8	945	75	-	TY
	20/06	7.8	151.0	1000	-	-	TD	25/06	23.6	155.8	950	70	-	TY
	20/12	8.3	150.7	998	35	-	TS	25/12	25.1	156.8	955	70	-	TY
	20/18	8.6	150.4	996	40	-	TS	25/18	26.8	157.7	960	70	-	TY
	21/00	8.9	150.4	994	45	-	TS	26/00	28.4	158.8	965	65	-	TY
	21/06	9.4	150.5	990	50	-	STS	26/06	30.1	160.6	975	60	-	STS
	21/12	10.0	150.5	985	55	-	STS	26/12	31.4	162.7	985	50	-	STS
	21/18	10.8	150.6	985	55	-	STS	26/18	32.8	164.9	985	50	-	STS
	22/00	11.4	150.9	980	55	-	STS	27/00	33.8	166.9	990	40	-	TS
	22/06	12.6	151.2	980	55	-	STS	27/06	34.8	169.5	996	-	-	L
	22/12	13.2	151.4	980	55	-	STS	27/12	35.6	171.9	996	-	-	L
	22/18	14.4	151.4	975	60	-	STS	27/18	35.8	174.4	1000	-	-	L
	23/00	15.0	151.1	975	60	-	STS	28/00	35.5	175.7	1008	-	-	L
	23/06	15.6	151.3	965	70	-	TY	28/06	35.5	177.7	1012	-	-	L
	23/12	16.4	151.4	950	80	-	TY	28/12						Dissip
	23/18	17.4	151.5	940	85	-	TY							



STS LINFA (0304)

Linfa formed as a tropical depression (TD) over the sea west of Luzon Island at 06UTC 25 May 2003. It began to take a counterclockwise course and developed into a tropical storm (TS) over the same waters at 00UTC 26 May. It changed its direction to the east and developed into a severe tropical storm (STS) near the western coast of Luzon Island at 00UTC 27 May. Moving to the east, it landed on Luzon Island and weakened into a TS, then turned northeastwards at 12UTC 27 May. After leaving Luzon Island, it held a fairly straight northeastward track. Moving to the northeast, it redeveloped into a STS and reached its peak intensity with maximum sustained wind of 55kt over the sea south of Okinawa at 18UTC 29 May. I turned north-northeastwards and passed over the sea east of Kyushu. After landing on the western Shikoku, it transformed into an extratropical cyclone at 00UTC 31 May. It held a fairly straight northeastward track and entered the Sea of Okhotsk on 2 June, then dissipated over the same waters at 12UTC 4 June.

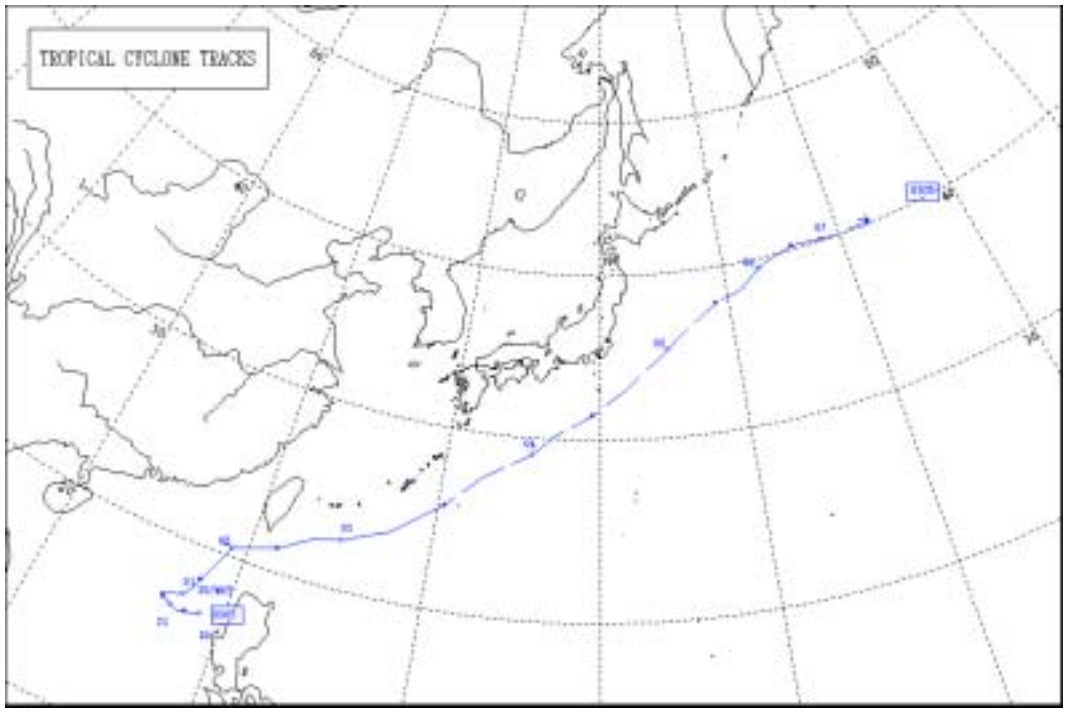
Date/Time		Center Position		Central pressure	Max Wind	CI Number	Grade	Date/Time		Center Position		Central pressure	Max Wind	CI Number	Grade
	(UTC)	Lat (N)	Lon (E)	(hPa)	(kt)				(UTC)	Lat (N)	Lon (E)	(hPa)	(kt)		
May	25/06	16.5	118.5	1000	-	-	TD		30/09	28.8	131.2	980	50	-	STS
	25/12	16.4	118.3	1000	-	-	TD		30/12	30.0	131.4	980	50	-	STS
	25/18	16.1	118.0	1000	-	-	TD		30/15	31.2	131.8	980	50	-	STS
	26/00	15.8	118.4	994	35	-	TS		30/18	32.3	132.2	980	50	-	STS
	26/06	16.0	118.7	990	45	-	TS		30/21	33.5	132.6	985	45	-	TS
	26/12	16.0	119.2	990	45	-	TS		31/00	33.9	133.2	988	-	-	L
	26/18	16.1	119.2	990	45	-	TS		31/06	35.0	134.4	988	-	-	L
	27/00	16.1	119.9	985	50	-	STS		31/12	36.1	135.1	992	-	-	L
	27/06	16.2	121.3	992	35	-	TS		31/18	37.7	137.7	994	-	-	L
	27/12	16.8	121.9	992	35	-	TS	Jun	01/00	39.6	140.5	994	-	-	L
	27/18	17.5	122.6	992	40	-	TS		01/06	40.9	142.5	992	-	-	L
	28/00	18.7	124.0	992	40	-	TS		01/12	42.8	144.1	992	-	-	L
	28/06	19.8	124.6	992	40	-	TS		01/18	44.2	146.8	988	-	-	L
	28/12	20.3	125.0	992	40	-	TS		02/00	45.1	148.3	988	-	-	L
	28/18	20.9	125.3	992	40	-	TS		02/06	47.3	149.5	986	-	-	L
	29/00	21.9	125.8	992	40	-	TS		02/12	49.0	150.4	984	-	-	L
	29/06	22.3	126.9	990	40	-	TS		02/18	50.0	150.7	982	-	-	L
	29/12	22.8	128.1	985	45	-	TS		03/00	50.9	152.0	982	-	-	L
	29/15	23.9	128.8	985	45	-	TS		03/06	52.8	152.1	984	-	-	L
	29/18	24.3	129.1	980	55	-	STS		03/12	54.1	152.1	986	-	-	L
	29/21	25.0	129.6	980	55	-	STS		03/18	55.0	152.2	986	-	-	L
	30/00	25.7	130.3	980	55	-	STS		04/00	55.1	152.9	988	-	-	L
	30/03	26.5	130.5	980	55	-	STS		04/06	55.9	153.6	990	-	-	L
	30/06	27.6	130.8	980	50	-	STS		04/12						Dissip



STS NANGKA (0305)

Nangka formed as a tropical depression (TD) west of Luzon Island at 00UTC 30 May 2003. It moved to the west and made an abrupt turn to the northeast at 18UTC 31 May. It became a tropical storm (TS) over the same waters at 00UTC 1 June and reached its peak intensity with a maximum sustained wind of 50kt south-southwest of Taiwan at 18UTC on the same day. Holding a fairly straight northeastward track, it passed the Bashi Channel on 2 June and downgraded into a TD west of Minamidaitojima at 12UTC 3 June, then transformed into a extratropical cyclone south of the Kii Peninsula at 00UTC 4 June. It dissipated far east of Japan at 18UTC 7 June.

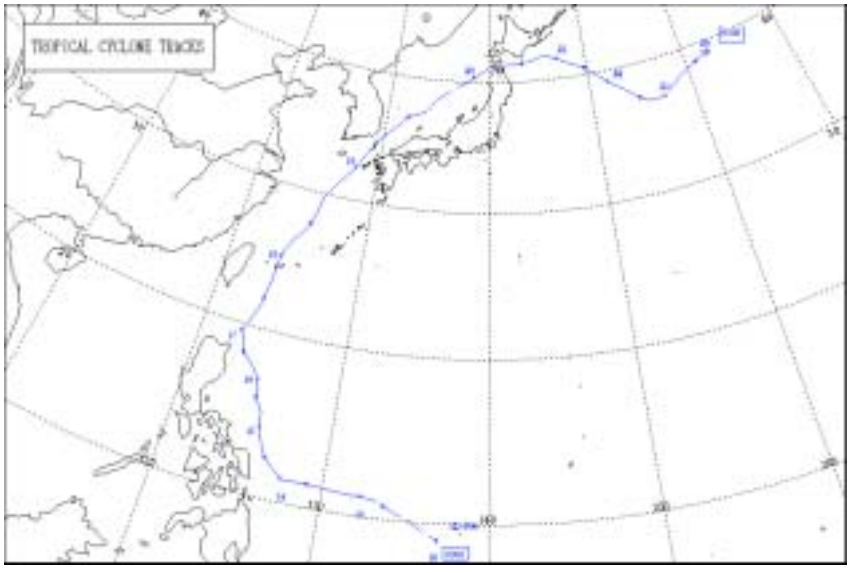
Date/Time		Center Position		Central pressure	Max Wind	CI Number	Grade	Date/Time	Center Position		Central pressure	Max Wind	CI Number	Grade
	(UTC)	Lat (N)	Lon (E)	(hPa)	(kt)			(UTC)	Lat (N)	Lon (E)	(hPa)	(kt)		
May	30/00	16.8	118.8	1002	-	-	TD	03/12	25.7	130.4	994	-	-	TD
	30/06	16.7	118.5	1000	-	-	TD	03/18	27.6	132.5	994	-	-	TD
	30/12	16.6	118.0	1000	-	-	TD	04/00	29.1	135.5	994	-	-	L
	30/18	16.5	117.6	1000	-	-	TD	04/06	30.3	136.9	996	-	-	L
	31/00	16.7	117.2	1000	-	-	TD	04/12	31.5	139.4	996	-	-	L
	31/06	16.8	117.0	998	-	-	TD	04/18	33.1	141.8	998	-	-	L
	31/12	16.9	116.7	998	-	-	TD	05/00	35.3	144.9	1000	-	-	L
	31/18	17.1	116.5	998	-	-	TD	05/06	36.2	146.2	1000	-	-	L
Jun	01/00	17.4	117.6	996	35	-	TS	05/12	37.8	149.0	1000	-	-	L
	01/06	17.8	117.9	994	40	-	TS	05/18	38.4	151.2	1000	-	-	L
	01/12	18.4	118.2	990	45	-	TS	06/00	39.5	152.9	1006	-	-	L
	01/18	19.5	118.7	985	50	-	STS	06/06	39.9	154.2	1006	-	-	L
	02/00	20.5	119.2	985	50	-	STS	06/12	40.3	155.9	1008	-	-	L
	02/06	20.7	119.8	985	50	-	STS	06/18	40.3	157.0	1008	-	-	L
	02/12	21.3	121.6	990	50	-	STS	07/00	40.2	158.4	1012	-	-	L
	02/18	22.3	123.3	992	45	-	TS	07/06	40.1	159.9	1012	-	-	L
	03/00	22.7	124.9	994	40	-	TS	07/12	40.3	162.6	1012	-	-	L
	03/06	23.7	127.5	994	35	-	TS	07/18						Dissip



TY SOUDELOR (0306)

Soudelor formed as a tropical depression (TD) northeast of the Palau Islands at 00UTC 12 June 2003. It moved to the west-northwest and became a tropical storm (TS) east of the Philippines at 06UTC 13 June. It changed the direction to the west on 13 June, then to the north-northwest east of Samar Island on 14 June. Shortly after it changed the direction to the north, it upgraded into a typhoon south of Iriomotejima at 12UTC 17 June and passed Iriomotejima around half past 20UTC 17 June. Moving north-northeastwards in East China Sea, it reached its peak intensity with a maximum sustained wind of 80kt west of Okinawa at 06UTC 18 June. With gradual weakening, it passed Tsushima at STS intensity around 04UTC 19 June. Moving to the northeast, it transformed into an extratropical cyclone north-northeast of Oki Island at 15UTC 19 June. After it passed the northern part of Japan on 20 June, it dissipated far east of Japan at 06UTC 24 June.

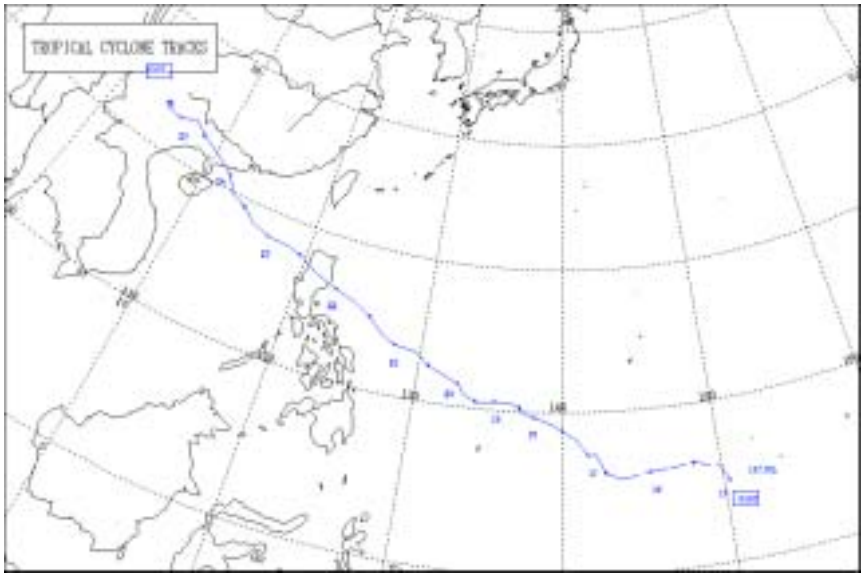
	Date/Time	Center Position		Central pressure	Max Wind	CI Number	Grade	Date/Time	Center Position		Central pressure	Max Wind	CI Number	Grade
	(UTC)	Lat (N)	Lon (E)	(hPa)	(kt)			(UTC)	Lat (N)	Lon (E)	(hPa)	(kt)		
Jun	12/00	9.1	136.9	1008	-	-	TD	18/09	27.1	125.1	955	80	-	TY
	12/06	10.1	135.1	1006	-	-	TD	18/12	27.8	125.5	960	75	-	TY
	12/12	10.8	133.7	1006	-	-	TD	18/15	28.9	125.8	960	75	-	TY
	12/18	11.0	133.4	1006	-	-	TD	18/18	29.9	126.0	965	70	-	TY
	13/00	11.2	132.3	1004	-	-	TD	18/21	31.1	126.9	970	65	-	TY
	13/06	11.2	131.5	1000	35	-	TS	19/00	32.5	128.1	975	60	-	STS
	13/12	11.4	129.1	1000	35	-	TS	19/03	33.9	128.9	975	60	-	STS
	13/18	11.4	128.0	996	40	-	TS	19/04	34.2	129.2	975	60	-	STS
	14/00	11.4	127.5	996	40	-	TS	19/06	34.8	129.6	980	55	-	STS
	14/06	11.9	126.9	996	40	-	TS	19/09	36.2	131.2	980	55	-	STS
	14/12	12.4	126.3	996	40	-	TS	19/12	36.9	132.0	985	50	-	STS
	14/18	13.1	125.9	996	40	-	TS	19/15	37.5	133.7	985	-	-	L
	15/00	14.1	125.6	994	45	-	TS	19/18	38.7	134.9	988	-	-	L
	15/06	15.0	125.4	990	50	-	STS	20/00	40.4	138.2	996	-	-	L
	15/12	15.8	124.9	985	50	-	STS	20/06	41.3	140.1	996	-	-	L
	15/18	16.4	124.7	980	55	-	STS	20/12	41.5	143.4	996	-	-	L
	16/00	16.9	124.7	980	55	-	STS	20/18	42.0	145.6	996	-	-	L
	16/06	17.6	124.1	980	55	-	STS	21/00	41.7	147.0	994	-	-	L
	16/12	18.3	123.3	980	55	-	STS	21/06	41.1	148.5	994	-	-	L
	16/18	19.2	123.0	980	55	-	STS	21/12	40.6	149.8	996	-	-	L
	17/00	19.6	122.8	975	60	-	STS	21/18	39.8	151.0	996	-	-	L
	17/06	20.7	123.2	975	60	-	STS	22/00	39.2	151.9	996	-	-	L
	17/09	21.4	123.5	975	60	-	STS	22/06	38.3	153.4	998	-	-	L
	17/12	22.0	123.6	970	65	-	TY	22/12	37.4	154.7	998	-	-	L
	17/15	22.7	123.7	970	65	-	TY	22/18	37.0	155.6	998	-	-	L
	17/18	23.6	123.8	970	65	-	TY	23/00	37.0	157.1	998	-	-	L
	17/20	24.2	123.8	968	65	-	TY	23/06	38.2	159.1	998	-	-	L
	17/21	24.3	123.8	965	70	-	TY	23/12	38.8	161.0	998	-	-	L
	18/00	25.1	123.9	960	75	-	TY	23/18	39.1	161.9	1002	-	-	L
	18/03	25.6	124.1	960	75	-	TY	24/00	39.2	162.5	1004	-	-	L
	18/06	26.4	124.5	955	80	-	TY	24/06						Dissip



TY IMBUDO (0307)

Imbudo formed as a tropical depression (TD) south-southwest of the Truk Islands at 00UTC 15 July 2003. It moved to the north-northwest and changed the direction to the west at TD intensity. After changing the direction to the northwest around 21UTC 16 July, it became a tropical storm (TS) east-southeast of Yap Island at 06UTC 17 July. Imbudo held an almost straight west-northwest track until its dissipation. It upgraded into a severe tropical storm (STS) west-northwest of Yap Island at 18UTC 18 July and developed into a typhoon north-northwest of Palau Islands at 18UTC on the following day. It reached its peak intensity with a maximum sustained wind of 90kt east of Philippines at 12UTC 20 July. With gradual weakening, it made landfall on Luzon Island around 03UTC 22 July. It entered South China Sea around 09UTC 22 July and made a minor development over the same waters on 23 July. With rapid weakening, it made landfall west of Macao around 03UTC 24 July. It downgraded into STS at 06UTC 24 July, then into TS around Nanning at 12UTC on that day. It downgraded into TD around the border between China and Vietnam at 00UTC 25 July and dissipated over the same region at 18UTC on that day.

Date/Time		Center Position		Central pressure	Max Wind	CI Number	Grade	Date/Time		Center Position		Central pressure	Max Wind	CI Number	Grade
	(UTC)	Lat (N)	Lon (E)	(hPa)	(kt)				(UTC)	Lat (N)	Lon (E)	(hPa)	(kt)		
Jul	15/00	4.8	150.4	1008	-	-	TD	20/12	12.5	130.7	935	90	-	TY	
	15/06	5.9	149.8	1006	-	-	TD	20/18	13.3	129.6	935	90	-	TY	
	15/12	6.2	148.3	1006	-	-	TD	21/00	13.5	128.1	945	85	-	TY	
	15/18	6.1	146.8	1004	-	-	TD	21/06	14.0	127.1	945	85	-	TY	
	16/00	6.0	145.6	1004	-	-	TD	21/12	15.0	125.9	945	85	-	TY	
	16/06	5.7	143.8	1004	-	-	TD	21/18	15.8	124.5	950	80	-	TY	
	16/12	6.1	142.8	1004	-	-	TD	22/00	16.3	123.0	950	80	-	TY	
	16/18	7.3	142.2	1002	-	-	TD	22/06	16.9	121.3	955	75	-	TY	
	17/00	7.3	141.7	1002	-	-	TD	22/12	17.8	119.6	960	70	-	TY	
	17/06	8.3	140.9	998	35	-	TS	22/18	18.1	118.4	965	70	-	TY	
	17/12	8.8	140.1	998	35	-	TS	23/00	18.2	116.7	960	70	-	TY	
	17/18	9.2	139.5	998	35	-	TS	23/06	18.7	115.2	955	75	-	TY	
	18/00	9.7	138.2	996	40	-	TS	23/12	19.5	114.1	955	75	-	TY	
	18/06	10.0	137.3	994	40	-	TS	23/18	20.0	112.8	955	75	-	TY	
	18/12	10.3	137.2	990	45	-	TS	24/00	21.1	112.0	965	65	-	TY	
	18/18	10.6	136.5	985	50	-	STS	24/06	22.1	110.1	975	50	-	STS	
	19/00	10.6	135.5	980	55	-	STS	24/12	22.8	108.5	985	40	-	TS	
	19/06	10.5	134.7	975	60	-	STS	24/18	23.5	107.2	992	35	-	TS	
	19/12	10.5	134.2	975	60	-	STS	25/00	23.0	106.0	996	-	-	TD	
	19/18	10.9	133.3	970	65	-	TY	25/06	23.1	105.0	996	-	-	TD	
	20/00	11.6	132.9	960	75	-	TY	25/12	23.5	104.4	998	-	-	TD	
	20/06	12.1	131.6	945	85	-	TY	25/18						Dissip	



STS KONI (0308)

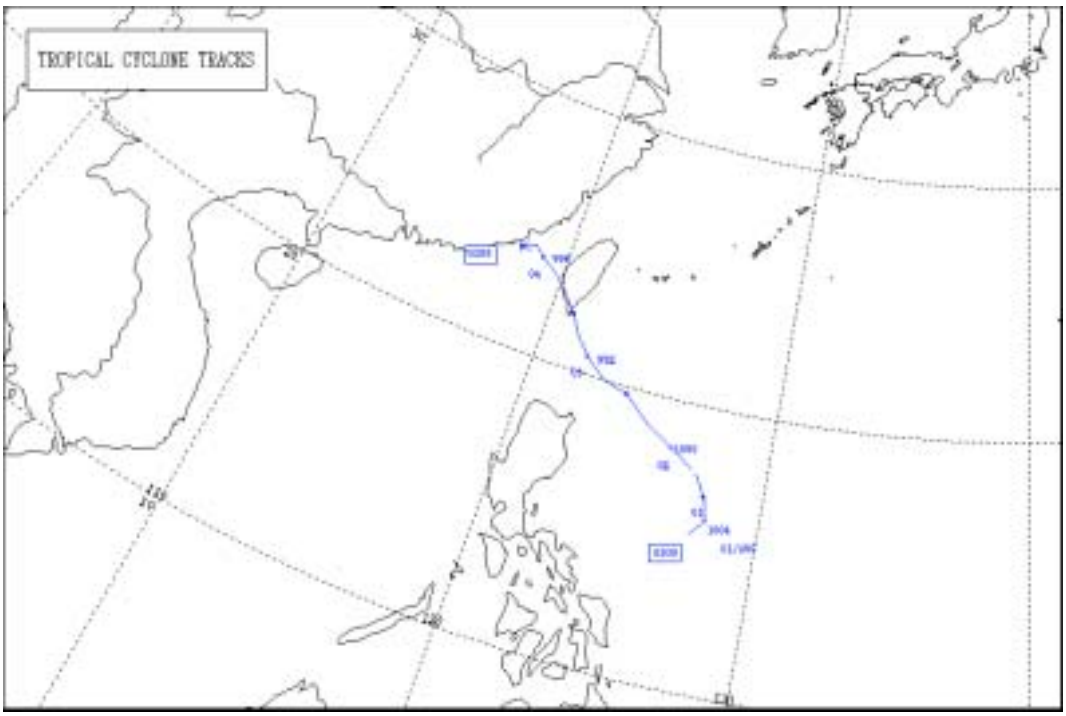
Koni formed as a tropical depression (TD) north of the Palau Islands at 00UTC 15 July 2003. It moved to the west and changed the direction to the west-northwest around 06UTC 16 July. It reached the southeastern edge of Samar Island around 00UTC 17 July and crossed the middle of Philippines at TD intensity on that day. Shortly after it entered South China Sea, it became a tropical storm (TS) north of Palawan Island at 06UTC 18 July. It changed its direction to the northwest around 18UTC 18 July and upgraded into a severe tropical storm (STS) over the middle of South China Sea at 00UTC 20 July. After it changed the direction to the west-northwest around 12UTC 20 July, it reached its peak intensity with a maximum sustained wind of 60kt southeast of Hainan Island at 18UTC on that day. With gradual weakening, it reached the southeastern coast of Hainan Island around 12UTC 21 July. It downgraded into TS over Hainan Island at 18UTC 21 July and entered Gulf of Tongking. After it landed on the coast of northern Vietnam around 08UTC 22 July, it downgraded into TD over the northern Laos at 18UTC on that day. It dissipated over the same region at 00UTC 23 July.

Date/Time	Center Position		Central pressure	Max Wind	CI Number	Grade	Date/Time	Center Position		Central pressure	Max Wind	CI Number	Grade
(UTC)	Lat (N)	Lon (E)	(hPa)	(kt)			(UTC)	Lat (N)	Lon (E)	(hPa)	(kt)		
Jul 15/00	9.4	134.8	1008	-	-	TD	19/06	14.5	116.7	992	45	-	TS
15/06	9.7	133.7	1004	-	-	TD	19/12	15.0	116.4	992	45	-	TS
15/12	10.0	132.0	1006	-	-	TD	19/18	15.5	116.0	990	45	-	TS
15/18	9.9	130.6	1004	-	-	TD	20/00	16.4	115.0	985	50	-	STS
16/00	9.6	130.3	1002	-	-	TD	20/06	16.9	114.2	980	55	-	STS
16/06	9.8	129.2	1002	-	-	TD	20/12	17.8	113.7	980	55	-	STS
16/12	10.3	128.3	1002	-	-	TD	20/18	18.1	112.1	975	60	-	STS
16/18	10.8	126.7	1002	-	-	TD	21/00	18.2	111.3	975	60	-	STS
17/00	10.9	125.9	1000	-	-	TD	21/06	18.5	110.9	975	55	-	STS
17/06	11.4	124.6	1000	-	-	TD	21/12	18.5	110.2	980	50	-	STS
17/12	12.2	122.5	1000	-	-	TD	21/18	19.2	109.1	985	45	-	TS
17/18	12.4	121.9	1000	-	-	TD	22/00	19.6	107.8	985	45	-	TS
18/00	12.4	120.3	1000	-	-	TD	22/06	20.0	106.5	985	45	-	TS
18/06	12.3	119.1	998	35	-	TS	22/12	20.2	105.0	990	40	-	TS
18/12	12.5	118.5	998	40	-	TS	22/18	20.0	103.0	998	-	-	TD
18/18	12.8	117.9	996	40	-	TS	23/00						Dissip
19/00	13.5	117.2	994	40	-	TS							

TS MORAKOT (0309)

Morakot formed as a tropical depression (TD) east of Luzon Island at 03UTC 1 August 2003. It took a counterclockwise track and began to hold an almost straight northwestward track around 18UTC 1 August. It became a tropical storm (TS) northeast of Luzon Island at 06UTC 2 August. It reached its peak intensity with maximum sustained wind of 45kt north of Luzon Island at 18UTC 2 August. It crossed Taiwan after 12UTC 3 August and weakened to a TD over Taiwan Strait at 12UTC 4 August. It dissipated over the same waters at 18UTC 4 August.

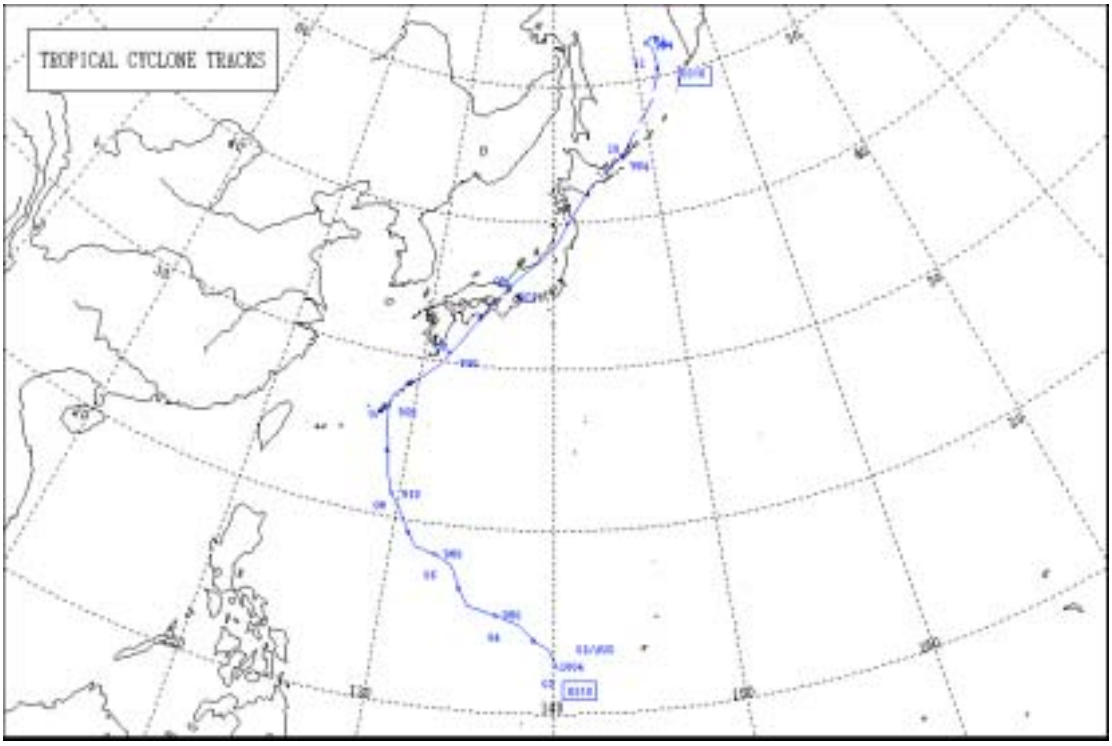
Date/Time		Center Position		Central pressure	Max Wind	CI Number	Grade	Date/Time		Center Position		Central pressure	Max Wind
	(UTC)	Lat (N)	Lon (E)	(hPa)	(kt)				(UTC)	Lat (N)	Lon (E)	(hPa)	(kt)
Jul	31/18	15.4	127.5	1004	-	-	TD		03/00	20.7	122.1	992	45
Aug	01/00	16.0	128.0	1004	-	-	TD		03/06	21.4	121.4	992	45
	01/06	16.6	127.9	1002	-	-	TD		03/12	22.1	121.0	994	45
	01/12	16.8	127.8	1002	-	-	TD		03/18	23.2	119.9	994	40
	01/18	17.6	127.3	1002	-	-	TD		04/00	23.7	119.0	996	35
	02/00	18.3	126.2	1000	-	-	TD		04/06	24.1	118.5	996	35
	02/06	18.9	125.1	996	35	2.5	TS		04/12	23.8	118.0	1000	-
	02/12	19.8	124.0	994	40	2.5	TS		04/18				
	02/18	20.1	122.9	992	45	3.0	TS						



TY ETAU (0310)

Etau formed as a tropical depression (TD) northeast of Yap Island at 18UTC 2 August 2003. It moved to the northwest and became a tropical storm (TS) north-northeast of Yap Island at 06UTC 3 August. Moving northwestwards, it developed into a severe tropical storm (STS) at 00UTC 4 August, then developed into a typhoon (TY) far southwest of Okinotorishima at 18UTC on the same day. It changed the direction to the north-northwest on 6 August and passed near Okinawa around half past 00UTC 7 August. It reached the peak intensity with a maximum sustained wind of 85kt north of Okinawa at 06UTC 7 August and changed the direction to the northeast. It passed near Amamioshima around half past 10UTC 7 August and made landfall around Muroto city, Kochi Prefecture at TY intensity before 13UTC 8 August. Then it passed near Awajishima around 18UTC 8 August and landed around Nishinomiya city, Hyogo Prefecture at STS intensity around 21UTC on that day. After traveling over Honshu with weakening, it entered the waters south of Hokkaido. It made landfall around Erimo Promontory at TS intensity around half past 16UTC 9 August and transformed into an extratropical cyclone over Hokkaido at 18UTC on that day. It entered Sea of Okhotsk and dissipated over the waters west of Kamchatka Peninsula at 00UTC 12 August.

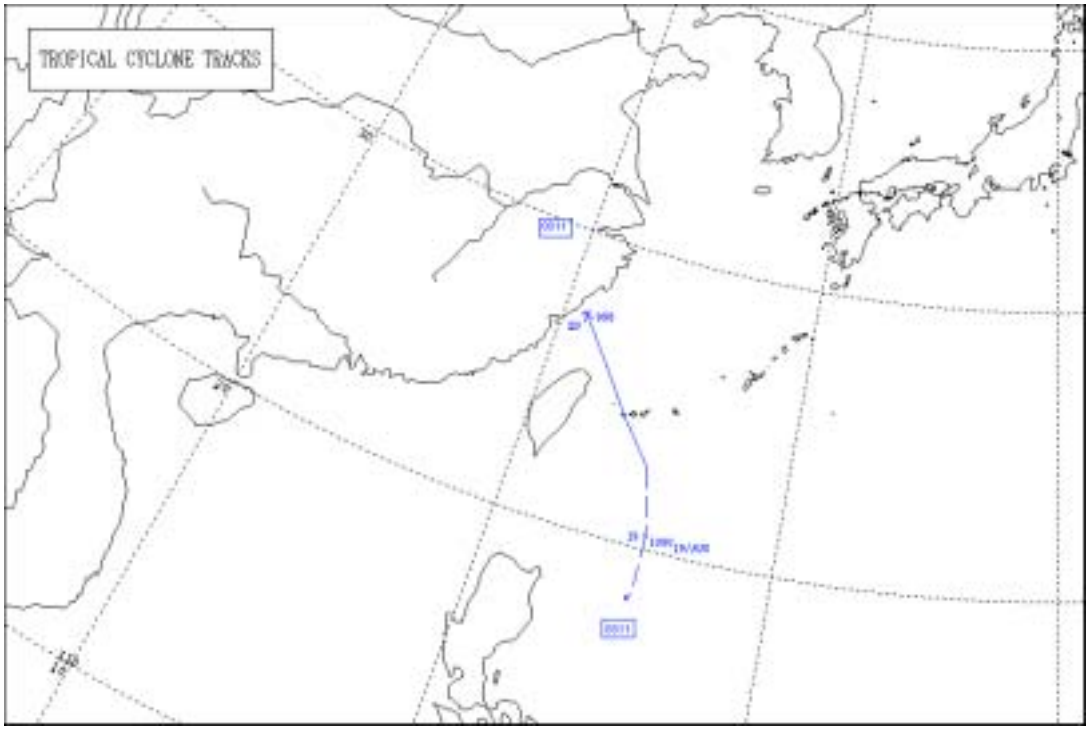
Date/Time		Center Position		Central pressure	Max Wind	CI Number	Grade	Date/Time		Center Position		Central pressure	Max Wind	CI Number	Grade
	(UTC)	Lat (N)	Lon (E)	(hPa)	(kt)				(UTC)	Lat (N)	Lon (E)	(hPa)	(kt)		
Aug	02/18	12.4	140.2	1004	-	-	TD	07/21	30.0	131.5	950	80	-	TY
	03/00	12.6	140.0	1004	-	-	TD	08/00	30.7	132.0	950	75	5.0	TY
	03/06	13.4	139.6	1000	35	2.0	TS	08/03	31.5	132.7	950	75	-	TY
	03/12	13.9	138.8	996	40	2.5	TS	08/06	32.1	133.1	950	75	5.0	TY
	03/18	14.7	138.0	990	45	3.0	TS	08/09	32.7	133.6	950	75	-	TY
	04/00	15.2	136.6	980	55	3.5	STS	08/12	33.2	134.0	950	75	5.0	TY
	04/06	15.6	135.0	980	55	3.5	STS	08/15	33.7	134.4	955	60	-	STS
	04/12	16.5	134.4	975	60	4.0	STS	08/18	34.2	134.8	965	50	4.0	STS
	04/18	17.8	133.8	965	70	4.5	TY	08/21	34.7	135.4	970	50	-	STS
	05/00	18.3	132.8	960	75	4.5	TY	09/00	35.5	136.1	975	45	4.0	TS
	05/06	18.6	131.5	960	75	4.5	TY	09/03	36.5	137.4	980	45	-	TS
	05/12	19.3	131.0	960	75	5.0	TY	09/06	37.4	138.8	985	40	3.5	TS
	05/18	20.5	130.3	960	75	5.0	TY	09/09	38.4	140.0	985	40	-	TS
	06/00	21.5	129.5	955	75	5.0	TY	09/12	40.0	141.2	985	40	3.0	TS
	06/06	22.7	129.0	955	75	5.0	TY	09/15	41.4	142.4	985	40	-	TS
	06/12	23.9	128.8	955	75	5.0	TY	09/16	41.9	142.8	985	40	-	TS
	06/15	24.7	128.6	955	75	-	TY	09/18	42.8	143.7	984	-	-	L
	06/18	25.3	128.4	950	80	5.0	TY	10/00	44.7	146.9	984	-	-	L
	06/21	26.0	128.3	950	80	-	TY	10/06	48.4	151.1	984	-	-	L
	07/00	26.5	128.2	950	80	5.5	TY	10/12	50.7	152.6	984	-	-	L
	07/03	27.0	128.2	950	80	-	TY	10/18	52.3	152.5	984	-	-	L
	07/06	27.5	128.5	945	85	5.5	TY	11/00	52.8	151.9	984	-	-	L
	07/09	28.0	129.0	945	85	-	TY	11/06	53.2	152.5	988	-	-	L
	07/10	28.1	129.2	945	85	-	TY	11/12	53.0	153.2	990	-	-	L
	07/12	28.4	129.5	950	80	5.5	TY	11/18	52.2	154.0	990	-	-	L
	07/15	28.8	130.1	950	80	-	TY	12/00						Dissip
	07/18	29.4	130.8	950	80	5.5	TY							


TROPICAL CYCLONE TRACKS

TS VAMCO (0311)

Vamco formed as a tropical depression (TD) east-northeast of Luzon Island at 06UTC 18 August 2003. It moved to the north-northwest and became a tropical storm (TS) and reached its peak intensity with a maximum sustained wind of 35kt over the sea south-southeast of Ishigakijima at 06UTC 19 August. It changed the direction to the northwest and weakened into a TD north of Taiwan Strait at 00UTC 20 August, then dissipated over the same waters at 06UTC on that day.

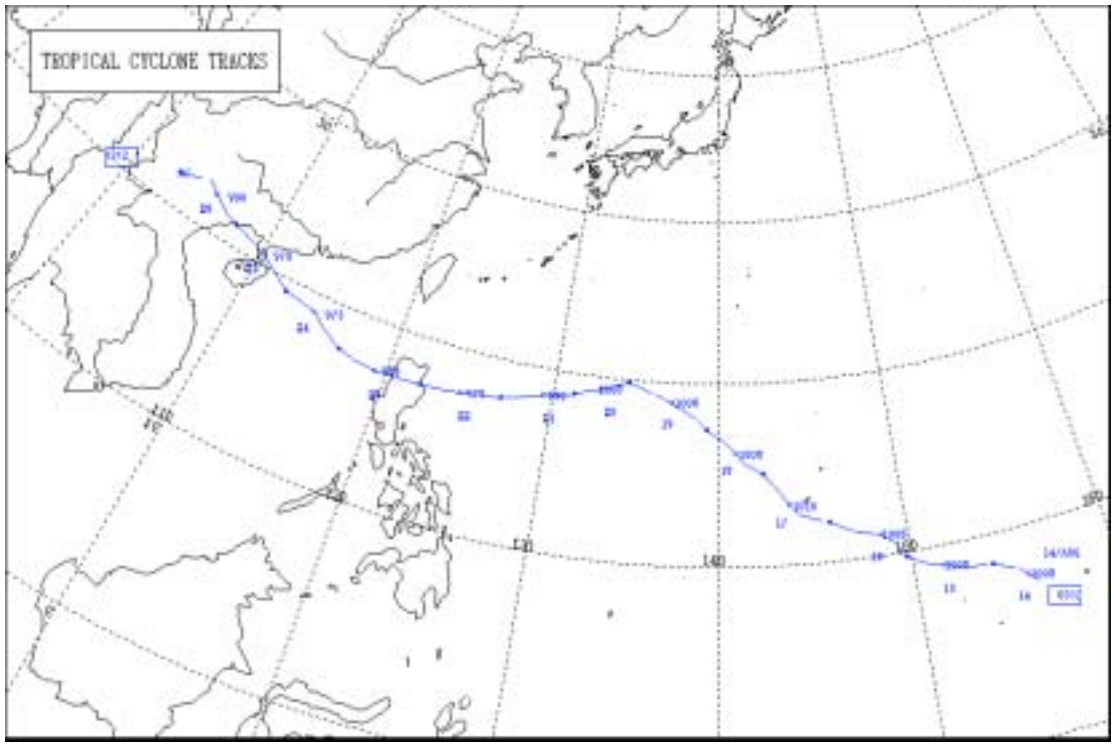
	Date/Time (UTC)	Center Position Lat (N)	Lon (E)	Central pressure (hPa)	Max Wind (kt)	CI Number	Grade	Date/Time (UTC)	Center Position Lat (N)	Lon (E)	Central pressure (hPa)	Max Wind (kt)	CI Number	Grade
Aug	18/06	18.3	125.3	1004	-	-	TD	19/12	24.2	123.5	996	35	2.5	TS
	18/12	18.4	125.3	1002	-	-	TD	19/15	24.9	122.9	996	35	-	TS
	18/18	18.6	125.4	1000	-	-	TD	19/18	25.5	122.4	996	35	2.5	TS
	19/00	20.5	125.4	1000	-	-	TD	20/00	27.2	120.9	998	-	-	TD
	19/06	22.7	124.8	996	35	2.5	TS	20/06						Dissip



TY KROVANH (0312)

Krovanh formed as a tropical depression (TD) west of Pompei Island at 18UTC 13 August 2003. It moved west-northwestwards and changed the direction to the northwest over the sea south of Guam around 18UTC 16 August. Keeping TD intensity, it changed the direction to the west-southwest over the sea west-southwest of Okinotorishima at 12UTC 19 August. It became a tropical storm (TS) far south of Minamidaitojima at 12UTC 20 August and developed into a severe tropical storm (STS) northeast of Luzon Island at 06UTC on the following day. It developed into a typhoon and reached its peak intensity with a maximum sustained wind of 65kt east of Luzon Island at 00UTC 22 August, then it crossed the Island on that day. After it temporarily weakened to TS over the western coast of Luzon Island at 18UTC 22, it developed into a STS west of the Island at 00UTC on the following day and gradually changed the direction to the west-northwest. It developed into a typhoon and reached the second peak intensity with a maximum sustained wind of 65kt over South China Sea at 18UTC 24 August. After it passed Leizhou Bandao around 00UTC 25 August, it landed on the northern coast of Vietnam at STS intensity around 12UTC on that day. It downgraded into a TS at 00 UTC 26 August and further downgraded into a TD over the northern part of Vietnam at 06UTC on that day. It dissipated over the northern part of Vietnam at 18UTC 26 August.

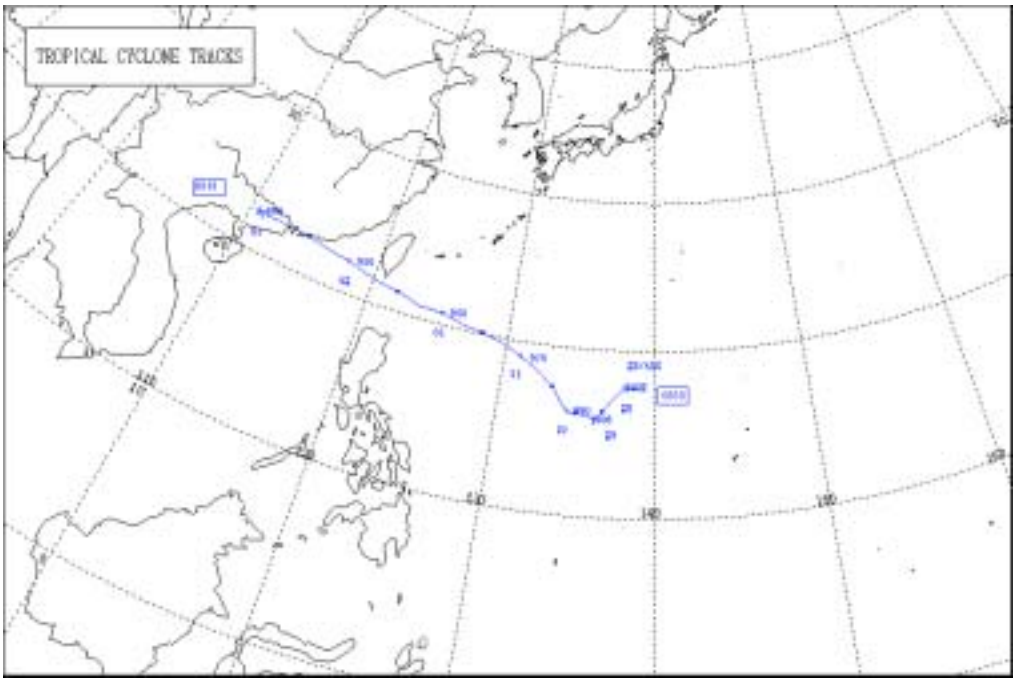
Date/Time		Center Position		Central pressure	Max Wind	CI Number	Grade	Date/Time		Center Position		Central pressure	Max Wind	CI Number	Grade
	(UTC)	Lat (N)	Lon (E)	(hPa)	(kt)				(UTC)	Lat (N)	Lon (E)	(hPa)	(kt)		
Aug	13/18	7.2	156.0	1008	-	-	TD	20/12	18.9	131.3	998	35	2.5	TS
	14/00	7.6	155.6	1008	-	-	TD	20/18	18.7	130.4	990	45	3.0	TS
	14/06	8.0	155.2	1008	-	-	TD	21/00	18.5	129.4	990	45	3.0	TS
	14/12	8.5	154.0	1008	-	-	TD	21/06	18.2	128.3	985	50	3.0	STS
	14/18	8.7	152.6	1006	-	-	TD	21/12	17.9	127.0	980	55	3.5	STS
	15/00	9.0	151.6	1008	-	-	TD	21/18	17.8	125.9	975	60	4.0	STS
	15/06	9.3	150.6	1006	-	-	TD	22/00	17.6	124.6	970	65	4.0	TY
	15/12	9.8	149.8	1006	-	-	TD	22/06	17.5	123.4	970	65	4.5	TY
	15/18	10.6	149.3	1006	-	-	TD	22/12	17.4	122.2	970	65	4.0	TY
	16/00	11.1	148.6	1008	-	-	TD	22/18	17.3	120.4	985	45	4.0	TS
	16/06	11.5	147.2	1008	-	-	TD	23/00	17.3	119.4	985	50	3.5	STS
	16/12	12.1	146.0	1008	-	-	TD	23/06	17.4	118.0	985	50	3.5	STS
	16/18	12.6	144.4	1008	-	-	TD	23/12	17.7	116.9	980	55	3.5	STS
	17/00	13.2	143.9	1010	-	-	TD	23/18	18.4	115.6	975	55	4.0	STS
	17/06	13.8	143.5	1008	-	-	TD	24/00	19.0	114.7	975	55	4.0	STS
	17/12	14.9	142.6	1008	-	-	TD	24/06	19.3	113.4	975	60	4.0	STS
	17/18	15.5	141.6	1008	-	-	TD	24/12	19.4	112.6	975	60	4.0	STS
	18/00	16.1	141.0	1008	-	-	TD	24/18	20.1	111.2	970	65	4.5	TY
	18/06	16.8	140.3	1008	-	-	TD	25/00	20.7	110.2	970	65	4.5	TY
	18/12	17.4	139.4	1008	-	-	TD	25/06	21.0	109.2	970	65	4.5	TY
	18/18	18.0	138.7	1008	-	-	TD	25/12	21.3	107.9	975	55	4.5	STS
	19/00	18.9	137.3	1008	-	-	TD	25/18	21.6	106.9	985	50	3.5	STS
	19/06	19.4	136.1	1008	-	-	TD	26/00	22.2	105.8	990	40	3.0	TS
	19/12	19.9	134.6	1008	-	-	TD	26/06	22.7	104.9	996	-	-	TD
	19/18	19.7	133.7	1008	-	-	TD	26/12	22.0	103.0	1000	-	-	TD
	20/00	19.4	132.9	1008	-	-	TD	26/18						Dissip
	20/06	19.2	132.0	1004	-	-	TD							


TROPICAL CYCLONE TRACKS

TY DUJUAN (0313)

Dujuan formed as a tropical depression (TD) southeast of Okinotorishima at 18UTC 27 August 2003. It moved westwards and soon changed the direction to the southwest, and then it changed the direction to the west again south of Okinotorishima at 00UTC 29 August. It became a tropical storm (TS) south-southwest of Okinotorishima at 18UTC 29 August. Shortly after it changed the direction to the west-northwest, it developed into a severe tropical storm (STS) southwest of Okinotorishima at 06UTC 30 August and further developed into a typhoon west-southwest of the Island at 18UTC on that day. It reached the peak intensity with a maximum sustained wind of 80kt south of Miyakojima at 00UTC 1 September. It downgraded into a STS and made landfall around Hong Kong at 12UTC 2 September. Travelling over the southern coast of China, it downgraded into a TS west of Hong Kong at 18UTC 2 September. It downgraded into a TD east of Nanning at 00UTC 3 September and dissipated 6 hours later.

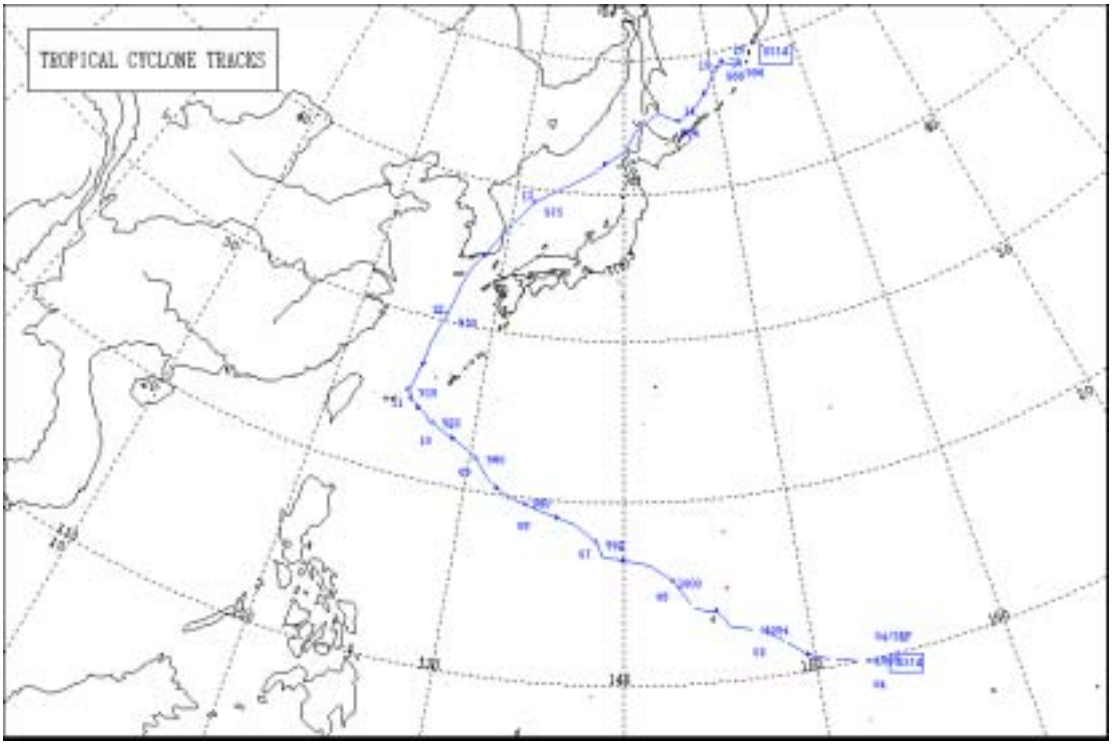
Date/Time		Center Position		Central pressure	Max Wind	CI Number	Grade	Date/Time		Center Position		Central pressure	Max Wind	CI Number	Grade
	(UTC)	Lat (N)	Lon (E)	(hPa)	(kt)				(UTC)	Lat (N)	Lon (E)	(hPa)	(kt)		
Aug	27/18	17.6	139.5	1008	-	-	TD		31/06	19.8	129.6	960	70	5.0	TY
	28/00	17.8	138.1	1008	-	-	TD		31/12	20.2	128.3	960	70	5.0	TY
	28/06	17.1	137.4	1008	-	-	TD		31/18	20.4	126.9	960	70	5.0	TY
	28/12	16.2	136.7	1008	-	-	TD	Sep	01/00	20.8	125.3	950	80	5.5	TY
	28/18	16.0	136.5	1006	-	-	TD		01/06	20.9	123.7	950	80	5.5	TY
	29/00	15.8	136.3	1006	-	-	TD		01/12	21.3	121.9	950	80	5.5	TY
	29/06	16.0	135.4	1002	-	-	TD		01/18	21.6	120.1	950	80	5.5	TY
	29/12	16.0	135.0	1000	-	-	TD		02/00	22.1	118.0	950	80	5.5	TY
	29/18	16.0	134.7	998	35	2.5	TS		02/06	22.3	116.6	960	70	5.0	TY
	30/00	16.1	134.5	990	45	3.0	TS		02/12	22.6	114.6	975	60	4.5	STS
	30/06	16.5	134.1	985	50	3.5	STS		02/18	22.6	112.7	990	45	4.5	TS
	30/12	17.5	133.4	980	55	3.5	STS		03/00	22.5	110.7	996	-	-	TD
	30/18	18.5	132.2	975	65	4.0	TY		03/06						Dissip
	31/00	19.1	131.1	970	65	4.5	TY								



TY MAEMI (0314)

Maemi formed as a tropical depression (TD) north of the Truk Islands at 00UTC 4 September 2003. It moved to the northwest and became a tropical storm (TS) west of the Mariana Islands at 06UTC 6 September. Holding a fairly straight northwestward track, it upgraded into a severe tropical storm (STS) far southwest of Okinotorishima at 18UTC 7 September, then upgraded into a typhoon (TY) south of Minamidaitojima at 18UTC on the following day. Still holding a northwestward track, it reached the peak intensity with a maximum sustained wind of 105kt southeast of Miyakojima at 12UTC 10 September. It passed near Miyakojima at the peak intensity after 19UTC 10 September and changed the direction sharply to the north-northeast. After it traveled over East China Sea, it made landfall on the southern coast of Korean Peninsula at TY intensity around 12UTC 12 September. It downgraded into STS near the eastern coast of Korean Peninsula at 18UTC 12 September and changed the direction to the northeast. It transformed into an extratropical cyclone over Sea of Okhotsk at 21UTC 13 September and dissipated over the adjacent waters of Chishima at 06UTC 16 September.

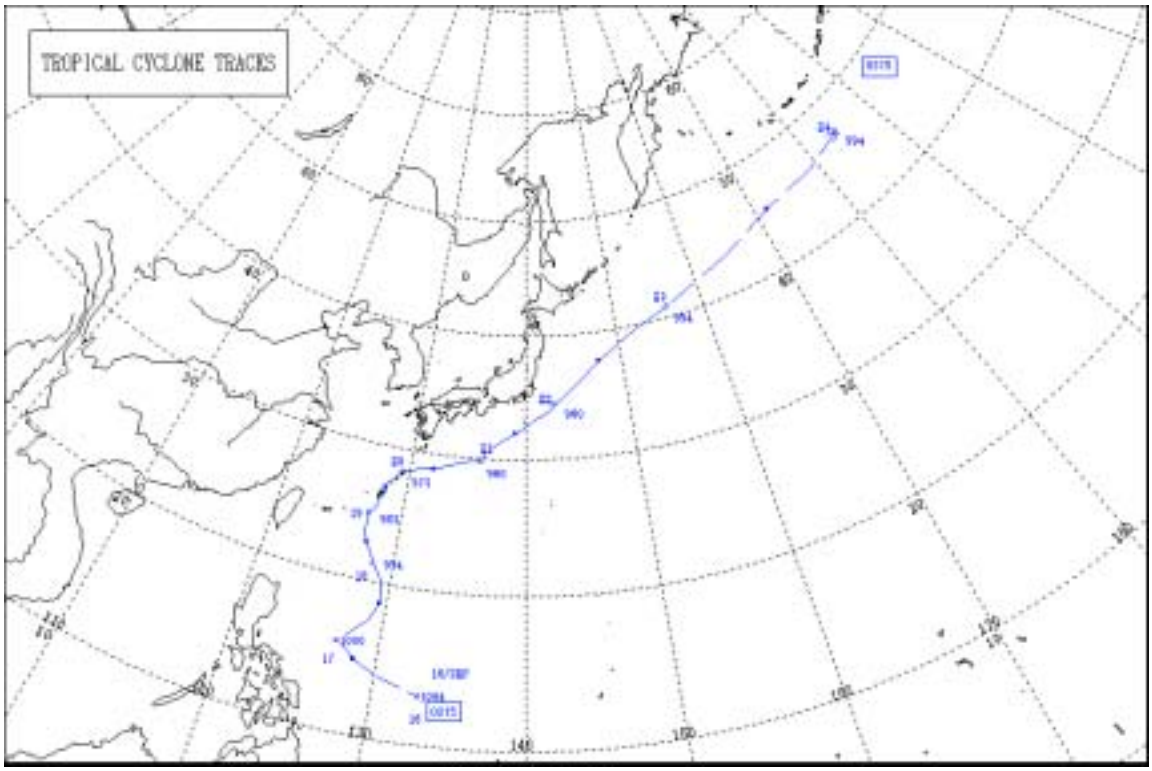
Date/Time		Center Position		Central pressure	Max Wind	CI Number	Grade	Date/Time		Center Position		Central pressure	Max Wind	CI Number	Grade
	(UTC)	Lat (N)	Lon (E)	(hPa)	(kt)				(UTC)	Lat (N)	Lon (E)	(hPa)	(kt)		
Sep	04/00	9.9	153.1	1008	-	-	TD	10/21	25.0	125.3	910	105	-	TY
	04/06	10.4	151.1	1006	-	-	TD	11/00	25.2	125.1	910	105	6.5	TY
	04/12	10.9	149.7	1006	-	-	TD	11/03	25.5	125.2	920	95	-	TY
	04/18	11.7	148.7	1004	-	-	TD	11/06	25.9	125.3	920	95	6.0	TY
	05/00	12.5	147.5	1004	-	-	TD	11/09	26.3	125.4	925	95	-	TY
	05/06	12.9	145.8	1004	-	-	TD	11/12	27.0	125.6	930	95	5.5	TY
	05/12	13.8	145.1	1004	-	-	TD	11/15	27.8	125.7	935	90	-	TY
	05/18	14.0	143.9	1002	-	-	TD	11/18	28.4	125.8	935	90	5.5	TY
	06/00	15.6	142.8	1000	-	-	TD	11/21	29.5	126.1	935	90	-	TY
	06/06	16.5	141.4	994	35	2.5	TS	12/00	30.5	126.5	930	95	6.0	TY
	06/12	16.8	139.9	994	35	2.5	TS	12/06	32.7	127.1	935	90	6.0	TY
	06/18	17.0	138.7	992	40	3.0	TS	12/09	33.9	127.5	945	80	-	TY
	07/00	17.8	138.3	992	40	3.0	TS	12/12	34.9	128.3	955	75	6.0	TY
	07/06	18.8	136.9	992	40	3.0	TS	12/18	37.0	129.8	970	60	6.0	STS
	07/12	19.1	135.9	990	45	3.5	TS	13/00	39.1	131.8	975	55	5.0	STS
	07/18	19.4	135.0	985	50	3.5	STS	13/06	40.5	134.6	980	50	5.0	STS
	08/00	19.7	133.9	980	55	4.0	STS	13/09	41.5	136.9	980	50	4.5	STS
	08/06	20.0	132.8	975	60	4.0	STS	13/12	42.3	138.1	980	50	4.0	STS
	08/12	20.4	132.0	975	60	4.0	STS	13/15	43.2	140.0	980	50	-	STS
	08/18	21.0	131.2	970	65	4.0	TY	13/18	44.7	141.2	980	50	3.5	STS
	09/00	22.0	130.4	960	70	5.0	TY	13/21	46.0	143.5	984	-	-	L
	09/06	22.6	129.4	950	80	5.5	TY	14/00	45.2	145.7	984	-	-	L
	09/12	22.9	128.7	940	85	6.0	TY	14/06	46.1	147.5	988	-	-	L
	09/18	23.3	127.8	930	90	6.5	TY	14/12	47.1	148.9	988	-	-	L
	10/00	23.6	127.2	925	95	6.5	TY	14/18	48.2	150.0	988	-	-	L
	10/03	23.7	126.9	920	95	-	TY	15/00	48.8	150.6	988	-	-	L
	10/06	24.0	126.6	910	100	7.0	TY	15/06	49.0	151.1	992	-	-	L
	10/09	24.2	126.3	910	100	-	TY	15/12	49.2	151.4	996	-	-	L
	10/12	24.3	126.0	910	105	7.0	TY	15/18	48.9	152.5	996	-	-	L
	10/15	24.6	125.7	910	105	-	TY	16/00	48.9	153.4	996	-	-	L
	10/18	24.7	125.4	910	105	7.0	TY	16/06						Dissip


TROPICAL CYCLONE TRACKS

TY CHOI-WAN (0315)

Choi-wan formed as a tropical depression (TD) north-northwest of the Palau Islands at 00UTC 16 September 2003. It moved to the northwest, then changed the direction to the northeast around 00UTC 17 September. After the change of its direction to the northwest again around 12UTC 17 September, it became a tropical storm (TS) far south of Okinawa at 00UTC 18 September. Shortly after changing the direction to the north-northeast, it upgraded into a severe tropical storm (STS) south of Okinawa at 00UTC 19 September and passed the northeastern part of Okinawa around 0830UTC on that day. Then it passed Amamioshima around 2230UTC 19 September and turned east-northeastwards. It upgraded into a typhoon (TY) southeast of Kyushu at 15UTC 20 September. After reaching the peak intensity with a maximum sustained wind of 70kt south of Kii Peninsula at 21UTC 20 September, it turned northeastwards around 00UTC 21 September. Holding a fairly straight northeastward track, it downgraded into STS over the waters east of Honshu at 12UTC 22 September and transformed into an extratropical cyclone east of Hokkaido at 00UTC 23 September. It crossed the International Date Line on that day.

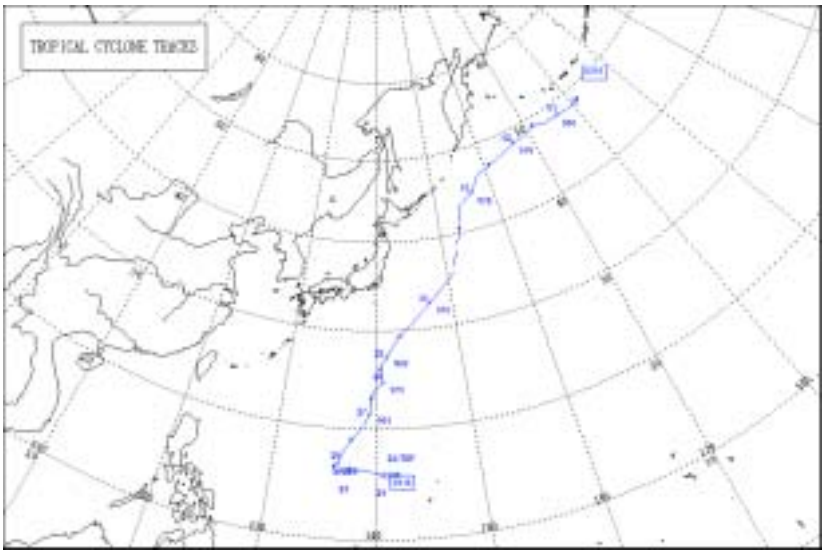
Date/Time		Center Position		Central pressure	Max Wind	CI Number	Grade	Date/Time		Center Position		Central pressure	Max Wind	CI Number	Grade
	(UTC)	Lat (N)	Lon (E)	(hPa)	(kt)				(UTC)	Lat (N)	Lon (E)	(hPa)	(kt)		
Sep	16/00	13.1	133.0	1004	-	-	TD	20/03	28.6	130.1	975	60	-	STS
	16/06	14.0	130.2	1004	-	-	TD	20/06	28.7	130.5	975	60	3.5	STS
	16/12	14.8	128.4	1002	-	-	TD	20/09	28.8	131.2	975	60	-	STS
	16/18	15.2	128.1	1000	-	-	TD	20/12	28.9	132.0	970	60	3.5	STS
	17/00	15.8	127.1	1000	-	-	TD	20/15	29.2	132.8	970	65	-	TY
	17/06	17.5	128.9	1000	-	-	TD	20/18	29.5	133.7	970	65	4.0	TY
	17/12	18.8	129.5	1000	-	-	TD	20/21	29.8	134.7	965	70	-	TY
	17/18	20.2	129.4	1000	-	-	TD	21/00	29.9	136.0	960	70	5.0	TY
	18/00	21.4	128.5	994	40	2.5	TS	21/03	30.5	136.3	960	70	-	TY
	18/06	21.8	128.3	990	45	3.0	TS	21/06	31.0	137.0	955	70	5.0	TY
	18/12	22.8	127.7	990	45	3.0	TS	21/09	31.6	138.0	955	70	-	TY
	18/15	23.2	127.5	990	45	-	TS	21/12	32.2	139.0	955	70	5.0	TY
	18/18	23.6	127.3	990	45	3.0	TS	21/15	32.7	140.0	955	70	-	TY
	18/21	24.1	127.3	990	45	-	TS	21/18	33.2	140.7	960	70	5.0	TY
	19/00	24.9	127.4	985	50	3.0	STS	21/21	33.8	142.1	960	70	-	TY
	19/03	25.4	127.7	985	50	-	STS	22/00	34.4	142.8	960	70	5.0	TY
	19/06	26.0	127.9	985	50	3.0	STS	22/03	35.1	143.8	965	70	-	TY
	19/08	26.5	128.2	985	50	-	STS	22/06	35.9	145.0	965	65	4.5	TY
	19/09	26.7	128.1	980	60	-	STS	22/12	37.7	147.6	980	55	4.0	STS
	19/12	27.0	128.2	980	60	3.5	STS	22/18	39.5	151.2	985	50	4.0	STS
	19/15	27.4	128.3	980	60	-	STS	23/00	41.0	156.0	994	-	-	L
	19/18	27.7	128.7	975	60	3.5	STS	23/06	43.4	164.3	1000	-	-	L
	19/21	28.0	129.0	975	60	-	STS	23/12	45.3	171.6	1000	-	-	L
	19/22	28.1	129.2	975	60	-	STS	23/18	46.0	178.7	996	-	-	L
	20/00	28.4	129.4	975	60	3.5	STS	24/00	47.0	184.5	994	-	-	Out


TROPICAL CYCLONE TRACKS

TY KOPPU (0316)

Koppu formed as a tropical depression (TD) over the sea west of the Mariana Islands at 00UTC 24 September 2003. After moving toward west for about a day, it began to take an abrupt clockwise turn. Moving toward the northeast, it developed into a tropical storm (TS) over the sea east of Okinotorishima at 18UTC 26 September. While it developed slowly, it made a meandering track for about two days over the sea southwest of Chichijima. Then it reached Typhoon intensity at 00UTC 29 September near Chichijima. Soon, it reached its peak intensity with a maximum sustained wind of 70kt over the same waters at 06TUC on that day. Moving toward the northeast, it weakened a little and transformed into an extratropical cyclone at 06UTC 30 September over the sea east of Japan and it turned north-northeastwards. After reaching the sea south of the Kuril Islands, it moved northeastwards and gradually changed the direction to the east over the sea south of the Aleutian Islands. It crossed the International Date Line at around 06UTC 3 October.

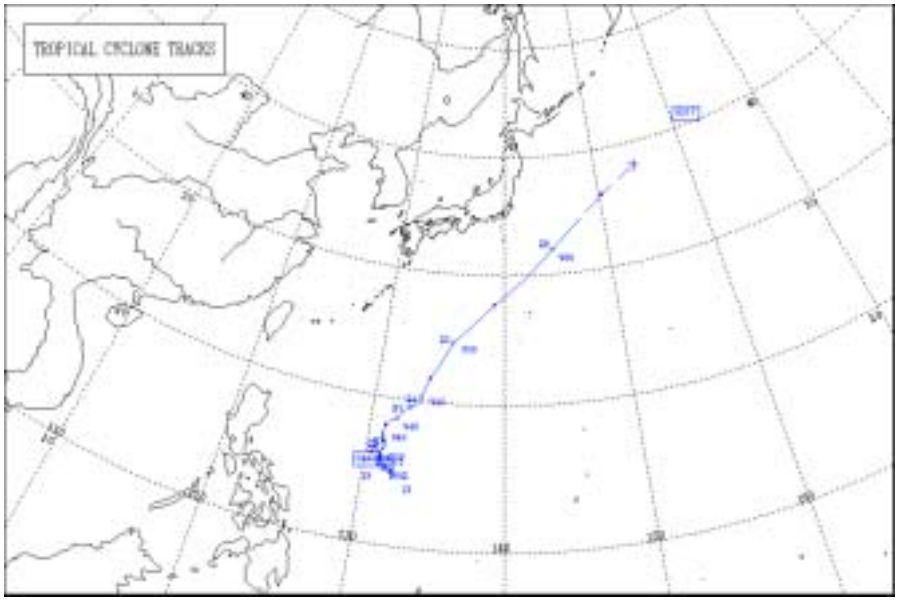
Date/Time		Center Position		Central pressure	Max Wind	CI Number	Grade	Date/Time		Center Position		Central pressure	Max Wind	CI Number	Grade
	(UTC)	Lat (N)	Lon (E)	(hPa)	(kt)				(UTC)	Lat (N)	Lon (E)	(hPa)	(kt)		
Sep	24/00	15.8	140.5	1006	-	-	TD		28/21	27.0	141.0	970	60	-	STS
	24/06	16.3	138.8	1004	-	-	TD		29/00	27.3	141.2	965	65	4.0	TY
	24/12	16.3	137.5	1002	-	-	TD		29/03	27.7	141.5	965	65	-	TY
	24/18	16.3	136.8	1002	-	-	TD		29/06	28.3	141.9	960	70	4.5	TY
	25/00	16.0	136.1	1000	-	-	TD		29/12	29.5	142.9	965	65	4.5	TY
	25/06	16.3	136.0	998	-	-	TD		29/18	30.6	144.3	965	65	4.5	TY
	25/12	16.5	136.0	998	-	-	TD		30/00	32.8	147.0	970	60	4.0	STS
	25/18	16.6	136.0	996	-	-	TD		30/06	35.6	150.7	976	-	-	L
	26/00	16.8	136.3	996	-	-	TD		30/12	40.7	153.1	972	-	-	L
	26/06	18.1	136.8	998	-	-	TD		30/18	43.2	153.8	968	-	-	L
	26/12	19.0	137.5	998	-	-	TD	Oct	01/00	44.5	156.4	972	-	-	L
	26/18	20.4	138.6	992	35	2.0	TS		01/06	46.3	158.3	976	-	-	L
	27/00	21.5	139.3	985	40	2.5	TS		01/12	47.1	160.9	976	-	-	L
	27/06	22.5	139.4	980	50	3.0	STS		01/18	47.6	163.8	976	-	-	L
	27/12	23.1	139.5	980	50	3.0	STS		02/00	48.3	166.6	976	-	-	L
	27/18	24.0	139.9	975	55	3.5	STS		02/06	48.5	169.1	976	-	-	L
	28/00	24.7	140.8	975	55	3.5	STS		02/12	49.1	171.4	978	-	-	L
	28/06	25.4	140.6	975	60	3.5	STS		02/18	48.5	173.5	980	-	-	L
	28/09	25.8	140.5	970	60	-	STS		03/00	48.5	176.4	980	-	-	L
	28/12	26.1	140.5	970	60	3.5	STS		03/06	48.2	179.6	980	-	-	L
	28/15	26.4	140.5	970	60	-	STS		03/12	48.5	181.3	984	-	-	Out
	28/18	26.7	140.7	970	60	3.5	STS								



TY KETSANA (0317)

Ketsana formed as a tropical depression (TD) far east of Luzon Island at 06UTC 17 October 2003. It drifted west-northwestwards and became a tropical storm (TS) over the same waters at 00UTC 19 October. Shortly after changing the direction to the east-northeast, it upgraded into a severe tropical storm (STS) over the same waters at 18UTC 19 October and further deepened into a typhoon (TY) at 12UTC on the following day. It changed the direction to the north around 12UTC 20 October and reached the peak intensity with a maximum sustained wind of 90kt far east of Luzon Island at 00UTC 22 October. It turned northeastwards around 12UTC 22 October and traveled over the waters far south of Japan. Holding a fairly straight northeastward track, it downgraded into STS over the waters far southeast of Hachijojima at 18UTC 25 October. It transformed into an extratropical cyclone east of Honshu at 06UTC 26 October and dissipated over the same waters around 00UTC 27 October.

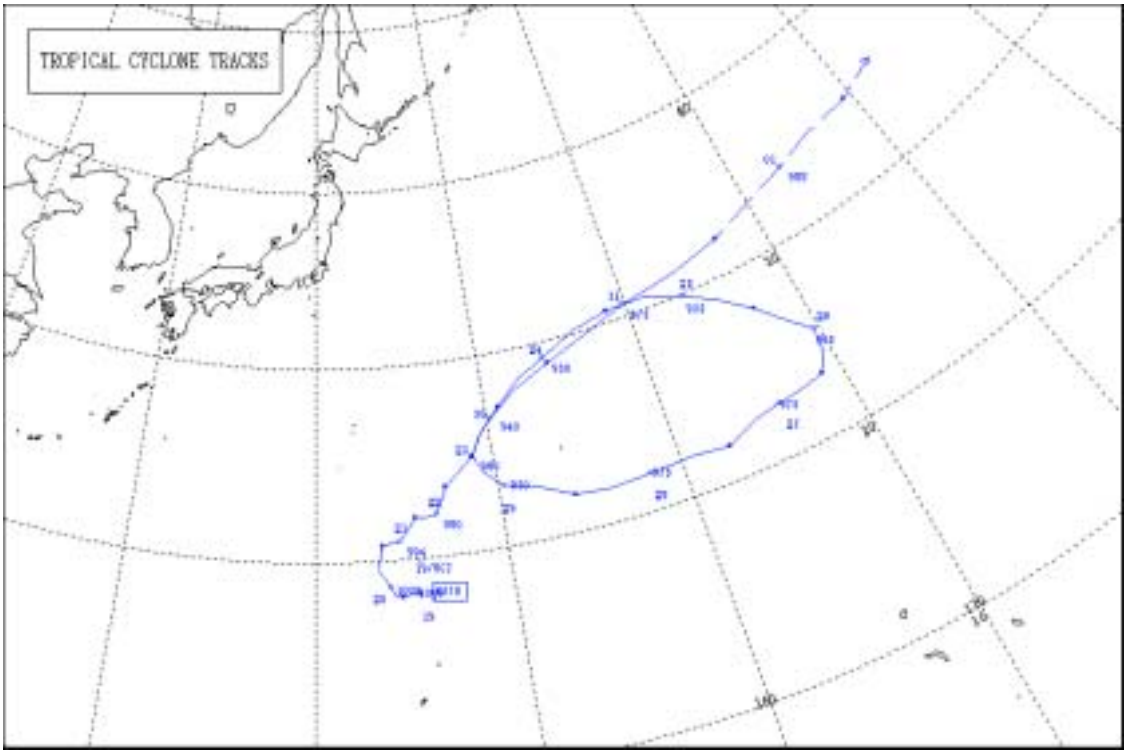
	Date/Time	Center Position		Central pressure	Max Wind	CI Number	Grade	Date/Time	Center Position		Central pressure	Max Wind	CI Number	Grade
	(UTC)	Lat (N)	Lon (E)	(hPa)	(kt)			(UTC)	Lat (N)	Lon (E)	(hPa)	(kt)		
Oct	17/06	15.1	131.8	1004	-	-	TD	22/06	17.8	131.1	940	90	6.0	TY
	17/12	15.0	132.1	1004	-	-	TD	22/12	18.1	131.2	940	85	6.0	TY
	17/18	14.8	132.2	1002	-	-	TD	22/18	18.5	131.5	940	85	6.0	TY
	18/00	14.7	132.1	1002	-	-	TD	23/00	18.7	132.0	940	85	6.0	TY
	18/06	14.8	131.8	1000	-	-	TD	23/06	19.2	132.3	940	85	6.0	TY
	18/12	15.1	131.6	1000	-	-	TD	23/12	19.6	132.8	940	85	6.0	TY
	18/18	15.4	130.9	1000	-	-	TD	23/18	20.0	133.5	940	85	6.0	TY
	19/00	15.6	130.4	996	35	-	TS	24/00	20.4	133.6	945	80	5.5	TY
	19/06	15.5	130.0	992	35	2.5	TS	24/06	21.0	133.7	945	80	5.5	TY
	19/12	15.4	130.1	990	45	2.5	TS	24/12	21.8	134.1	945	80	5.5	TY
	19/18	15.5	130.5	985	50	3.0	STS	24/18	22.9	134.8	945	80	5.5	TY
	20/00	15.6	130.7	980	55	3.5	STS	25/00	24.6	135.7	950	80	5.5	TY
	20/06	15.7	130.9	975	60	4.0	STS	25/06	25.9	137.1	955	75	5.0	TY
	20/12	15.9	131.1	970	65	4.0	TY	25/12	27.7	139.1	965	70	4.5	TY
	20/18	16.2	131.0	965	70	4.5	TY	25/18	29.8	141.9	975	60	4.0	STS
	21/00	16.4	131.2	950	80	5.5	TY	26/00	32.1	144.6	980	55	3.5	STS
	21/06	16.7	131.3	945	85	6.0	TY	26/06	34.4	147.7	986	-	-	L
	21/12	17.0	131.2	940	85	6.0	TY	26/12	36.1	150.3	990	-	-	L
	21/18	17.2	131.2	940	85	6.0	TY	26/18	38.2	154.6	996	-	-	L
	22/00	17.4	131.1	940	90	6.0	TY	27/00						Dissip



TY PARMA (0318)

Parma formed as a tropical depression (TD) over the adjacent seas of the Mariana Islands at 00UTC 19 October 2003. It took a clockwise track and became a tropical storm (TS) over the same waters at 00UTC 21 October. It drifted northeastwards and upgraded into a severe tropical storm (STS) north of the Mariana Islands at 18UTC 21 October and further deepened into a typhoon (TY) at 06UTC on the following day. It took a clockwise elliptical track ranging about 9 and 21 degrees in latitude and longitude, respectively, from 00UTC 23 October to 12UTC 29 October. During this period, Parma reached its peak intensity twice. One of them is with a maximum sustained wind of 95kt north of Minamitorishima at 00UTC 24 October and the other one is 90kt west of the Island at 06UTC 29 October. After taking this elliptical track, it took a fairly straight east-northeast track and rapidly weakened into STS northeast of Minamitorishima at 00UTC 31 October. It transformed into an extratropical cyclone far northeast of Minamitorishima at 12UTC 31 October and crossed the International Date Line on 1 November.

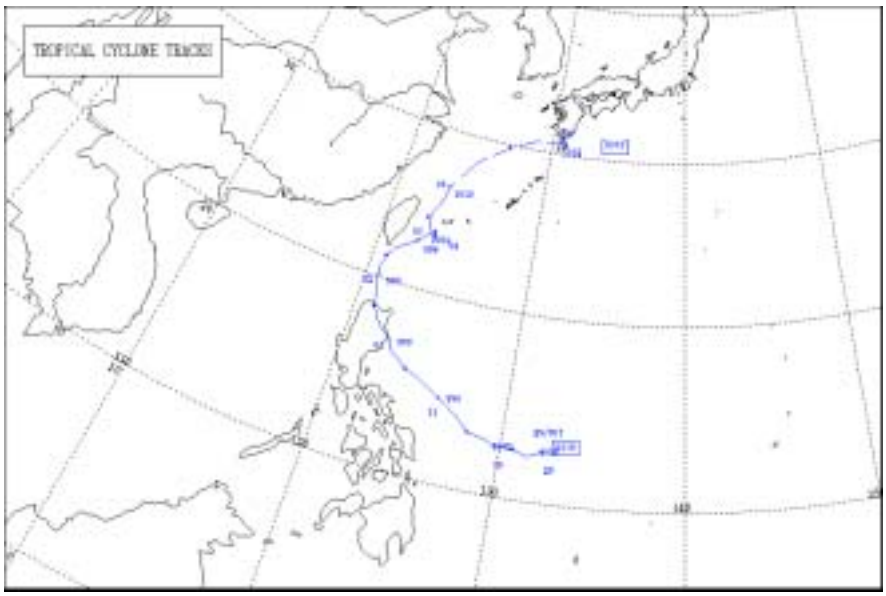
Date/Time		Center Position		Central pressure	Max Wind	CI Number	Grade	Date/Time		Center Position		Central pressure	Max Wind	CI Number	Grade
	(UTC)	Lat (N)	Lon (E)	(hPa)	(kt)				(UTC)	Lat (N)	Lon (E)	(hPa)	(kt)		
Oct	19/00	18.4	145.2	1000	-	-	TD		26/00	25.3	169.7	965	65	4.5	TY
	19/06	18.4	144.8	1000	-	-	TD		26/06	24.0	169.5	970	60	4.5	STS
	19/12	18.3	144.4	1000	-	-	TD		26/12	23.1	168.9	970	60	4.5	STS
	19/18	18.4	144.0	1000	-	-	TD		26/18	22.9	167.6	970	60	4.5	STS
	20/00	18.8	143.8	1000	-	-	TD		27/00	22.7	166.0	975	60	4.0	STS
	20/06	19.7	143.2	998	-	-	TD		27/06	22.5	164.5	975	60	4.0	STS
	20/12	20.8	143.5	998	-	-	TD		27/12	21.8	162.7	975	60	4.0	STS
	20/18	20.9	143.9	996	-	-	TD		27/18	22.0	160.6	975	60	4.0	STS
	21/00	21.0	144.4	994	35	2.5	TS		28/00	21.9	158.2	975	60	4.0	STS
	21/06	21.5	144.9	992	40	2.5	TS		28/06	21.8	155.9	975	60	4.0	STS
	21/12	22.1	145.3	990	45	3.0	TS		28/12	21.9	154.0	970	65	4.5	TY
	21/18	22.1	146.1	985	50	3.5	STS		28/18	22.7	152.2	960	70	5.0	TY
	22/00	22.2	146.5	980	55	3.5	STS		29/00	23.1	150.4	950	80	5.5	TY
	22/06	23.0	146.9	970	65	4.0	TY		29/06	23.9	149.4	935	90	6.5	TY
	22/12	23.5	147.1	970	65	4.0	TY		29/12	24.8	148.9	935	90	6.5	TY
	22/18	24.1	147.9	965	65	4.0	TY		29/18	25.7	149.3	935	90	6.5	TY
	23/00	24.8	148.8	960	70	5.0	TY		30/00	26.6	150.2	940	85	6.0	TY
	23/06	26.1	149.6	950	80	5.5	TY		30/06	27.8	151.8	945	80	5.5	TY
	23/12	27.1	150.8	940	85	6.0	TY		30/12	28.9	154.3	955	75	5.0	TY
	23/18	28.4	152.3	935	90	6.5	TY		30/18	29.7	156.6	965	70	4.5	TY
	24/00	29.2	154.1	930	95	6.5	TY		31/00	30.7	159.8	975	60	4.0	STS
	24/06	30.2	156.3	930	95	6.5	TY		31/06	31.3	163.5	980	55	3.5	STS
	24/12	30.7	158.7	930	95	6.5	TY		31/12	32.0	167.0	984	-	-	L
	24/18	30.7	161.4	930	95	6.5	TY		31/18	33.0	170.2	988	-	-	L
	25/00	30.0	163.5	935	90	6.5	TY	Nov	01/00	33.7	173.1	988	-	-	L
	25/06	29.0	165.4	935	90	6.0	TY		01/06	34.4	175.9	990	-	-	L
	25/12	27.7	167.2	945	85	5.5	TY		01/12	34.7	179.4	992	-	-	L
	25/18	26.4	168.5	955	75	5.0	TY		01/18	35.6	182.6	992	-	-	Out


TROPICAL CYCLONE TRACKS

STS MELOR (0319)

Melor formed as a tropical depression (TD) east of the Philippines at 00UTC 29 October 2003. It moved to the west and became a tropical storm (TS) over the same waters at 12UTC 30 October. It changed the direction to the northwest and upgraded into a severe tropical storm (STS) and also reached the peak intensity with a maximum sustained wind of 50kt east of Luzon Island at 18UTC 31 October. After making landfall on Luzon Island about 6 hours later, it downgraded into TS over the Island and gradually changed the direction to the north. After changing the direction to the northeast over the Bashi Channel at around 12UTC 2 November, it reached the waters south-southwest of Iriomotejima at 12UTC on the following day and almost stationed there for more than a half day. It downgraded into TD over the same waters at 18UTC 3 November and began to move to the northwest about 12 hours later. It changed the direction to the northeast gradually near Yonagunijima from 12UTC 4 November. It transformed into an extratropical cyclone southwest of Kyushu at 18UTC 5 November and dissipated near Tanegashima around 06UTC on the following day.

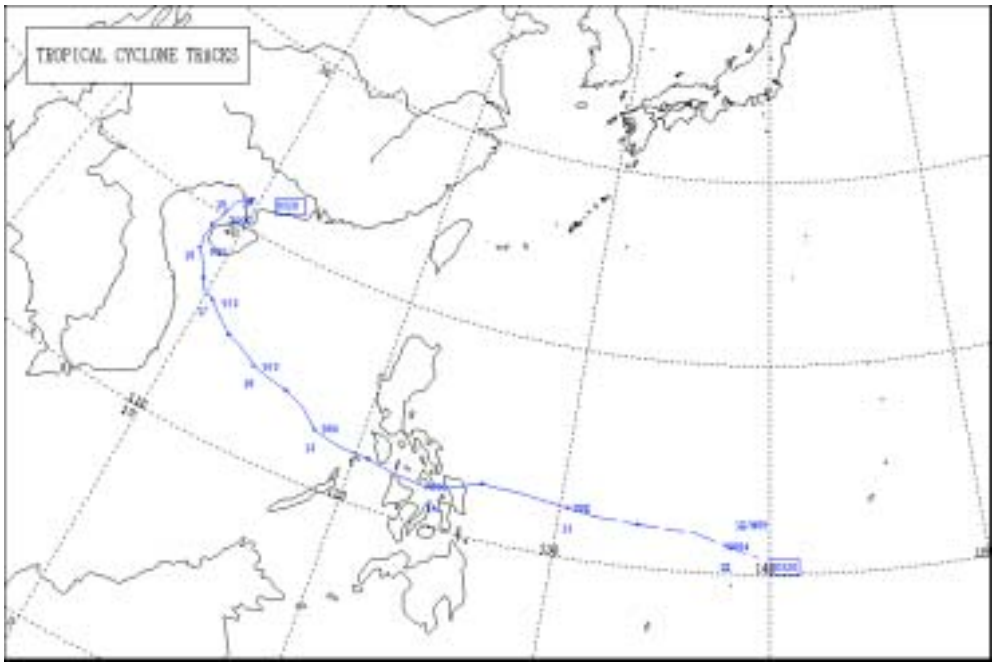
Date/Time		Center Position		Central pressure	Max Wind	CI Number	Grade	Date/Time		Center Position		Central pressure	Max Wind	CI Number	Grade
	(UTC)	Lat (N)	Lon (E)	(hPa)	(kt)				(UTC)	Lat (N)	Lon (E)	(hPa)	(kt)		
Oct	29/00	12.7	132.3	1006	-	-	TD		02/12	21.4	120.9	990	40	3.5	TS
	29/06	12.4	131.5	1006	-	-	TD		02/18	22.0	121.3	992	35	3.5	TS
	29/12	12.6	130.7	1006	-	-	TD		03/00	22.8	122.5	996	35	3.5	TS
	29/18	12.7	130.3	1004	-	-	TD		03/06	23.2	122.9	998	35	3.0	TS
	30/00	12.6	129.7	1002	-	-	TD		03/09	23.5	123.3	998	35	-	TS
	30/06	12.9	129.1	1000	-	-	TD		03/12	23.6	123.4	998	35	3.0	TS
	30/12	13.1	128.1	996	35	2.5	TS		03/18	23.5	123.5	1004	-	-	TD
	30/18	13.8	127.3	996	35	2.5	TS		04/00	23.3	123.5	1004	-	-	TD
	31/00	14.5	126.2	990	40	3.0	TS		04/06	23.5	123.2	1006	-	-	TD
	31/06	15.3	124.8	985	45	3.5	TS		04/12	24.3	122.7	1008	-	-	TD
	31/12	15.6	124.0	985	45	3.5	TS		04/18	25.5	123.3	1008	-	-	TD
	31/18	16.3	122.9	980	50	4.0	STS		05/00	26.5	123.5	1010	-	-	TD
Nov	01/00	16.9	122.6	980	50	4.0	STS		05/06	28.5	124.9	1010	-	-	TD
	01/06	17.5	121.8	990	40	3.5	TS		05/12	29.8	127.0	1012	-	-	TD
	01/12	18.4	121.2	996	35	3.0	TS		05/18	30.6	128.7	1012	-	-	L
	01/18	19.5	121.0	992	45	3.5	TS		06/00	30.8	130.8	1012	-	-	L
	02/00	20.1	120.8	990	45	3.5	TS		06/06						Dissip
	02/06	20.6	120.7	990	45	3.5	TS								



TY NEPARTAK (0320)

Nepartak formed as a tropical depression (TD) over the sea northeast of Yap Island at 18UTC 11 November 2003. After moving toward west for about a day, it developed into a tropical storm (TS) over the sea east of the Philippines at 18UTC 12 November. Developing slowly, it moved toward west and made landfall on the Philippines at around 16UTC 13 November. After it crossed over the Philippines, it turned gradually to west-northwest and reached Typhoon intensity and its peak intensity with a maximum sustained wind of 65kt over the sea southeast of Hainan Island at 18UTC 16 November. It turned gradually to the north and went into Gulf of Tongking and weakened into a tropical depression at 06UTC 19 November. The tropical depression dissipated over the Gulf of Tongking at 18UTC 19 November.

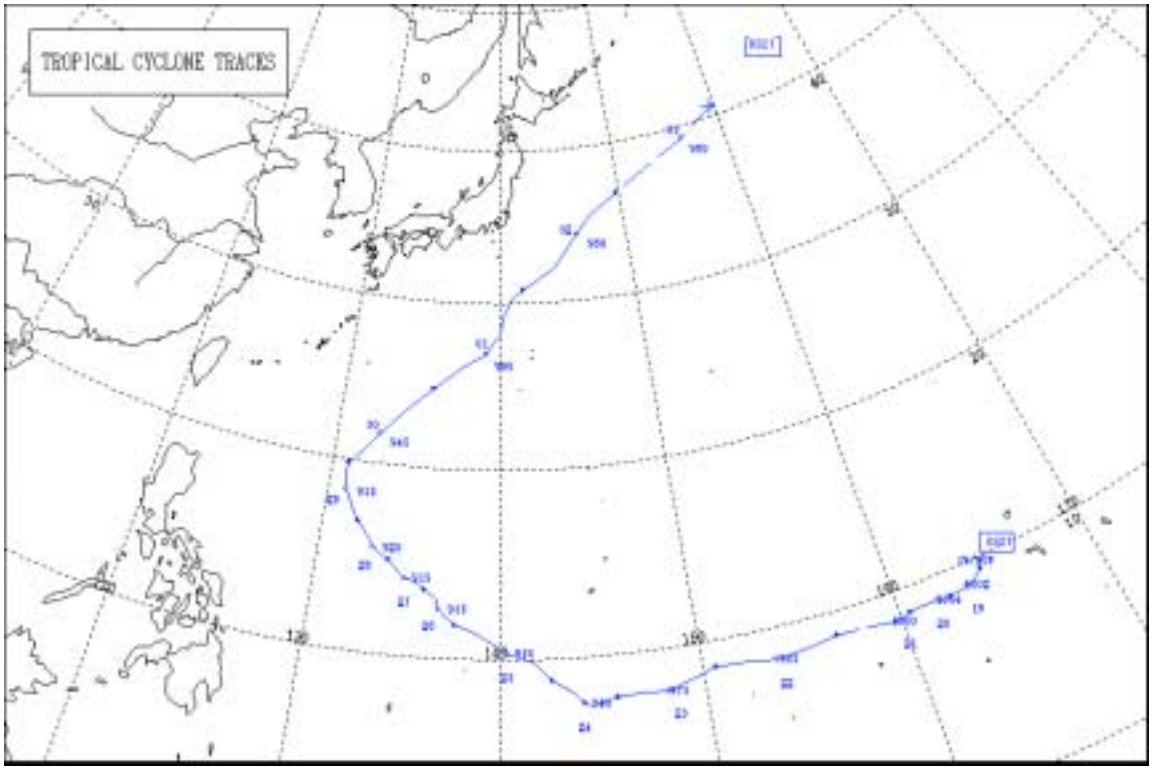
	Date/Time	Center Position		Central pressure	Max Wind	CI Number	Grade	Date/Time	Center Position		Central pressure	Max Wind	CI Number	Grade
	(UTC)	Lat (N)	Lon (E)	(hPa)	(kt)			(UTC)	Lat (N)	Lon (E)	(hPa)	(kt)		
Nov	11/18	10.8	139.5	1004	-	-	TD	16/00	14.2	113.9	975	60	4.0	STS
	12/00	11.3	138.0	1004	-	-	TD	16/06	14.6	113.2	975	60	4.0	STS
	12/06	11.8	136.5	1002	-	-	TD	16/12	15.0	112.1	975	60	4.0	STS
	12/12	12.0	133.8	1000	-	-	TD	16/18	15.5	111.3	970	65	4.5	TY
	12/18	12.1	131.8	998	35	3.0	TS	17/00	16.1	110.5	975	60	4.5	STS
	13/00	12.3	130.4	992	40	3.0	TS	17/06	16.3	109.9	975	60	4.5	STS
	13/06	12.6	128.2	992	40	3.0	TS	17/12	16.8	109.6	975	60	4.5	STS
	13/12	12.6	126.2	985	50	3.5	STS	17/18	17.4	109.1	980	60	4.5	STS
	13/18	12.2	125.0	990	45	3.5	TS	18/00	18.0	108.6	985	55	4.5	STS
	14/00	11.8	123.7	990	45	3.0	TS	18/06	18.6	108.4	990	55	4.0	STS
	14/06	12.0	121.9	990	45	3.0	TS	18/12	19.3	108.5	996	45	3.5	TS
	14/12	12.2	120.7	990	45	3.5	TS	18/18	19.7	108.6	1000	40	3.0	TS
	14/18	12.3	119.1	985	50	3.5	STS	19/00	20.3	108.8	1000	35	2.5	TS
	15/00	12.6	117.8	980	55	4.0	STS	19/06	21.0	109.0	1004	-	-	TD
	15/06	13.4	116.8	975	60	4.0	STS	19/12	21.3	109.7	1008	-	-	TD
	15/12	13.8	115.8	975	60	4.0	STS	19/18						Dissip
	15/18	14.0	114.7	975	60	4.0	STS							



TY LUPIT (0321)

Lupit formed as a tropical depression (TD) over the sea west of the Marshall Islands at 12UTC 18 November 2003. After moving westward for three days, it developed into a tropical storm (TS) northwest of Pompei Island at 12UTC 21 November. Developing slowly, it moved westward and developed into a typhoon (TY) near the Caroline Islands at around 12UTC 23 November. Then it moved northwestward at around 00UTC 24 November. Moving northwestward, it reached its peak intensity with a maximum sustained wind of 100kt over the sea east of Philippines at 12UTC 26 November. It turned gradually northeastward at around 12UTC 29 November and moved to the sea south of Japan. It transformed an extratropical cyclone at 12UTC 2 December over the sea east of Japan and dissipated over the sea far east of Japan at 12UTC 3 December.

Date/Time	Center Position		Central pressure	Max Wind	CI Number	Grade	Date/Time	Center Position		Central pressure	Max Wind	CI Number	Grade
(UTC)	Lat (N)	Lon (E)	(hPa)	(kt)			(UTC)	Lat (N)	Lon (E)	(hPa)	(kt)		
Nov 18/12	9.5	164.5	1004	-	-	TD	26/12	13.5	136.0	920	100	7.0	TY
18/18	9.0	163.8	1002	-	-	TD	26/18	13.9	135.4	915	100	7.0	TY
19/00	9.0	163.6	1002	-	-	TD	27/00	14.0	134.9	915	100	7.0	TY
19/06	8.9	163.2	1002	-	-	TD	27/06	14.4	134.5	915	100	7.0	TY
19/12	8.8	162.6	1002	-	-	TD	27/12	14.9	133.9	915	100	7.0	TY
19/18	8.8	162.2	1002	-	-	TD	27/18	15.2	133.4	915	100	7.0	TY
20/00	8.9	162.0	1004	-	-	TD	28/00	15.5	133.0	920	100	6.5	TY
20/06	8.9	160.9	1002	-	-	TD	28/06	16.1	132.6	925	95	6.0	TY
20/12	8.8	160.5	1004	-	-	TD	28/12	16.8	132.0	930	90	5.5	TY
20/18	8.7	160.2	1000	-	-	TD	28/18	17.6	131.5	935	85	5.5	TY
21/00	8.6	159.7	1000	-	-	TD	29/00	18.4	131.1	935	85	5.5	TY
21/06	8.8	158.5	1000	-	-	TD	29/06	19.2	130.9	940	85	5.5	TY
21/12	8.9	156.7	998	35	2.5	TS	29/12	19.9	131.0	940	85	5.5	TY
21/18	8.6	154.9	992	45	3.0	TS	29/18	20.8	131.8	940	85	5.5	TY
22/00	8.5	153.6	985	50	3.5	STS	30/00	21.8	132.6	945	80	5.0	TY
22/06	8.7	152.1	985	50	3.5	STS	30/06	23.2	134.0	945	80	5.5	TY
22/12	8.8	150.6	980	50	4.0	STS	30/12	24.7	135.7	945	80	5.5	TY
22/18	8.4	149.5	980	50	4.0	STS	30/18	26.1	137.6	950	80	5.5	TY
23/00	8.0	148.2	975	55	4.0	STS	Dec 01/00	26.9	139.1	960	70	4.5	TY
23/06	8.1	147.1	970	60	4.0	STS	01/03	28.2	140.0	965	65	-	TY
23/12	8.0	145.7	965	70	5.0	TY	01/06	29.3	140.3	970	60	4.5	STS
23/18	7.7	144.5	960	75	5.0	TY	01/09	30.4	141.0	970	60	-	STS
24/00	7.8	144.1	955	75	5.0	TY	01/12	30.9	141.7	975	60	4.0	STS
24/06	8.5	143.5	955	75	5.0	TY	01/18	32.2	144.1	975	60	4.0	STS
24/12	9.0	142.6	955	75	5.0	TY	02/00	34.3	146.1	980	55	3.5	STS
24/18	9.9	141.7	955	75	5.0	TY	02/06	35.5	147.4	980	55	3.5	STS
25/00	10.4	140.4	955	75	5.0	TY	02/12	36.7	149.7	980	-	-	L
25/06	11.4	138.8	950	80	5.0	TY	02/18	38.0	152.7	980	-	-	L
25/12	11.8	137.7	945	80	5.0	TY	03/00	39.3	156.2	980	-	-	L
25/18	12.2	137.1	940	85	6.0	TY	03/06	40.9	159.8	980	-	-	L
26/00	12.6	136.8	935	90	6.5	TY	03/12						Dissip


TROPICAL CYCLONE TRACKS

RSMC Tropical Cyclone Best Tracks in 2003

TS YANYAN (0301)

15 Jan - 21 Jan

Date/Time (UTC)	Center Position Lat (N)	Lon (E)	Central pressure (hPa)	Max Wind (kt)	CI Number	Grade
Jan 15/06	6.9	163	1004	-		TD
15/12	7.6	161	1004	-		TD
15/18	8.2	160	1002	-		TD
16/00	8.6	158	1004	-		TD
16/06	9.4	157	1004	-		TD
16/12	10.2	154	1004	-		TD
16/18	11.1	153	1004	-		TD
17/00	11.6	151	1004	-		TD
17/06	12.5	149	1002	-		TD
17/12	12.9	149	1004	-		TD
17/18	13.2	148	1004	-		TD
18/00	13.6	147	1004	-		TD
18/06	14.1	147	1000	35		TS
18/12	14.5	147	1000	35		TS
18/18	14.6	147	1000	35		TS
19/00	14.9	148	1000	35		TS
19/06	15.2	149	1000	35		TS
19/12	15.6	150.0	1000	35		TS
19/18	16.2	151	1000	35		TS
20/00	16.8	152	1000	35		TS
20/06	17.2	154	1000	35		TS
20/12	17.4	155	1004	-		TD
20/18	17.9	156	1004	-		TD
21/00	18.7	156	1004	-		L
21/06						Dissip

STS LINFA (0304)

25 May - 04 Jun

Date/Time (UTC)	Center Position Lat (N)	Lon (E)	Central pressure (hPa)	Max Wind (kt)	CI Number	Grade
May 25/06	16.5	119	1000	-		TD
25/12	16.4	118	1000	-		TD
25/18	16.1	118.0	1000	-		TD
26/00	15.8	118	994	35		TS
26/06	16.0	119	990	45		TS
26/12	16.0	119	990	45		TS
26/18	16.1	119	990	45		TS
27/00	16.1	120	985	50		STS
27/06	16.2	121	992	35		TS
27/12	16.8	122	992	35		TS
27/18	17.5	123	992	40		TS
28/00	18.7	124.0	992	40		TS
28/06	19.8	125	992	40		TS
28/12	20.3	125.0	992	40		TS
28/18	20.9	125	992	40		TS
29/00	21.9	126	992	40		TS
29/06	22.3	127	990	40		TS
29/12	22.8	128	985	45		TS
29/15	23.9	129	985	45		TS
29/18	24.3	129	980	55		STS
29/21	25.0	130	980	55		STS
30/00	25.7	130	980	55		STS
30/03	26.5	131	980	55		STS
30/06	27.6	131	980	50		STS
30/09	28.8	131	980	50		STS
30/12	30.0	131	980	50		STS
30/15	31.2	132	980	50		STS
30/18	32.3	132	980	50		STS
30/21	33.5	133	985	45		TS
31/00	33.9	133	988	-		L
31/06	35.0	134	988	-		L
31/12	36.1	135	992	-		L
31/18	37.7	138	994	-		L
Jun 01/00	39.6	141	994	-		L
01/06	40.9	143	992	-		L
01/12	42.8	144	992	-		L
01/18	44.2	147	988	-		L
02/00	45.1	148	988	-		L
02/06	47.3	150	986	-		L
02/12	49.0	150	984	-		L
02/18	50.0	151	982	-		L
03/00	50.9	152.0	982	-		L
03/06	52.8	152	984	-		L
03/12	54.1	152	986	-		L
03/18	55.0	152	986	-		L
04/00	55.1	153	988	-		L
04/06	55.9	154	990	-		L
04/12						Dissip

TY KUJIRA (0302)

09 Apr - 25 Apr

Date/Time (UTC)	Center Position Lat (N)	Lon (E)	Central pressure (hPa)	Max Wind (kt)	CI Number	Grade
Apr 09/00	4.1	160	1008	-		TD
09/06	4.3	160	1006	-		TD
09/12	5.6	160	1006	-		TD
09/18	6.4	160	1004	-		TD
10/00	6.7	160	1004	-		TD
10/06	7.7	160	1004	-		TD
10/12	8.0	159	1004	-		TD
10/18	8.6	158.0	1004	-		TD
11/00	9.0	157	1002	35		TS
11/06	9.5	156	1000	35		TS
11/12	9.8	156	996	35		TS
11/18	9.8	155	996	35		TS
12/00	9.9	154	992	40		TS
12/06	10.0	153.0	990	45		TS
12/12	10.1	152	990	45		TS
12/18	10.1	152	985	50		STS
13/00	10.0	151	980	55		STS
13/06	10.1	150	980	55		STS
13/12	10.0	149	980	55		STS
13/18	10.4	148	975	60		STS
14/00	10.4	147	965	70		TY
14/06	10.6	146	960	75		TY
14/12	10.8	145	950	80		TY
14/18	11.2	144	945	80		TY
15/00	11.5	142	945	80		TY
15/06	11.9	141	945	80		TY
15/12	12.3	140	940	85		TY
15/18	12.7	138	930	90		TY
16/00	13.1	137.0	930	90		TY
16/06	13.5	136.0	930	90		TY
16/12	13.7	135	935	85		TY
16/18	13.9	134	935	85		TY
17/00	13.9	134	940	85		TY
17/06	13.8	133	940	85		TY
17/12	13.7	132	945	85		TY
17/18	13.6	131	945	85		TY
18/00	13.5	131	940	85		TY
18/06	13.5	130.0	940	85		TY
18/12	13.7	130	945	80		TY
18/18	13.9	129	945	80		TY
19/00	14.1	129	945	80		TY
19/06	14.6	128	945	80		TY
19/12	15.1	128	950	80		TY
19/18	15.7	127	950	75		TY
20/00	16.2	127	955	75		TY
20/06	16.8	126.0	955	75		TY
20/12	17.2	126	950	80		TY
20/18	18.0	125	950	80		TY
21/00	18.3	125	950	80		TY
21/06	18.8	124	955	75		TY
21/12	19.2	124	955	70		TY
21/18	19.6	124	960	70		TY
22/00	20.2	124.0	975	55		STS
22/06	20.4	123	980	55		STS
22/12	20.6	123	985	50		STS
22/18	20.7	123.0	990	45		TS
23/00	20.7	123	994	45		TS
23/06	20.8	122	994	45		TS
23/12	21.0	122	994	45		TS
23/18	21.3	122	994	45		TS
24/00	22.0	123	994	45		TS
24/06	23.2	123.0	994	45		TS
24/12	24.8	124	994	45		TS
24/18	26.8	125	996	40		TS
25/00	29.3	127	998	35		TS
25/03	30.6	129	1000	-		TD
25/06	32.1	130	1000	-		TD
25/12						Dissip

TY CHAN-HOM (0303)

19 May - 28 May

Date/Time (UTC)	Center Position Lat (N)	Lon (E)	Central pressure (hPa)	Max Wind (kt)	CI Number	Grade
May 19/00	7.1	150	1006	-		TD
19/06	7.1	150	1004	-		TD
19/12	7.1	150	1004	-		TD
19/18	7.2	150	1004	-		TD
20/00	7.3	151	1004	-		TD
20/06	7.8	151.0	1000	-		TD
20/12	8.3	151	998	35		TS
20/18	8.6	150	996	40		TS
21/00	8.9	150	994	45		TS
21/06	9.4	151	990	50		STS
21/12	10.0	151	985	55		STS
21/18	10.8	151	985	55		STS
22/00	11.4	151	980	55		STS
22/06	12.6	151	980	55		STS
22/12	13.2	151	980	55		STS
22/18	14.4	151	975	60		STS
23/00	15.0	151	975	60		STS
23/06	15.6	151	965	70		TY
23/12	16.4	151	950	80		TY
23/18	17.4	152	940	85		TY
24/00	18.3	151	940	85		TY
24/06	19.3	152	940	85		TY
24/12	20.0	153	940	85		TY
24/18	21.1	154	940	85		TY
25/00	22.3	155	945	75		TY
25/06	23.6	156	950	70		TY
25/12	25.1	157	955	70		TY
25/18	26.8	158	960	70		TY
26/00	28.4	159	965	65		TY
26/06	30.1	161	975	60		STS
26/12	31.4	163	985	50		STS
26/18	32.8	165	985	50		STS
27/00	33.8	167	990	40		TS
27/06	34.8	170	996	-		L
27/12	35.6	172	996	-		L
27/18	35.8	174	1000	-		L
28/00	35.5	176	1008	-		L
28/06	35.5	178	1012	-		L
28/12						Dissip

STS NANGKA (0305)

30 May - 07 Jun

Date/Time (UTC)	Center Position Lat (N)	Lon (E)	Central pressure (hPa)	Max Wind (kt)	CI Number	Grade
May 30/00	16.8	119	1002	-		TD
30/06	16.7	119	1000	-		TD
30/12	16.6	118.0	1000	-		TD
30/18	16.5	118	1000	-		TD
31/00	16.7	117	1000	-		TD
31/06	16.8	117.0	998	-		TD
31/12	16.9	117	998	-		TD
31/18	17.1	117	998	-		TD
Jun 01/00	17.4	118	996	35		TS
01/06	17.8	118	994	40		TS
01/12	18.4	118	990	45		TS
01/18	19.5	119	985	50		STS
02/00	20.5	119	985	50		STS
02/06	20.7	120	985	50		STS
02/12	21.3	122	990	50		STS
02/18	22.3	123	992	45		TS
03/00	22.7	125	994	40		TS
03/06	23.7	128	994	35		TS
03/12	25.7	130	994	-		TD
03/18	27.6	133	994	-		TD
04/00	29.1	136	994	-		L
04/06	30.3	137	996	-		L
04/12	31.5	139	996	-		L
04/18	33.1	142	998	-		L
05/00	35.3	145	1000	-		L
05/06	36.2	146	1000	-		L
05/12	37.8	149.0	1000	-		L
05/18	38.4	151	1000	-		L
06/00	39.5	153	1006	-		L
06/06	39.9	154	1006	-		L
06/12	40.3	156	1008	-		L
06/18	40.3	157.0	1008	-		L
07/00	40.2	158	1012	-		L
07/06	40.1	160	1012	-		L
07/12	40.3	163	1012	-		L
07/18						Dissip

TY SOUDELOR (0306)

12 Jun - 24 Jun

Date/Time (UTC)	Center Position Lat (N)	Lon (E)	Central pressure (hPa)	Max Wind (kt)	CI Number	Grade
Jun 12/00	9.1	137	1008	-		TD
12/06	10.1	135	1006	-		TD
12/12	10.8	134	1006	-		TD
12/18	11.0	133	1006	-		TD
13/00	11.2	132	1004	-		TD
13/06	11.2	132	1000	35		TS
13/12	11.4	129	1000	35		TS
13/18	11.4	128.0	996	40		TS
14/00	11.4	128	996	40		TS
14/06	11.9	127	996	40		TS
14/12	12.4	126	996	40		TS
14/18	13.1	126	996	40		TS
15/00	14.1	126	994	45		TS
15/06	15.0	125	990	50		STS
15/12	15.8	125	985	50		STS
15/18	16.4	125	980	55		STS
16/00	16.9	125	980	55		STS
16/06	17.6	124	980	55		STS
16/12	18.3	123	980	55		STS
16/18	19.2	123.0	980	55		STS
17/00	19.6	123	975	60		STS
17/06	20.7	123	975	60		STS
17/09	21.4	124	975	60		STS
17/12	22.0	124	970	65		TY
17/15	22.7	124	970	65		TY
17/18	23.6	124	970	65		TY
17/20	24.2	124	968	65		TY
17/21	24.3	124	965	70		TY
18/00	25.1	124	960	75		TY
18/03	25.6	124	960	75		TY
18/06	26.4	125	955	80		TY
18/09	27.1	125	955	80		TY
18/12	27.8	126	960	75		TY
18/15	28.9	126	960	75		TY
18/18	29.9	126.0	965	70		TY
18/21	31.1	127	970	65		TY
19/00	32.5	128	975	60		STS
19/03	33.9	129	975	60		STS
19/04	34.2	129	975	60		STS
19/06	34.8	130	980	55		STS
19/09	36.2	131	980	55		STS
19/12	36.9	132.0	985	50		STS
19/15	37.5	134	985	-		L
19/18	38.7	135	988	-		L
20/00	40.4	138	996	-		L
20/06	41.3	140	996	-		L
20/12	41.5	143	996	-		L
20/18	42.0	146	996	-		L
21/00	41.7	147.0	994	-		L
21/06	41.1	149	994	-		L
21/12	40.6	150	996	-		L
21/18	39.8	151.0	996	-		L
22/00	39.2	152	996	-		L
22/06	38.3	153	998	-		L
22/12	37.4	155	998	-		L
22/18	37.0	156	998	-		L
23/00	37.0	157	998	-		L
23/06	38.2	159	998	-		L
23/12	38.8	161.0	998	-		L
23/18	39.1	162	1002	-		L
24/00	39.2	163	1004	-		L
24/06						Dissip

TY IMBUDO (0307)

15 Jul - 25 Jul

Date/Time (UTC)	Center Position Lat (N)	Lon (E)	Central pressure (hPa)	Max Wind (kt)	CI Number	Grade
Jul 15/00	4.8	150	1008	-		TD
15/06	5.9	150	1006	-		TD
15/12	6.2	148	1006	-		TD
15/18	6.1	147	1004	-		TD
16/00	6.0	146	1004	-		TD
16/06	5.7	144	1004	-		TD
16/12	6.1	143	1004	-		TD
16/18	7.3	142	1002	-		TD
17/00	7.3	142	1002	-		TD
17/06	8.3	141	998	35		TS
17/12	8.8	140	998	35		TS
17/18	9.2	140	998	35		TS
18/00	9.7	138	996	40		TS
18/06	10.0	137	994	40		TS
18/12	10.3	137	990	45		TS
18/18	10.6	137	985	50		STS
19/00	10.6	136	980	55		STS
19/06	10.5	135	975	60		STS
19/12	10.5	134	975	60		STS
19/18	10.9	133	970	65		TY
20/00	11.6	133	960	75		TY
20/06	12.1	132	945	85		TY
20/12	12.5	131	935	90		TY
20/18	13.3	130	935	90		TY
21/00	13.5	128	945	85		TY
21/06	14.0	127	945	85		TY
21/12	15.0	126	945	85		TY
21/18	15.8	125	950	80		TY
22/00	16.3	123.0	950	80		TY
22/06	16.9	121	955	75		TY
22/12	17.8	120	960	70		TY
22/18	18.1	118	965	70		TY
23/00	18.2	117	960	70		TY
23/06	18.7	115	955	75		TY
23/12	19.5	114	955	75		TY
23/18	20.0	113	955	75		TY
24/00	21.1	112.0	965	65		TY
24/06	22.1	110	975	50		STS
24/12	22.8	109	985	40		TS
24/18	23.5	107	992	35		TS
25/00	23.0	106.0	996	-		TD
25/06	23.1	105.0	996	-		TD
25/12	23.5	104	998	-		TD
25/18						Dissip

TS MORAKOT (0309)

31 Jul - 04 Aug

Date/Time (UTC)	Center Position Lat (N)	Lon (E)	Central pressure (hPa)	Max Wind (kt)	CI Number	Grade
Jul 31/18	15.4	128	1004	-		TD
Aug 01/00	16.0	128.0	1004	-		TD
01/06	16.6	128	1002	-		TD
01/12	16.8	128	1002	-		TD
01/18	17.6	127	1002	-		TD
02/00	18.3	126	1000	-		TD
02/06	18.9	125	996	35	2.5	TS
02/12	19.8	124.0	994	40	2.5	TS
02/18	20.1	123	992	45	3.0	TS
03/00	20.7	122	992	45	3.0	TS
03/06	21.4	121	992	45	3.0	TS
03/12	22.1	121.0	994	45	3.0	TS
03/18	23.2	120	994	40	3.0	TS
04/00	23.7	119.0	996	35	3.0	TS
04/06	24.1	119	996	35	3.0	TS
04/12	23.8	118.0	1000	-		TD
04/18						Dissip

STS KONI (0308)

15 Jul - 22 Jul

Date/Time (UTC)	Center Position Lat (N)	Lon (E)	Central pressure (hPa)	Max Wind (kt)	CI Number	Grade
Jul 15/00	9.4	135	1008	-		TD
15/06	9.7	134	1004	-		TD
15/12	10.0	132.0	1006	-		TD
15/18	9.9	131	1004	-		TD
16/00	9.6	130	1002	-		TD
16/06	9.8	129	1002	-		TD
16/12	10.3	128	1002	-		TD
16/18	10.8	127	1002	-		TD
17/00	10.9	126	1000	-		TD
17/06	11.4	125	1000	-		TD
17/12	12.2	123	1000	-		TD
17/18	12.4	122	1000	-		TD
18/00	12.4	120	1000	-		TD
18/06	12.3	119	998	35		TS
18/12	12.5	119	998	40		TS
18/18	12.8	118	996	40		TS
19/00	13.5	117	994	40		TS
19/06	14.5	117	992	45		TS
19/12	15.0	116	992	45		TS
19/18	15.5	116.0	990	45		TS
20/00	16.4	115.0	985	50		STS
20/06	16.9	114	980	55		STS
20/12	17.8	114	980	55		STS
20/18	18.1	112	975	60		STS
21/00	18.2	111	975	60		STS
21/06	18.5	111	975	55		STS
21/12	18.5	110	980	50		STS
21/18	19.2	109	985	45		TS
22/00	19.6	108	985	45		TS
22/06	20.0	107	985	45		TS
22/12	20.2	105.0	990	40		TS
22/18	20.0	103.0	998	-		TD
23/00						Dissip

TY ETAU (0310)

02 Aug - 11 Aug

Date/Time (UTC)	Center Position Lat (N)	Lon (E)	Central pressure (hPa)	Max Wind (kt)	CI Number	Grade
Aug 02/18	12.4	140	1004	-		TD
03/00	12.6	140.0	1004	-		TD
03/06	13.4	140	1000	35	2.0	TS
03/12	13.9	139	996	40	2.5	TS
03/18	14.7	138.0	990	45	3.0	TS
04/00	15.2	137	980	55	3.5	STS
04/06	15.6	135.0	980	55	3.5	STS
04/12	16.5	134	975	60	4.0	STS
04/18	17.8	134	965	70	4.5	TY
05/00	18.3	133	960	75	4.5	TY
05/06	18.6	132	960	75	4.5	TY
05/12	19.3	131.0	960	75	5.0	TY
05/18	20.5	130	960	75	5.0	TY
06/00	21.5	130	955	75	5.0	TY
06/06	22.7	129.0	955	75	5.0	TY
06/12	23.9	129	955	75	5.0	TY
06/15	24.7	129	955	75		TY
06/18	25.3	128	950	80	5.0	TY
06/21	26.0	128	950	80		TY
07/00	26.5	128	950	80	5.5	TY
07/03	27.0	128	950	80		TY
07/06	27.5	129	945	85	5.5	TY
07/09	28.0	129.0	945	85		TY
07/10	28.1	129	945	85		TY
07/12	28.4	130	950	80	5.5	TY
07/15	28.8	130	950	80		TY
07/18	29.4	131	950	80	5.5	TY
07/21	30.0	132	950	80		TY
08/00	30.7	132.0	950	75	5.0	TY
08/03	31.5	133	950	75		TY
08/06	32.1	133	950	75	5.0	TY
08/09	32.7	134	950	75		TY
08/12	33.2	134.0	950	75	5.0	TY
08/15	33.7	134	955	60		STS
08/18	34.2	135	965	50	4.0	STS
08/21	34.7	135	970	50		STS
09/00	35.5	136	975	45	4.0	TS
09/03	36.5	137	980	45		TS
09/06	37.4	139	985	40	3.5	TS
09/09	38.4	140.0	985	40		TS
09/12	40.0	141	985	40	3.0	TS
09/15	41.4	142	985	40		TS
09/16	41.9	143	985	40		TS
09/18	42.8	144	984	-		L
10/00	44.7	147	984	-		L
10/06	48.4	151	984	-		L
10/12	50.7	153	984	-		L
10/18	52.3	153	984	-		L
11/00	52.8	152	984	-		L
11/06	53.2	153	988	-		L
11/12	53.0	153	990	-		L
11/18	52.2	154.0	990	-		L
12/00						Dissip

TS VAMCO (0311)

18 Aug - 20 Aug

Date/Time (UTC)	Center Position Lat (N)	Lon (E)	Central pressure (hPa)	Max Wind (kt)	CI Number	Grade
Aug 18/06	18.3	125	1004	-		TD
18/12	18.4	125	1002	-		TD
18/18	18.6	125	1000	-		TD
19/00	20.5	125	1000	-		TD
19/06	22.7	125	996	35	2.5	TS
19/12	24.2	124	996	35	2.5	TS
19/15	24.9	123	996	35		TS
19/18	25.5	122	996	35	2.5	TS
20/00	27.2	121	998	-		TD
20/06						Dissip

TY DUJUAN (0313)

27 Aug - 03 Sep

Date/Time (UTC)	Center Position Lat (N)	Lon (E)	Central pressure (hPa)	Max Wind (kt)	CI Number	Grade
Aug 27/18	17.6	140	1008	-		TD
28/00	17.8	138	1008	-		TD
28/06	17.1	137	1008	-		TD
28/12	16.2	137	1008	-		TD
28/18	16.0	137	1006	-		TD
29/00	15.8	136	1006	-		TD
29/06	16.0	135	1002	-		TD
29/12	16.0	135.0	1000	-		TD
29/18	16.0	135	998	35	2.5	TS
30/00	16.1	135	990	45	3.0	TS
30/06	16.5	134	985	50	3.5	STS
30/12	17.5	133	980	55	3.5	STS
30/18	18.5	132	975	65	4.0	TY
31/00	19.1	131	970	65	4.5	TY
31/06	19.8	130	960	70	5.0	TY
31/12	20.2	128	960	70	5.0	TY
31/18	20.4	127	960	70	5.0	TY
Sep 01/00	20.8	125	950	80	5.5	TY
01/06	20.9	124	950	80	5.5	TY
01/12	21.3	122	950	80	5.5	TY
01/18	21.6	120	950	80	5.5	TY
02/00	22.1	118.0	950	80	5.5	TY
02/06	22.3	117	960	70	5.0	TY
02/12	22.6	115	975	60	4.5	STS
02/18	22.6	113	990	45	4.5	TS
03/00	22.5	111	996	-		TD
03/06						Dissip

TY KROVANH (0312)

13 Aug - 26 Aug

Date/Time (UTC)	Center Position Lat (N)	Lon (E)	Central pressure (hPa)	Max Wind (kt)	CI Number	Grade
Aug 13/18	7.2	156.0	1008	-		TD
14/00	7.6	156	1008	-		TD
14/06	8.0	155	1008	-		TD
14/12	8.5	154.0	1008	-		TD
14/18	8.7	153	1006	-		TD
15/00	9.0	152	1008	-		TD
15/06	9.3	151	1006	-		TD
15/12	9.8	150	1006	-		TD
15/18	10.6	149	1006	-		TD
16/00	11.1	149	1008	-		TD
16/06	11.5	147	1008	-		TD
16/12	12.1	146.0	1008	-		TD
16/18	12.6	144	1008	-		TD
17/00	13.2	144	1010	-		TD
17/06	13.8	144	1008	-		TD
17/12	14.9	143	1008	-		TD
17/18	15.5	142	1008	-		TD
18/00	16.1	141.0	1008	-		TD
18/06	16.8	140	1008	-		TD
18/12	17.4	139	1008	-		TD
18/18	18.0	139	1008	-		TD
19/00	18.9	137	1008	-		TD
19/06	19.4	136	1008	-		TD
19/12	19.9	135	1008	-		TD
19/18	19.7	134	1008	-		TD
20/00	19.4	133	1008	-		TD
20/06	19.2	132.0	1004	-		TD
20/12	18.9	131	998	35	2.5	TS
20/18	18.7	130	990	45	3.0	TS
21/00	18.5	129	990	45	3.0	TS
21/06	18.2	128	985	50	3.0	STS
21/12	17.9	127.0	980	55	3.5	STS
21/18	17.8	126	975	60	4.0	STS
22/00	17.6	125	970	65	4.0	TY
22/06	17.5	123	970	65	4.5	TY
22/12	17.4	122	970	65	4.0	TY
22/18	17.3	120	985	45	4.0	TS
23/00	17.3	119	985	50	3.5	STS
23/06	17.4	118.0	985	50	3.5	STS
23/12	17.7	117	980	55	3.5	STS
23/18	18.4	116	975	55	4.0	STS
24/00	19.0	115	975	55	4.0	STS
24/06	19.3	113	975	60	4.0	STS
24/12	19.4	113	975	60	4.0	STS
24/18	20.1	111	970	65	4.5	TY
25/00	20.7	110	970	65	4.5	TY
25/06	21.0	109	970	65	4.5	TY
25/12	21.3	108	975	55	4.5	STS
25/18	21.6	107	985	50	3.5	STS
26/00	22.2	106	990	40	3.0	TS
26/06	22.7	105	996	-		TD
26/12	22.0	103.0	1000	-		TD
26/18						Dissip

TY MAEMI (0314)

04 Sep - 16 Sep

Date/Time (UTC)	Center Position Lat (N)	Lon (E)	Central pressure (hPa)	Max Wind (kt)	CI Number	Grade
Sep 04/00	9.9	153	1008	-		TD
04/06	10.4	151	1006	-		TD
04/12	10.9	150	1006	-		TD
04/18	11.7	149	1004	-		TD
05/00	12.5	148	1004	-		TD
05/06	12.9	146	1004	-		TD
05/12	13.8	145	1004	-		TD
05/18	14.0	144	1002	-		TD
06/00	15.6	143	1000	-		TD
06/06	16.5	141	994	35	2.5	TS
06/12	16.8	140	994	35	2.5	TS
06/18	17.0	139	992	40	3.0	TS
07/00	17.8	138	992	40	3.0	TS
07/06	18.8	137	992	40	3.0	TS
07/12	19.1	136	990	45	3.5	TS
07/18	19.4	135.0	985	50	3.5	STS
08/00	19.7	134	980	55	4.0	STS
08/06	20.0	133	975	60	4.0	STS
08/12	20.4	132.0	975	60	4.0	STS
08/18	21.0	131	970	65	4.0	TY
09/00	22.0	130	960	70	5.0	TY
09/06	22.6	129	950	80	5.5	TY
09/12	22.9	129	940	85	6.0	TY
09/18	23.3	128	930	90	6.5	TY
10/00	23.6	127	925	95	6.5	TY
10/03	23.7	127	920	95		TY
10/06	24.0	127	910	100	7.0	TY
10/09	24.2	126	910	100		TY
10/12	24.3	126.0	910	105	7.0	TY
10/15	24.6	126	910	105		TY
10/18	24.7	125	910	105	7.0	TY
10/19	24.8	125	910	105		TY
10/21	25.0	125	910	105		TY
11/00	25.2	125	910	105	6.5	TY
11/03	25.5	125	920	95		TY
11/06	25.9	125	920	95	6.0	TY
11/09	26.3	125	925	95		TY
11/12	27.0	126	930	95	5.5	TY
11/15	27.8	126	935	90		TY
11/18	28.4	126	935	90	5.5	TY
11/21	29.5	126	935	90		TY
12/00	30.5	127	930	95	6.0	TY
12/06	32.7	127	935	90	6.0	TY
12/09	33.9	128	945	80		TY
12/12	34.9	128	955	75	6.0	TY
12/18	37.0	130	970	60	6.0	STS
13/00	39.1	132	975	55	5.0	STS
13/06	40.5	135	980	50	5.0	STS
13/09	41.5	137	980	50	4.5	STS
13/12	42.3	138	980	50	4.0	STS
13/15	43.2	140.0	980	50		STS
13/18	44.7	141	980	50	3.5	STS
13/21	46.0	144	984	-		L
14/00	45.2	146	984	-		L
14/06	46.1	148	988	-		L
14/12	47.1	149	988	-		L
14/18	48.2	150.0	988	-		L
15/00	48.8	151	988	-		L
15/06	49.0	151	992	-		L
15/12	49.2	151	996	-		L
15/18	48.9	153	996	-		L
16/00	48.9	153	996	-		L
16/06						Dissip

TY CHOI-WAN (0315)

16 Sep - 24 Sep

Date/Time (UTC)	Center Position Lat (N)	Lon (E)	Central pressure (hPa)	Max Wind (kt)	CI Number	Grade
Sep 16/00	13.1	133.0	1004	-		TD
16/06	14.0	130	1004	-		TD
16/12	14.8	128	1002	-		TD
16/18	15.2	128	1000	-		TD
17/00	15.8	127	1000	-		TD
17/06	17.5	129	1000	-		TD
17/12	18.8	130	1000	-		TD
17/18	20.2	129	1000	-		TD
18/00	21.4	129	994	40	2.5	TS
18/06	21.8	128	990	45	3.0	TS
18/12	22.8	128	990	45	3.0	TS
18/15	23.2	128	990	45		TS
18/18	23.6	127	990	45	3.0	TS
18/21	24.1	127	990	45		TS
19/00	24.9	127	985	50	3.0	STS
19/03	25.4	128	985	50		STS
19/06	26.0	128	985	50	3.0	STS
19/08	26.5	128	985	50		STS
19/09	26.7	128	980	60		STS
19/12	27.0	128	980	60	3.5	STS
19/15	27.4	128	980	60		STS
19/18	27.7	129	975	60	3.5	STS
19/21	28.0	129.0	975	60		STS
19/22	28.1	129	975	60		STS
20/00	28.4	129	975	60	3.5	STS
20/03	28.6	130	975	60		STS
20/06	28.7	131	975	60	3.5	STS
20/09	28.8	131	975	60		STS
20/12	28.9	132.0	970	60	3.5	STS
20/15	29.2	133	970	65		TY
20/18	29.5	134	970	65	4.0	TY
20/21	29.8	135	965	70		TY
21/00	29.9	136.0	960	70	5.0	TY
21/03	30.5	136	960	70		TY
21/06	31.0	137.0	955	70	5.0	TY
21/09	31.6	138.0	955	70		TY
21/12	32.2	139.0	955	70	5.0	TY
21/15	32.7	140.0	955	70		TY
21/18	33.2	141	960	70	5.0	TY
21/21	33.8	142	960	70		TY
22/00	34.4	143	960	70	5.0	TY
22/03	35.1	144	965	70		TY
22/06	35.9	145.0	965	65	4.5	TY
22/12	37.7	148	980	55	4.0	STS
22/18	39.5	151	985	50	4.0	STS
23/00	41.0	156.0	994	-		L
23/06	43.4	164	1000	-		L
23/12	45.3	172	1000	-		L
23/18	46.0	179	996	-		L
24/00	47.0	185	994	-		Out

TY KOPPU (0316)

24 Sep - 03 Oct

Date/Time (UTC)	Center Position Lat (N)	Lon (E)	Central pressure (hPa)	Max Wind (kt)	CI Number	Grade
Sep 24/00	15.8	141	1006	-		TD
24/06	16.3	139	1004	-		TD
24/12	16.3	138	1002	-		TD
24/18	16.3	137	1002	-		TD
25/00	16.0	136	1000	-		TD
25/06	16.3	136.0	998	-		TD
25/12	16.5	136.0	998	-		TD
25/18	16.6	136.0	996	-		TD
26/00	16.8	136	996	-		TD
26/06	18.1	137	998	-		TD
26/12	19.0	138	998	-		TD
26/18	20.4	139	992	35	2.0	TS
27/00	21.5	139	985	40	2.5	TS
27/06	22.5	139	980	50	3.0	STS
27/12	23.1	140	980	50	3.0	STS
27/18	24.0	140	975	55	3.5	STS
28/00	24.7	141	975	55	3.5	STS
28/06	25.4	141	975	60	3.5	STS
28/09	25.8	141	970	60		STS
28/12	26.1	141	970	60	3.5	STS
28/15	26.4	141	970	60		STS
28/18	26.7	141	970	60	3.5	STS
28/21	27.0	141.0	970	60		STS
29/00	27.3	141	965	65	4.0	TY
29/03	27.7	142	965	65		TY
29/06	28.3	142	960	70	4.5	TY
29/12	29.5	143	965	65	4.5	TY
29/18	30.6	144	965	65	4.5	TY
30/00	32.8	147.0	970	60	4.0	STS
30/06	35.6	151	976	-		L
30/12	40.7	153	972	-		L
30/18	43.2	154	968	-		L
Oct 01/00	44.5	156	972	-		L
01/06	46.3	158	976	-		L
01/12	47.1	161	976	-		L
01/18	47.6	164	976	-		L
02/00	48.3	167	976	-		L
02/06	48.5	169	976	-		L
02/12	49.1	171	978	-		L
02/18	48.5	174	980	-		L
03/00	48.5	176	980	-		L
03/06	48.2	180	980	-		L
03/12	48.5	181	984	-		Out

TY KETSANA (0317)

17 Oct - 26 Oct

Date/Time (UTC)	Center Position Lat (N)	Lon (E)	Central pressure (hPa)	Max Wind (kt)	CI Number	Grade
Oct 17/06	15.1	132	1004	-		TD
17/12	15.0	132	1004	-		TD
17/18	14.8	132	1002	-		TD
18/00	14.7	132	1002	-		TD
18/06	14.8	132	1000	-		TD
18/12	15.1	132	1000	-		TD
18/18	15.4	131	1000	-		TD
19/00	15.6	130	996	35		TS
19/06	15.5	130.0	992	35	2.5	TS
19/12	15.4	130	990	45	2.5	TS
19/18	15.5	131	985	50	3.0	STS
20/00	15.6	131	980	55	3.5	STS
20/06	15.7	131	975	60	4.0	STS
20/12	15.9	131	970	65	4.0	TY
20/18	16.2	131.0	965	70	4.5	TY
21/00	16.4	131	950	80	5.5	TY
21/06	16.7	131	945	85	6.0	TY
21/12	17.0	131	940	85	6.0	TY
21/18	17.2	131	940	85	6.0	TY
22/00	17.4	131	940	90	6.0	TY
22/06	17.8	131	940	90	6.0	TY
22/12	18.1	131	940	85	6.0	TY
22/18	18.5	132	940	85	6.0	TY
23/00	18.7	132.0	940	85	6.0	TY
23/06	19.2	132	940	85	6.0	TY
23/12	19.6	133	940	85	6.0	TY
23/18	20.0	134	940	85	6.0	TY
24/00	20.4	134	945	80	5.5	TY
24/06	21.0	134	945	80	5.5	TY
24/12	21.8	134	945	80	5.5	TY
24/18	22.9	135	945	80	5.5	TY
25/00	24.6	136	950	80	5.5	TY
25/06	25.9	137	955	75	5.0	TY
25/12	27.7	139	965	70	4.5	TY
25/18	29.8	142	975	60	4.0	STS
26/00	32.1	145	980	55	3.5	STS
26/06	34.4	148	986	-		L
26/12	36.1	150	990	-		L
26/18	38.2	155	996	-		L
27/00						Dissip

TY NEPARTAK (0320)

11 Nov - 19 Nov

Date/Time (UTC)	Center Position Lat (N)	Lon (E)	Central pressure (hPa)	Max Wind (kt)	CI Number	Grade
Nov 11/18	10.8	140	1004	-		TD
12/00	11.3	138.0	1004	-		TD
12/06	11.8	137	1002	-		TD
12/12	12.0	134	1000	-		TD
12/18	12.1	132	998	35	3.0	TS
13/00	12.3	130	992	40	3.0	TS
13/06	12.6	128	992	40	3.0	TS
13/12	12.6	126	985	50	3.5	STS
13/18	12.2	125.0	990	45	3.5	TS
14/00	11.8	124	990	45	3.0	TS
14/06	12.0	122	990	45	3.0	TS
14/12	12.2	121	990	45	3.5	TS
14/18	12.3	119	985	50	3.5	STS
15/00	12.6	118	980	55	4.0	STS
15/06	13.4	117	975	60	4.0	STS
15/12	13.8	116	975	60	4.0	STS
15/18	14.0	115	975	60	4.0	STS
16/00	14.2	114	975	60	4.0	STS
16/06	14.6	113	975	60	4.0	STS
16/12	15.0	112	975	60	4.0	STS
16/18	15.5	111	970	65	4.5	TY
17/00	16.1	111	975	60	4.5	STS
17/06	16.3	110	975	60	4.5	STS
17/12	16.8	110	975	60	4.5	STS
17/18	17.4	109	980	60	4.5	STS
18/00	18.0	109	985	55	4.5	STS
18/06	18.6	108	990	55	4.0	STS
18/12	19.3	109	996	45	3.5	TS
18/18	19.7	109	1000	40	3.0	TS
19/00	20.3	109	1000	35	2.5	TS
19/06	21.0	109.0	1004	-		TD
19/12	21.3	110	1008	-		TD
19/18						Dissip

TY PARMA (0318)

19 Oct - 01 Nov

Date/Time (UTC)	Center Position Lat (N)	Lon (E)	Central pressure (hPa)	Max Wind (kt)	CI Number	Grade
Oct 19/00	18.4	145	1000	-		TD
19/06	18.4	145	1000	-		TD
19/12	18.3	144	1000	-		TD
19/18	18.4	144.0	1000	-		TD
20/00	18.8	144	1000	-		TD
20/06	19.7	143	998	-		TD
20/12	20.8	144	998	-		TD
20/18	20.9	144	996	-		TD
21/00	21.0	144	994	35	2.5	TS
21/06	21.5	145	992	40	2.5	TS
21/12	22.1	145	990	45	3.0	TS
21/18	22.1	146	985	50	3.5	STS
22/00	22.2	147	980	55	3.5	STS
22/06	23.0	147	970	65	4.0	TY
22/12	23.5	147	970	65	4.0	TY
22/18	24.1	148	965	65	4.0	TY
23/00	24.8	149	960	70	5.0	TY
23/06	26.1	150	950	80	5.5	TY
23/12	27.1	151	940	85	6.0	TY
23/18	28.4	152	935	90	6.5	TY
24/00	29.2	154	930	95	6.5	TY
24/06	30.2	156	930	95	6.5	TY
24/12	30.7	159	930	95	6.5	TY
24/18	30.7	161	930	95	6.5	TY
25/00	30.0	164	935	90	6.5	TY
25/06	29.0	165	935	90	6.0	TY
25/12	27.7	167	945	85	5.5	TY
25/18	26.4	169	955	75	5.0	TY
26/00	25.3	170	965	65	4.5	TY
26/06	24.0	170	970	60	4.5	STS
26/12	23.1	169	970	60	4.5	STS
26/18	22.9	168	970	60	4.5	STS
27/00	22.7	166.0	975	60	4.0	STS
27/06	22.5	165	975	60	4.0	STS
27/12	21.8	163	975	60	4.0	STS
27/18	22.0	161	975	60	4.0	STS
28/00	21.9	158	975	60	4.0	STS
28/06	21.8	156	975	60	4.0	STS
28/12	21.9	154.0	970	65	4.5	TY
28/18	22.7	152	960	70	5.0	TY
29/00	23.1	150	950	80	5.5	TY
29/06	23.9	149	935	90	6.5	TY
29/12	24.8	149	935	90	6.5	TY
29/18	25.7	149	935	90	6.5	TY
30/00	26.6	150	940	85	6.0	TY
30/06	27.8	152	945	80	5.5	TY
30/12	28.9	154	955	75	5.0	TY
30/18	29.7	157	965	70	4.5	TY
31/00	30.7	160	975	60	4.0	STS
31/06	31.3	164	980	55	3.5	STS
31/12	32.0	167.0	984	-		L
31/18	33.0	170	988	-		L
Nov 01/00	33.7	173	988	-		L
01/06	34.4	176	990	-		L
01/12	34.7	179	992	-		L
01/18	35.6	183	992	-		Out

STS MELOR (0319)

29 Oct - 06 Nov

Date/Time (UTC)	Center Position Lat (N)	Lon (E)	Central pressure (hPa)	Max Wind (kt)	CI Number	Grade
Oct 29/00	12.7	132	1006	-		TD
29/06	12.4	132	1006	-		TD
29/12	12.6	131	1006	-		TD
29/18	12.7	130	1004	-		TD
30/00	12.6	130	1002	-		TD
30/06	12.9	129	1000	-		TD
30/12	13.1	128	996	35	2.5	TS
30/18	13.8	127	996	35	2.5	TS
31/00	14.5	126	990	40	3.0	TS
31/06	15.3	125	985	45	3.5	TS
31/12	15.6	124.0	985	45	3.5	TS
31/18	16.3	123	980	50	4.0	STS
Nov 01/00	16.9	123	980	50	4.0	STS
01/06	17.5	122	990	40	3.5	TS
01/12	18.4	121	996	35	3.0	TS
01/18	19.5	121.0	992	45	3.5	TS
02/00	20.1	121	990	45	3.5	TS
02/06	20.6	121	990	45	3.5	TS
02/12	21.4	121	990	40	3.5	TS
02/18	22.0	121	992	35	3.5	TS
03/00	22.8	123	996	35	3.5	TS
03/06	23.2	123	998	35	3.0	TS
03/09	23.5	123	998	35		TS
03/12	23.6	123	998	35	3.0	TS
03/18	23.5	124	1004	-		TD
04/00	23.3	124	1004	-		TD
04/06	23.5	123	1006	-		TD
04/12	24.3	123	1008	-		TD
04/18	25.5	123	1008	-		TD
05/00	26.5	124	1010	-		TD
05/06	28.5	125	1010	-		TD
05/12	29.8	127.0	1012	-		TD
05/18	30.6	129	1012	-		L
06/00	30.8	131	1012	-		L
06/06						Dissip

TY LUPIT (0321)

18 Nov - 03 Dec

	Date/Time (UTC)	Center Position Lat (N)	Lon (E)	Central pressure (hPa)	Max Wind (kt)	CI Number	Grade
Nov	18/12	9.5	165	1004	-		TD
	18/18	9.0	164	1002	-		TD
	19/00	9.0	164	1002	-		TD
	19/06	8.9	163	1002	-		TD
	19/12	8.8	163	1002	-		TD
	19/18	8.8	162	1002	-		TD
	20/00	8.9	162.0	1004	-		TD
	20/06	8.9	161	1002	-		TD
	20/12	8.8	161	1004	-		TD
	20/18	8.7	160	1000	-		TD
	21/00	8.6	160	1000	-		TD
	21/06	8.8	159	1000	-		TD
	21/12	8.9	157	998	35	2.5	TS
	21/18	8.6	155	992	45	3.0	TS
	22/00	8.5	154	985	50	3.5	STS
	22/06	8.7	152	985	50	3.5	STS
	22/12	8.8	151	980	50	4.0	STS
	22/18	8.4	150	980	50	4.0	STS
	23/00	8.0	148	975	55	4.0	STS
	23/06	8.1	147	970	60	4.0	STS
	23/12	8.0	146	965	70	5.0	TY
	23/18	7.7	145	960	75	5.0	TY
	24/00	7.8	144	955	75	5.0	TY
	24/06	8.5	144	955	75	5.0	TY
	24/12	9.0	143	955	75	5.0	TY
	24/18	9.9	142	955	75	5.0	TY
	25/00	10.4	140	955	75	5.0	TY
	25/06	11.4	139	950	80	5.0	TY
	25/12	11.8	138	945	80	5.0	TY
	25/18	12.2	137	940	85	6.0	TY
	26/00	12.6	137	935	90	6.5	TY
	26/06	13.1	137	925	95	7.0	TY
	26/12	13.5	136.0	920	100	7.0	TY
	26/18	13.9	135	915	100	7.0	TY
	27/00	14.0	135	915	100	7.0	TY
	27/06	14.4	135	915	100	7.0	TY
	27/12	14.9	134	915	100	7.0	TY
	27/18	15.2	133	915	100	7.0	TY
	28/00	15.5	133.0	920	100	6.5	TY
	28/06	16.1	133	925	95	6.0	TY
	28/12	16.8	132.0	930	90	5.5	TY
	28/18	17.6	132	935	85	5.5	TY
	29/00	18.4	131	935	85	5.5	TY
	29/06	19.2	131	940	85	5.5	TY
	29/12	19.9	131.0	940	85	5.5	TY
	29/18	20.8	132	940	85	5.5	TY
	30/00	21.8	133	945	80	5.0	TY
	30/06	23.2	134.0	945	80	5.5	TY
	30/12	24.7	136	945	80	5.5	TY
	30/18	26.1	138	950	80	5.5	TY
Dec	01/00	26.9	139	960	70	4.5	TY
	01/03	28.2	140.0	965	65		TY
	01/06	29.3	140	970	60	4.5	STS
	01/09	30.4	141.0	970	60		STS
	01/12	30.9	142	975	60	4.0	STS
	01/18	32.2	144	975	60	4.0	STS
	02/00	34.3	146	980	55	3.5	STS
	02/06	35.5	147	980	55	3.5	STS
	02/12	36.7	150	980	-		L
	02/18	38.0	153	980	-		L
	03/00	39.3	156	980	-		L
	03/06	40.9	160	980	-		L
	03/12						Dissip

Position and Intensity Forecast Errors for Each Tropical Cyclone in 2003

TS YANYAN (0301)

Date/Time (UTC)	Center Position T=00(km)	T=24(km)	T=48(km)	T=72(km)	Central Pressure T=24(hPa)	T=48(hPa)	T=72(hPa)	Max. Wind T=24(kt)	T=48(kt)	T=72(kt)
Jan 18/06	11	196	349		-4	-8		5	10	
18/12	44	258			-4			5		
18/18	49	345			-4			5		
19/00	40	291			-4			5		
19/06	0	457			-4			5		
19/12	58									
19/18	39									
20/00	11									
20/06	39									

TY CHAN-HOM (0303)

Date/Time (UTC)	Center Position T=00(km)	T=24(km)	T=48(km)	T=72(km)	Central Pressure T=24(hPa)	T=48(hPa)	T=72(hPa)	Max. Wind T=24(kt)	T=48(kt)	T=72(kt)
May 20/12	0	123	435	645	5	0		-10	0	
20/18	40	138	450	610	0	-5		-5	5	
21/00	16	159	359	570	0	-5		0	5	
21/06	0	98	155	310	-5	0		10	5	
21/12	0	89	180	201	-10	15		10	-10	
21/18	11	131	269	343	-5	20		5	-15	
22/00	16	102	220	402	-10	15		10	-10	
22/06	16	193	274	369	0	15		0	-10	
22/12	0	144	272	443	15	15		-10	-10	
22/18	0	142	242	400	25	20		-15	-10	
23/00	11	127	248	291	25	15		-15	0	
23/06	11	161	394	555	20	10		-10	5	
23/12	24	53	340	586	10	-5		-5	10	
23/18	0	121	252	655	5	-10		-5	10	
24/00	11	214	325	684	0	-10		5	10	
24/06	0	149	325		-5	-20		10	15	
24/12	0	197	356		-5	-20		10	20	
24/18	10	178	221		-5	-20		5	20	
25/00	0	162	365		-5	-20		5	25	
25/06	44	106			-5			0		
25/12	0	204			-15			10		
25/18	0	305			-15			10		
26/00	20	205			-15			20		
26/06	0									
26/12	72									
26/18	44									
27/00	0									

STS LINFA (0304)

Date/Time (UTC)	Center Position T=00(km)	T=24(km)	T=48(km)	T=72(km)	Central Pressure T=24(hPa)	T=48(hPa)	T=72(hPa)	Max. Wind T=24(kt)	T=48(kt)	T=72(kt)
May 26/00	58	208	715	1092	5	-7		-10	10	
26/06	25	160	429	569	-7	-7		15	10	
26/12	89	173	407	624	-7	-7		15	10	
26/18	68	250	423	697	-2	0		5	0	
27/00	76	268	402	622	2	0		-5	0	
27/06	33	301	478	528	-2	-10		5	15	
27/12	0	311	314	627	-7	-5		10	10	
27/18	137	371	317	492	-7	0		10	0	
28/00	42	444	328		-7	-5		10	5	
28/06	92	73	178		-10	-5		15	10	
28/12	47	150	135		-5	0		10	5	
28/18	0	114	80		0	0		0	5	
29/00	15	184			0			0		
29/06	0	23			5			0		
29/12	35	35			0			5		
29/18	0	15			0			5		
30/00	44									
30/06	0									
30/12	0									
30/18	15									

STS NANGKA (0305)

Date/Time (UTC)	Center Position T=00(km)	T=24(km)	T=48(km)	T=72(km)	Central Pressure T=24(hPa)	T=48(hPa)	T=72(hPa)	Max. Wind T=24(kt)	T=48(kt)	T=72(kt)
Jun 01/00	138	276	589		11	-2		-15	0	
01/06	134	68	104		5	-9		-5	15	
01/12	0	56			-5			0		
01/18	24	22			-12			10		
02/00	0	116			-14			15		
02/06	0	134			-14			20		
02/12	0									
02/18	0									
03/00	0									
03/06	0									

TY KUJIRA (0302)

Date/Time (UTC)	Center Position T=00(km)	T=24(km)	T=48(km)	T=72(km)	Central Pressure T=24(hPa)	T=48(hPa)	T=72(hPa)	Max. Wind T=24(kt)	T=48(kt)	T=72(kt)
Apr 11/00	44	119	180	222	6	12		0	-10	
11/06	0	99	197	298	2	0		0	0	
11/12	0	98	236	297	2	0		0	0	
11/18	0	77	139	188	5	5		-5	-5	
12/00	11	123	191	240	5	10		-5	-10	
12/06	0	84	133	212	0	10		0	-10	
12/12	0	78	134	172	0	20		0	-15	
12/18	0	46	117	272	0	20		0	-10	
13/00	0	40	94	147	5	20		-5	-10	
13/06	0	62	171	155	10	25		-10	-15	
13/12	0	45	134	168	20	25		-15	-15	
13/18	0	47	117	123	25	35		-15	-20	
14/00	0	35	11	141	20	35		-10	-20	
14/06	0	70	124	132	10	25		-5	-15	
14/12	0	89	81	132	0	5		0	0	
14/18	0	70	93	161	10	5		-5	0	
15/00	0	39	34	205	10	0		-5	0	
15/06	0	88	170	309	10	0		-5	0	
15/12	0	93	187	315	0	-15		0	5	
15/18	0	97	181	290	-5	-15		5	5	
16/00	0	152	182	286	-10	-10		5	5	
16/06	0	165	232	363	-10	-10		5	5	
16/12	0	166	264	370	-5	0		0	0	
16/18	0	118	170	163	-5	0		0	0	
17/00	0	139	178	148	0	0		0	0	
17/06	0	145	214	217	0	0		0	0	
17/12	0	70	109	167	0	0		5	0	
17/18	0	49	31	116	0	-5		5	10	
18/00	0	66	84	151	-5	-10		5	5	
18/06	0	70	112	191	-5	-10		5	5	
18/12	0	46	88	232	-10	-5		5	0	
18/18	0	68	148	161	-10	-5		10	0	
19/00	0	55	149	248	-10	0		5	0	
19/06	0	40	172	241	-10	-5		5	5	
19/12	0	42	115	191	5	5		-5	5	
19/18	0	55	123	94	10	5		-10	0	
20/00	0	68	170	130	10	-10		-10	10	
20/06	0	74	137	149	5	-15		-5	10	
20/12	15	97	133	156	-5	-25		10	25	
20/18	0	117	159	136	-10	-30		10	30	
21/00	0	158	109	184	-20	-29		20	25	
21/06	21	109	88	157	-20	-24		20	20	
21/12	21	24	69	391	-25	-24		15	15	
21/18	31	70	192	360	-20	-4		15	0	
22/00	42	148	223	517	-9	0		0	-10	
22/06	21	106	157		2	8		-10	-15	
22/12	0	137			6			-15		
22/18	35	121			8			-15		
23/00	0	113			10			-15		
23/06	0	173			10			-15		
23/12	0	266			10			-15		
23/18	0	175			8			-10		
24/00	0	243			4			-5		
24/06	0									
24/12	0									
24/18	0									
25/00	0									

TY SOUDELOR (0306)

Date/Time (UTC)	Center Position T=00(km)	T=24(km)	T=48(km)	T=72(km)	Central Pressure T=24(hPa)	T=48(hPa)	T=72(hPa)	Max. Wind T=24(kt)	T=48(kt)	T=72(kt)
Jun 13/06	16	290			0			-5		
13/12	46	22	99	39	-6	-15	-25	5	15	20
13/18	24	144	193	207	-16	-15	-25	15	15	20
14/00	11	97	219	277	-14	-20	-15	10	20	15
14/06	100	322	477	766	-10	-10	5	5	10	-5
14/12	44	222	412	630	-5	-5	10	5	5	-10
14/18	0	139	372	501	0	0	15	0	0	-15
15/00	0	161	503	709	0	5	20	0	-5	-20
15/06	85	93	241	451	0	5	25	0	-5	-25
15/12	109	177	270	346	0	5	15	0	-5	-15
15/18	54	147	174	257	0	10	15	5	-5	-10
16/00	0	192	130	223	5	15	0	0	-10	5
16/06	11	83	150	96	0	15	0	0	-15	0
16/12	0	88	102	205	5	15	5	-5	-15	-5
16/18	0	82	100		5	10		-5	-10	
17/00	0	52	197		15	5		-15	-5	
17/06	11	45	64		20	-5		-20	5	
17/12	15	70	238		10	-5		-10	5	
17/18	10	59			5			-5		
18/00	15	62			-5			5		
18/06	22	71			-10			10		
18/12	0	56			-5			5		
18/18	106									
19/00	0									
19/06	29									
19/12	66									

Date/Time (UTC)	Center Position T=00(km)	T=24(km)	T=48(km)	T=72(km)	Central Pressure T=24(hPa)	T=48(hPa)	T=72(hPa)	Max. Wind T=24(kt)	T=48(kt)	T=72(kt)
TY IMBUDO (0307)										
Jul 17/06	0	141	226	372	-4	10	30	5	-10	-25
17/12	0	86	226	374	-5	0	35	5	0	-25
17/18	0	44	197	261	0	5	35	0	-5	-25
18/00	0	81	109	193	0	10	20	0	-10	-15
18/06	0	181	162	294	5	20	15	-5	-15	-10
18/12	16	194	263	316	0	30	10	0	-20	-10
18/18	0	134	170	347	5	30	5	-5	-20	-5
19/00	22	57	318	446	15	20	5	-10	-15	-5
19/06	0	45	264	411	20	10	0	-15	-10	0
19/12	0	69	251	452	25	10	-5	-15	-10	5
19/18	0	77	278	459	25	5	-10	-15	-5	5
20/00	0	248	446	612	15	5	-10	-10	-5	10
20/06	0	170	383	546	0	-10	-5	-5	5	5
20/12	0	267	550	714	0	-15	-5	0	15	5
20/18	0	185	361	516	0	-20	0	0	15	0
21/00	0	141	328	531	0	-15	0	0	15	5
21/06	0	182	399	479	-15	-15	10	10	10	0
21/12	0	191	375	542	-20	-15	0	15	10	10
21/18	0	123	284	332	-20	-5	-7	15	5	15
22/00	0	177	187		0	0		5	5	
22/06	0	204	181		0	5		0	0	
22/12	0	154	78		10	5		-10	0	
22/18	0	64	59		15	2		-10	5	
23/00	11	73			5			0		
23/06	0	35			-5			15		
23/12	0	44			0			5		
23/18	0	57			0			0		
24/00	0									
24/06	46									
24/12	0									
24/18	61									

Date/Time (UTC)	Center Position T=00(km)	T=24(km)	T=48(km)	T=72(km)	Central Pressure T=24(hPa)	T=48(hPa)	T=72(hPa)	Max. Wind T=24(kt)	T=48(kt)	T=72(kt)
TS MORAKOT (0309)										
Aug 02/06	0	174	310		0	-6		-5	10	
02/12	39	176			-2			0		
02/18	0	178			-9			10		
03/00	39	181			-6			10		
03/06	0	122			-6			10		
03/12	57									
03/18	0									
04/00	53									
04/06	0									

Date/Time (UTC)	Center Position T=00(km)	T=24(km)	T=48(km)	T=72(km)	Central Pressure T=24(hPa)	T=48(hPa)	T=72(hPa)	Max. Wind T=24(kt)	T=48(kt)	T=72(kt)
TS VAMCO (0311)										
Aug 19/06	0									
19/12	24									
19/18	0									

Date/Time (UTC)	Center Position T=00(km)	T=24(km)	T=48(km)	T=72(km)	Central Pressure T=24(hPa)	T=48(hPa)	T=72(hPa)	Max. Wind T=24(kt)	T=48(kt)	T=72(kt)
TY KROVANH (0312)										
Aug 20/12	11	164	226	429	12	20	10	-10	-20	-10
20/18	11	137	344	324	5	-10	5	-5	15	0
21/00	15	116	253	170	5	-10	5	-5	10	0
21/06	11	135	294	189	0	-15	5	0	15	-5
21/12	0	148	205	92	-5	-10	0	5	10	0
21/18	0	167	212	250	-20	-15	5	25	20	-5
22/00	11	188	289	393	-20	-15	5	20	20	-5
22/06	0	113	148	286	-20	-15	5	20	15	-5
22/12	22	122	92	25	-15	-15	5	15	15	0
22/18	48	170	308	230	-10	0	0	15	0	0
23/00	15	110	147	135	-5	0	-5	10	0	10
23/06	57	214	235		-5	10		10	-10	
23/12	31	122	204		-5	5		5	0	
23/18	24	145	154		0	-5		0	5	
24/00	25	108	201		0	6		0	-40	
24/06	0	103			5			-5		
24/12	57	53			10			-5		
24/18	15	35			5			-10		
25/00	0	83			2			-5		
25/06	10									
25/12	0									
25/18	15									
26/00	41									

Date/Time (UTC)	Center Position T=00(km)	T=24(km)	T=48(km)	T=72(km)	Central Pressure T=24(hPa)	T=48(hPa)	T=72(hPa)	Max. Wind T=24(kt)	T=48(kt)	T=72(kt)
STS KONI (0308)										
Jul 18/06	0	134	143	203	2	10	10	-5	-10	-5
18/12	34	205	266	113	0	10	14	0	-10	-10
18/18	0	34	96	130	0	15	9	0	-15	-5
19/00	11	15	131	99	5	15	9	-5	-15	-5
19/06	0	44	229	261	10	10	0	-10	-5	5
19/12	0	148	242	418	10	5	-5	-10	0	10
19/18	0	282	366		10	0		-10	5	
20/00	0	196	240		10	0		-10	5	
20/06	0	127	267		-10	-15		15	20	
20/12	0	131	314		-5	-10		10	15	
20/18	39	69			0			0		
21/00	33	49			0			5		
21/06	11	136			-5			5		
21/12	0	191			0			5		
21/18	0									
22/00	49									
22/06	15									
22/12	0									

Date/Time (UTC)	Center Position T=00(km)	T=24(km)	T=48(km)	T=72(km)	Central Pressure T=24(hPa)	T=48(hPa)	T=72(hPa)	Max. Wind T=24(kt)	T=48(kt)	T=72(kt)
TY ETAU (0310)										
Aug 03/06	84	208	371	514	10	20	20	-10	-20	-15
03/12	22	171	324	430	10	10	5	-10	-10	0
03/18	0	121	235	224	10	0	5	-10	0	-5
04/00	11	39	190	282	0	-5	0	0	5	0
04/06	21	25	153	148	0	-5	5	0	5	-5
04/12	0	190	254	272	0	-5	-5	0	5	0
04/18	46	281	363	385	-10	-10	-5	5	5	0
05/00	0	155	229	145	-15	-15	-10	10	5	10
05/06	0	62	148	108	-20	-10	-10	15	5	10
05/12	0	116	108	122	-20	-15	-5	15	10	5
05/18	0	59	124	369	-15	-15	5	10	10	15
06/00	0	22	98	236	-10	-5	-5	5	5	20
06/06	23	30	100	512	0	5	-5	-5	0	10
06/12	0	69	152	339	-5	10	-5	0	0	15
06/18	0	69	162		-5	0		0	20	
07/00	11	92	229		-5	-5		5	20	
07/06	0	73	244		-5	-15		5	25	
07/12	10	148	264		10	-10		-5	20	
07/18	0	80			0			20		
08/00	0	91			-5			20		
08/06	0	122			-10			20		
08/12	9	61			-10			20		
08/18	11									
09/00	35									
09/06	35									
09/12	69									

Date/Time (UTC)	Center Position T=00(km)	T=24(km)	T=48(km)	T=72(km)	Central Pressure T=24(hPa)	T=48(hPa)	T=72(hPa)	Max. Wind T=24(kt)	T=48(kt)	T=72(kt)
TY DUJUAN (0313)										
Aug 29/18	25	228	575	1006	19	30	30	-25	-25	-25
30/00	25	271	562	880	10	15	5	-10	-10	-5
30/06	0	240	459	666	15	15	-5	-10	-10	5
30/12	0	157	375	606	5	5	-15	0	0	15
30/18	0	79	108	166	-5	10	-20	10	-5	20
31/00	0	39	104		5	10		0	-5	
31/06	0	54	146		0	-5		0	5	
31/12	0	43	207		0	-20		0	15	
31/18	0	69	222		0	-30		0	30	
Sep 01/00	21	78			0			0		
01/06	0	98			-5			5		
01/12	11	33			-10			10		
01/18	0	24			-15			15		
02/00	39									
02/06	22									
02/12	0									
02/18	0									

TY MAEMI (0314)

Date/Time (UTC)	Center Position T=00(km)	T=24(km)	T=48(km)	T=72(km)	Central Pressure T=24(hPa)	T=48(hPa)	T=72(hPa)	Max. Wind T=24(kt)	T=48(kt)	T=72(kt)
Sep 06/06	57	85	344	474	-2	10	35	5	-10	-30
06/12	68	64	185	247	-5	-5	20	5	5	-10
06/18	62	46	64	213	-5	0	30	5	0	-15
07/00	123	92	178	196	0	10	35	0	-5	-20
07/06	0	168	170	152	5	20	50	-5	-15	-25
07/12	0	71	129	102	5	30	50	-5	-20	-30
07/18	24	49	45	120	5	35	45	-5	-20	-30
08/00	0	43	70	134	15	40	45	-10	-25	-30
08/06	0	91	57	159	10	45	30	-5	-25	-15
08/12	0	88	135	370	25	50	25	-20	-35	-20
08/18	0	23	99	324	35	45	20	-25	-30	-15
09/00	21	60	93	278	30	40	20	-25	-30	-20
09/06	0	102	191	78	30	15	10	-15	-10	-10
09/12	0	54	40	465	25	10	-5	-20	-10	5
09/18	0	24	158	584	15	-5	-30	-15	0	25
10/00	0	49	294	783	10	0	-30	-10	-5	25
10/06	0	37	169	245	-5	0	-10	5	-5	20
10/12	0	59	156	227	-20	-15	-5	15	15	20
10/18	0	31	274	319	-25	-20	0	20	25	15
11/00	0	89	272		-10	-15		0	20	
11/06	0	65	220		10	-10		-10	15	
11/12	0	76	258		0	-10		0	15	
11/18	0	58	100		-5	-5		10	10	
12/00	0	78			0			5		
12/06	0	88			-5			15		
12/12	0	80			-5			10		
12/18	0	188			0			0		
13/00	0									
13/06	0									
13/12	0									
13/18	0									

TY KOPPU (0316)

Date/Time (UTC)	Center Position T=00(km)	T=24(km)	T=48(km)	T=72(km)	Central Pressure T=24(hPa)	T=48(hPa)	T=72(hPa)	Max. Wind T=24(kt)	T=48(kt)	T=72(kt)
Sep 26/18	10	99	151	194	15	10	15	-10	-5	-10
27/00	0	51	86	422	10	15	5	-5	-10	0
27/06	54	75	24		-5	5		5	0	
27/12	10	114	10		0	0		5	5	
27/18	0	157	441		-5	0		10	5	
28/00	0	126	57		0	-5		0	5	
28/06	20	184			5			0		
28/12	0	176			-5			5		
28/18	0	135			0			0		
29/00	0	50			-10			10		
29/06	20									
29/12	66									
29/18	15									
30/00	0									

TY CHOI-WAN (0315)

Date/Time (UTC)	Center Position T=00(km)	T=24(km)	T=48(km)	T=72(km)	Central Pressure T=24(hPa)	T=48(hPa)	T=72(hPa)	Max. Wind T=24(kt)	T=48(kt)	T=72(kt)
Sep 18/00	0	273	652	1278	5	10	20	-5	-10	-15
18/06	61	164	422	955	-5	0	15	5	0	-5
18/12	0	296	549	1096	0	5	15	-5	0	-5
18/18	0	199	397	897	5	0	10	-5	0	-5
19/00	0	148	485	718	0	10	10	0	-5	-5
19/06	0	30	286	389	0	15	15	0	-5	-10
19/12	0	59	250	367	0	10	0	5	0	0
19/18	0	97	182	546	-10	0	0	5	0	0
20/00	0	131	296		-5	15		5	-10	
20/06	11	59	178		5	10		5	-5	
20/12	0	67	149		25	5		-15	-5	
20/18	0	57	82		20	5		-15	-5	
21/00	48	38			20			-15		
21/06	0	125			15			-10		
21/12	0	89			0			0		
21/18	0	14			-5			5		
22/00	0									
22/06	0									
22/12	0									
22/18	0									

TY KETSANA (0317)

Date/Time (UTC)	Center Position T=00(km)	T=24(km)	T=48(km)	T=72(km)	Central Pressure T=24(hPa)	T=48(hPa)	T=72(hPa)	Max. Wind T=24(kt)	T=48(kt)	T=72(kt)
Oct 19/00	123	112	70		16	42		-20	-40	
19/06	11	203	130	286	10	30	25	-10	-25	-20
19/12	35	151	138	362	5	20	10	-5	-10	-5
19/18	11	85	193	269	5	15	5	-5	-10	-5
20/00	49	72	202	317	15	10	0	-10	-10	0
20/06	33	35	241	389	15	10	0	-10	-10	0
20/12	24	129	333	439	20	10	0	-10	-5	0
20/18	11	64	167	283	15	5	5	-10	-5	-5
21/00	11	115	255	423	10	5	5	-10	-5	0
21/06	0	155	199	346	0	0	5	-5	0	0
21/12	15	176	251	351	-5	0	5	5	0	0
21/18	11	128	209	201	0	5	10	0	-5	-5
22/00	0	69	203	268	-5	5	5	5	0	-5
22/06	0	15	115	483	-5	5	0	5	0	0
22/12	0	24	150	608	0	5	-10	0	0	5
22/18	11	59	213	807	5	5	-20	-5	0	15
23/00	0	84	352	988	5	5	-25	0	-5	20
23/06	0	74	101		0	-5		0	5	
23/12	0	108	146		5	-5		0	5	
23/18	0	75	116		10	-15		-5	10	
24/00	0	54	157		10	-10		-10	10	
24/06	0	63			5			-5		
24/12	0	70			-5			5		
24/18	0	87			-15			15		
25/00	0	130			-15			15		
25/06	0									
25/12	24									
25/18	24									
26/00	0									

TY PARMA (0318)

Date/Time (UTC)	Center Position T=00(km)	T=24(km)	T=48(km)	T=72(km)	Central Pressure T=24(hPa)	T=48(hPa)	T=72(hPa)	Max. Wind T=24(kt)	T=48(kt)	T=72(kt)
Oct 21/00	56	142	188	45	10	25	55	-10	-20	-45
21/06	52	147	60	44	15	30	50	-15	-25	-40
21/12	10	112	49	119	15	40	50	-15	-30	-40
21/18	0	52	82	208	15	45	50	-10	-35	-40
22/00	11	44	93	227	10	40	45	-5	-30	-35
22/06	0	67	127	380	10	30	45	-5	-20	-35
22/12	0	173	270	548	20	30	40	-10	-20	-35
22/18	10	162	270	615	25	35	35	-15	-25	-30
23/00	0	131	362	874	25	40	25	-20	-30	-20
23/06	0	40	361	872	15	30	20	-15	-20	-15
23/12	0	142	438	772	15	20	22	-10	-15	-20
23/18	0	97	523	700	30	20	22	-20	-15	-20
24/00	0	141	626	759	20	15	21	-15	-10	-30
24/06	15	173	489	377	25	10	15	-15	-5	-15
24/12	0	230	449	376	15	10	15	-10	-5	-15
24/18	0	149	204	201	5	0	-5	0	5	5
25/00	0	269	177	216	-5	-5	-5	10	5	5
25/06	53	213	205	309	-15	-15	-15	20	15	15
25/12	0	158	192	332	-10	-5	0	15	5	0
25/18	0	47	174	239	-5	-5	10	10	5	-5
26/00	0	0	102	242	-10	-10	20	10	5	-15
26/06	22	103	235	313	-10	-15	25	10	15	-15
26/12	0	94	164	314	-10	-10	20	10	10	-10
26/18	0	70	84	83	-10	0	25	10	5	-15
27/00	0	106	156	296	-5	15	20	5	-10	-10
27/06	0	47	108	603	-5	30	20	5	-20	-10
27/12	0	78	272	869	0	30	10	0	-20	-5
27/18	0	70	262	782	5	25	-5	-5	-20	0
28/00	0	80	251	768	20	25	-15	-15	-15	15
28/06	0	122	490	1394	35	20	-20	-25	-10	20
28/12	0	118	246		35	10		-25	-5	
28/18	0	89	264		25	0		-15	0	
29/00	11	126	482		10	-20		-5	15	
29/06	0	70	392		-5	-30		5	25	
29/12	0	162			-20			10		
29/18	0	179			-30			15		
30/00	0	323			-35			25		
30/06	0	271			-25			20		
30/12	0									
30/18	78									
31/00	0									
31/06	0									

TY NEPARTAK (0320)

Date/Time (UTC)	Center Position T=00(km)	T=24(km)	T=48(km)	T=72(km)	Central Pressure T=24(hPa)	T=48(hPa)	T=72(hPa)	Max. Wind T=24(kt)	T=48(kt)	T=72(kt)
Nov 12/18	47	180	292	271	6	9	17	-5	-10	-15
13/00	0	135	243	243	-5	5	-5	5	-5	5
13/06	65	131	189	87	-5	0	-5	5	0	5
13/12	0	132	93	64	-5	0	-5	5	0	5
13/18	0	172	300	261	0	0	0	0	0	0
14/00	69	213	263	294	5	0	0	-5	0	0
14/06	86	107	87	172	0	0	5	0	0	-5
14/12	11	89	97	168	0	-5	5	0	5	-5
14/18	0	24	75	235	-10	0	0	10	0	-5
15/00	0	60	55	223	-10	-5	0	10	5	-5
15/06	0	123	79	156	-10	-5	0	10	5	-10
15/12	0	86	164	206	-5	0	-6	5	0	0
15/18	0	109	163	217	0	-5	-10	0	0	5
16/00	0	123	158	130	0	-5	-4	0	0	0
16/06	39	151	169		-5	-10		5	0	
16/12	0	78	62		-5	-16		5	10	
16/18	0	44	67		-5	-15		0	10	
17/00	0	21	237		-5	-10		0	10	
17/06	0	79			-5			-5		
17/12	22	119			-11			5		
17/18	34	33			-10			5		
18/00	34	74			-10			10		
18/06	0									
18/12	31									
18/18	0									
19/00	10									

STS MELOR (0319)

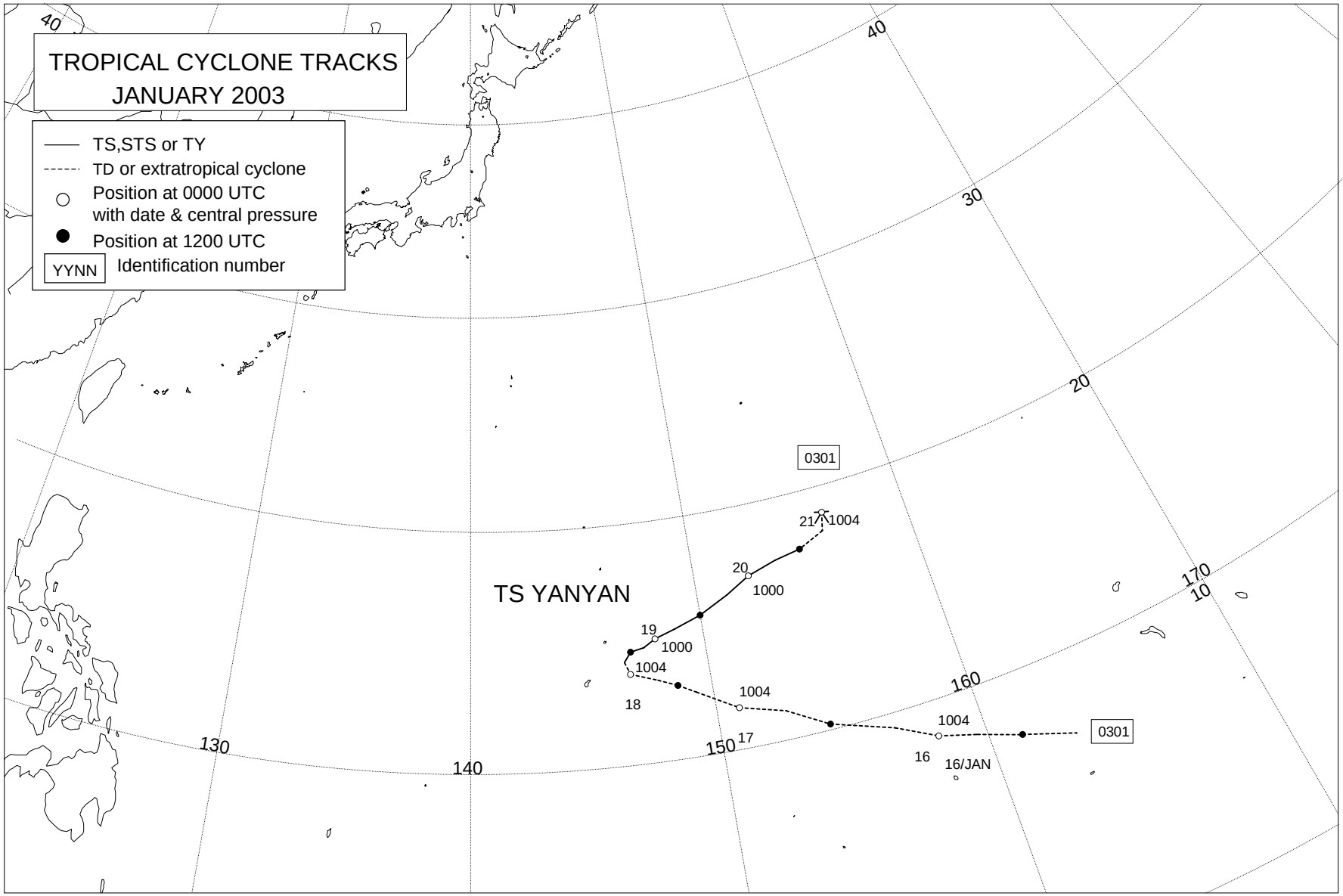
Date/Time (UTC)	Center Position T=00(km)	T=24(km)	T=48(km)	T=72(km)	Central Pressure T=24(hPa)	T=48(hPa)	T=72(hPa)	Max. Wind T=24(kt)	T=48(kt)	T=72(kt)
Oct 30/12	0	116	74	176	5	-21	-30	0	25	35
30/18	11	15	285	676	10	-12	-22	-5	10	30
31/00	0	46	376	946	5	-5	-16	0	5	20
31/06	0	11	175	619	-10	-10	-18	15	10	20
31/12	0	25	257	721	-16	-10	-18	20	15	20
31/18	11	207	519		-12	-12		10	20	
Nov 01/00	0	185	516		-5	-16		0	20	
01/06	0	252	690		-5	-23		5	25	
01/12	15	231	721		-5	-18		10	20	
01/18	0	212			-7			15		
02/00	0	310			-11			15		
02/06	0	295			-13			15		
02/12	0	143			-6			0		
02/18	0									
03/00	0									
03/06	0									
03/12	20									

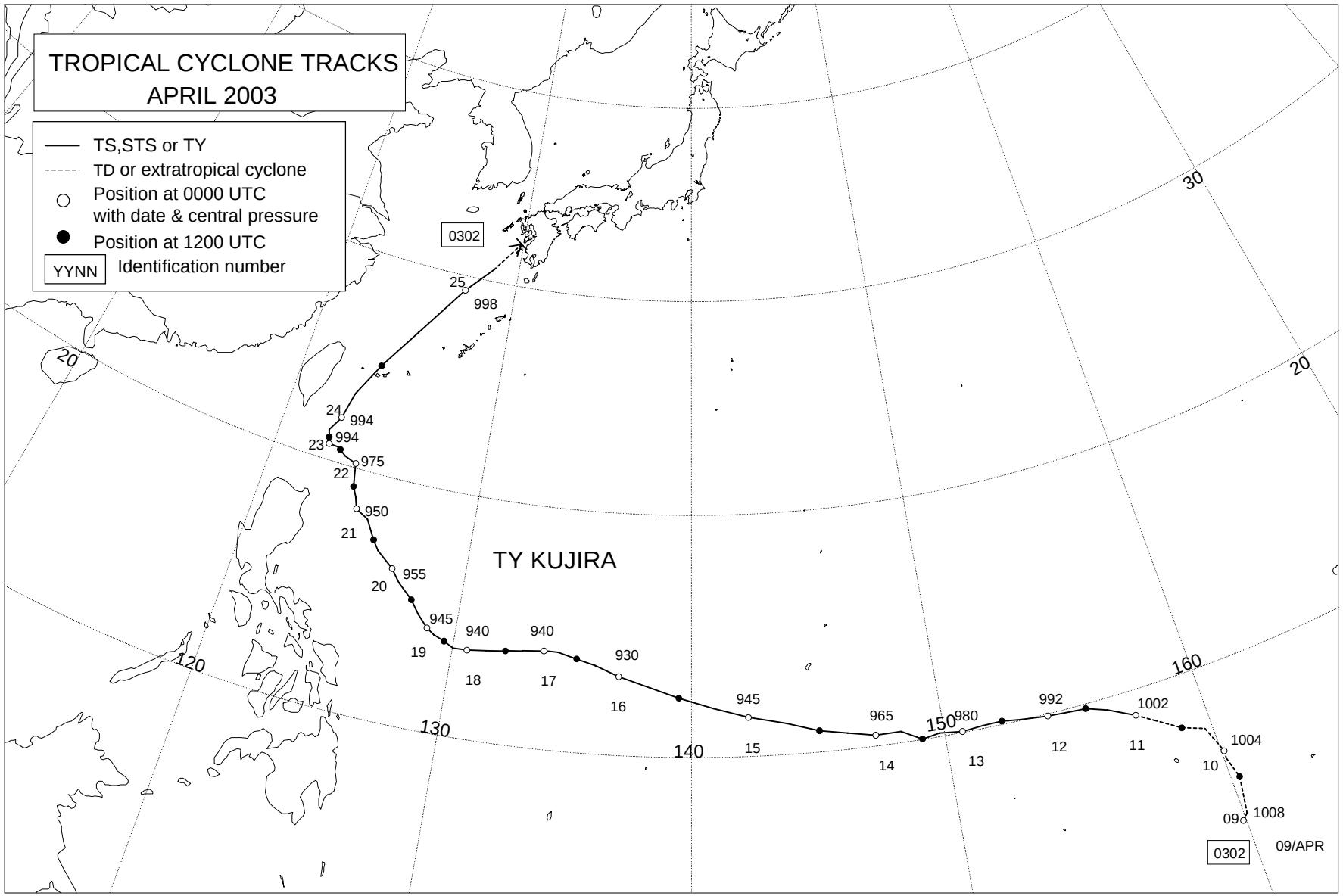
TY LUPIT (0321)

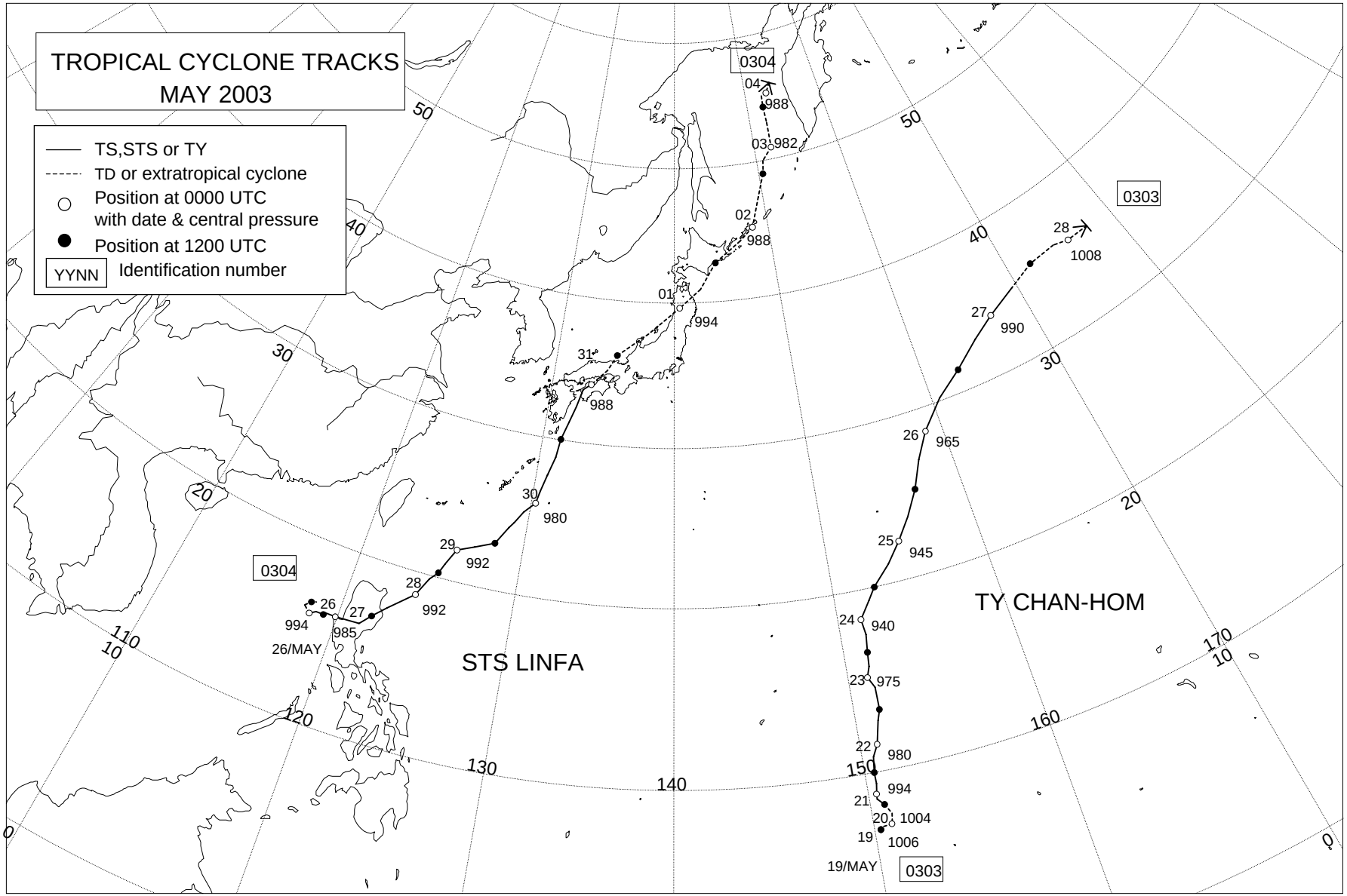
Date/Time (UTC)	Center Position T=00(km)	T=24(km)	T=48(km)	T=72(km)	Central Pressure T=24(hPa)	T=48(hPa)	T=72(hPa)	Max. Wind T=24(kt)	T=48(kt)	T=72(kt)
Nov 21/12	46	104	104	86	12	20	20	-5	-20	-15
21/18	90	184	183	326	5	15	15	0	-15	-10
22/00	11	101	144	101	-5	10	5	10	-5	0
22/06	11	124	199	50	0	10	10	5	-5	-5
22/12	33	268	450	239	5	10	15	-5	-5	-5
22/18	80	264	371	195	10	10	20	-10	-5	-10
23/00	0	215	153	88	10	0	15	-10	0	-10
23/06	11	142	50	98	10	5	25	-10	-5	-15
23/12	0	153	95	108	0	5	30	0	0	-20
23/18	22	165	25	79	-10	0	25	5	0	-15
24/00	33	55	131	173	-10	5	25	5	-5	-15
24/06	0	94	98	216	-5	15	25	0	-10	-15
24/12	0	133	122	226	0	20	25	0	-15	-15
24/18	25	218	231	290	5	25	25	-5	-15	-15
25/00	0	31	131	196	10	25	20	-10	-15	-15
25/06	0	99	127	156	20	25	15	-15	-15	-10
25/12	0	56	119	281	20	25	10	-15	-15	-5
25/18	0	66	227	413	25	25	5	-15	-15	0
26/00	0	87	170	323	20	20	5	-10	-15	0
26/06	0	82	180	327	10	5	0	0	-5	0
26/12	0	100	251	320	10	0	0	-5	0	0
26/18	0	156	262	193	10	-5	0	-5	5	0
27/00	0	93	154	98	0	-5	-5	-5	5	5
27/06	0	79	170	93	-5	-10	-5	0	5	5
27/12	0	63	114	256	-10	-10	-5	5	5	5
27/18	0	40	146	405	-10	-5	-5	5	0	0
28/00	0	53	99	74	-5	-5	-5	5	5	5
28/06	0	77	157	121	-5	5	0	5	0	5
28/12	0	77	112	158	0	10	0	0	-5	0
28/18	0	133	41	200	0	5	0	0	-5	0
29/00	0	94	178	284	-5	-5	-5	0	5	5
29/06	0	88	254	223	0	-10	0	0	15	5
29/12	0	145	299		5	-10		0	10	
29/18	0	157	258		5	-5		-5	5	
30/00	0	206	86		0	-5		5	5	
30/06	0	146	190		-5	-5		10	5	
30/12	0	144			-10			10		
30/18	0	115			-5			5		
Dec 01/00	0	89			-5			5		
01/06	0	48			0			0		
01/12	0									
01/18	0									
02/00	11									
02/06	22									

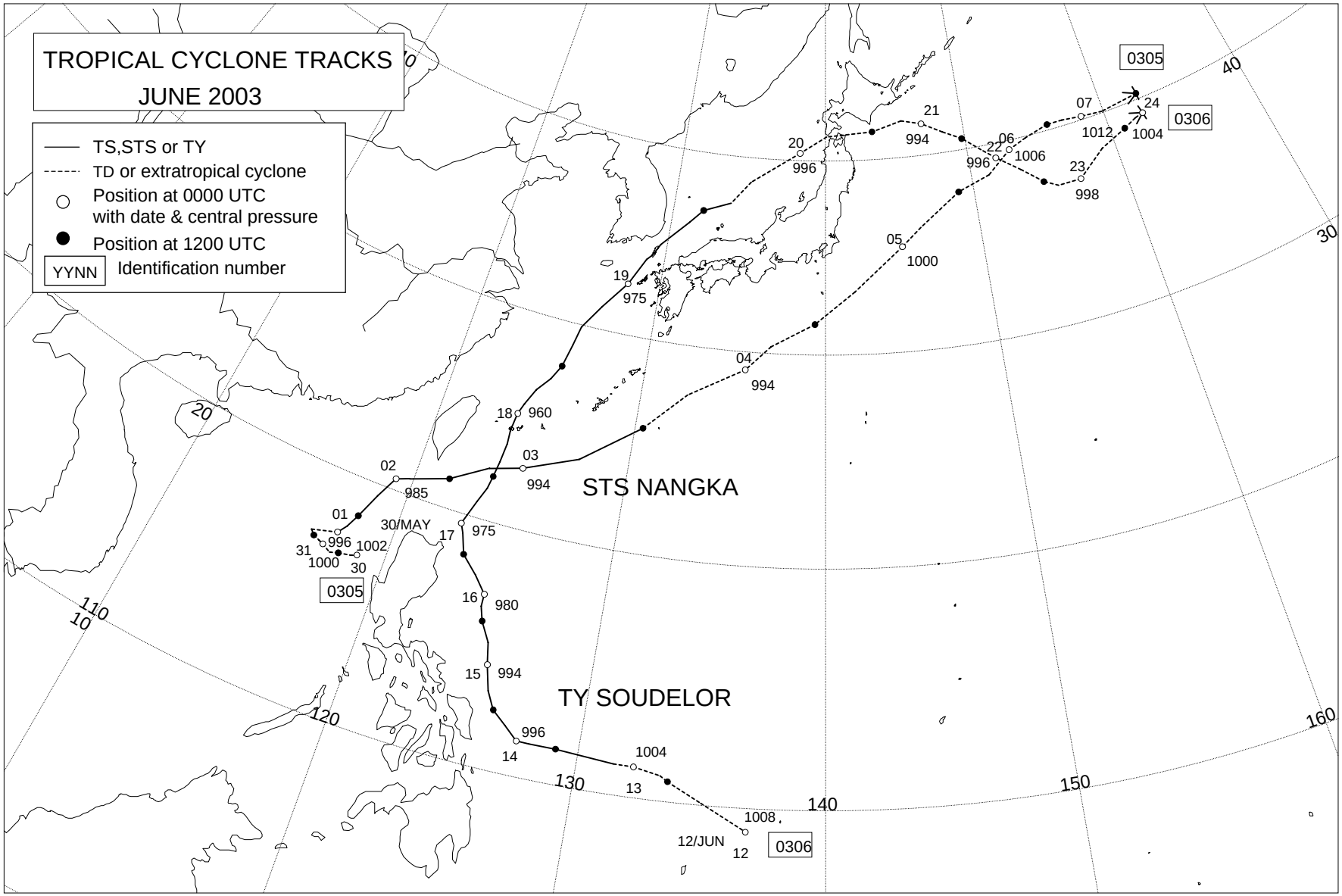
Tropical Cyclone Tracks in 2003

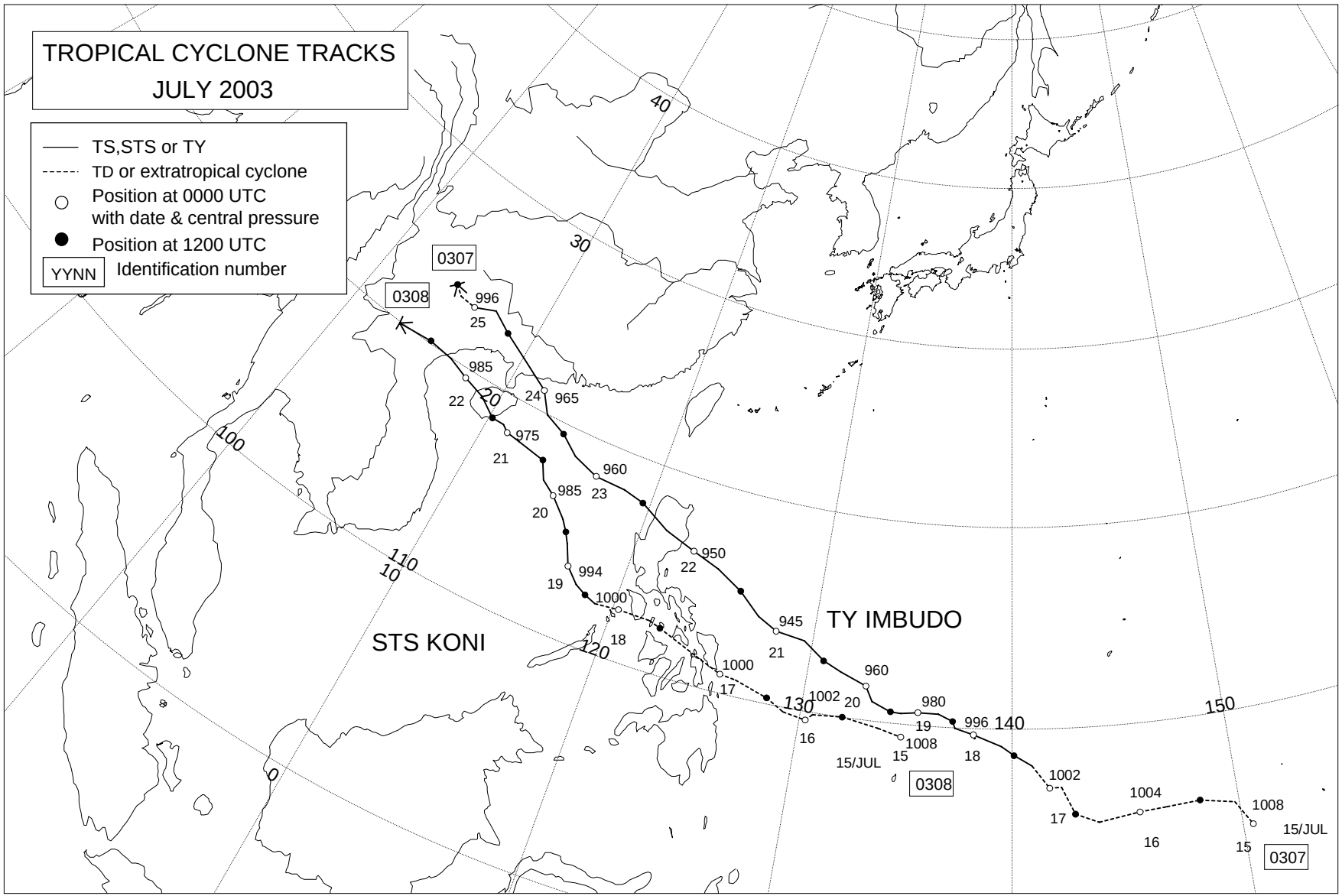
Appendix 3

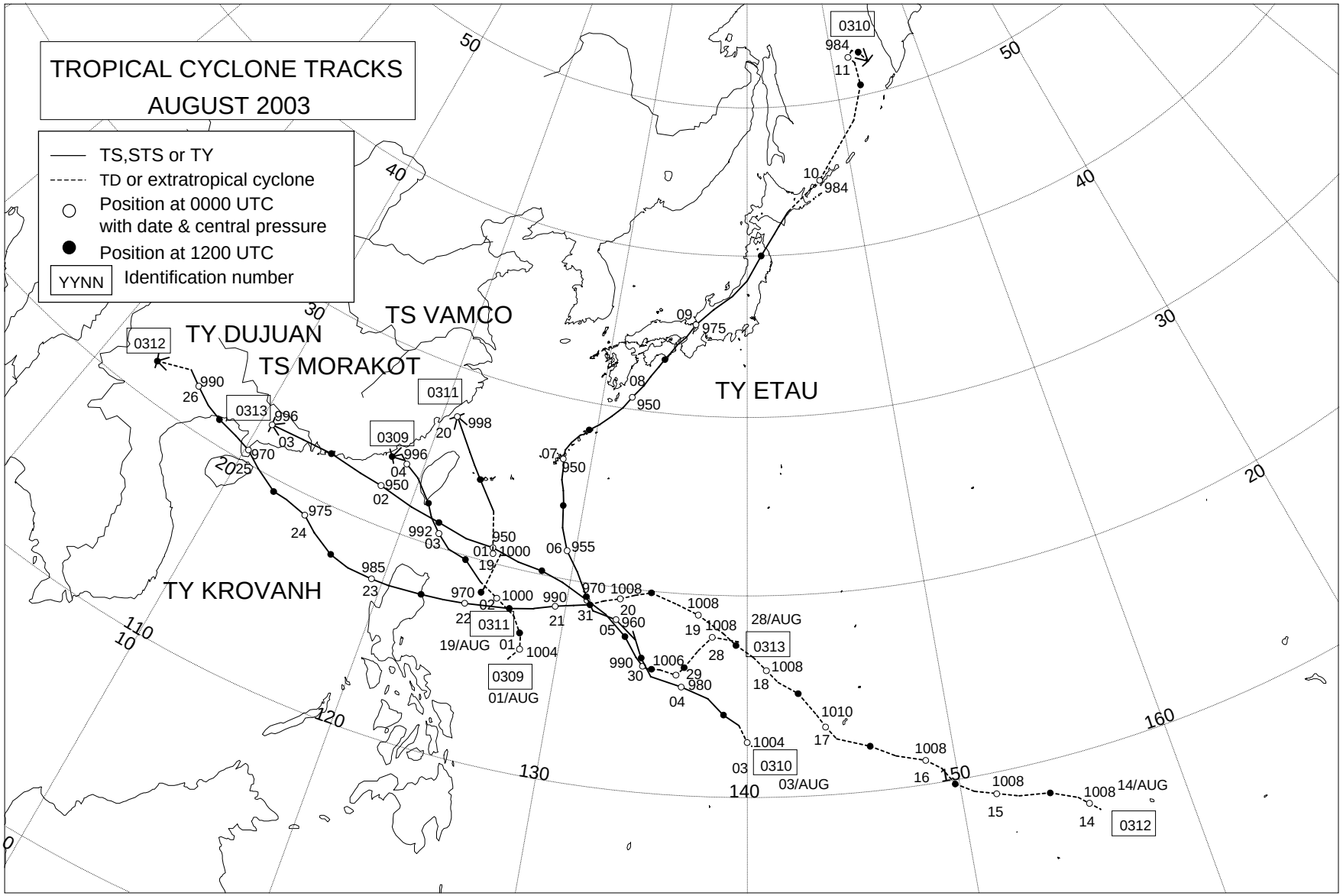


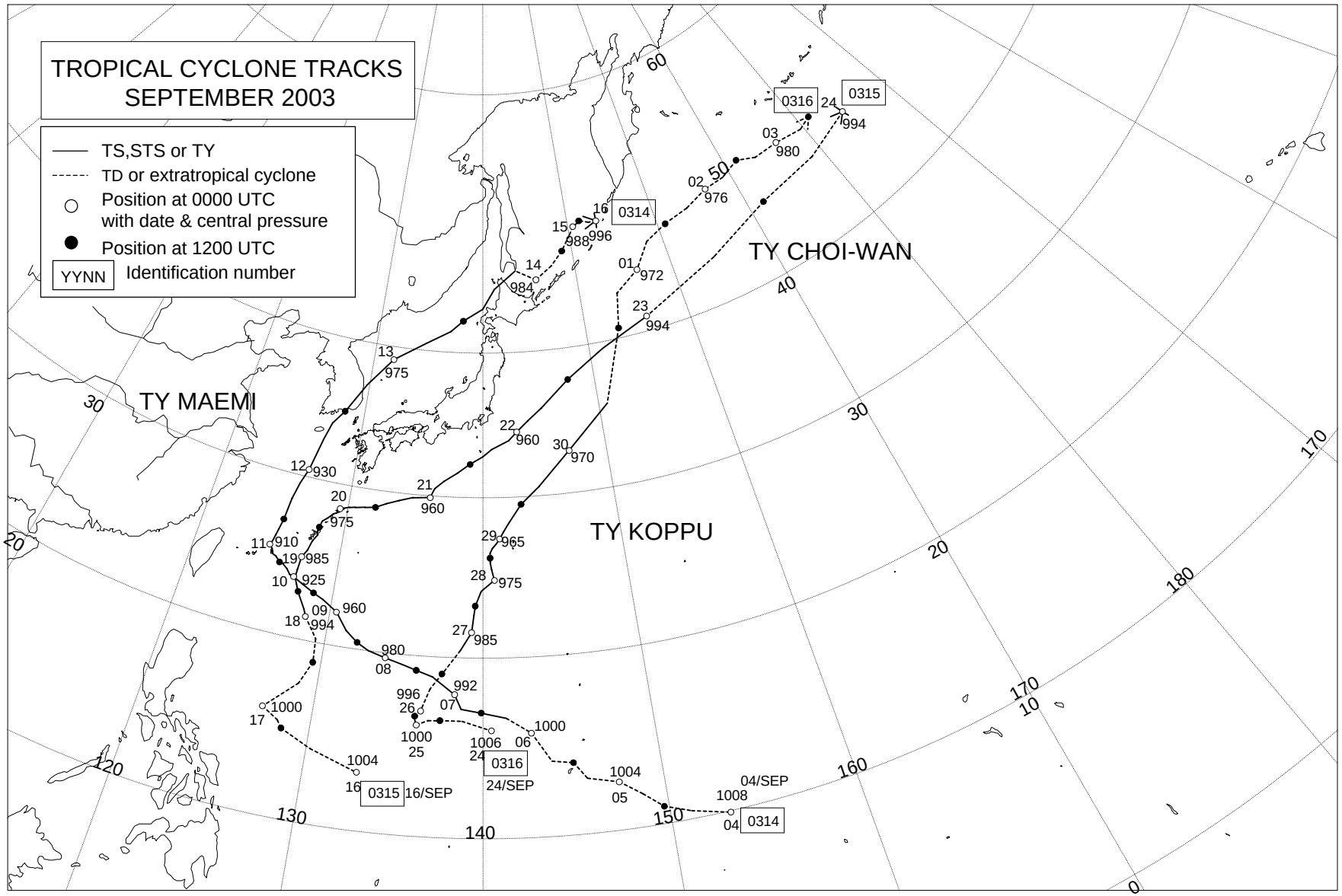

TROPICAL CYCLONE TRACKS
APRIL 2003
TS,STS or TY
TD or extratropical cyclone
Position at 0000 UTC
with date & central pressure
Position at 1200 UTC
YYNN
Identification number
TY KUJIRA
0302
25
998
24
994
994
23
975
22
950
21
955
20
945
940
940
19
18
17
930
16
945
965
15
14
980
992
1002
1004
1008
13
12
11
10
09
0302
09/APR
20
30
120
130
140
150
160

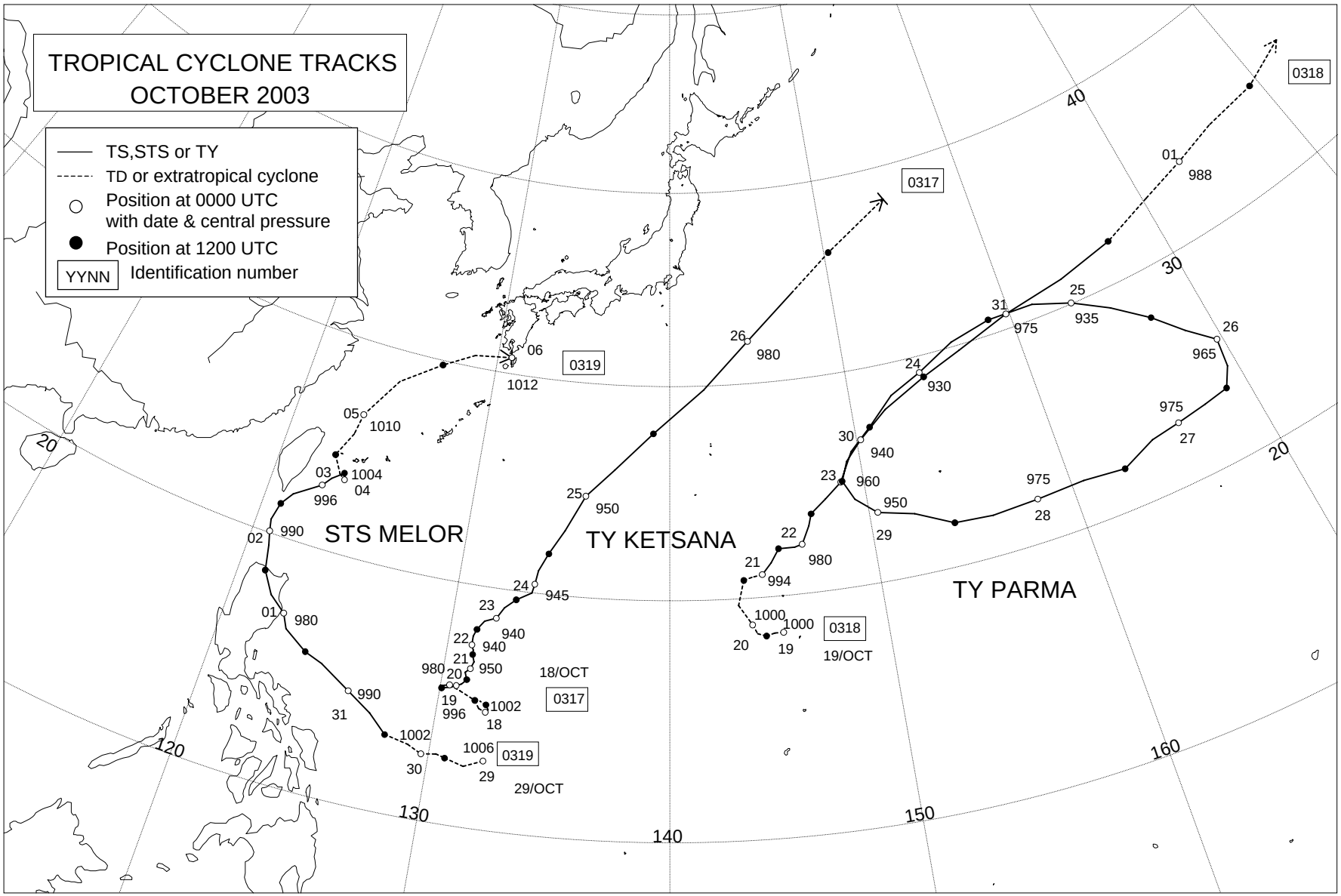

TROPICAL CYCLONE TRACKS
MAY 2003
TS,STS or TY
TD or extratropical cyclone
Position at 0000 UTC
with date & central pressure
Position at 1200 UTC
YYNN Identification number
0304
04
988
03
982
02
988
01
994
31
988
30
980
29
992
28
992
26
994
27
985
26/MAY
STS LINFA
0304
0303
28
1008
27
990
26
965
25
945
24
940
23
975
22
980
21
994
20
1004
19
1006
19/MAY
0303
TY CHAN-HOM
50
40
30
20
10
0
110
120
130
140
150
160
170

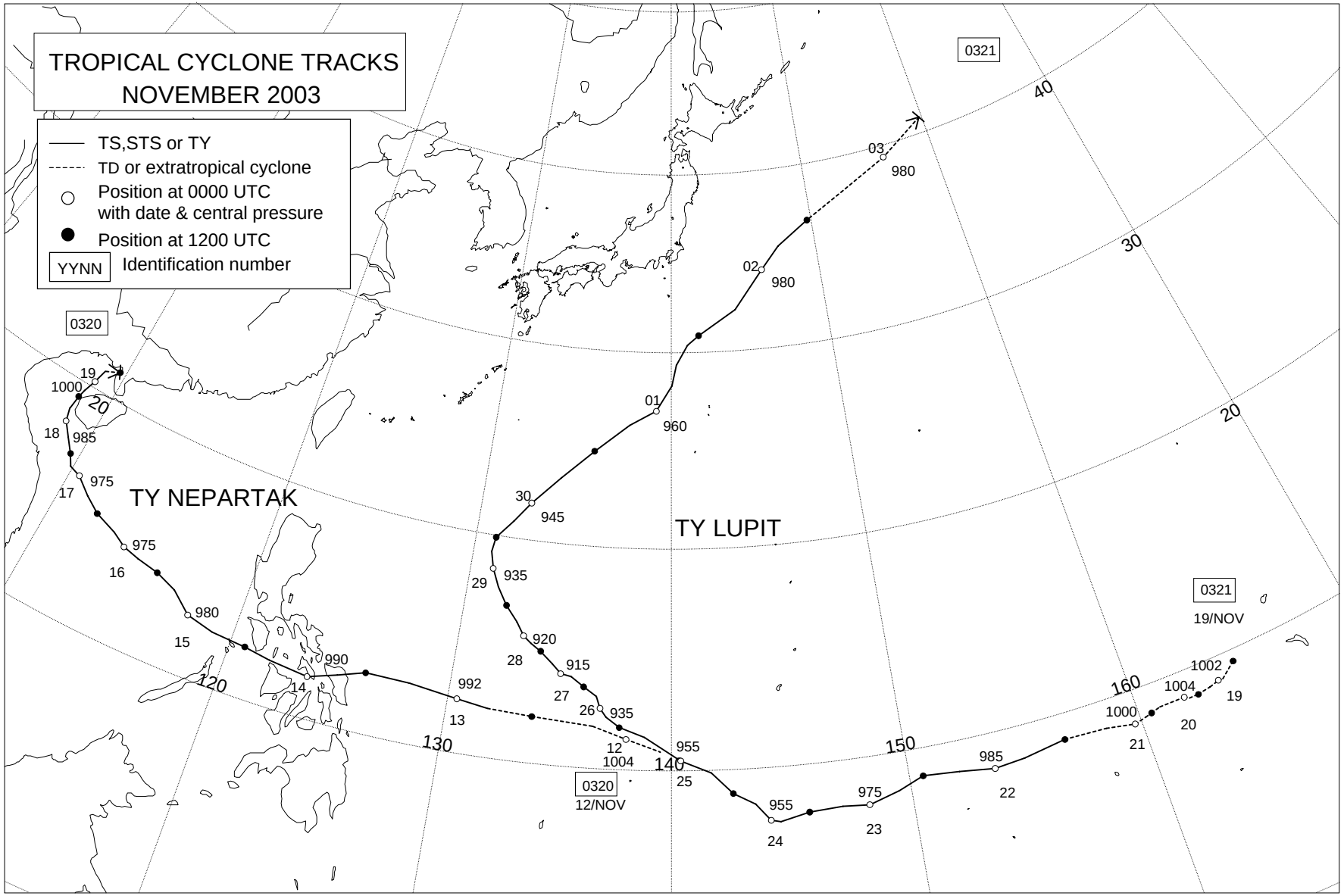

TROPICAL CYCLONE TRACKS
JUNE 2003
TS,STS or TY
TD or extratropical cyclone
Position at 0000 UTC
with date & central pressure
Position at 1200 UTC
YYNN
Identification number
STS NANGKA
TY SOUDELOR
0305
0306
30/MAY
12/JUN
01
02
03
04
05
06
07
12
13
14
15
16
17
18
19
20
21
22
23
24
30
31
1000
1002
985
994
960
975
980
996
1004
1008
1012
998
1006
10
20
30
40
110
120
130
140
150
160


TROPICAL CYCLONE TRACKS
JULY 2003
TS,STS or TY
TD or extratropical cyclone
Position at 0000 UTC
with date & central pressure
Position at 1200 UTC
YYNN Identification number
0307
0308
STS KONI
TY IMBUDO
15/JUL
0308
15/JUL
0307


TROPICAL CYCLONE TRACKS
AUGUST 2003
TS,STS or TY
TD or extratropical cyclone
Position at 0000 UTC
with date & central pressure
Position at 1200 UTC
YYNN
Identification number
TY DUJUAN
TS MORAKOT
TS VAMCO
TY ETAU
TY KROVANH
0312
0313
0311
0309
0310
2025
19/AUG
01/AUG
28/AUG
03/AUG
14/AUG
10
20
30
40
50
110
120
130
140
150
160


TROPICAL CYCLONE TRACKS
SEPTEMBER 2003
TS,STS or TY
TD or extratropical cyclone
Position at 0000 UTC
with date & central pressure
Position at 1200 UTC
YYNN
Identification number
TY MAEMI
TY KOPPU
TY CHOI-WAN
0315
0316
0314
0316
0315
0314
16/SEP
24/SEP
04/SEP
60
50
40
30
20
10
0
170
180
160
150
140
130
120


TROPICAL CYCLONE TRACKS
OCTOBER 2003
TS,STS or TY
TD or extratropical cyclone
Position at 0000 UTC
with date & central pressure
Position at 1200 UTC
YYNN Identification number
STS MELOR
TY KETSANA
TY PARMA
0317
0318
0319
18/OCT
19/OCT
29/OCT
20
30
40
120
130
140
150
160


TROPICAL CYCLONE TRACKS
NOVEMBER 2003
TS,STS or TY
TD or extratropical cyclone
Position at 0000 UTC
with date & central pressure
Position at 1200 UTC
YYNN Identification number
0320
0321
TY NEPARTAK
TY LUPIT
19/NOV
12/NOV
120
130
140
150
160
20
30
40

Appendix 4

Monthly and Annual Frequency of Tropical Cyclones

Monthly and annual frequency of tropical cyclones that attained TS intensity or higher in the western North Pacific and the South China Sea for 1951 - 2003

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1951		1	1	2	1	1	3	3	2	4	1	2	21
1952						3	3	5	3	6	3	4	27
1953		1			1	2	1	6	3	5	3	1	23
1954			1		1		1	5	5	4	3	1	21
1955	1	1	1	1		2	7	6	4	3	1	1	28
1956			1	2		1	2	5	6	1	4	1	23
1957	2			1	1	1	1	4	5	4	3		22
1958	1			1	1	4	7	5	5	3	2	2	31
1959		1	1	1			2	5	5	4	2	2	23
1960				1	1	3	3	10	3	4	1	1	27
1961	1		1		2	3	4	6	6	4	1	1	29
1962		1		1	2		5	8	4	5	3	1	30
1963				1		4	4	3	5	4		3	24
1964					2	2	7	5	6	5	6	1	34
1965	2	1	1	1	2	3	5	6	7	2	2		32
1966				1	2	1	4	10	9	5	2	1	35
1967		1	2	1	1	1	7	9	9	4	3	1	39
1968				1	1	1	3	8	3	5	5		27
1969	1		1	1			3	4	3	3	2	1	19
1970		1				2	3	6	5	5	4		26
1971	1		1	3	4	2	8	5	6	4	2		36
1972	1				1	3	7	5	4	5	3	2	31
1973							7	5	2	4	3		21
1974	1		1	1	1	4	4	5	5	4	4	2	32
1975	1						2	4	5	5	3	1	21
1976	1	1		2	2	2	4	4	5	1	1	2	25
1977			1			1	3	3	5	5	1	2	21
1978	1			1		3	4	8	5	4	4		30
1979	1		1	1	2		4	2	6	3	2	2	24
1980				1	4	1	4	2	6	4	1	1	24
1981			1	2		3	4	8	4	2	3	2	29
1982			3		1	3	3	5	5	3	1	1	25
1983						1	3	5	2	5	5	2	23
1984						2	5	5	4	7	3	1	27
1985	2				1	3	1	8	5	4	1	2	27
1986		1		1	2	2	4	4	3	5	4	3	29
1987	1			1		2	4	4	6	2	2	1	23
1988	1				1	3	2	8	8	5	2	1	31
1989	1			1	2	2	7	5	6	4	3	1	32
1990	1			1	1	3	4	6	4	4	4	1	29
1991			2	1	1	1	4	5	6	3	6		29
1992	1	1				2	4	8	5	7	3		31
1993			1			1	4	7	5	5	2	3	28
1994				1	1	2	7	9	8	6		2	36
1995				1		1	2	6	5	6	1	1	23
1996		1		1	2		6	5	6	2	2	1	26
1997				2	3	3	4	6	4	3	2	1	28
1998							1	3	5	2	3	2	16
1999				2		1	4	6	6	2	1		22
2000					2		5	6	5	2	2	1	23
2001					1	2	5	6	5	3	1	3	26
2002	1	1			1	3	5	6	4	2	2	1	26
2003	1			1	2	2	2	5	3	3	2		21
Normal 1971-2000	0.5	0.1	0.4	0.8	1.0	1.7	4.2	5.4	5.0	3.9	2.5	1.3	26.7

Appendix 5

Code Forms of RSMC Products

(a) RSMC Tropical Cyclone Advisory (WTPQ20-25 RJTD)

WTPQ i i RJTD YYGGgg
RSMC TROPICAL CYCLONE ADVISORY
NAME class ty-No. name (common-No.)
ANALYSIS
PSTN YYGGgg UTC LaLa.La N LoLoLo.Lo E (or W) confidence
MOVE direction SpSpSp KT
PRES PPPP HPA
MXWD VmVmVm KT
50KT RdRdRd NM (or 50KT RdRdRd NM octant RdRdRd NM octant)
30KT RdRdRd NM (or 30KT RdRdRd NM octant RdRdRd NM octant)
FORECAST
24HF YYGGgg$_F$ UTC LaLa.La$_F$ N LoLoLo.Lo$_F$ E (or W) FrFrFr NM 70%
MOVE direction SpSpSp KT
PRES PPPP HPA
MXWD VmVmVm KT
Ft1Ft1HF YYGGgg$_F$ UTC LaLa.La$_F$ N LoLoLo.Lo$_F$ E (or W) FrFrFr NM 70%
MOVE direction SpSpSp KT
PRES PPPP HPA
MXWD VmVmVm KT
Ft2Ft2HF YYGGgg$_F$ UTC LaLa.La$_F$ N LoLoLo.Lo$_F$ E (or W) FrFrFr NM 70%
MOVE direction SpSpSp KT
PRES PPPP HPA
MXWD VmVmVm KT =

Notes:

a. Underlined is fixed.

b. Abbreviations

PSTN	:	Position
MOVE	:	Movement
PRES	:	Pressure
MXWD	:	Maximum wind
HF	:	Hour forecast

c. Symbolic letters

i i	:	'20', '21', '22', '23', '24' or '25'.
YYGGgg	:	Time of observation submitting the data for analysis. Date(YY), hour(GG) and minute(gg) are given in UTC.
class	:	Intensity classification of the tropical cyclone. 'TY', 'STS', 'TS' or 'TD'.
ty-No.	:	Domestic identification number of the tropical cyclone adopted in Japan. Given in four digits and same as the international identification number.
name	:	Name assigned to the tropical cyclone from the name list prepared by the Typhoon Committee.
common-No.	:	International identification number of the tropical cyclones given in four digits.
LaLa.La	:	Latitude of the center position in "ANALYSIS" part.
LoLoLo.Lo	:	Longitude of the center position in "ANALYSIS" part.
confidence	:	Confidence of the center position. 'GOOD', 'FAIR' or 'POOR'.
direction	:	Direction of movement given in 16 azimuthal direction as 'N', 'NNE', 'NE', 'ENE' etc.
SpSpSp	:	Speed of movement.
PPPP	:	Central pressure.
VmVmVm	:	Maximum sustained wind.
RdRdRd	:	Radii of 30knots and 50knots wind.

octant	:	Eccentric distribution of wind given in 8 azimuthal direction as 'NORTH', 'NORTHEAST', 'EAST' etc.
Ft1Ft1	:	48 (00, 06, 12 and 18 UTC) or 45 (03, 09, 15 and 21 UTC)
Ft2Ft2	:	72 (00, 06, 12 and 18 UTC) or 69 (03, 09, 15 and 21 UTC)
$YYGGgg_F$	:	Time in UTC on which the forecast is valid.
$LaLa.La_F$	:	Latitude of the center of 70% probability circle in "FORECAST" part.
$LoLoLo.Lo_F$	:	Longitude of the center of 70% probability circle in "FORECAST" part.
FrFrFr	:	Radius of 70% probability circle.

d. MOVE is optionally described as 'ALMOST STATIONARY' or '(direction) SLOWLY' depending on the speed of movement.

Example:

WTPQ20 RJTD 150000
RSMC TROPICAL CYCLONE ADVISORY
NAME STS 0320 NEPARTAK (0320)
ANALYSIS
PSTN 150000UTC 12.6N 117.8E FAIR
MOVE WNW 13KT
PRES 980HPA
MXWD 055KT
50KT 40NM
30KT 240NM NORTHEAST 160NM SOUTHWEST
FORECAST
24HF 160000UTC 14.7N 113.7E 110NM 70%
MOVE WNW 11KT
PRES 965HPA
MXWD 070KT
48HF 170000UTC 16.0N 111.0E 170NM 70%
MOVE WNW 07KT
PRES 970HPA
MXWD 065KT
72HF 180000UTC 19.5N 110.0E 250NM 70%
MOVE NNW 09KT
PRES 985HPA
MXWD 050KT =

(b) RSMC Guidance for Forecast (FXPQ20-25 RJTD)

FXPQ i i RJTD YYGGgg
RSMC GUIDANCE FOR FORECAST
NAME class ty-No. name (common-No.)
PSTN YYGGgg UTC LaLa.La N LoLoLo.Lo E (or W)
PRES PPPP HPA
MXWD WWW KT
FORECAST BY TYPHOON (or GLOBAL) MODEL

TIME	PSTN	PRES	MXWD
		(CHANGE FROM T=0)	
T=06	LaLa.La N LoLoLo.Lo E (or W)	appp HPA	awww KT
T=12	LaLa.La N LoLoLo.Lo E (or W)	appp HPA	awww KT
T=18	LaLa.La N LoLoLo.Lo E (or W)	appp HPA	awww KT
	:		
	:		
T=78 (or 84)	LaLa.La N LoLoLo.Lo E (or W)	appp HPA	awww KT=

Notes:

a. Underlined is fixed.

b. Symbolic letters

i i	:	'20', '21', '22', '23', '24' or '25'.
YYGGgg	:	Initial time of the model in UTC.
PPPP	:	Central pressure in hPa.
WWW	:	Maximum wind speed in knots.
a	:	Sign of ppp and www (+, - or blank).

ppp : Absolute value of change in central pressure from T=0, in hectopascals.
www : Absolute value of change in maximum wind speed from T=0, in knots.

c. The prediction terminates in T=78 for Typhoon Model and in T=84 for Global Model.

Example:

```
FXPQ20 RJTD 180600
RSMC GUIDANCE FOR FORECAST
NAME T 0001DAMREY (0001)
PSTN 180000UTC 15.2N 126.3E
PRES   905HPA
MXWD   105KT
FORECAST BY GLOBAL MODEL
TIME      PSTN          PRES      MXWD
                    (CHANGE FROM T=0)
T=06 15.4N 125.8E +018HPA -008KT
T=12 15.5N 125.6E +011HPA -011KT
T=18 15.8N 125.7E +027HPA -028KT
                  :
                  :
T=78 20.7N 128.8E +021HPA -022KT=
```

(c) SAREP (TCNA20/21 RJTD)

TCNA i i RJTD YYGGgg
CCAA YYGGg 47644 name (common-No.) nt nt LaLaLa Qc LoLoLoLo 1At Wt at tm
2St St // (9ds ds fs fs)=

Notes:

a. Underlined is fixed.

b. Symbolic letters

i i : 20 for the observation at 03, 09, 15 and 21 UTC.
21 for the observation at 00, 06, 12 and 18 UTC.

YYGGgg : Time of observation submitting the data for analysis. Date(YY), hour(GG) and minute(gg) are given in UTC.

nt nt : Serial number of the tropical cyclone in order of the time of its formation in the year. Given in '01' - '99' irrespective of TS attainment in intensity.

LaLaLa : Latitude given in 0.1E

Qc : Quadrant of the earth. 1:N/E, 2:S/E, 3:S/W and 4:N/W.

LoLoLoLo : Longitude in 0.1E.

At : Confidence.
0: =<10km 1: =<20km 2: =<50km 3: =<100km 4: =<200km 5: =<300km
/: unable to determine

Wt : Mean diameter (d: degree in latitude) of cloud system.
0: d<1° 1: 1°=<d<2° 2: 2°=<d<3° 3: 3°=<d<4° 4: 4°=<d<5° 5: 5°=<d<6°
6: 6°=<d<7° 7: 7°=<d<8° 8: 8°=<d<9° 9: 9°=<d /: unable to determine

at : 24-hour intensity inclination.
0: further weakening 1: weakening 2: no change
3: intensifying 4: further intensifying 9: no former observation
/: unable to determine

tm : Time interval (t: hour) for determination of movement.
0: t<1 1: 1=<t<2 2: 2=<t<3 3: 3=<t<6 4: 6=<t<9 5: 9=<t<12
6: 12=<t<15 7: 15=<t<18 8: 18=<t<21 9: 21=<t<30 /: no (9dsdsfsfs) group

StSt : Intensity.
00: weakening 15, 20, 25 … 80: CI-number (in 0.1)
99: under extratropical transformation //: unable to determine

dsds : Direction of movement (in 10°).

fsfs : Speed of movement (in knots).

Example:

TCNA21 RJTD 180000
CCAA 18000 47644
DAMREY(0001) 29149 11272
11334 275// 92811=

(d) RSMC Prognostic Reasoning (WTPQ30-35 RJTD)

Example:

WTPQ30 RJTD 180000

RSMC TROPICAL CYCLONE PROGNOSTIC REASONING
REASONING NO. 9 FOR TY 0001 DAMREY (0001)
1.GENERAL COMMENTS
REASONING OF PROGNOSIS THIS TIME IS SIMILAR TO PREVIOUS ONE.
POSITION FORECAST IS MAINLY BASED ON NWP AND PERSISTENCY.
2.SYNOPTIC SITUATION
SUBTROPICAL RIDGE WILL NOT CHANGE ITS LOCATION AND STRENGTH FOR THE NEXT 24 HOURS.

3.MOTION FORECAST
POSITION ACCURACY AT 180000 UTC IS GOOD.
TY WILL DECELERATE FOR THE NEXT 12 HOURS.
TY WILL RECURVE WITHIN 60 HOURS FROM 180000 UTC.
TY WILL MOVE WEST FOR THE NEXT 12 HOURS THEN MOVE GRADUALLY TO WEST-NORTHWEST.
4.INTENSITY FORECAST
TY WILL KEEP PRESENT INTENSITY FOR NEXT 24 HOURS.
FI-NUMBER WILL BE 7.0 AFTER 24 HOURS.=

(e) Tropical Cyclone Advisory for SIGMET (FKPQ30-35 RJTD)

FKPQ i i RJTD YYGGgg	
TC ADVISORY	
DTG:	yyyymmdd/time Z
TCAC:	TOKYO
TC:	class ty-No. name (common-No.)
NR:	number
PSN:	N LaLa.LaLa E LoLoLo.LoLo
MOV:	direction SpSpSp KT
C:	PPPP HPA
MAX WIND:	WWW KT
FCST PSN +12HR:	YYGGgg NLaLa.LaLa ELoLoLo.LoLo
FCST MAX WIND +12HR:	WWW KT
FCST PSN +18HR:	NIL
FCST MAX WIND +18HR:	NIL
FCST PSN +24HR:	YYGGgg N LaLa.LaLa E LoLoLo.LoLo
FCST MAX WIND +24HR:	WWW KT
NXT MSG:	yyyymmdd/time Z=

Notes:

a. Underlined is fixed.

b. Abbreviations

DTG	:	Date and time
TCAC	:	Tropical Cyclone Advisory Centre
TC	:	Tropical Cyclone
NR	:	Number
PSN	:	Position
MOV	:	Movement
C	:	Center pressure

MAX WIND	:	Maximum wind
FCST	:	Forecast
NXT MSG	:	Next message

c. Symbolic letters

i i	:	'30', '31', '32', '33', '34' or '35'.
YYGGgg	:	Date(YY), hour(GG) and minute(gg) are given in UTC.
yyyymmdd/time	:	Year(yyyy),month(mm), data(dd), hour and minute (time) are given in UTC. (Using "Z")
class	:	Intensity classification of the tropical cyclone. 'TY', 'STS', 'TS' or 'TD'
ty-No.	:	Domestic identification number of the tropical cyclone adopted in Japan. Given in four digits and same as the international identification number.
name	:	Name assigned to the tropical cyclone by JTWC (Joint Typhoon Warning Center, Guam). But for assignment, this is indicated as 'NAMELESS'.
common-No.	:	International identification number of the tropical cyclones given in four digits.
Number	:	Advisory number. (starting with "01" for each cyclone)
LaLa.LaLa	:	Latitude of the center position.
LoLoLo.LoLo	:	Longitude of the center position.
direction	:	Direction of movement given in 16 azimuthal direction as 'N', 'NNE', 'NE', 'ENE' etc.
SpSpSp	:	Speed of movement.
PPPP	:	Central pressure.
WWW	:	Maximum sustained wind.

Example:

FKPQ30 RJTD 160600
TC ADVISORY

DTG:	20040416/0600Z
TCAC:	TOKYO
TC:	STS 0401 SUDAL (0401)
NR:	47
PSN:	N2830 E15855
MOV:	ENE 25KT
C:	985HPA
MAX WIND:	50KT
FCST PSN +12HR:	161800 N3150 E15855
FCST MAX WIND 12HR:	50KT
FCST PSN +18HR:	NIL
FCST MAX WIND 18HR:	NIL
FCST PSN +24HR:	170600 N3500 E16700
FCST MAX WIND 24HR:	45KT
NXT MSG:	20040416/1200Z =

(f) RSMC Tropical Cyclone Best Track (AXPQ20 RJTD)

AXPQ20 RJTD YYGGgg
RSMC TROPICAL CYCLONE BEST TRACK
NAME ty-No. name (common-No.)
PERIOD FROM MMMDDTTUTC TO MMMDDTTUTC
DDTT LaLa.LaN LoLoLo.LoE PPPHPA WWWKT DDTT LaLa.LaN LoLoLo.LoE PPPHPA WWWKT
DDTT LaLa.LaN LoLoLo.LoE PPPHPA WWWKT DDTT LaLa.LaN LoLoLo.LoE PPPHPA WWWKT
:
:
DDTT LaLa.LaN LoLoLo.LoE PPPHPA WWWKT DDTT LaLa.LaN LoLoLo.LoE PPPHPA WWWKT
REMARKS[1)]
TD FORMATION AT MMMDDTTUTC
FROM TD TO TS AT MMMDDTTUTC
:
:
DISSIPATION AT MMMDDTTUTC=

Notes:

a. Underlined is fixed.

b. [1)] REMARKS is given optionally.

c. Symbolic letters

MMM	:	Month in UTC. Given as 'JAN', 'FEB', etc.
DD	:	Date in UTC.
TT	:	Hour in UTC.
PPP	:	Central pressure.
WWW	:	Maximum wind speed.

Example:

```
AXPQ20 RJTD 020600

RSMC TROPICAL CYCLONE BEST TRACK
NAME 0001 DAMREY (0001)
PERIOD FROM OCT1300UTC TO OCT2618UTC
1300 10.8N 155.5E 1008HPA   //KT   1306 10.9N 153.6E 1006HPA   //KT
1312 11.1N 151.5E 1004HPA   //KT   1318 11.5N 149.8E 1002HPA   //KT
1400 11.9N 148.5E 1000HPA   //KT   1406 12.0N 146.8E   998HPA   35KT
                              :
                              :
1712 14.6N 129.5E   905HPA 105KT   1718 14.7N 128.3E   905HPA 105KT
                              :
                              :
2612 32.6N 154.0E 1000HPA   //KT   2618 33.8N 157.4E 1010HPA   //KT
REMARKS
TD    FORMATION   AT OCT1300UTC
FROM TD   TO TS   AT OCT1406UTC
FROM TS   TO STS AT OCT1512UTC
FROM STS TO TY   AT OCT1600UTC
FROM TY   TO STS AT OCT2100UTC
FROM STS TO TS   AT OCT2112UTC
FROM TS   TO L    AT OCT2506UTC
DISSIPATION       AT OCT2700UTC=
```

Appendix 6

List of GPV products and data on the RSMC Data Serving System

Area	20S-60N, 80E-160W	20S-60N, 60E-160W
Resolution	2.5x2.5 degrees	1.25x1.25 degrees
Levels and elements	Surface (P,U,V,T,TTd,R) 850hPa (Z,U,V,T,TTd,ω) 700hPa (Z,U,V,T,TTd,ω) 500hPa (Z,U,V,T,TTd,ζ) 300hPa (Z,U,V,T) 250hPa (Z,U,V,T) 200hPa (Z,U,V,T) 150hPa (Z,U,V,T) 100hPa (Z,U,V,T)	Surface (P,U,V,T,TTd,R)** 1000hPa (Z,U,V,T,TTd) 925hPa (Z,U,V,T,TTd,ω) 850hPa (Z*,U*,V*,T*,TTd*,ω,ψ,χ) 700hPa (Z*,U*,V*,T*,TTd*,ω) 500hPa (Z*,U*,V*,T*,TTd*,ζ) 400hPa (Z,U,V,T,TTd) 300hPa (Z,U,V,T,TTd) 250hPa (Z,U,V,T) 200hPa (Z*,U*,V*,T*,ψ,χ) 150hPa (Z,U,V,T) 100hPa (Z,U,V,T) 70hPa (Z,U,V,T) 50hPa (Z,U,V,T) 30hPa (Z,U,V,T) 20hPa (Z,U,V,T) 10hPa (Z,U,V,T)
Forecast hours	(00 and 12 UTC) 0, 6, 12, 18, 24, 30, 36, 48, 60 and 72 hours	(00 and 12 UTC) 0 – 84 every 6 hours In addition (12 UTC), * 96, 120, 144, 168 and 192 hours ** 90 – 192 every 6 hours
Frequency (initial times)	Twice a day (00 and 12 UTC)	Twice a day (00 and 12 UTC)

Area	Whole globe		Whole globe
Resolution	2.5x2.5 degrees		1.25x1.25 degrees
Levels and elements	Surface(P,R,U,V,T) 1000hPa(Z) 850hPa(Z,U,V,T,TTd) 700hPa(Z,U,V,T,TTd) 500hPa(Z,U,V,T) 300hPa(Z,U,V,T) 250hPa(Z,U,V,T)* 200hPa(Z,U,V,T) 100hPa(Z,U,V,T)* 70hPa(Z,U,V,T)* 50hPa(Z,U,V,T)* 30hPa(Z,U,V,T)*	Surface (P,U,V,T,TTd*) 1000hPa (Z,U,V,T,TTd*) 850hPa (Z,U,V,T,TTd) 700hPa (Z,U,V,T,TTd) 500hPa (Z,U,V,T,TTd*) 400hPa (Z,U,V,T,TTd*) 300hPa (Z,U,V,T,TTd*) 250hPa (Z,U,V,T) 200hPa (Z,U,V,T) 150hPa (Z,U,V,T) 100hPa (Z,U,V,T) 70hPa (Z,U,V,T) 50hPa (Z,U,V,T) 30hPa (Z,U,V,T) 20hPa (Z,U,V,T) 10hPa (Z,U,V,T)	Surface (P,U,V,T,RH,R,Cl) 1000hPa (Z,U,V,T,RH, ω) 925hPa (Z,U,V,T,RH, ω) 850hPa (Z,U,V,T,RH, ω,ψ,χ) 700hPa (Z,U,V,T, RH, ω) 600hPa (Z,U,V,T, RH, ω) 500hPa (Z,U,V,T, RH, ω, ζ) 400hPa (Z,U,V,T, RH, ω) 300hPa (Z,U,V,T, RH, ω) 250hPa (Z,U,V,T) 200hPa (Z,U,V,T, ψ,χ) 150hPa (Z,U,V,T) 100hPa (Z,U,V,T) 70hPa (Z,U,V,T) 50hPa (Z,U,V,T) 30hPa (Z,U,V,T) 20hPa (Z,U,V,T) 10hPa (Z,U,V,T)
Forecast hours	(00 and 12 UTC) 24, 48 and 72 hours In addition (12 UTC), 96 – 192 every 24 hours * 96 and 120 only	(00 and 12 UTC) 0 hours * 00UTC only	(00 and 12 UTC) 0 – 84 every 6 hours In addition (12 UTC), 96 – 192 every 12 hours
Frequency (initial times)	twice a day (00 and 12 UTC)		twice a day (00 and 12 UTC)

Area	Whole globe
Resolution	2.5x2.5 degrees
Levels and elements	Surface (P) 1000hPa(Z) 850hPa (T,U,V) 500hPa (Z) 250hPa (U,V) *Above GPVs are ensemble mean and standard deviation of ensemble forecast memers.
Forecast hours	Every 12 hours from 0 192 hours
Frequency (initial times)	Once a day (12 UTC)

Notes:
Cl : cloud cover (total)
RH :relative humidity
U : u-component of wind
ζ : relative vorticity
ω : vertical velocity
P : pressure reduced to MSL
T : temperature
V : v-component of wind
χ : velocity potential
R : total precipitation
TTd : dew point depression
Z : geopotential height
ψ : stream function

Products/ Data	GOES data	Typhoon Information	Global Wave Model (GRIB)	Observational data
Contents	(a) Digital data (GRIB) • Cloud amount • Convective cloud amount • Equivalent blackbody temperature (b) Satellite-derived high density cloud motion vectors (BUFR)	Tropical cyclone related information (BUFR) • Position, etc.	• Significant wave height • Prevailing wave period • Prevailing wave direction Forecast hours: 0, 6, 12, 18, 24, 30, 36, 42, 48, 54, 60, 72 78, 84 (00 and 12 UTC); 96, 108, 120, 132, 144, 156, 168 ,180 and 192 hours (12 UTC)	(a) Surface data (SYNOP, SHIP) (b) Upper-air data (TEMP, parts A-D) (PILOT, parts A-D)
Frequency (initial times)	(a) 4 times a day (00, 06, 12 and 18 UTC) (b) Once a day (04 UTC)	4 times a day (00, 06, 12 and 18 UTC)	Twice a day (00 and 12 UTC)	(a) Mainly 4 times a day (b) Mainly 2 times a day

Appendix 7

User's Guide to the attached CD-ROM

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1) This CD-ROM should not be reproduced and not be provided to any third party.
2) The source should be properly acknowledged in any work obtained with this CD-ROM.

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Preface

This CD-ROM contains all the texts, tables, charts of this report and GMS-5 (GOES-9 from 22 May 2003) satellite images of the tropical cyclones that attained TS intensity or higher in the western North Pacific and the South China Sea in 2003. This document is a brief user's guide for the CD-ROM. The CD-ROM was mastered in ISO-9660 format.

Directory and File layout

```
|------ar405eng.exe (Acrobat Reader Installer)
|------Readme.txt (belief explanation about the CD-ROM)
|------TopMenu.exe (Start menu setup program)
|------Users_Manual.htm (user's manual of a satellite image viewer)
|------Annual_Report
        |---Text (text of Annual Report 2003 in PDF)
        |---Figure (figures for MS PowerPoint)
        |---Table (tables for MS Excel)
        |---Appendix (appendixes for MS Excel, PowerPoint)
|------Programs
        |---Gmslpd
            |--Gmslpd.exe (Viewer; tropical cyclone version in English)
            |--Gsetup.exe, etc. (Setup program, etc.)
|------Satellite_Image_Data
        |---2003_1 (3-hourly GMS image data)
        |---2003_2 (3-hourly GMS image data)
                :
        |---2003_21 (3-hourly GOES image data)
|------Users_Manual
        |--Gmanual.doc (User's Manual for MS Word)
|------Andata
        |--Best2003.txt (Best track data for the year 2003)
```

How to use this CD-ROM

When you set the CD-ROM, start menu will be presented automatically with a panel which has “Annual Report 2003”, “Satellite Images”, “About CD-ROM” and “Close” buttons and a file list box for some introductory documents. Choose and click a button or file which you want to see and follow instructions on your display.

Required hardware/OS for the CD-ROM are:

Hardware : DOS-V, NEC PC-9800 Series or their compatible
OS : Microsoft Windows Ver. 3.1 or later

< Annual Report 2003 >

Annual Report 2003 is prepared in the following two formats: ”PDF files” and “MS Word/Excel/PowerPoint files”.

- PDF files:

Click the “Annual Report 2003” button to open the annual report 2003 in PDF. If you can not open the PDF file, install ‘Adobe Acrobat Reader’ with its installer (ar405eng.exe) in the file list box on a start menu window, and try again. ‘Adobe Acrobat Reader’ (or ‘Adobe Acrobat’) is required to view PDF files.

- Word/Excel/PowerPoint files:

Original figures and tables prepared with Microsoft Word, Excel or PowerPoint are stored in Annual_Report folder of the CD-ROM.

< Satellite Images >

- Installation of a program for displaying satellite images:

Click the “Satellite Image” button to run a setup program (Gsetup.exe) of a satellite image viewer. If you follow some instructions, the viewer ‘Gmslpd.exe’, which is a program for displaying satellite images, will be installed into the harddisk of your computer and a list of the tropical cyclones in 2003 is displayed in the ‘Selection window’ of satellite images for tropical cyclones.

- Displaying satellite images:

Choose a tropical cyclone from the list and click the name, and 3-hourly satellite images for the tropical cyclone will be displayed. You can display the track of the tropical cyclone superimposed on the satellite image and measure the intensity of the tropical cyclone using Dvorak's technique.

- User’s manual for the viewer:

Besides the above functions, the viewer has many useful ones. See the User's Manual (Users_Manual.htm or /Users_Manual/Gmanual.doc) about further detailed operations.

- Explanation of satellite image data

Period : From Generating Stage to Weakening Stage of each tropical cyclone.
Images : Infrared images (00, 03, 06, 09, 12, 15, 18, 21UTC)
Visible images (00, 03, 06, 09, 21UTC)
Range : 40 degrees in both latitude and longitude.
(The image window moves following a tropical cyclone's track so that the center of a tropical cyclone is fixed at the center of the image window.)
Time interval : 3-hourly
Resolution : 0.08 degrees in both latitude and longitude.
Compression of file : Compressed using 'compress.exe' command of Microsoft Windows.

< About CD-ROM >

Click the “About CD-ROM” button to open ReadmeE.txt file.

< Close >

Click the “Close” button to close start menu window.

< File list box >

You can open document files from a file list box on the start menu window. Choose a file and click the “Open” button or double click the file name.

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For further information, please contact the following address:

RSMC Tokyo-Typhoon Center,
Forecast Division,
Forecast Department,
JAPAN METEOROLOGICAL AGENCY
1-3-4 Otemachi, Chiyoda-ku, Tokyo, 100-8122 Japan
FAX: +81-03-3211-8303
e-mail: rsmc-tokyo@met.kishou.go.jp

JAPAN METEOROLOGICAL AGENCY
1-3-4 Otemachi, Chiyoda-ku, Tokyo, 100-8122 Japan