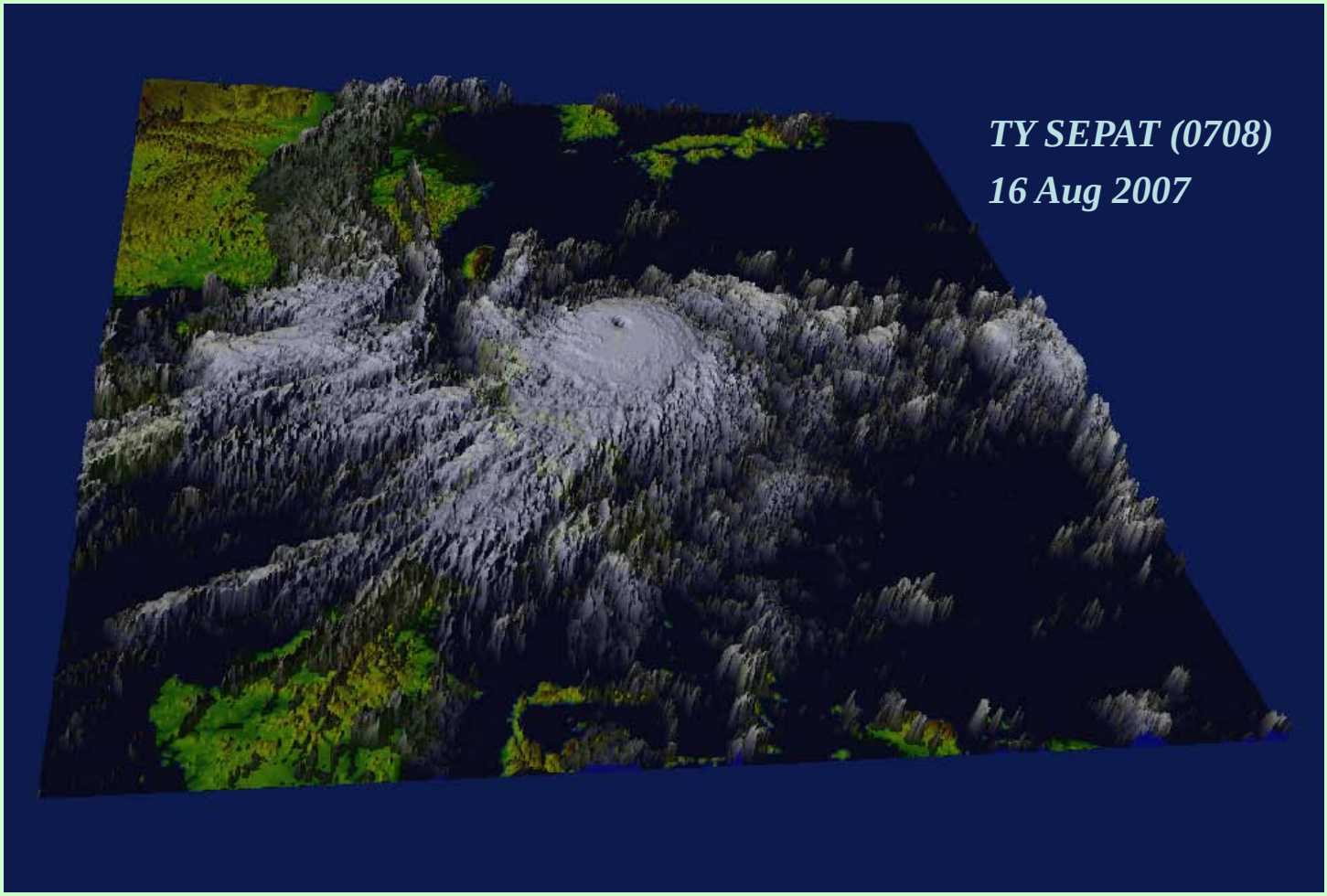
Annual Report on the Activities of the RSMC Tokyo - Typhoon Center 2007



Japan Meteorological Agency

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Introduction

The RSMC Tokyo - Typhoon Center (referred to below as *the Center*) is a Regional Specialized Meteorological Centre (RSMC) that carries out specialized activities in analysis, tracking and forecasting of western North Pacific tropical cyclones (TCs) 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 a designation by the WMO Executive Council at its 40th session (Geneva, June 1988).

The Center conducts the following operations on a routine basis:

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

In addition to the routine services outlined above, the Center distributes a series of reports entitled *Annual Report on the Activities of the RSMC Tokyo - Typhoon Center* to serve as operational references for the NMSs concerned. The report is aimed at summarizing the activities of the Center and reviewing the TCs of the preceding year.

In this issue covering 2007, an outline of routine operations at the Center and its operational products are presented in Chapter 1, while Chapter 2 reports on the major activities of the Center in 2007. Chapter 3 describes atmospheric and oceanic conditions in the tropics and notes the highlights of TC activities in 2007. 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 TCs in 2007 are shown in table and chart forms in the appendices. All the relevant texts, tables, charts and appendices are included on the CD-ROM attached to this report.

The CD-ROM contains three-hourly cloud images of all the TCs in 2007 of TS intensity or higher within the Center's area of responsibility. Also included is the necessary viewer software, which features various functions for analyzing satellite imagery such as image animation and is expected to facilitate efficient post-analysis of TCs and their environments. A setup program and a user manual for the software are also included on 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 2007

The Center's area of responsibility covers the western North Pacific and the South China Sea (0°-60°N, 100°-180°E) including the marginal seas and adjacent land areas (Figure 1.1). The Center carries out analyses and forecasts of tropical cyclones (TCs) when they are in or expected to move into the area. The Center provides the relevant National Meteorological Services (NMSs) with the RSMC products through such means as the GTS, the AFTN and the JMA website.

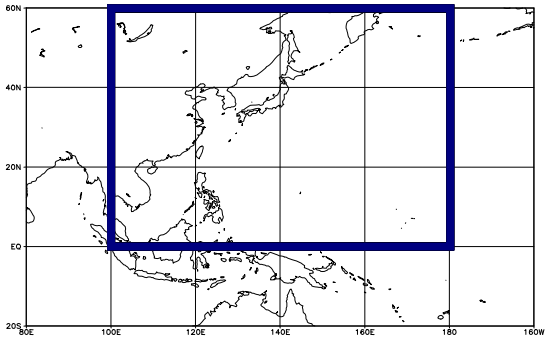


Figure 1.1
Area of responsibility of the RSMC Tokyo - Typhoon Center

1.1 Analysis

TC analyses are performed eight times a day at 00, 03, 06, 09, 12, 15, 18 and 21 UTC, and each analysis begins with the determination of the center position of the TC. Cloud images from the Multi-functional Transport Satellite (MTSAT) are the principal source for determining this, especially for TCs migrating over data-sparse ocean areas. The TC's direction and speed of movement are determined primarily from the six-hourly displacement vectors of the center position.

The central pressure of a TC is determined mainly from the CI number, which is derived from satellite imagery using the Dvorak method. The CI number also gives the maximum sustained wind speed in the vicinity of the center. The radii of circles of winds more than 30 and 50 knots are determined mainly from surface observations, QuikSCAT observations and low-level cloud motion winds (LCW) derived from cloud motion vectors of satellite images in the vicinity of the TC.

1.2 Forecasts

As a primary basis for TC track forecasts, JMA used two NWP models; the Typhoon Model (TYM) and the Global Spectral Model (GSM). On 21 November 2007, JMA upgraded its GSM from TL319L40 to TL959L60 with the topmost level raised from 0.4 hPa to 0.1 hPa. With this upgrade, JMA terminated the operation of TYM on the same day. The new GSM has approx. 20 km horizontal resolution and 60 vertical layers, finer than TYM at the time. The central pressure and the maximum sustained wind speed are forecasted based on the basis of results obtained using NWP and the Dvorak method.

A probability circle shows the range into which the center of a TC is expected to move with 70% probability at each validation time. The radius of the circle is statistically determined according to the speed of TC movement based on the verification results of recent TC track forecasts.

1.3 Provision of RSMC Products

The Center prepares and disseminates the RSMC bulletins listed below via the GTS and the AFTN when:

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

The RSMC products are continually issued as long as a TC keeps TS intensity or higher within the area of responsibility. Appendix 5 denotes the code forms of the bulletins.

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

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

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

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

Until 20 November 2007:

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

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

Since 21 November 2007:

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

NWP prediction (T=06 to 84)
Center position
Central pressure*
Maximum sustained wind speed*

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

(3) SAREP (TCNA20/21 RJTD: via GTS)

The SAREP reports TC analysis including intensity information (i.e. the CI number) based on the Dvorak method. It is issued a half to one hour after observations at 00, 03, 06, 09, 12, 15, 18 and 21 UTC, and contains following elements:

MTSAT imagery analysis
Center position
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 movement

*** These parameters are reported only at 00, 06, 12 and 18 UTC.*

In accordance with the WMO migration plan to table-driven code forms, the Center has been disseminating SAREP reports in BUFR format (IUCC10 RJTD) since November 2005 while also continuing dissemination in the existing format. BUFR/CREX templates for translation into table-driven code forms are provided on the WMO website at http://www.wmo.ch/web/www/WMOCodes.html.

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

The RSMC Prognostic Reasoning provides a brief reasoning for a TC 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, the synoptic situation of the subtropical ridge, the movement and intensity of the TC as well as relevant remarks are given in plain language.

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

The RSMC Tropical Cyclone Best Track provides post-analysis data on TCs of TS intensity or higher. It contains the center position, the central pressure and the maximum sustained wind speed. The best track for a TC is usually finalized one and a half months after the termination of issuance of the above RSMC bulletins for the TC.

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

The Center, as one of the Tropical Cyclone Advisory Centres within the framework of the International Civil Aviation Organization (ICAO), provides Tropical Cyclone Advisory for SIGMET to Meteorological Watch Offices (MWOs) to support their preparations of SIGMET information on TCs. It includes the following elements in the analysis and the 12- and 24-hour forecasts:

Analysis	Center position Direction and speed of movement Central pressure Maximum sustained wind speed (10-minute average)
12- and 24-hour forecasts	Center position Maximum sustained wind speed (10-minute average)

1.4 RSMC Data Serving System

Since 1995, JMA has been operating the RSMC Data Serving System which allows the NMSs concerned to use the Internet to retrieve NWP products such as predicted fields in grid-point-value (GPV) form and observational data. The server is accessible at “http://ddb.kishou.go.jp/” and the products and data provided through the system are listed in Appendix 6.

1.5 RSMC Tokyo - Typhoon Center Website

The RSMC Tokyo - Typhoon Center Website provides TC advisories on a real-time basis, as well as a wide variety of products including TC analysis archives, technical reviews and annual reports on the activities of the Center. The website address is

http://www.jma.go.jp/jma/jma-eng/jma-center/rsmc-hp-pub-eg/RSMC_HP.htm.

1.6 Numerical Typhoon Prediction Website

JMA has been operating the Numerical Typhoon Prediction (NTP) website since 1 October 2004. The site provides predictions of TC tracks performed by models of eight major NWP centers i.e. BoM (Australia), CMC (Canada), DWD (Germany), ECMWF, KMA (Republic of Korea), NCEP (USA), UKMO (UK) and JMA to assist the NMSs of the Typhoon Committee Members in improving TC forecasting and warning services. The site includes:

- TC track predictions, in table and chart format, of the participating NWP centers with several useful functions such as deriving an ensemble mean from any combination of predictions by the centers
- Weather charts of the NWP models of the participating NWP centers

Chapter 2

Major Activities of the RSMC Tokyo - Typhoon Center in 2007

2.1 Dissemination of RSMC Products

In 2007, the Center provided operational products for tropical cyclone (TC) forecasting to NMSs via such networks as the GTS and the AFTN. The monthly and annual totals of issuance of the products supplied are listed in Table 2.1.

Product	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
TCNA20	0	0	1	20	23	0	47	76	86	75	85	0	413
TCNA21	0	0	1	21	27	0	58	89	99	87	90	0	472
IUCC10	0	0	2	41	50	0	105	165	185	162	175	0	885
WTPQ20-25	0	0	4	41	56	0	120	183	202	179	189	0	974
WTPQ30-35	0	0	0	10	13	0	29	46	52	43	47	0	240
FXPQ20-25	0	0	3	30	40	0	86	135	149	128	113	0	684
FKPQ30-35	0	0	2	20	27	0	59	90	98	85	93	0	474
AXPQ20	3	0	0	0	1	1	0	2	3	6	7	4	27

Notes:
Names of the products and their headers via the GTS or the AFTN

SAREP	(TACs)	TCNA20/21 RJTD
	(BUFR format)	IUCC10 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

Table 2.1 Monthly and annual total numbers of products supplied by the RSMC Tokyo - Typhoon Center in 2007

2.2 Publication

In March 2007, *the ninth issue of the RSMC Technical Review* was issued with the following two topics.

1. The Mechanism of the Storm Surges in the Seto Inland Sea Caused by Typhoon Chaba (0416)
2. Comparative Study on Organized Convective Cloud Systems detected through Early Stage Dvorak Analysis and Tropical Cyclones in Early Developing Stage in the western North Pacific and the South China Sea

In November 2007, the Center published the *Annual Report on the Activities of the RSMC Tokyo - Typhoon Center in 2006*. Both of the publications are available on the website.

2.3 Monitoring of Observational Data Availability

The Center carried out regular monitoring of information exchange for enhanced TC observations in accordance with the standard procedures stipulated in Section 6.2, Chapter 6 of *The Typhoon Committee Operational Manual (TOM) - Meteorological Component (WMO/TD-No.196)*. Monitoring for the period from 1st November 2006 to 31st October 2007 was conducted for the following two periods:

1. from 00 UTC on 15 August to 23 UTC on 19 August (for TY SEPAT (0708))
2. from 00 UTC on 29 September to 23 UTC on 3 October (for TY LEKIMA (0714))

The results were distributed to all the Typhoon Committee Members in June 2007, and are also available on the WMO Distributed Database server at ftp://ddb.kishou.go.jp/pub/monitoring/.

Chapter 3

Summary of the 2007 Typhoon Season

In 2007, 24 TCs of tropical storm (TS) intensity or higher formed in the western North Pacific and the South China Sea. This total is less than the 30-year average* frequency of 26.7. Out of these 24 TCs, 14 reached typhoon (TY) intensity, 4 reached severe tropical storm (STS) intensity, and 6 reached TS intensity (Table 3.1).

Tropical Cyclone			Duration (UTC)			(UTC)	Minimum Central Pressure (UTC)	(N)	(E)	(hPa)	Max Wind (kt)
TY	KONG-REY	(0701)	010000 Apr	-	060000 Apr		031200	17.7	144.3	960	80
TY	YUTU	(0702)	171800 May	-	230000 May		201200	19.8	135.3	935	95
TS	TORAJI	(0703)	040600 Jul	-	051800 Jul		041800	19.6	109.2	994	35
TY	MAN-YI	(0704)	090000 Jul	-	160000 Jul		120000	21	129.2	930	95
TY	USAGI	(0705)	290600 Jul	-	040600 Aug		010000	25.1	137.1	945	90
TY	PABUK	(0706)	050600 Aug	-	090600 Aug		070900	22.1	122.7	975	65
TS	WUTIP	(0707)	080000 Aug	-	082100 Aug		080600	21.1	124.1	990	35
TY	SEPAT	(0708)	121800 Aug	-	191200 Aug		160000	17.3	126.5	910	110
TY	FITOW	(0709)	290000 Aug	-	080000 Sep		310000	26.5	155.2	965	70
STS	DANAS	(0710)	070600 Sep	-	111800 Sep		101800	40.4	154.7	990	55
TY	NARI	(0711)	130000 Sep	-	170000 Sep		141200	25.7	127.2	935	100
TY	WIPHA	(0712)	160000 Sep	-	191200 Sep		171800	23.9	124.6	925	100
TS	FRANCISCO	(0713)	231200 Sep	-	250600 Sep		231200	19.3	114	990	40
STS	LEKIMA	(0714)	300000 Sep	-	040600 Oct		020000	17.1	111.7	975	60
TY	KROSA	(0715)	011800 Oct	-	080000 Oct		050000	20.4	125.3	925	105
TS	HAIYAN	(0716)	050000 Oct	-	060600 Oct		051200	28.2	171.9	994	40
STS	PODUL	(0717)	050000 Oct	-	070600 Oct		060600	32.2	155.6	985	55
TS	LINGLING	(0718)	111800 Oct	-	150600 Oct		121200	25.9	172.2	994	45
TY	KAJIKI	(0719)	190000 Oct	-	220600 Oct		201800	26	142.1	945	90
STS	FAXAI	(0720)	260000 Oct	-	271200 Oct		270000	29.3	136	975	55
TY	PEIPAH	(0721)	031200 Nov	-	081800 Nov		061200	18.6	118.3	970	70
TS	TAPAH	(0722)	120000 Nov	-	121800 Nov		120600	23.1	143.4	996	35
TY	MITAG	(0723)	201200 Nov	-	271200 Nov		221200	14	127.8	955	80
TY	HAGIBIS	(0724)	201800 Nov	-	271200 Nov		220600	10.6	112.5	970	70

Table 3.1 List of the tropical cyclones reaching TS intensity or higher in 2007

3.1 Atmospheric and Oceanographic Conditions in the Tropics

In terms of the sea surface temperature (SST), positive anomalies associated with La Niña events that started in the spring of 2007 were widely found over the tropics of the western North Pacific throughout 2007. SST anomalies of more than 1.0°C were seen in particular north of 20°N and east of 140°E in June, July and October through December. No specific trend was observed over the South China Sea throughout the year.

Regarding atmospheric conditions low convective activities until July resulted in less tropical cyclones development than usual. From August to November, enhanced convection and cyclonic wind shear in the lower troposphere were seen around the Philippines. Definite cyclonic wind circulations were seen in particular in September and October. Monthly mean streamlines at 850 hPa, outgoing long-wave radiation (OLR) and TC tracks in October are presented in Figure 3.1. The low OLR areas in the region of 10 to 20 degrees north latitude indicate active convection.

Consequently, the total of ten named TCs that formed during September and October exceeded the

30-year average* of 6.4. The monthly and annual frequencies of named tropical cyclones since 1951 are presented in Appendix 4.

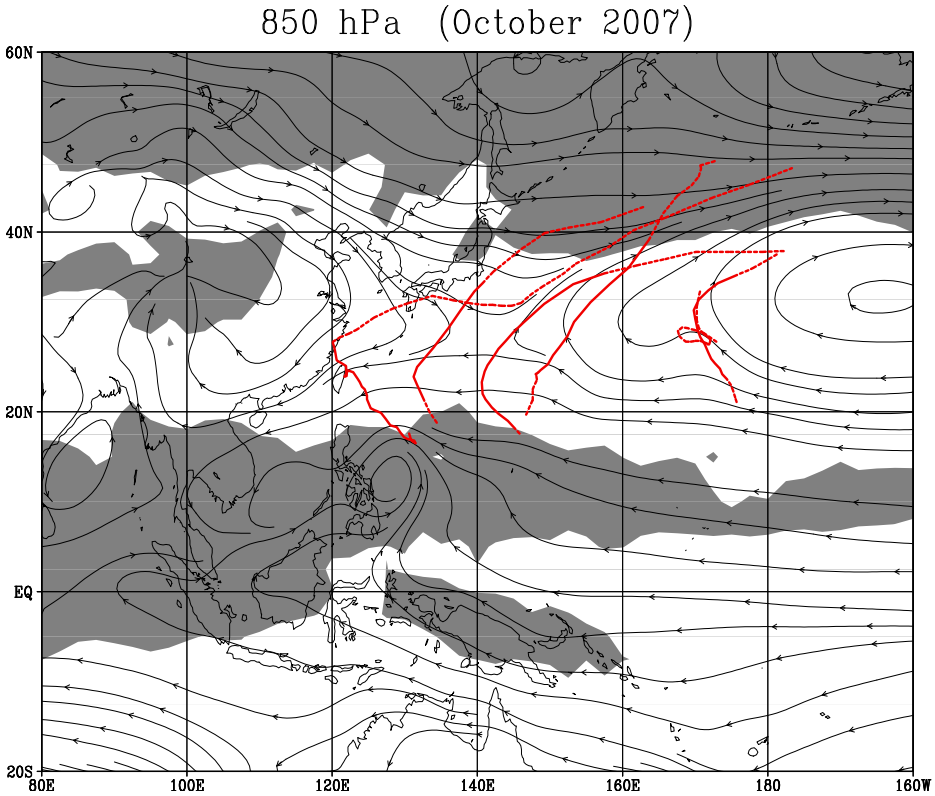


Figure 3.1 Monthly mean streamline at 850 hPa (lines with arrows) and areas of less than 230 w/m^2 of OLR (shaded) in August 2007. The tracks of the five named TCs formed in September are superimposed onto the figure.

The following charts are included on the attached CD-ROM: monthly mean SST anomalies for the western North Pacific and the South China Sea, monthly mean streamlines at 850 hPa and 200 hPa, and OLR for the months from January to December (SST anomalies 2007.ppt and Streamline 2007.ppt).

3.2 Tropical Cyclones in 2007

The tropical cyclone season of 2007 began in April with the formation of KONG-REY (0701). From April to May, two TCs formed in the western North Pacific in response to enhanced convective activity. In June and July, convective activity became low over the sea around the Philippines and in the South China Sea, and the subtropical high was weak over the south of Japan. Of the three TCs that formed in this period (the 30-year average* is 5.8), two formed over the sea east of 140ºE and one in the South China Sea. MAN-YI (0704) and USAGI (0705) moved northwestward and hit Japan, bringing serious damage.

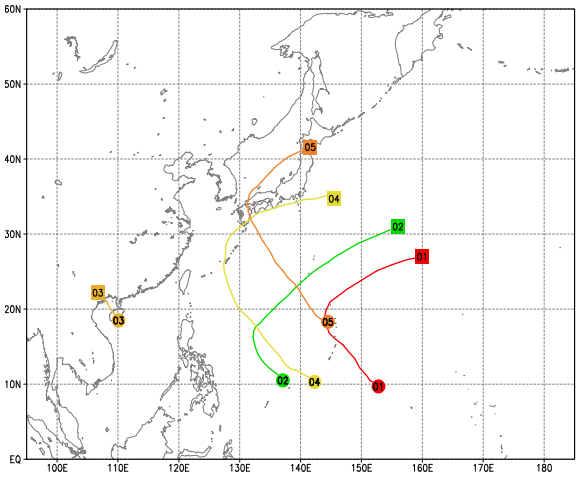
After August, convective activity became enhanced over the sea east of the Philippines, and the subtropical high turned strong over the sea south of Japan. Many TCs that formed over the sea east of the Philippines and in the South China Sea moved westward and hit China and Viet Nam. PABUK (0706), WUTIP (0707), SEPAT (0708), WIPHA (0712), LEKIMA (0714) and KROSA (0715) brought serious

damage to a number of countries including China, the Philippines and Viet Nam. On the other hand, FITOW (0709) and NARI (0711) moved northward, bringing serious damage to Japan and Korea.

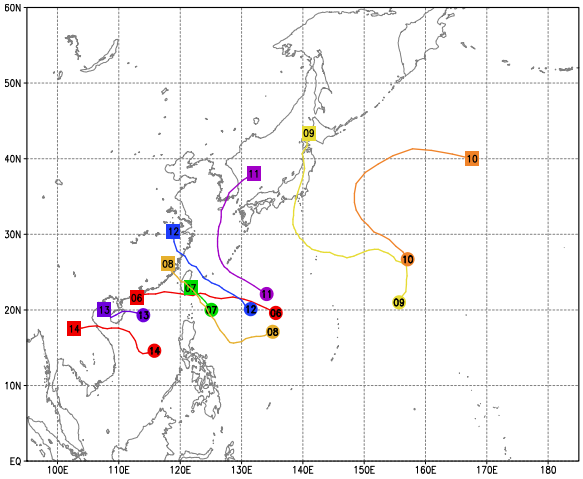
In October, four named TCs in a row formed east of 140°E when positive SST anomalies as high as 3.0°C prevailed around 30° – 40°N near the dateline. In November, MITAG (0723) passed over Luzon Island and brought serious damage to the Philippines.

Figure 3.3 shows genesis points of the 24 TCs generated in 2007 superimposed on the average frequency distribution (1951 – 2005). Genesis points in 2007 generally deflected northeastwards in comparison to average years.

(a) April to July



(b) August and September



(c) October and November

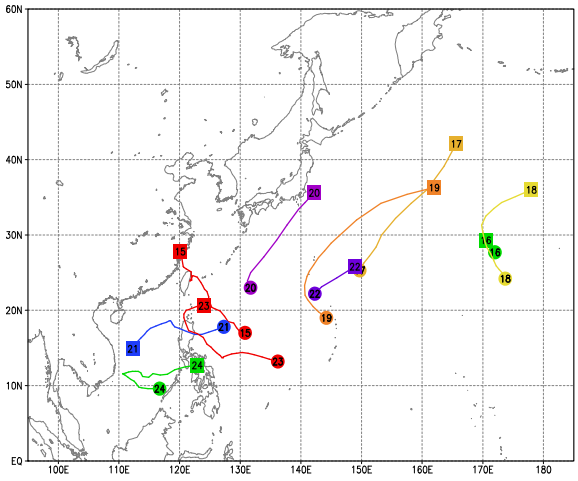


Figure 3.2 Tracks of the 24 named tropical cyclones in 2007

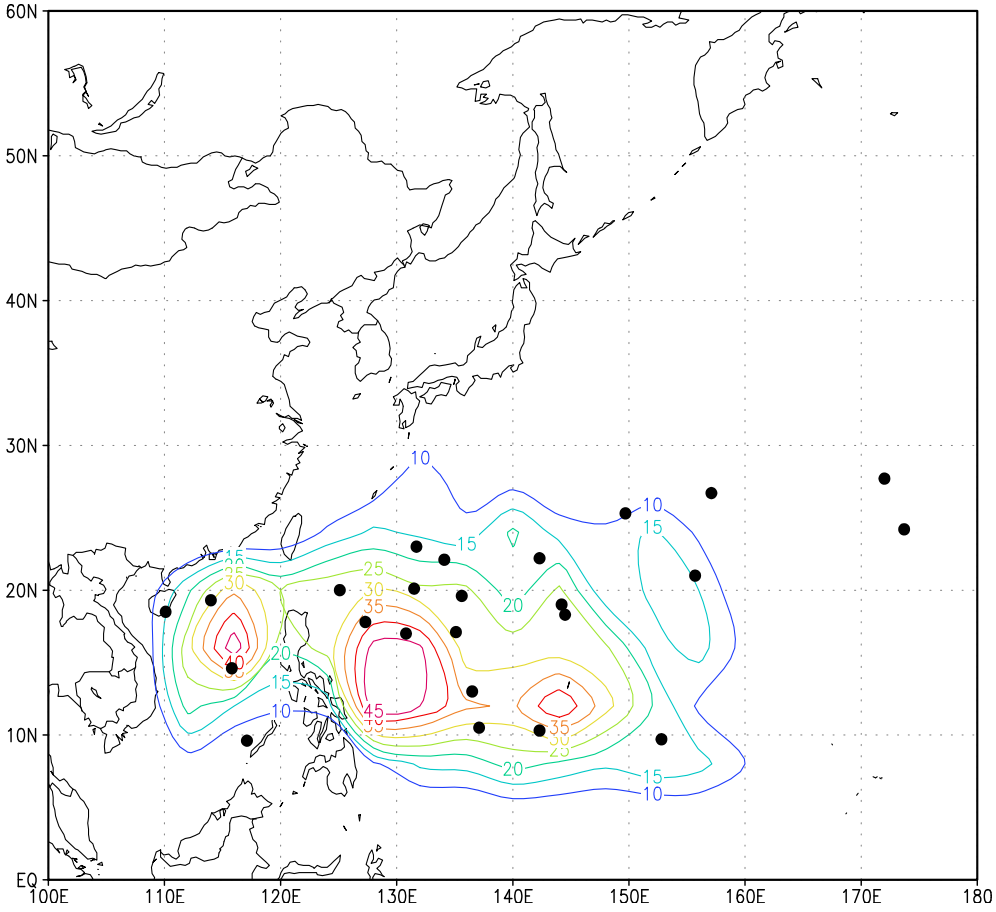


Figure 3.3 Genesis points of the 24 TCs generated in 2007 (dots) and frequency distribution of genesis points for 1951 - 2006 (lines)

* *The 30-year average is from 1971 to 2000.*

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

Chapter 4

Verification of Forecasts in 2007

4.1 Operational Forecasts

Operational forecasts of the 24 tropical cyclones (TCs) of TS intensity or higher in 2007 were verified with the RSMC TC best track data. The verified elements are the 24-, 48- and 72-hour forecasts of the center position, central pressure and maximum sustained wind. The position and intensity errors of operational forecasts for each TC in 2007 are indicated in Appendix 3.

4.1.1 Center Position

Figure 4.1 shows annual mean errors of 24-hour (since 1982), 48-hour (since 1988) and 72-hour (since 1997) forecasts of center position. The errors in 2007 were 114 km, 196 km and 247 km for 24-hour, 48-hour and 72-hour forecasts respectively. The error of 72-hour forecast hit a record low while those of 24- and 48- hour are slightly worse than the previous year.

The details of the errors for each TC in 2007 are summarized in Table 4.1. The forecasts for SEPAT (0708), KROSA (0715) which moved northwestwards from the sea east of Luzon Island had small errors. HAGIBIS (0724) which first moved westwards then eastwards over the South China Sea was well forecasted with small errors. On the other hand, KONG-REY (0701), NARI (0711) and KAJIKI (0719) recurved south of Japan and moved northeastwards had larger errors.

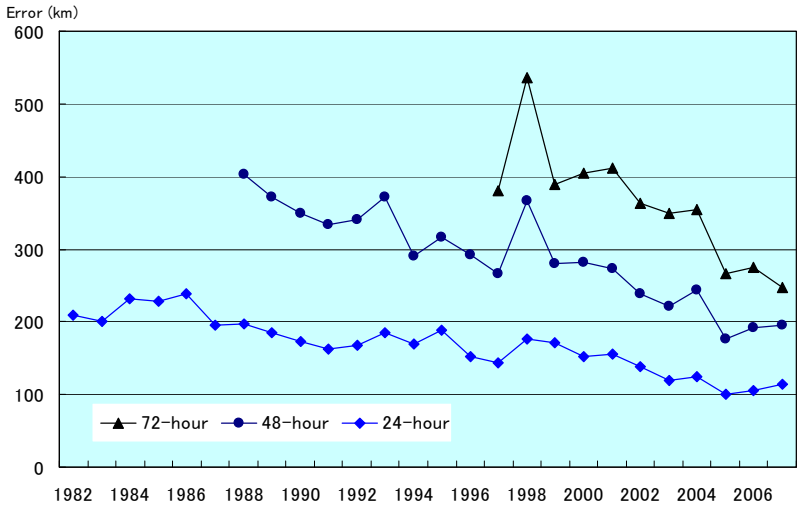


Figure 4.1 Annual means of position errors in 24-, 48- and 72-hour operational track forecasts

The position errors were also compared with those of the persistency (PER) method*. The ratios of EO (i.e. the position errors of operational forecasts) to EP (the position errors of PER method forecasts) as percentages are also shown in Table 4.1. An EO/EP of smaller/greater than 100% indicates that the operational forecast is better/worse than the PER method forecast. The annual mean EO/EPs for the 24-, 48- and 72-hour forecasts in 2007 were 44% (52% in 2006), 32% (42%) and 24% (36%) respectively.

** The PER method is based on the assumption that a TC holds the same movement throughout the forecast period, and the linear extrapolation of the latest 12-hour track of the TC is applied to obtain the TC track forecasts. Position errors of the PER method are used to evaluate the relative performance of operational forecasts and model predictions.*

Table 4.1 Mean position errors of 24-, 48- and 72-hour operational forecasts for each TC in 2007. S.D., EO, EP, and EO/EP represents the standard deviation of operational forecast position error, the operational forecast position error, the position error with the PER method, and the ratio of EO to EP respectively.

Tropical Cyclone			24-hour Forecast				48-hour Forecast				72-hour 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 (%)
TY	KONG-REY	(0701)	169	104	16	41	264	151	12	26	332	236	8	18
TY	YUTU	(0702)	113	70	17	38	194	104	13	20	367	118	9	18
TS	TORAJI	(0703)	144	88	2	0	-	-	0	-	-	-	0	-
TY	MAN-YI	(0704)	110	58	24	37	158	64	20	20	215	57	16	16
TY	USAGI	(0705)	91	43	20	34	170	91	16	31	350	173	12	41
TY	PABUK	(0706)	120	50	12	68	253	38	8	61	475	110	4	104
TS	WUTIP	(0707)	-	-	0	-	-	-	0	-	-	-	0	-
TY	SEPAT	(0708)	80	48	23	54	147	95	19	39	145	87	15	20
TY	FITOW	(0709)	68	29	36	36	121	61	32	25	224	85	27	28
STS	DANAS	(0710)	72	46	14	19	171	48	9	16	287	128	5	15
TY	NARI	(0711)	162	86	12	66	321	257	8	44	358	143	3	33
TY	WIPHA	(0712)	75	49	9	40	220	59	5	74	551	0	1	0
TS	FRANCISCO	(0713)	145	8	3	53	-	-	0	-	-	-	0	-
STS	LEKIMA	(0714)	110	62	13	41	202	60	9	38	400	90	5	63
TY	KROSA	(0715)	73	36	21	40	129	43	16	39	172	73	12	31
TS	HAIYAN	(0716)	-	-	0	-	-	-	0	-	-	-	0	-
STS	PODUL	(0717)	-	-	0	-	-	-	0	-	-	-	0	-
TS	LINGLING	(0718)	171	30	10	65	473	121	5	88	-	-	0	-
TY	KAJIKI	(0719)	352	191	9	63	879	277	5	51	-	-	0	-
STS	FAXAI	(0720)	208	123	2	0	-	-	0	-	-	-	0	-
TY	PEIPAH	(0721)	192	62	17	68	260	87	13	40	291	52	9	32
TS	TAPAH	(0722)	-	-	0	-	-	-	0	-	-	-	0	-
TY	MITAG	(0723)	85	39	24	35	157	59	20	34	200	64	16	26
TY	HAGIBIS	(0724)	98	69	24	54	128	118	20	29	148	115	16	18
Annual Mean (Total)			114	85	308	44	196	160	230	32	247	140	158	24

Figure 4.2 shows a histogram of 24-hour forecast position errors. About 77% (82% in 2006) of 24-hour forecasts, 84% (84%) of 48-hour forecasts, and 86% (79%) of 72-hour forecasts had errors of less than 150km, 300km, and 450 km respectively.

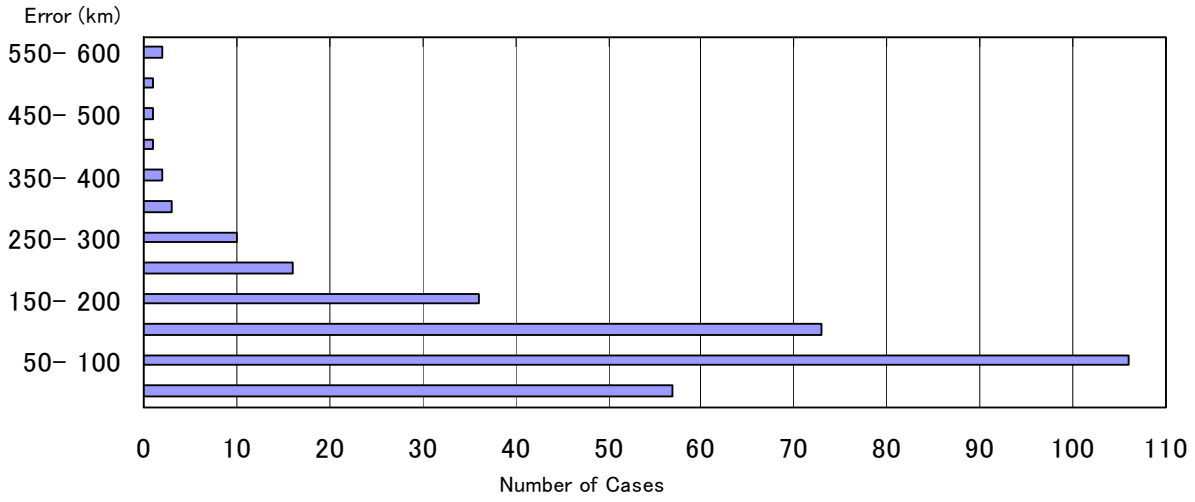


Figure 4.2 Histogram of 24-hour forecast position errors in 2007
(Those for 48- and 72-hour forecasts are included on the attached CD-ROM).

Table 4.2 presents the mean hitting ratios and radii of the 70% probability circles of operational forecasts for each TC in 2006. The term *hitting ratio* here is used to describe the ratio of forecasts of 70% probability circles within which the actual TC center fell. The annual mean radius of the circles issued for 24-hour position forecasts was 167 km (157 km in 2006), and their hitting ratio was 82% (83%). The corresponding ones for 48-hour forecasts were 288 km (349 km in 2006) and 83% (81%), while those for 72-hour forecasts were 448 km (422 km in 2006) and 91% (85%).

Table 4.2 Mean hitting ratios (%) and radii (km) of 70% probability circles for 24-, 48- and 72-hour operational forecasts for each TC in 2007

Tropical Cyclone			24-hour Forecast			48-hour Forecast			72-hour Forecast		
			Ratio (%)	Num.	Radius (km)	Ratio (%)	Num.	Radius (km)	Ratio (%)	Num.	Radius (km)
TY	KONG-REY	(0701)	62	16	169	42	12	292	50	8	486
TY	YUTU	(0702)	88	17	180	85	13	299	89	9	533
TS	TORAJI	(0703)	100	2	278	-	0	-	-	0	-
TY	MAN-YI	(0704)	88	24	171	100	20	291	100	16	499
TY	USAGI	(0705)	95	20	169	88	16	285	75	12	446
TY	PABUK	(0706)	67	12	161	62	8	278	50	4	431
TS	WUTIP	(0707)	-	0	-	-	0	-	-	0	-
TY	SEPAT	(0708)	87	23	156	89	19	278	100	15	408
TY	FITOW	(0709)	100	36	161	94	32	286	100	27	422
STS	DANAS	(0710)	100	14	179	100	9	299	100	5	523
TY	NARI	(0711)	75	12	174	62	8	303	67	3	408
TY	WIPHA	(0712)	100	9	152	80	5	278	0	1	408
TS	FRANCISCO	(0713)	67	3	148	-	0	-	-	0	-
STS	LEKIMA	(0714)	77	13	154	100	9	278	40	5	408
TY	KROSA	(0715)	100	21	166	100	16	278	100	12	408
TS	HAIYAN	(0716)	-	0	-	-	0	-	-	0	-
STS	PODUL	(0717)	-	0	-	-	0	-	-	0	-
TS	LINGLING	(0718)	50	10	204	40	5	356	-	0	-
TY	KAJIKI	(0719)	33	9	194	0	5	334	-	0	-
STS	FAXAI	(0720)	50	2	185	-	0	-	-	0	-
TY	PEIPAH	(0721)	29	17	148	46	13	278	100	9	408
TS	TAPAH	(0722)	-	0	-	-	0	-	-	0	-
TY	MITAG	(0723)	96	24	153	100	20	278	100	16	412
TY	HAGIBIS	(0724)	79	24	173	95	20	289	100	16	505
Annual Mean (Total)			82	308	167	83	230	288	91	158	448

4.1.2 Central Pressure and Maximum Wind Speed

Table 4.3 gives the root mean square errors (RMSEs) of 24-, 48- and 72-hour operational central pressure forecasts for each TC in 2007. The RMSEs for maximum wind speed forecasts are included on the attached CD-ROM. The annual mean RMSEs of the central pressure and the maximum wind speed for 24-hour forecasts were 13.0 hPa (14.1 hPa in 2006) and 6.7 m/s (6.1 m/s). For 48-hour forecasts, the corresponding ones were 17.0 hPa (17.1 hPa in 2006) and 8.5 m/s (7.7 m/s), while those for 72-hour forecasts were 19.9 hPa (18.6 hPa) and 9.5 m/s (8.3 m/s) respectively.

The forecasts for central pressure and maximum wind speed for SEPAT (0708), NARI (0711), WIPHA (0712) and KROSA (0715) had relatively larger errors since they all developed so far as 935 hPa and also weakened rapidly such a pace as more than 50 hPa a day.

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.
TY	KONG-REY	(0701)	-0.6	8.4	16	4.0	10.9	12	2.6	6.1	8
TY	YUTU	(0702)	0.6	14.5	17	12.3	21.3	13	14.4	18.1	9
TS	TORAJI	(0703)	2.0	2.0	2	0.0	0.0	0	0.0	0.0	0
TY	MAN-YI	(0704)	-1.5	8.2	24	-0.8	9.6	20	-6.2	16.2	16
TY	USAGI	(0705)	-4.7	7.9	20	-4.7	11.5	16	-3.0	16.8	12
TY	PABUK	(0706)	-7.4	9.5	12	-9.0	11.5	8	-10.5	12.0	4
TS	WUTIP	(0707)	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0
TY	SEPAT	(0708)	5.0	19.7	23	13.1	31.1	19	12.2	40.6	15
TY	FITOW	(0709)	-3.1	7.8	36	-7.8	11.8	32	-15.4	17.4	27
STS	DANAS	(0710)	0.3	2.6	14	3.1	4.4	9	5.6	6.3	5
TY	NARI	(0711)	16.2	25.4	12	13.1	28.9	8	1.3	20.5	3
TY	WIPHA	(0712)	18.3	26.8	9	17.0	29.4	5	0.0	0.0	1
TS	FRANCISCO	(0713)	-6.7	6.7	3	0.0	0.0	0	0.0	0.0	0
STS	LEKIMA	(0714)	-1.5	4.7	13	-3.7	5.6	9	-9.6	11.1	5
TY	KROSA	(0715)	4.6	16.6	21	7.9	22.7	16	6.8	24.9	12
TS	HAIYAN	(0716)	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0
STS	PODUL	(0717)	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0
TS	LINGLING	(0718)	-3.2	4.8	10	-6.8	7.3	5	0.0	0.0	0
TY	KAJIKI	(0719)	14.4	22.6	9	19.6	26.7	5	0.0	0.0	0
STS	FAXAI	(0720)	7.5	10.6	2	0.0	0.0	0	0.0	0.0	0
TY	PEIPAH	(0721)	-3.6	9.0	17	-3.8	11.9	13	-6.0	17.1	9
TS	TAPAH	(0722)	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0
TY	MITAG	(0723)	-0.5	9.9	24	1.7	10.8	20	-0.8	7.7	16
TY	HAGIBIS	(0724)	-4.3	10.3	24	-9.5	13.4	20	-15.9	17.9	16
Annual Mean (Total)			0.5	13.0	308	0.9	17.0	230	-3.3	19.9	158

Table 4.3 Mean intensity errors of 24-, 48- and 72-hour operational central pressure forecasts for each TC in 2007

Figure 4.3 shows a histogram of maximum wind speed errors for 24-hour forecasts. About 44% (55% in 2006) of 24-hour forecasts had errors of less than ±3.75 m/s, with figures of ±6.25 m/s for 55% (66%) of 48-hour forecasts and ±6.25 m/s for 47% (54%) of 72-hour forecasts.

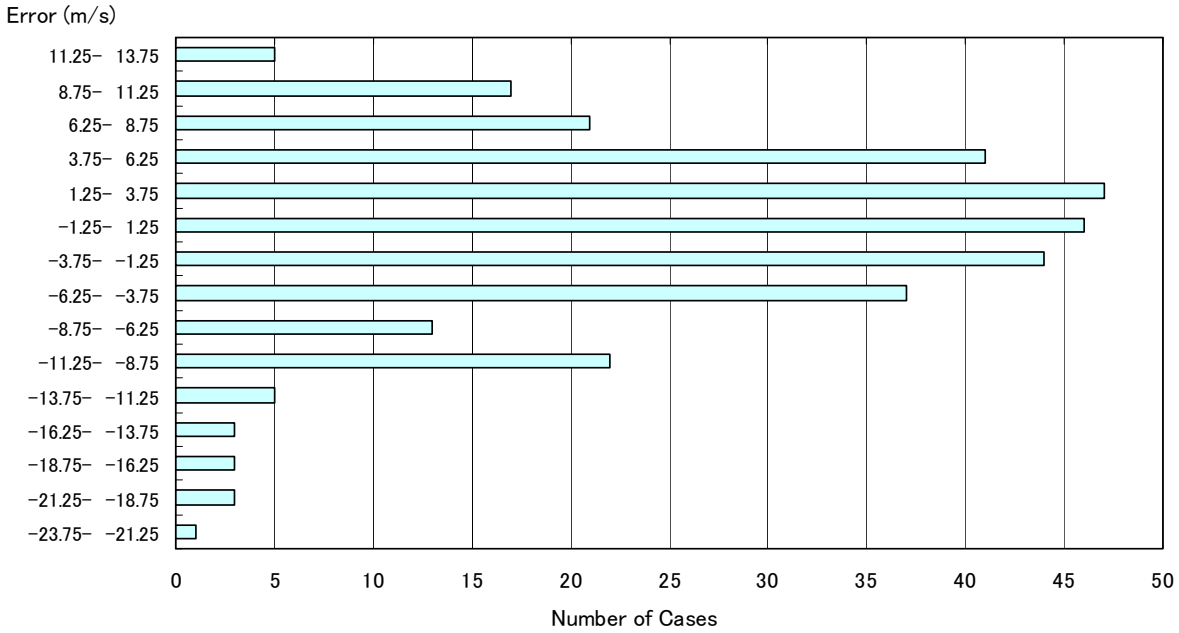


Figure 4.3 Histogram of 24-hour forecast maximum wind speed errors in 2007
(Those for 48- and 72-hour forecasts are shown on the attached CD-ROM)

4.2 Numerical Models (TYM, GSM, and new GSM)

JMA started to assimilate the following data for global analysis in 2007:

- ATOVS data through AP-RARS (Asia-Pacific Regional ATOVS Retransmission Service) and EARS (EUMETSAT Advanced Retransmission Service)
- Brightness temperature obtained by MTSAT water vapor channel

Typhoon Model (TYM) and Global Spectral Model (GSM) provided primary information for JMA forecasters to make operational TC track and intensity forecasts. TYM and GSM predictions were verified with RSMC TC best track data and predictions using the persistency (PER) method. As JMA upgraded GSM and terminated TYM at 00 UTC on 21 November 2007, active TCs at the time i.e. MITAG (0723) and HAGIBIS (0724) were forecasted with TYM and (old) GSM until 18 UTC on 20 November and only (new) GSM was used from 00 UTC on 21 November. The verification of MITAG and HAGIBIS was carried out with then used models accordingly.

4.2.1 TYM Predictions

1) Center Position

The annual mean position errors of TYM track predictions since 1996 are indicated in Figure 4.4. The errors for 30-*, 54-* and 78-hour* predictions in 2007 were 146 km (131 km in 2006), 227 km (220 km) and 301 km (310 km) respectively. The overall performance of TYM track predictions in 2007 was almost the same as 2006. The mean position errors of 18-, 30-, 42-, 54-, 66- and 78-hour predictions for each TC are also shown in Table 4.4.

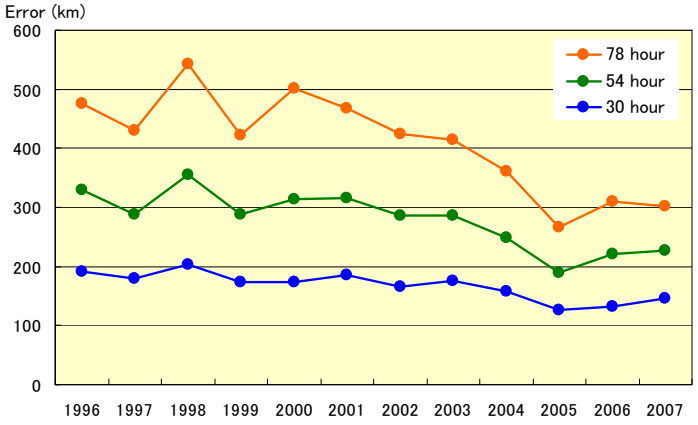


Figure 4.4 TYM annual mean position errors since 1996

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

Table 4.4 Mean position errors (km) of TYM for each TC in 2007
(The number of samples is given in parentheses)

Tropical Cyclone			T=18		T=30		T=42		T=54		T=66		T=78	
TY	0701	KONG-REY	127.5	(19)	158.2	(17)	196.2	(15)	298.1	(13)	384.2	(11)	533.6	(9)
TY	0702	YUTU	111.7	(24)	156.6	(22)	197.9	(20)	230.5	(18)	262.1	(16)	283.4	(14)
TS	0703	TORAJI	122.4	(2)	-	(-)	-	(-)	-	(-)	-	(-)	-	(-)
TY	0704	MAN-YI	108.0	(34)	116.7	(32)	156.0	(30)	197.5	(28)	234.4	(26)	261.6	(24)
TY	0705	USAGI	97.3	(26)	127.0	(24)	156.5	(22)	205.5	(20)	282.2	(18)	376.3	(16)
TY	0706	PABUK	141.9	(14)	185.9	(14)	256.2	(14)	366.2	(14)	454.8	(13)	464.4	(11)
TS	0707	WUTIP	259.8	(3)	453.3	(1)	-	(-)	-	(-)	-	(-)	-	(-)
TY	0708	SEPAT	93.2	(28)	124.3	(26)	178.1	(24)	225.1	(22)	253.2	(20)	270.5	(18)
TY	0709	FITOW	64.6	(38)	83.1	(36)	99.2	(34)	123.6	(32)	161.2	(30)	194.8	(28)
STS	0710	DANAS	76.7	(18)	84.0	(16)	111.7	(14)	157.0	(12)	201.7	(10)	241.2	(8)
TY	0711	NARI	122.5	(13)	179.8	(11)	263.6	(9)	373.2	(7)	384.6	(5)	519.3	(3)
TY	0712	WIPHA	86.6	(14)	64.6	(12)	109.8	(10)	190.5	(8)	261.8	(6)	314.4	(4)
TS	0713	FRANCISCO	86.4	(7)	144.7	(5)	125.4	(3)	94.6	(1)	-	(-)	-	(-)
STS	0714	LEKIMA	100.4	(18)	136.5	(16)	164.7	(14)	216.6	(12)	318.7	(10)	437.0	(8)
TY	0715	KROSA	84.8	(26)	98.1	(24)	98.4	(22)	121.2	(20)	136.5	(18)	158.8	(16)
TS	0716	HAIYAN	65.5	(3)	117.5	(1)	-	(-)	-	(-)	-	(-)	-	(-)
STS	0717	PODUL	-	(-)	-	(-)	-	(-)	-	(-)	-	(-)	-	(-)
TS	0718	LINGLING	157.7	(12)	249.9	(10)	377.3	(8)	501.1	(6)	643.2	(4)	966.6	(2)
TY	0719	KAJIKI	205.2	(10)	441.1	(8)	650.4	(6)	832.1	(4)	966.6	(2)	-	(-)
STS	0720	FAXAI	332.2	(5)	507.1	(3)	109.4	(1)	-	(-)	-	(-)	-	(-)
TY	0721	PEIPAH	128.8	(21)	182.3	(19)	231.0	(17)	279.7	(15)	311.2	(13)	364.5	(11)
TS	0722	TAPAH	582.5	(3)	1084.4	(1)	-	(-)	-	(-)	-	(-)	-	(-)
TY	0723	MITAG	99.4	(4)	130.4	(4)	166.3	(4)	187.6	(4)	180.1	(4)	153.6	(4)
TY	0724	HAGIBIS	117.2	(4)	71.0	(4)	70.9	(4)	93.1	(4)	96.1	(4)	103.0	(4)
	Annual Mean		113.6	(346)	145.7	(306)	177.3	(271)	227.0	(240)	267.7	(210)	301.4	(180)

Table 4.5 gives TYM's relative performance compared with the PER method. In this comparison, life stages of TCs were classified into the three stages of before, during and after recurvature. Each stage is defined with the direction of movement of each TC at each prediction time. The table indicates that TYM outperformed the PER method throughout the forecast period beyond 18 hours from the initial time, and that the rates of error reduction of TYM to the PER method for 18-, 30-, 42-, 54-, 66-, and 78-hour predictions were about 40% (36% in 2006), 57% (50%), 65% (56%), 67% (58%), 70% (61%), and 72% (63%) respectively. These rates were relatively higher for the *after* stage, in which the position errors of the PER methods were larger than those for the other two stages.

About 63% (70% in 2006) of 30-hour predictions had errors of less than 150 km, while 77% (76%) of 54-hour predictions had errors of less than 300 km, and 83% (82%) of 78-hour predictions had errors of less than 450 km respectively. Histograms of position errors for 30-, 54- and 78-hour predictions of TYM are included on the attached CD-ROM.

Table 4.5 Mean position errors (km) of TYM and PER-method predictions for the 24 TCs in 2007 in the stages before, during and after recurvature. The number of samples is given in parentheses. IMPROV is error reduction rate of TYM to the PER method.

TIME	MODEL	Before	During	After	All
T=18	TYM	108.5 (178)	84.0 (88)	157.4 (80)	113.6 (346)
	PER	163.7 (178)	162.0 (88)	278.5 (80)	189.8 (346)
	IMPROV	33.7 %	48.1 %	43.5 %	40.2 %
T=30	TYM	132.1 (152)	126.5 (81)	195.2 (73)	145.7 (306)
	PER	274.7 (152)	287.4 (81)	543.6 (73)	342.2 (306)
	IMPROV	51.9 %	56.0 %	64.1 %	57.4 %
T=42	TYM	164.6 (127)	149.5 (74)	229.7 (70)	177.3 (271)
	PER	386.2 (127)	427.5 (74)	802.7 (70)	505.1 (271)
	IMPROV	57.4 %	65.0 %	71.4 %	64.9 %
T=54	TYM	200.5 (105)	203.0 (66)	290.4 (69)	227.0 (240)
	PER	548.5 (105)	525.4 (66)	1058.8 (69)	688.8 (240)
	IMPROV	63.4 %	61.4 %	72.6 %	67.0 %
T=66	TYM	241.9 (88)	213.3 (56)	348.3 (66)	267.7 (210)
	PER	710.6 (88)	683.1 (56)	1276.3 (66)	881.1 (210)
	IMPROV	66.0 %	68.8 %	72.7 %	69.6 %
T=78	TYM	281.1 (72)	254.8 (43)	354.8 (65)	301.4 (180)
	PER	825.3 (72)	855.4 (43)	1518.9 (65)	1082.9 (180)
	IMPROV	65.9 %	70.2 %	76.6 %	72.2 %

2) Central Pressure and Maximum Wind Speed

The mean errors of 30-, 54- and 78-hour central pressure predictions by TYM in 2007 were +2.7 hPa (+3.1 hPa in 2006), +4.2 hPa (+2.2 hPa) and +1.8 hPa (+1.7 hPa) respectively. Their root mean square errors (RMSEs) were 15.8 hPa (15.4 hPa in 2006) for 30-hour predictions, 19.5 hPa (16.7 hPa) for 54-hour predictions and 22.4 hPa (18.0 hPa) for 78-hour predictions. The bias for 30-, 54-, and 78-hour maximum wind speed predictions were –3.9 m/s (–3.0 m/s in 2006) with RMSE of 8.4 m/s (7.4 m/s), –5.0 m/s (–3.3 m/s) with RMSE of 10.3 m/s (8.3 m/s) and –3.9 m/s (–3.4 m/s) with RMSE of 11.1 m/s (8.8 m/s) respectively.

Figure 4.5 shows histograms of the errors for 30-hour central pressure and maximum wind speed predictions. About 46% (39% in 2006) of central pressure predictions had errors of less than ±7.5 hPa, while 43% (43%) of maximum wind speed predictions had errors less than ±3.75 m/s. For 54-hour predictions, these ratios were 59% (58% in 2006) with errors of less than ±12.5 hPa, and 48% (62%) with errors less than ±6.25 m/s respectively. The figures for 78-hour predictions were 59% (67% in 2006) with errors of less than ±17.5 hPa and 58% (68%) with errors of less than ±8.75 m/s respectively (the figures are shown on the attached CD-ROM).

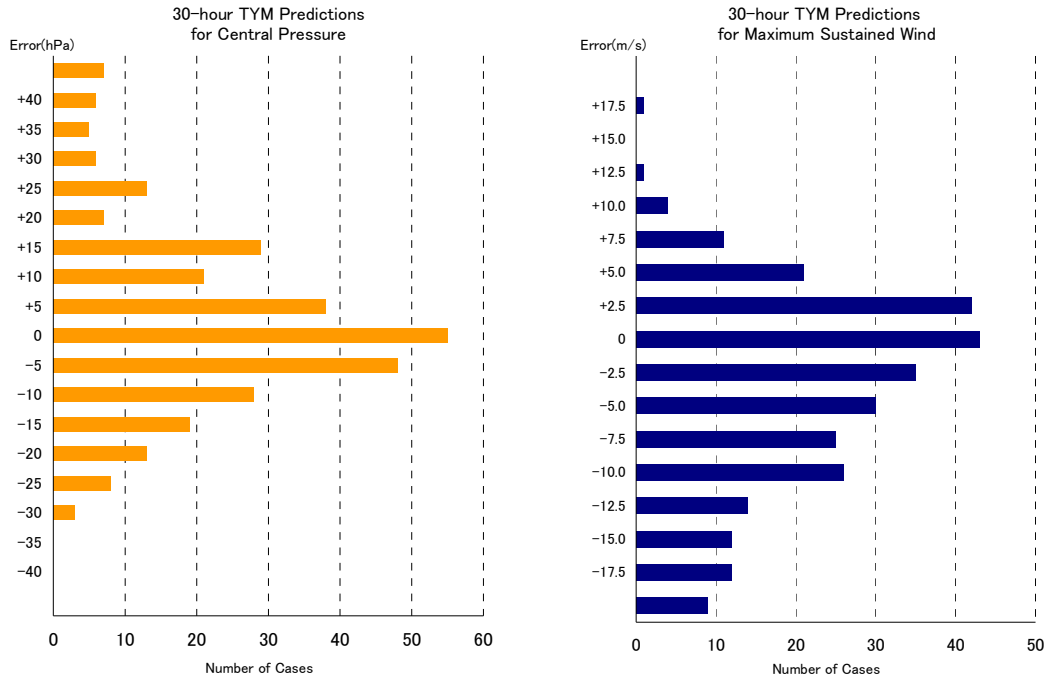


Figure 4.5 Error distributions of TYM 30-hour intensity predictions in 2007
The figure on the left shows error distributions for central pressure, and the one on the right shows those for maximum wind speed (the error distirutions for 54- and 78-hour predictions are included on the attached CD-ROM).

4.2.2 GSM Predictions

1) Center Position

The GSM annual mean position errors since 1996 are presented in Figure 4.6. In 2007, the annual mean errors for 30-, 54- and 78-hour predictions were 143 km (124 km in 2006), 201 km (210 km) and 252 km (300 km) respectively. The difference of errors between forecast times is smaller than the previous years. The mean position errors of 18-, 30-, 42-, 54-, 66- and 78-hour predictions for each TC are given in Table 4.6.

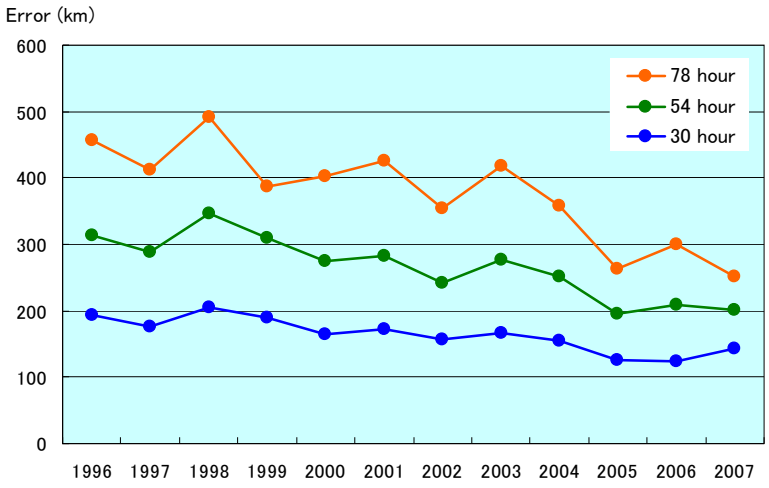


Figure 4.6 GSM annual mean position errors since 1996

Table 4.6 Mean position errors (km) of GSM for each TC in 2007.
The number of samples is given in parentheses.

Tropical Cyclone			T=18		T=30		T=42		T=54		T=66		T=78	
TY	0701	KONG-REY	128.1	(10)	177.4	(9)	220.0	(8)	258.7	(7)	256.6	(6)	256.8	(5)
TY	0702	YUTU	113.4	(12)	164.3	(11)	207.3	(10)	245.4	(9)	302.2	(8)	375.9	(7)
TS	0703	TORAJI	-	(-)	-	(-)	-	(-)	-	(-)	-	(-)	-	(-)
TY	0704	MAN-YI	93.6	(18)	124.0	(17)	164.7	(16)	201.2	(15)	225.9	(14)	258.8	(13)
TY	0705	USAGI	96.7	(13)	122.6	(12)	141.8	(11)	188.3	(10)	268.2	(9)	350.6	(8)
TY	0706	PABUK	154.1	(8)	184.0	(8)	205.3	(5)	334.4	(3)	464.0	(3)	592.0	(1)
TS	0707	WUTIP	219.3	(2)	329.1	(1)	-	(-)	-	(-)	-	(-)	-	(-)
TY	0708	SEPAT	89.7	(14)	110.7	(13)	140.9	(12)	157.6	(11)	147.9	(10)	153.5	(9)
TY	0709	FITOW	64.2	(19)	73.9	(18)	68.4	(17)	95.8	(16)	116.1	(15)	145.2	(14)
STS	0710	DANAS	92.7	(9)	120.9	(8)	149.5	(7)	177.1	(6)	240.7	(5)	260.9	(4)
TY	0711	NARI	141.4	(7)	205.5	(6)	291.9	(5)	443.8	(4)	392.8	(3)	554.3	(2)
TY	0712	WIPHA	80.8	(7)	83.8	(6)	114.8	(5)	143.7	(4)	230.2	(3)	282.4	(2)
TS	0713	FRANCISCO	65.0	(4)	75.9	(3)	86.2	(2)	153.1	(1)	-	(-)	-	(-)
STS	0714	LEKIMA	102.8	(8)	131.0	(8)	171.8	(6)	188.1	(4)	258.7	(4)	327.9	(3)
TY	0715	KROSA	96.4	(13)	126.2	(12)	142.1	(11)	144.4	(10)	150.2	(9)	188.3	(8)
TS	0716	HAIYAN	58.9	(1)	133.4	(1)	-	(-)	-	(-)	-	(-)	-	(-)
STS	0717	PODUL	-	(-)	-	(-)	-	(-)	-	(-)	-	(-)	-	(-)
TS	0718	LINGLING	133.3	(6)	223.8	(5)	332.1	(4)	478.8	(3)	641.0	(2)	982.8	(1)
TY	0719	KAJIKI	232.6	(5)	413.5	(4)	633.4	(3)	824.9	(2)	1015.4	(1)	-	(-)
STS	0720	FAXAI	381.5	(2)	441.0	(1)	-	(-)	-	(-)	-	(-)	-	(-)
TY	0721	PEIPAH	116.9	(10)	182.2	(9)	229.5	(8)	307.2	(7)	371.9	(6)	370.0	(5)
TS	0722	TAPAH	493.2	(2)	981.8	(1)	-	(-)	-	(-)	-	(-)	-	(-)
TY	0723	MITAG	85.5	(26)	101.4	(24)	123.9	(22)	158.0	(20)	203.3	(18)	237.5	(16)
TY	0724	HAGIBIS	106.4	(27)	139.0	(25)	164.9	(23)	165.2	(21)	170.0	(19)	182.5	(17)
	Annual Mean		109.8	(223)	143.2	(202)	167.6	(175)	201.4	(153)	229.8	(135)	252.5	(115)

Table 4.7 gives GSM's relative performance compared with the PER method. The rates of error reduction for GSM compared to the PER method were about 41% (39% in 2006), 57% (51%), 69% (58%) and 76% (63%) for 18-, 30-, 54- and 78-hour predictions respectively.

About 65% (70% in 2006) of 30-hour predictions had errors of less than 150 km, while 83% (79%) of 54-hour predictions had errors of less than 300 km, and 90% (83%) of 78-hour predictions had errors of less than 450 km respectively. Histograms of the position errors of 30-, 54- and 78-hour predictions are included on the attached CD-ROM.

Table 4.7 Mean position errors (km) of GSM and PER method predictions for the TCs in 2007 in the stages before, during and after recurvature. The number of samples is given in parentheses. IMPROV is error reduction rate of GSM to the PER method.

TIME	MODEL	Before	During	After	All
T=18	GSM	99.4 (113)	94.5 (48)	140.8 (62)	109.8 (223)
	PER	159.1 (113)	173.0 (48)	243.2 (62)	185.5 (223)
	IMPROV	37.6 %	45.4 %	42.1 %	40.8 %
T=30	GSM	124.2 (95)	123.6 (47)	188.6 (60)	143.2 (202)
	PER	266.2 (95)	297.9 (47)	464.8 (60)	332.6 (202)
	IMPROV	53.3 %	58.5 %	59.4 %	56.9 %
T=42	GSM	147.8 (75)	135.9 (44)	219.2 (56)	167.6 (175)
	PER	407.2 (75)	401.1 (44)	645.0 (56)	481.8 (175)
	IMPROV	63.7 %	66.1 %	66.0 %	65.2 %
T=54	GSM	174.9 (59)	164.3 (39)	256.2 (55)	201.4 (153)
	PER	552.3 (59)	519.4 (39)	848.6 (55)	650.4 (153)
	IMPROV	68.3 %	68.4 %	69.8 %	69.0 %
T=66	GSM	205.8 (49)	183.1 (32)	279.2 (54)	229.8 (135)
	PER	687.4 (49)	687.9 (32)	1042.2 (54)	829.4 (135)
	IMPROV	70.1 %	73.4 %	73.2 %	72.3 %
T=78	GSM	227.6 (38)	205.0 (26)	295.2 (51)	252.5 (115)
	PER	839.8 (38)	819.7 (26)	1295.2 (51)	1037.2 (115)
	IMPROV	72.9 %	75.0 %	77.2 %	75.7 %

2) Central Pressure and Maximum Wind Speed

Figure 4.7 shows histograms of the central pressure errors and the maximum wind speed errors of 30-hour GSM predictions. The figures show that in most cases GSM underestimated the wind speed of TCs (right) and had a positive bias for the central pressure prediction (left).

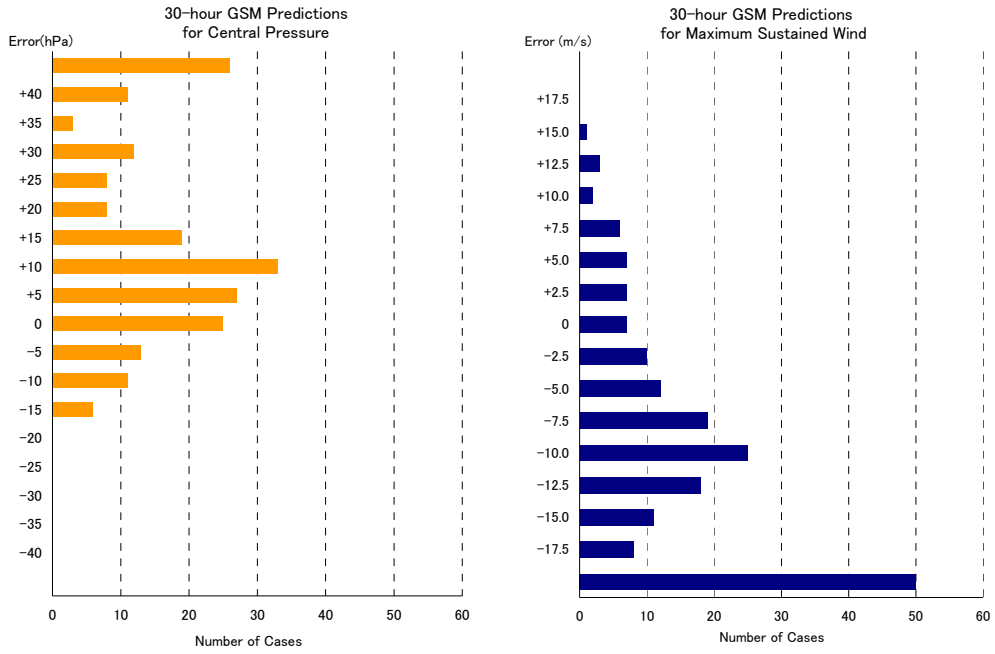
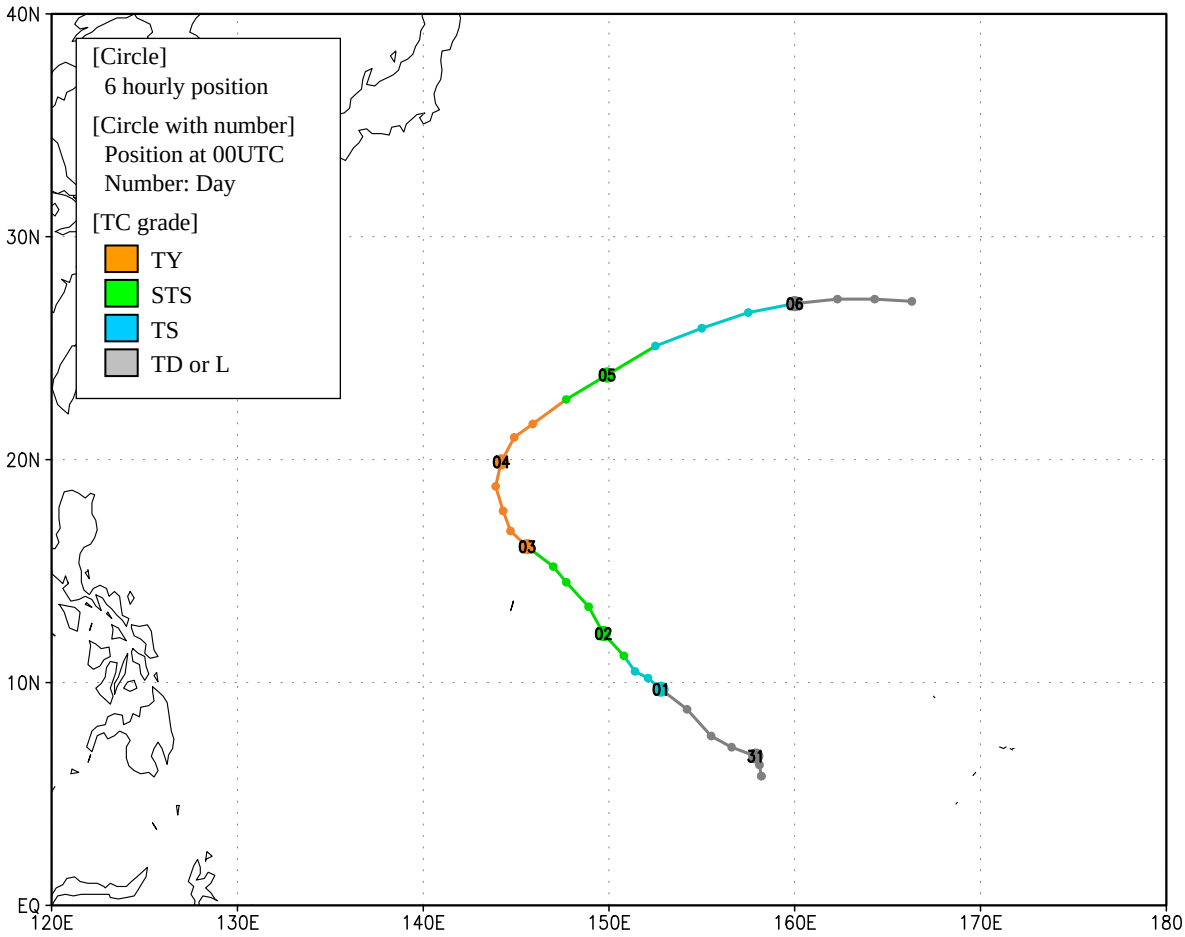


Figure 4.7 Error distributions of GSM 30-hour intensity predictions in 2007
The figure on the left shows error distributions for central pressure, while the one on the right shows those for maximum wind speed (the error distributions of 54- and 78-hour predictions are included on the attached CD-ROM).

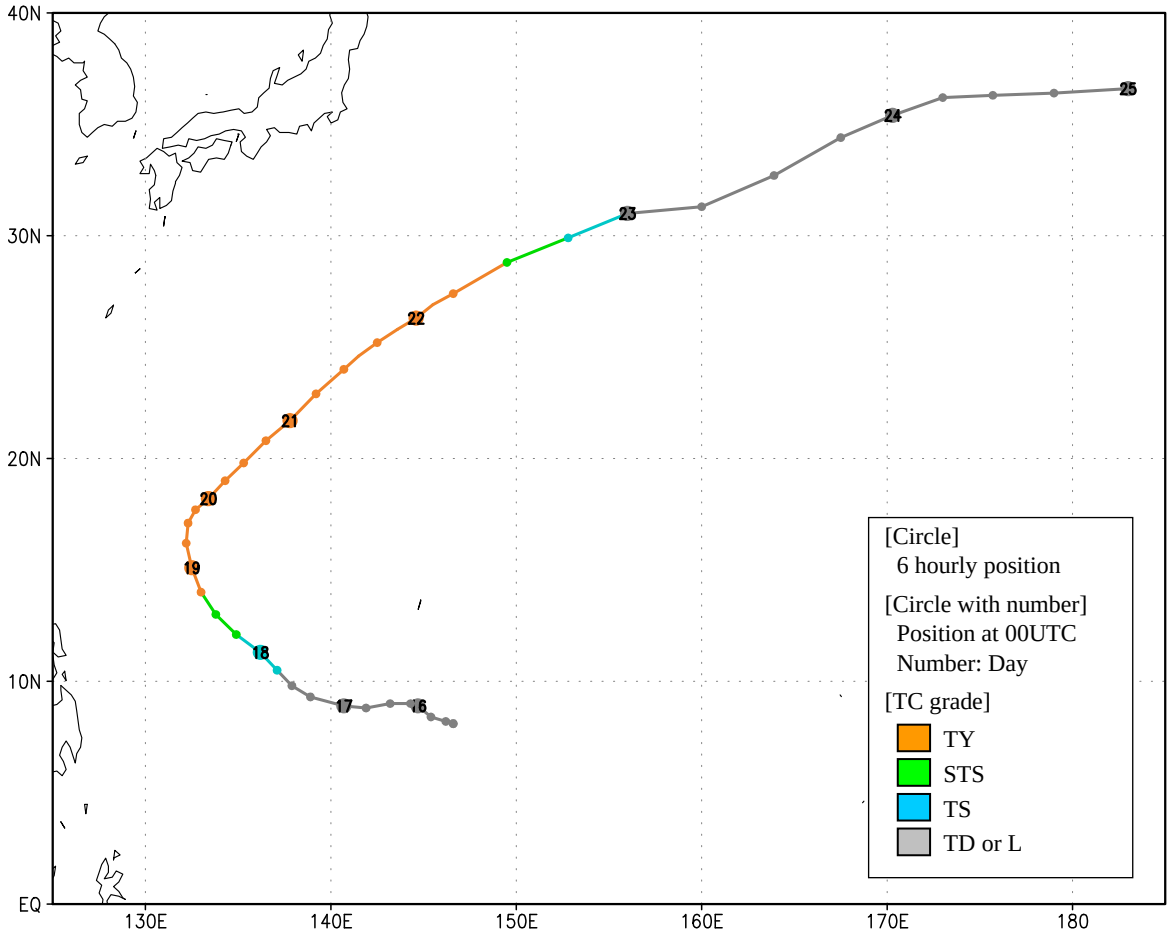
KONG-REY (0701)

KONG-REY formed as a tropical depression (TD) over the sea around the Marshall Islands at 12 UTC on 30 March 2007. Moving northwestward, it was upgraded to tropical storm (TS) intensity over the sea around the Caroline Islands at 00 UTC on 1 April. Keeping its northwestward track, it was upgraded to typhoon (TY) intensity over the sea north of Saipan Island at 00 UTC on 3 April. During the recurvature, KONG-REY reached its peak strength with maximum sustained winds of 80 kt and a central pressure of 960 hPa over the sea northwest of Saipan Island at 12 UTC on 3 April. After turning east-northeastward, it was downgraded to TS intensity west of Minamitorishima Island at 06 UTC on 5 April, and then transformed into an extratropical cyclone east of Minamitorishima Island at 00 UTC the next day. Moving to the east, it dissipated at 00 UTC on 7 April.



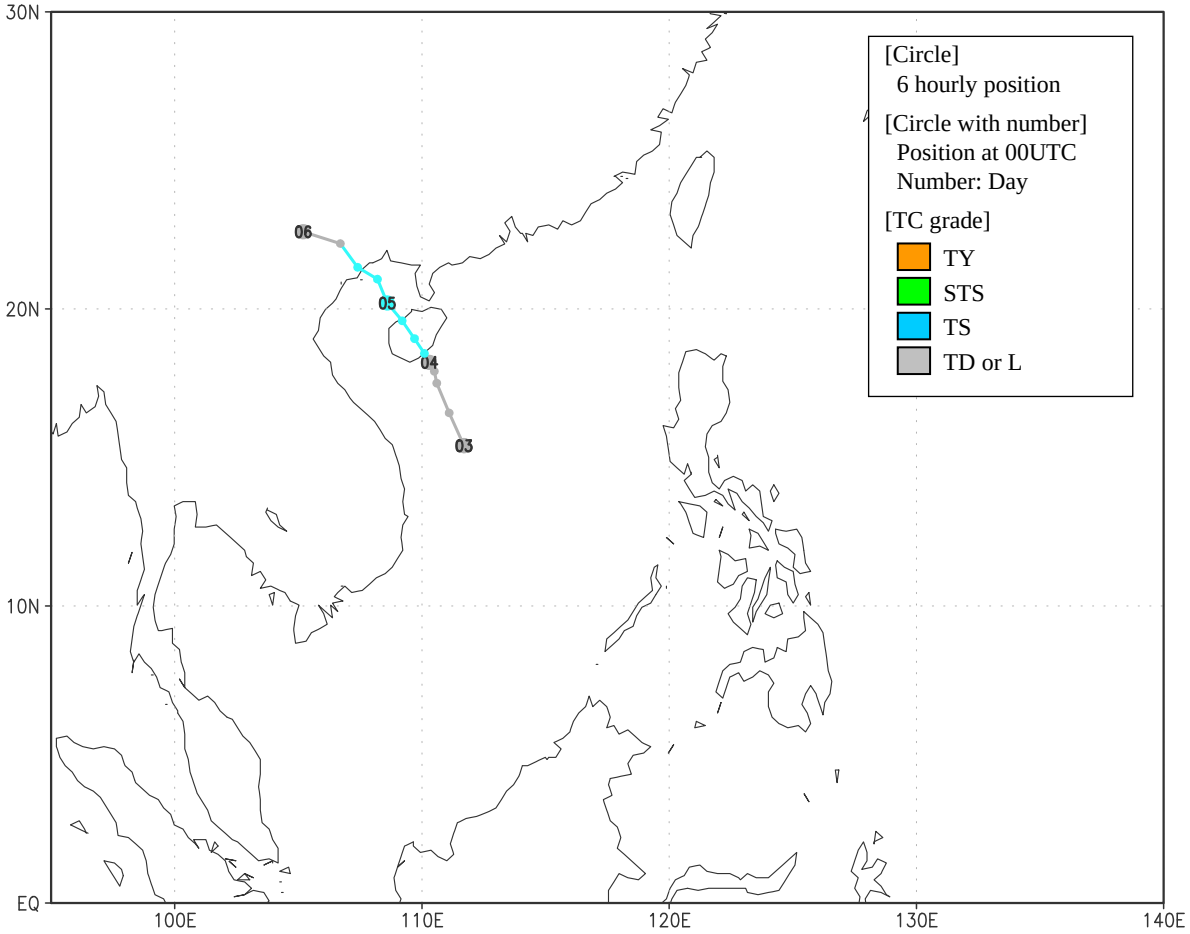
YUTU (0702)

YUTU formed as a tropical depression (TD) over the sea around the Caroline Islands at 06 UTC on 15 May 2007. After moving west-northwestward over the sea near Yap Island early on 17 May, it was upgraded to tropical storm (TS) intensity over the sea northwest of Yap Island at 18 UTC the same day. Moving northwestward, it was upgraded to typhoon (TY) intensity over the sea east of the Philippines at 18 UTC on 18 May. After recurvature over the same sea on 19 May, YUTU reached its peak strength with maximum sustained winds of 95 kt and a central pressure of 935 hPa southwest of Okinotorishima Island at 12 UTC the next day. Moving east-northeastward, it approached Iwojima Island with TY intensity after 12 UTC on 21 May. Weakening in intensity, YUTU was downgraded to TS intensity at 18 UTC on 22 May, and transformed into an extratropical cyclone over the sea east of Japan six hours later. Keeping its east-northeastward track, it crossed longitude 180 degrees east over the sea south of the Aleutian Islands before 00 UTC on 25 May.



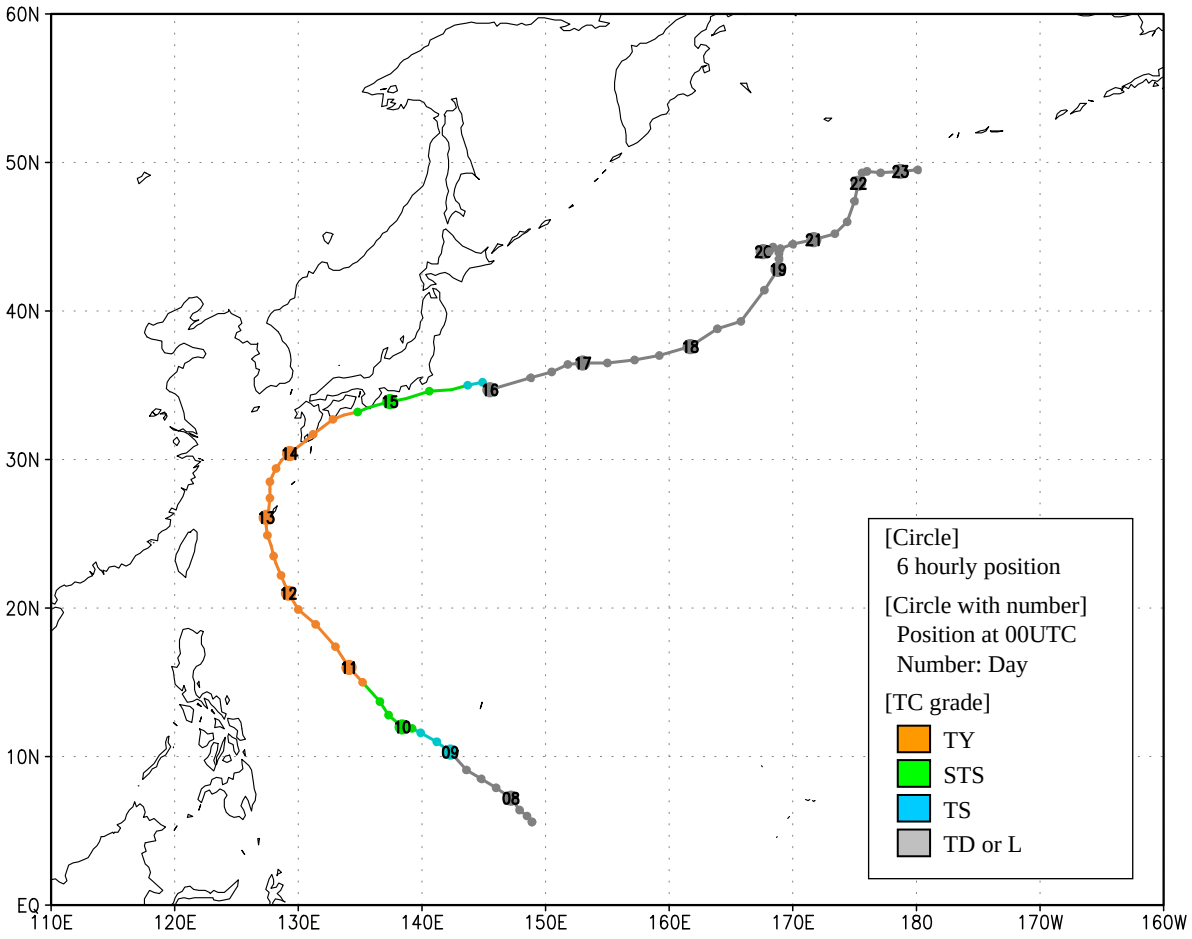
TORAJI (0703)

TORAJI formed as a tropical depression (TD) in the South China Sea at 00 UTC on 3 July 2007, and moved to the north-northwest. Moving northwestward, it was upgraded to tropical storm (TS) intensity around the southern coast of Hainan Island at 06 UTC the next day. It crossed the Island northwestward and reached its peak intensity with maximum sustained winds of 35 kt and a central pressure of 994 hPa around the northwestern coast of the island at 18 UTC the same day. Keeping its northwestward track in the Gulf of Tongking, it hit around the border between China and Vietnam on 5 July. Moving northwestward along the border, TRAJI weakened to TD intensity at 18 UTC on 5 July and dissipated at 06 UTC on 6 July.



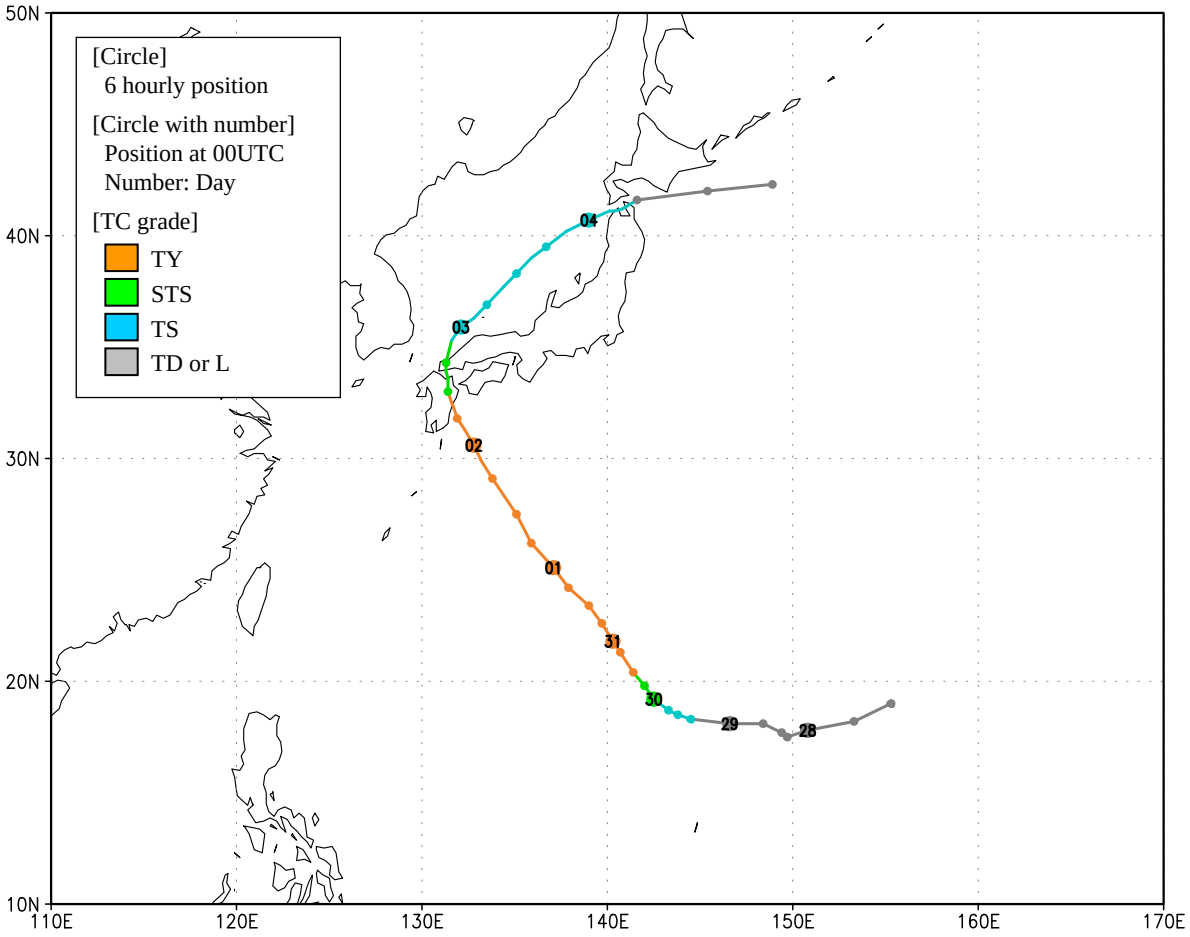
MAN-YI (0704)

MAN-YI formed as a tropical depression (TD) over the sea around the Caroline Islands at 06 UTC on 7 July 2007. Moving west-northwestward, it was upgraded to tropical storm (TS) intensity over the sea southwest of Guam Island at 00 UTC on 9 July. Keeping its west-northwestward track, it was upgraded to typhoon (TY) intensity over the sea far east of the Philippines at 18 UTC on 10 July. Turning to the north, it reached its peak intensity with maximum sustained winds of 95 kt and a central pressure of 930 hPa over the sea south of Okinawa Island at 00 UTC on 12 July. MAN-YI recurved off the west coast of Okinawa Island around 00 UTC the next day. It turned to the northeast weakened in intensity, and made landfall in Kyusyu with TY intensity after 05 UTC on 14 July. After moving east-northeastward along the coast of the Japanese islands, it was downgraded to TS intensity at 12 UTC on 15 July, and transformed into an extratropical cyclone over the sea east of Japan at 00 UTC on 16 July. It turned to the northeast over the sea far east of Japan and then crossed longitude 180 degrees east over the sea south of the Aleutian Islands at 06 UTC on 23 July.



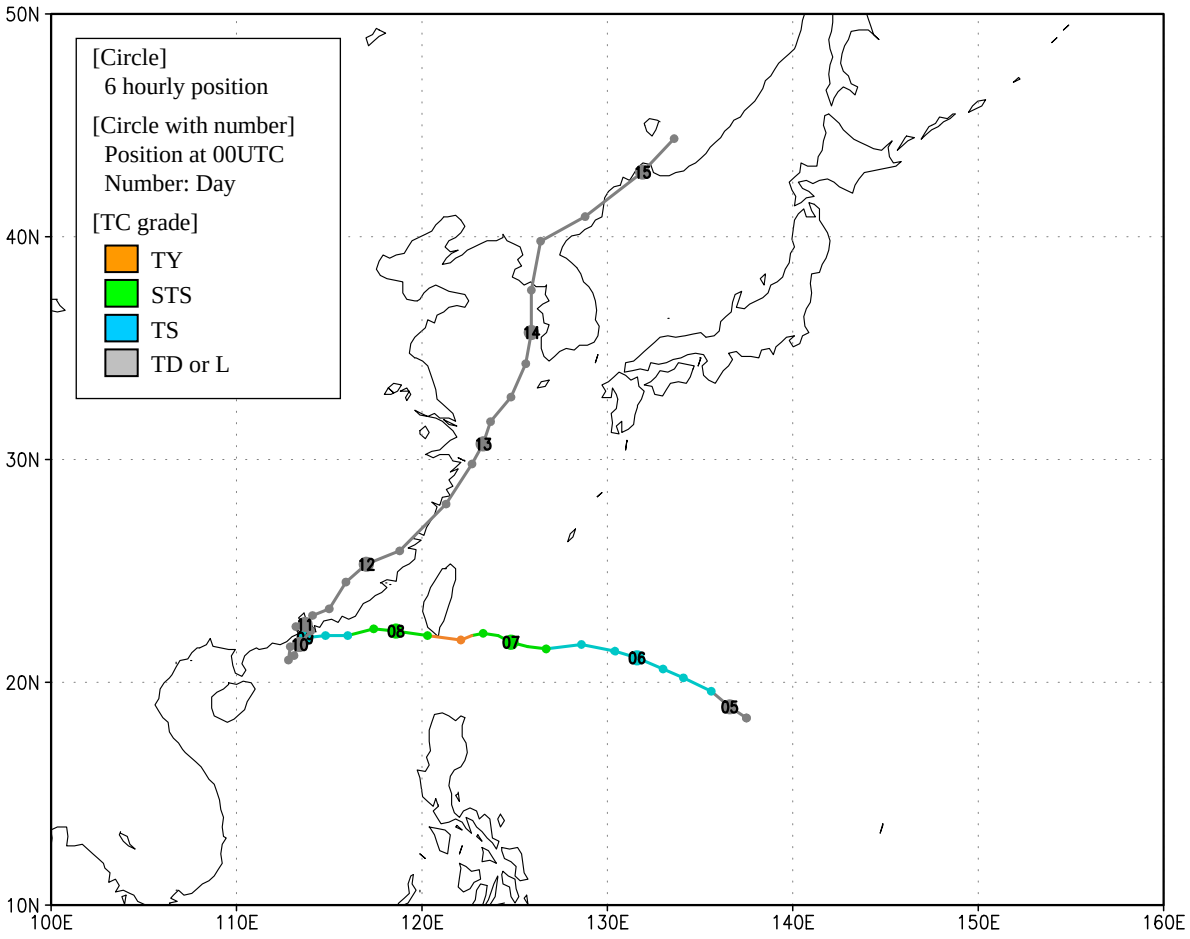
USAGI (0705)

USAGI formed as a tropical depression (TD) over the sea south of Minamitorishima Island at 12 UTC on 27 July 2007. Moving westward, it was upgraded to tropical storm (TS) intensity over the sea around the Mariana Islands at 06 UTC on 29 July. Turning to the northwest, it was upgraded to typhoon (TY) intensity over the sea south of Iwojima Island at 12 UTC the next day. Keeping its northwest track, USAGI reached its peak strength with maximum sustained winds of 90 kt and a central pressure of 945 hPa over the sea south of Japan at 00 UTC on 1 August. Turning to the north, it made landfall on Kyushu with TY intensity before 09 UTC the next day. After recurvature, it was downgraded to TS intensity at 21 UTC the same day and moved northeastward over the Sea of Japan. Soon after USAGI made landfall in the northern part of Honshu after 03 UTC on 4 August, it weakened to TD intensity at 06 UTC the same day and then transformed into an extratropical cyclone over the sea south of Hokkaido six hours later. Moving eastward, it dissipated over the sea southeast of Hokkaido at 00 UTC on 5 August.



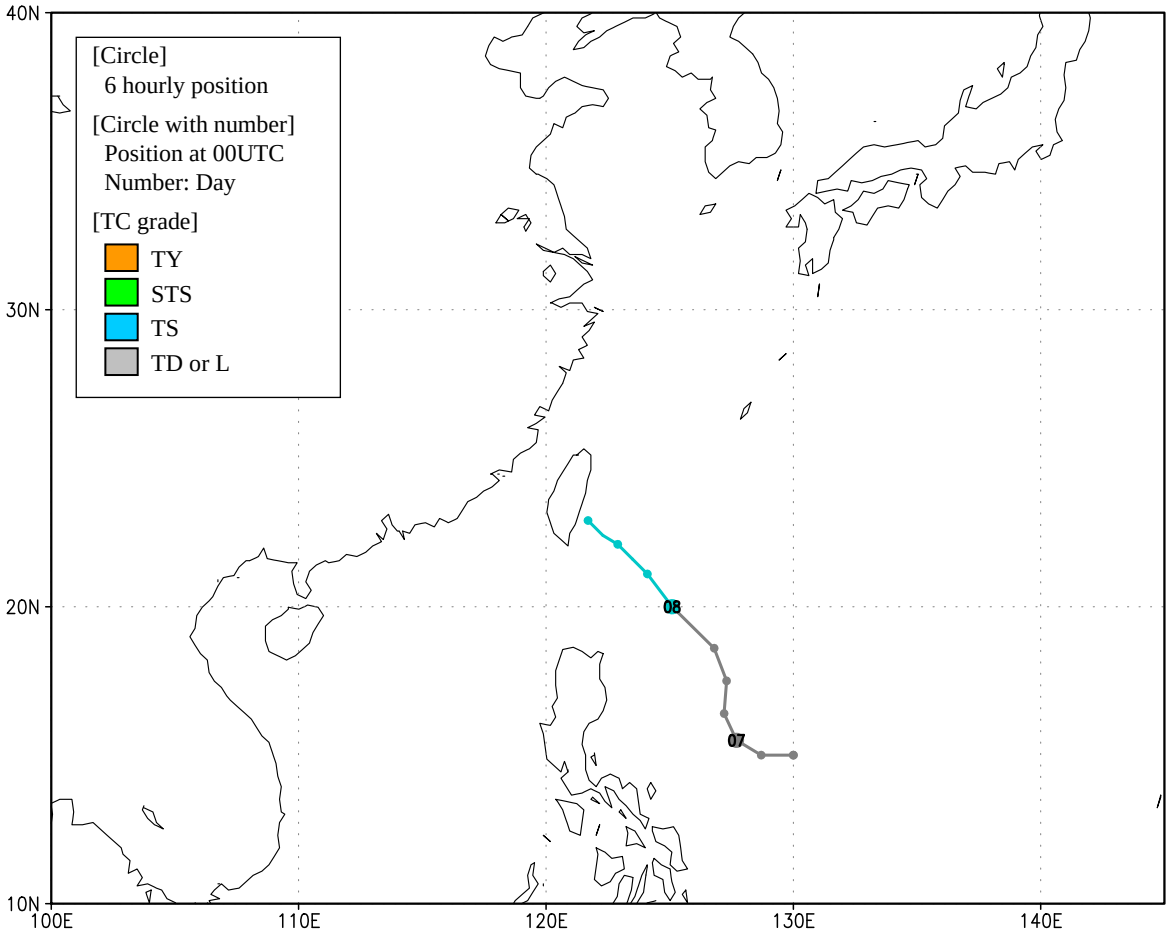
PABUK (0706)

PABUK formed as a tropical depression (TD) over the sea far east of the Philippines at 18 UTC on 4 August 2007. Moving west-northwestward, it was upgraded to tropical storm (TS) intensity over the sea south of Okinotorishima Island at 06 UTC on 5 August. After turning to the west, it reached its peak intensity with maximum sustained winds of 65 kt and a central pressure of 975 hPa, and was upgraded to typhoon (TY) intensity over the sea southeast of Taiwan at 09 UTC on 7 August. After passing around the southern tip of Taiwan with TY intensity after 15 UTC on 7 August, PABUK was downgraded to TS intensity over the sea east of Hong Kong at 12 UTC on 8 August and then weakened to TD intensity off the southern coast of Hong Kong at 06 UTC on 9 August. After staying over the same sea on 10 August, it hit around Hong Kong the next day. Moving to the northeast, it entered the East China Sea late on 12 August. PABUK turned to the north in the same sea and transformed into an extratropical cyclone over the northern part of the Korean Peninsula at 12 UTC on 14 August. After turning quickly to the northeast, it dissipated northeast of Vladivostok at 12 UTC on 15 August.



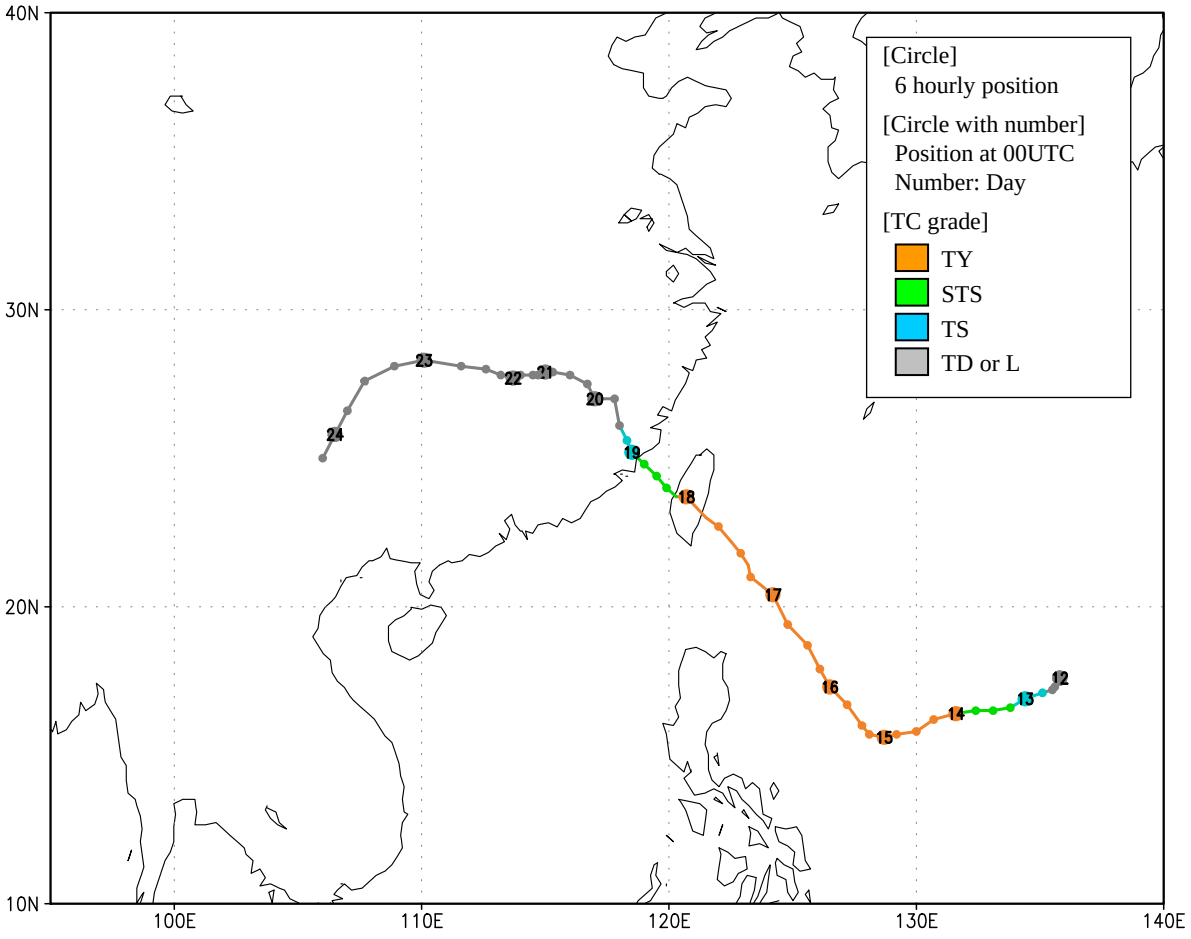
WUTIP (0707)

WUTIP formed as a tropical depression (TD) over the sea east of the Philippines at 12 UTC on 6 August 2007, and then moved to the west. After turning to the northwest, it was upgraded to tropical storm (TS) intensity at 00 UTC on 8 August and reached its peak intensity with maximum sustained winds of 35 kt and a central pressure of 990 hPa over the sea east of the Luzon Straits at 03 UTC on 8 August. Moving to the northwest, WUTIP rapidly dissipated off the eastern coast of Taiwan at 21 UTC on 8 August.



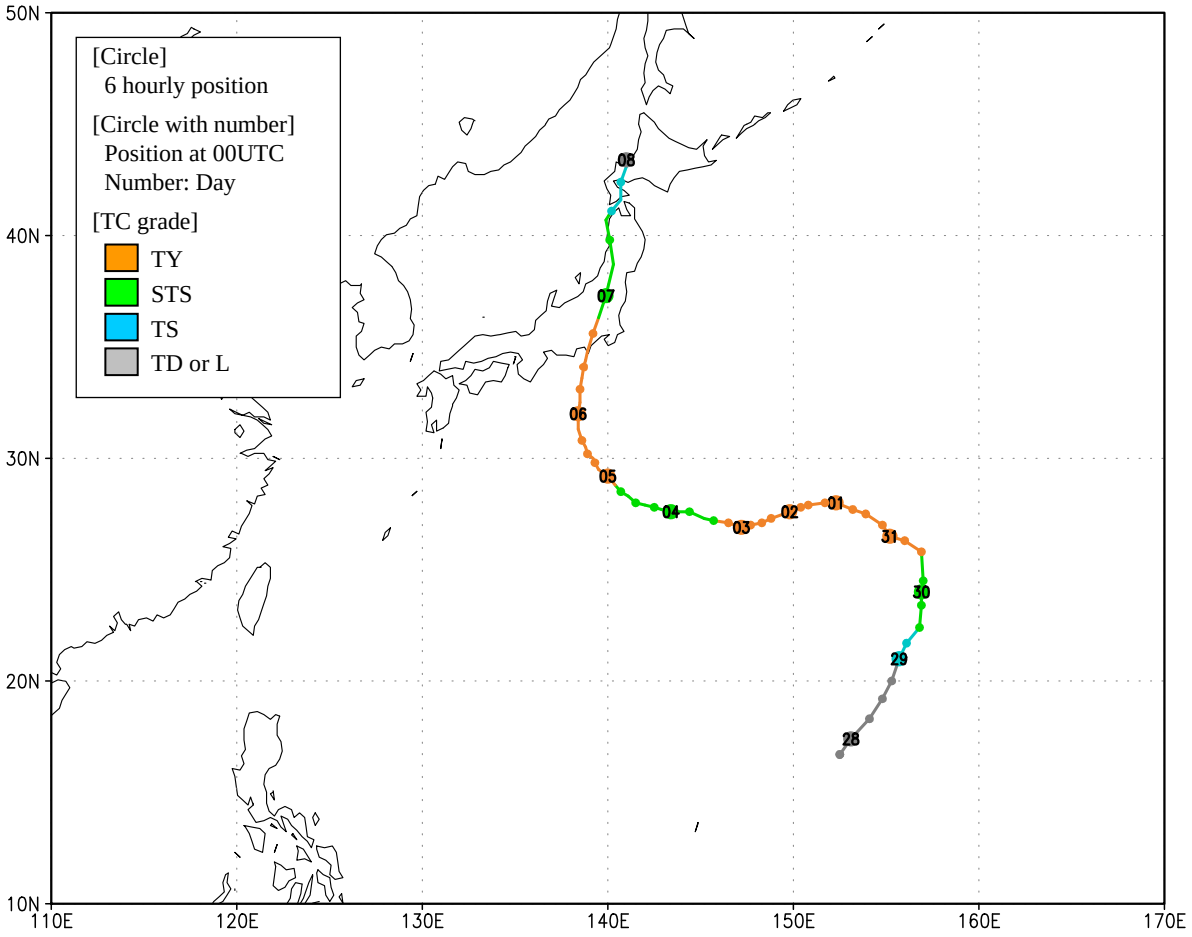
SEPAT (0708)

SEPAT formed as a tropical depression (TD) over the sea far east of the Philippines at 00 UTC on 12 August 2007. It moved to the west and was upgraded to tropical storm (TS) intensity over the same sea 18 hours later. Keeping its westward track, it was upgraded to typhoon (TY) intensity over the sea east of the Philippines at 00 UTC on 14 August. After turning to the northwest, it reached its peak intensity with maximum sustained winds of 110 kt and a central pressure of 910 hPa over the same sea at 00 UTC on 16 August 2007. After moving over the sea south of the Nansei Islands, it hit Taiwan late on 17 August. After hitting South China, SEPAT was downgraded to TS intensity at 00 UTC on 19 August and then to TD intensity at 12 UTC on 19 August. It moved to the west and dissipated in the same area at 12 UTC on 24 August.



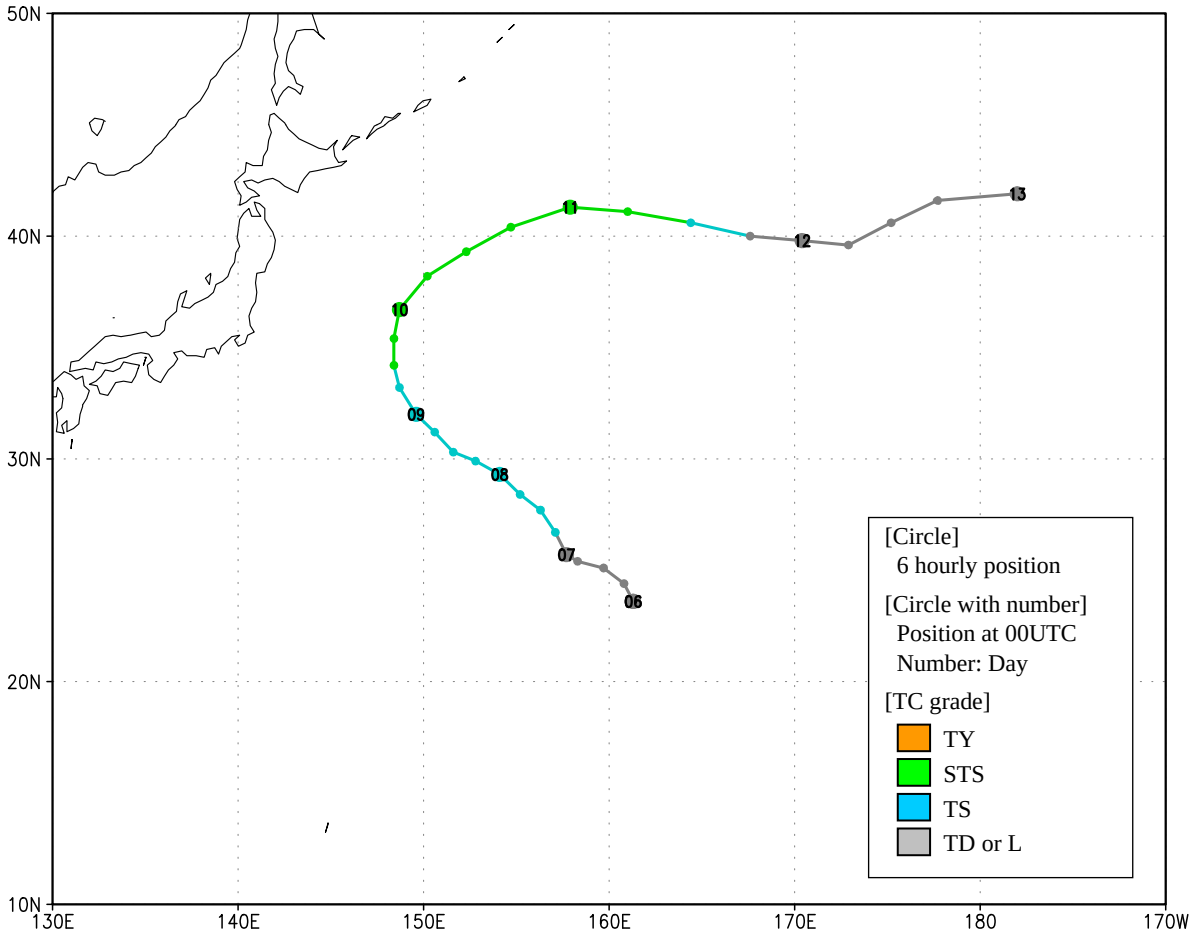
FITOW (0709)

FITOW formed as a tropical depression (TD) over the sea south of Minamitorishima Island at 18 UTC on 27 August 2007. Moving to the northeast, it developed to tropical storm (TS) intensity over the sea southeast of Minamitorishima Island at 00 UTC on 29 August. Turning to the west in a counterclockwise direction, it was upgraded to typhoon (TY) intensity at 12 UTC on 31 August and then reached its peak intensity with maximum sustained winds of 70 kt and a central pressure of 965 hPa over the sea north of Minamitorishima Island at 00 UTC on 1 September. Moving to the west, FITOW was downgraded to severe tropical storm (STS) intensity over the sea east of Chichijima Island at 12 UTC on 3 September. Then turning to the north, it developed again to TY intensity and reached its peak intensity a with maximum sustained winds of 70 kt and a central pressure of 965 hPa over the sea northwest of Chichijima Island at 00 UTC on 5 September. Almost keeping its peak intensity and northward track, it made landfall in Honshu late the next day. Weakening in intensity, it moved northward over the Japanese islands. It was downgraded to TS intensity in the Tsugaru Straits at 15 UTC on 7 September and then transformed into an extratropical cyclone off the east of Hokkaido at 00 UTC on 8 September. It dissipated around the same area six hours later.



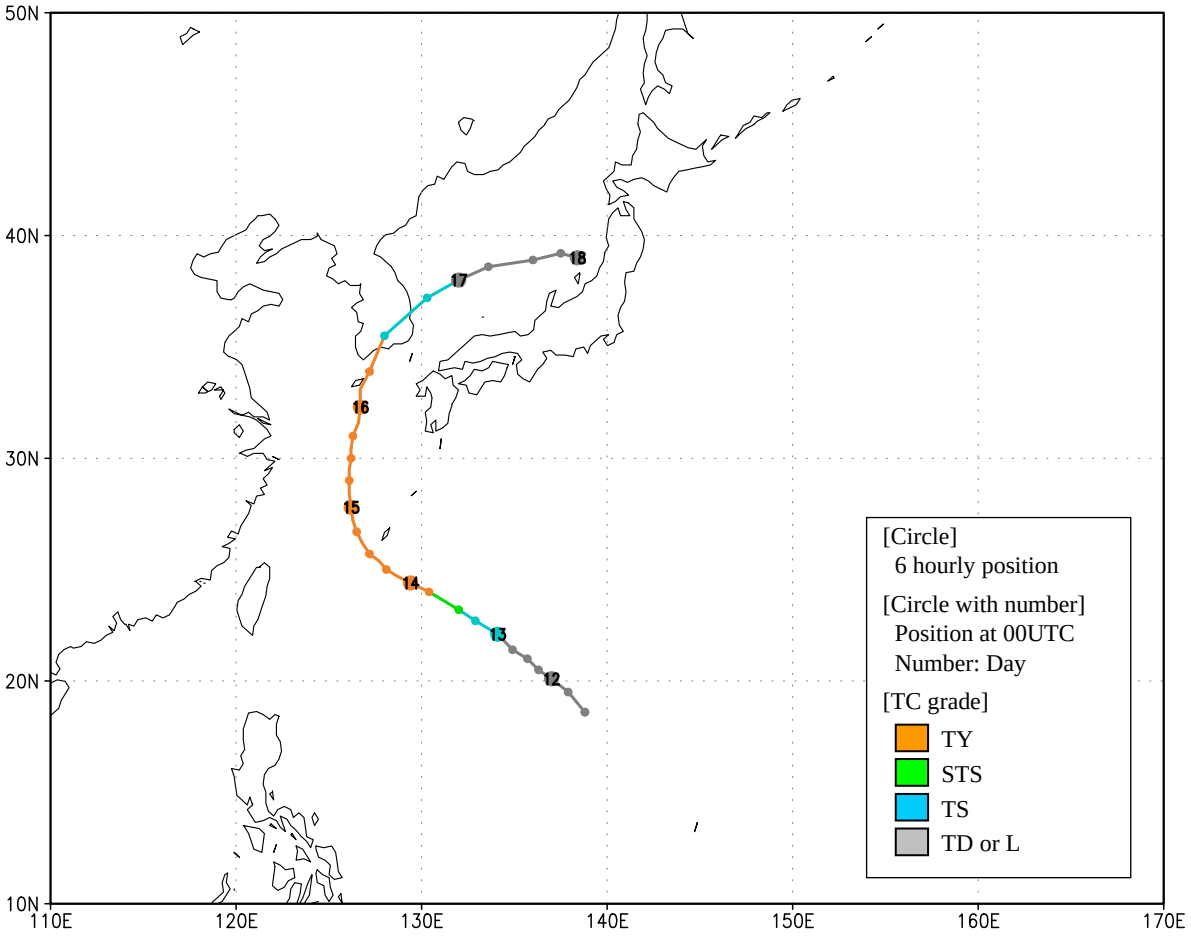
DANAS (0710)

DANAS formed as a tropical depression (TD) over the sea east of Minamitorishima Island at 00 UTC on 6 September 2007. Moving northwestward, it was upgraded to tropical storm (TS) intensity over the sea northeast of Minamitorishima Island at 06 UTC on 7 September. During the recurvature, it was upgraded to severe tropical storm (STS) intensity over the sea east of Japan at 12 UTC on 9 September. After turning to the northeast, it reached its peak intensity with maximum sustained winds of 55 kt and a central pressure of 990 hPa over the same sea at 18 UTC on 10 September. Moving eastward, it was downgraded to TS intensity at 12 UTC on 11 September and transformed into an extratropical cyclone over the sea far east of Japan six hours later. Keeping its eastward track, it crossed longitude 180 degrees east over the sea south of the Aleutian Islands before 00 UTC on 13 September.



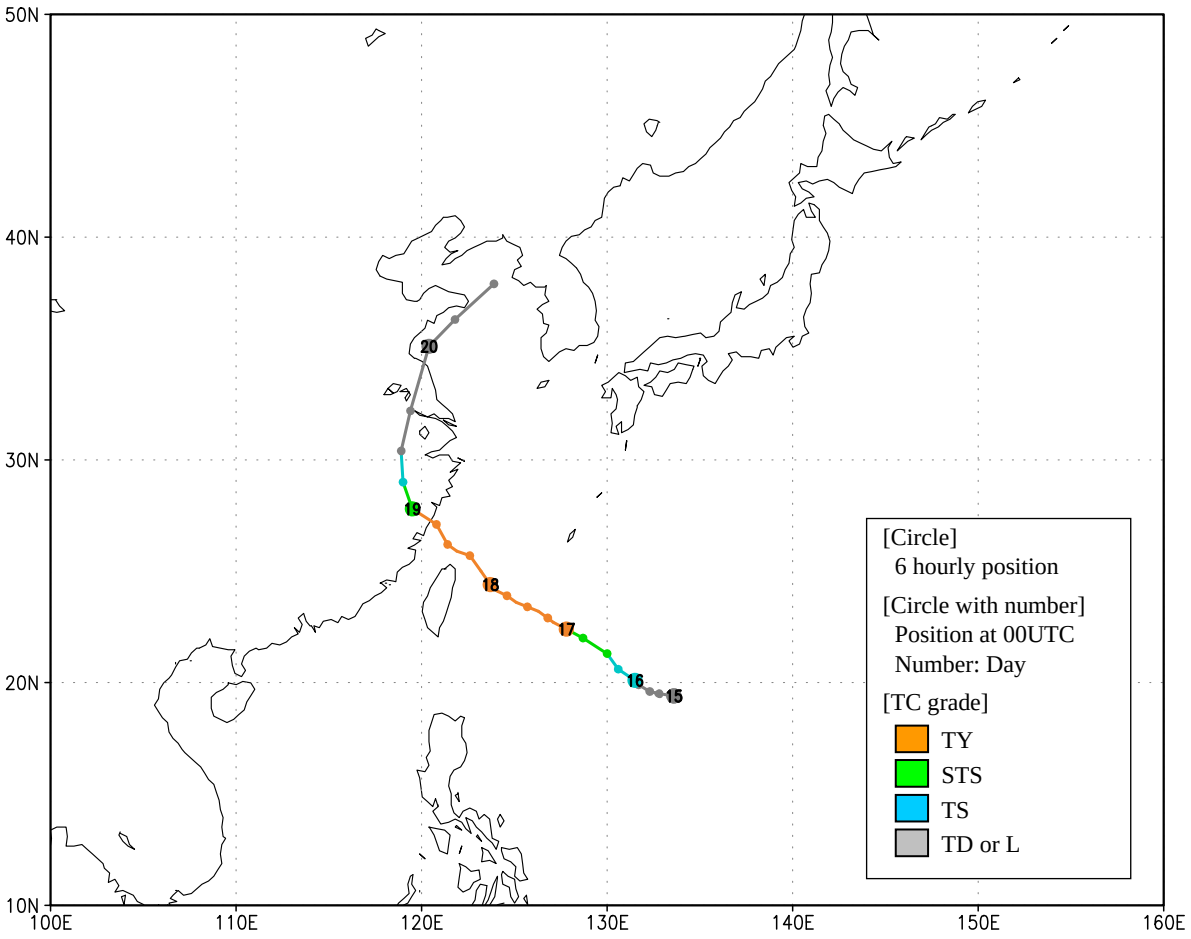
NARI (0711)

NARI formed as a tropical depression (TD) over the sea far east of the Philippines at 12 UTC on 11 September 2007. Moving west-northwestward, it was upgraded to tropical storm (TS) intensity southeast of Minamidaitojima Island at 00 UTC on 13 September 2007. Keeping its west-northwestward track, it developed rapidly to typhoon (TY) intensity at 18 UTC on 13 September. Turning to the north, it reached its peak intensity with maximum sustained winds of 100 kt and a central pressure of 935 hPa southwest of Okinawa Island at 12 UTC on 14 September. After passing around Kumejima Island at its peak intensity the same day, it moved northward with gradual weakening over the East China Sea. It approached Cheju Island with TY intensity early on 16 September. Turning to the northeast, NARI hit the Korean Peninsula the same day and then transformed into an extratropical cyclone over the Sea of Japan at 00 UTC on 17 September. It dissipated over the same sea at 06 UTC the next day.



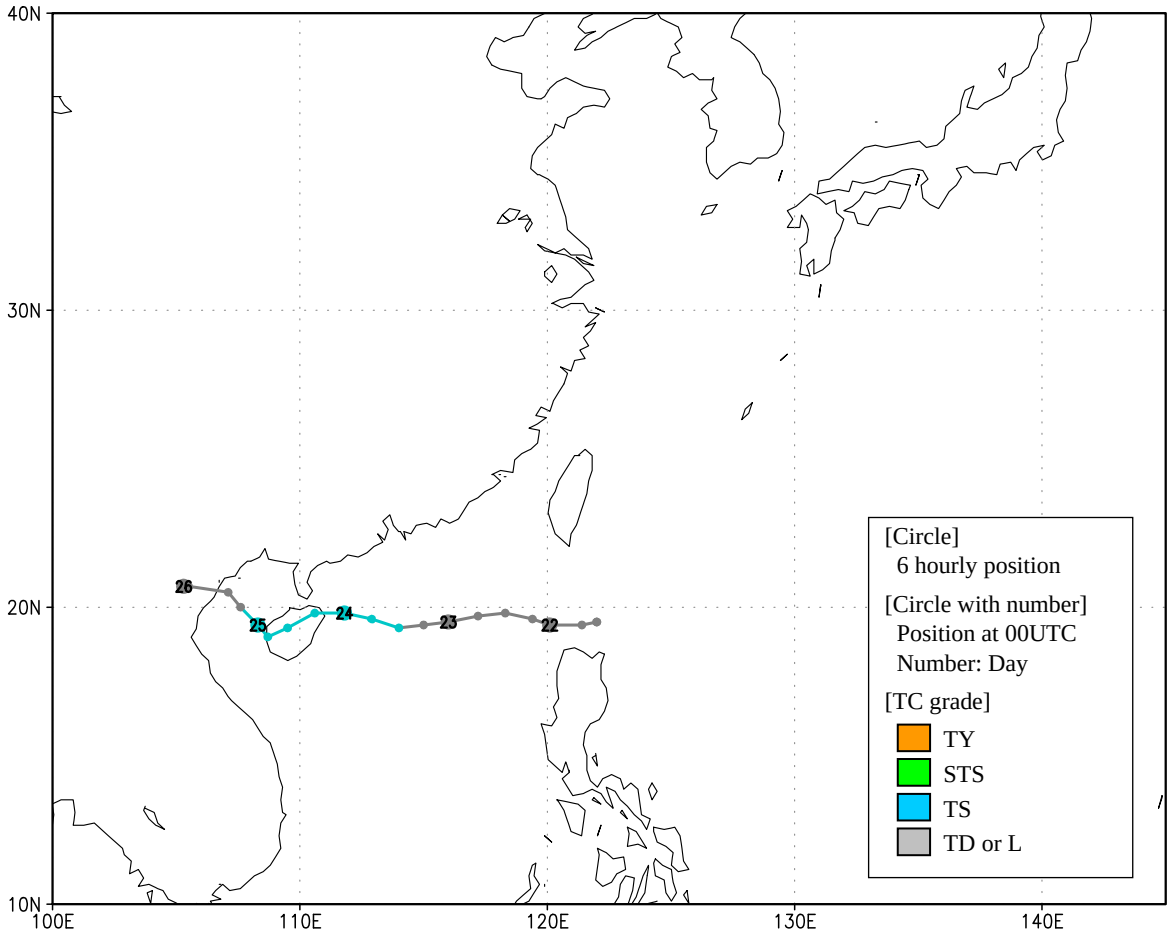
WIPHA (0712)

WIPHA formed as a tropical depression (TD) over the sea far east of the Philippines at 00 UTC on 15 September 2007. Moving west-northwestward, it was upgraded to tropical storm (TS) intensity over the same sea at 00 UTC the next day. Moving to the northwest, it was upgraded to typhoon (TY) intensity at 00 UTC on 17 September and reached its peak intensity with maximum sustained winds of 100 kt and a central pressure of 925 hPa over the sea south of the Nansei Islands at 18 UTC on 17 September. After passing Iriomotejima Island before 00 UTC on 18 September, it hit the central part of China, keeping its intensity and northwestward track late the same day. Turning to the north, it rapidly weakened to TS and TD intensity at 06 and 12 UTC respectively in the central part of China on 19 September. Turning to the northeast, it transformed into an extratropical cyclone at 00 UTC on 20 September and dissipated over the Yellow Sea at 18 UTC on 20 September.



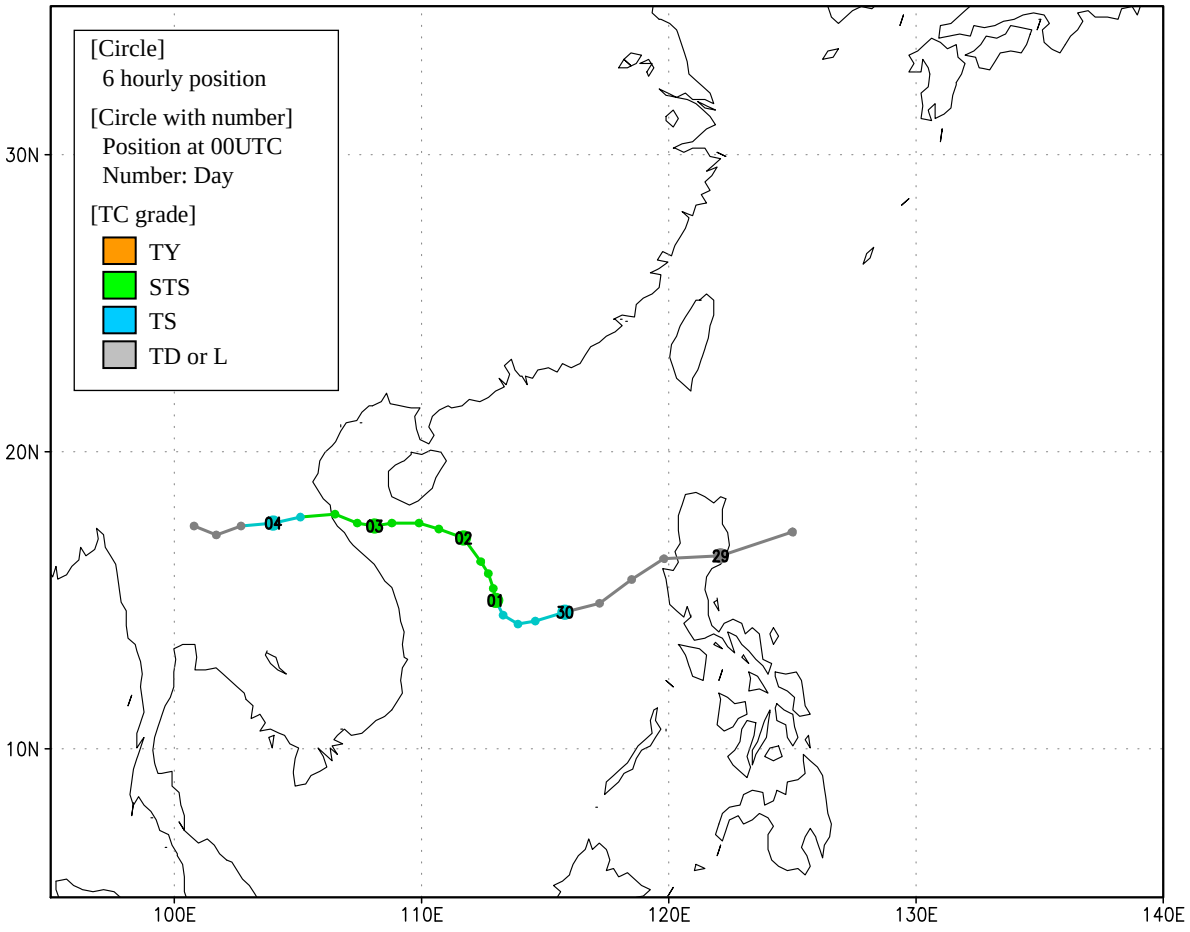
FRANCISCO (0713)

FRANCISCO formed as a tropical depression (TD) over the sea around the Babuyan Islands at 12 UTC on 21 September 2007. Moving to the west, it was upgraded to tropical storm (TS) intensity at 12 UTC on 23 September and reached its peak intensity with maximum sustained winds of 40 kt and a central pressure of 990 hPa over the sea south of Hong Kong at 18 UTC on 23 September. Turning to the southwest, it hit Hainan Island the next day. Soon after passing Hainan Island, it abruptly turned to the northwest and was downgraded to tropical depression (TD) intensity in the Gulf of Tonkin at 06 UTC on 25 September. After hitting Vietnam late the same day, it dissipated there at 06 UTC on 26 September.



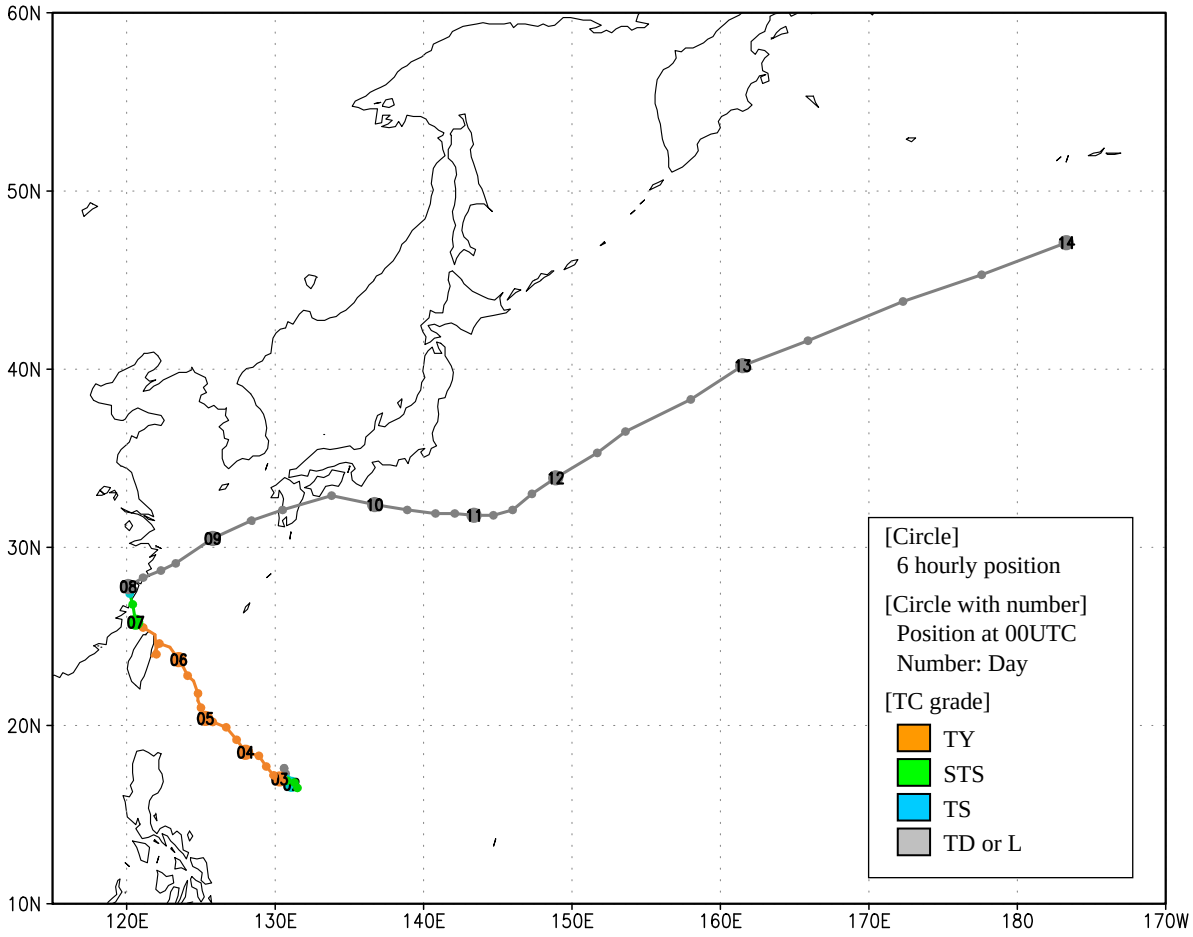
LEKIMA (0714)

LEKIMA formed as a tropical depression (TD) over the sea east of Luzon Island at 18 UTC on 28 September 2007. Moving west-southwestward, it passed Luzon Island the next day and developed into a tropical storm (TS) in the South China Sea at 00 UTC on 30 September 2007. After turning to the northwest, it was upgraded to severe tropical storm (STS) intensity over the same waters at 00 UTC on 1 October. Keeping its northwestward track, LEKIMA attained its peak intensity with maximum sustained winds of 60kt and a central pressure of 975 hPa over the sea southeast of Hainan Island at 00 UTC on 2 October. After turning to the west, it hit Vietnam with STS intensity the next day. Keeping its westward track, it weakened to TD intensity at 06 UTC on 4 October and dissipated around the border between Laos and Thailand at 00 UTC on 5 October.



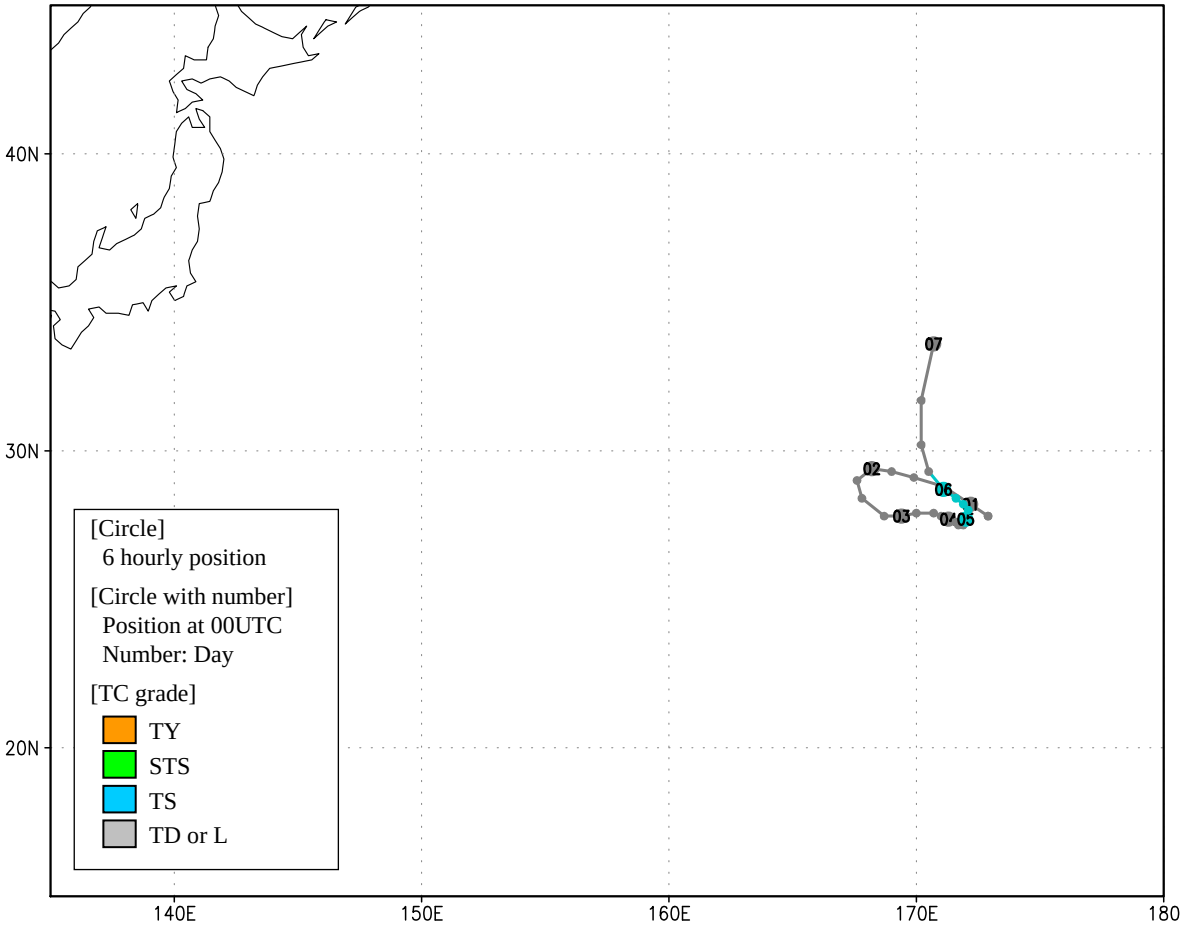
KROSA (0715)

KROSA formed as a tropical depression (TD) over the sea east of the Philippines at 06 UTC on 1 October 2007 and was upgraded to tropical storm (TS) intensity over the same sea at 18 UTC the same day. After staying there on 2 October, it moved to the northwest from the next day and was upgraded to typhoon (TY) intensity over the same sea at 00 UTC on 3 October. Keeping its northwest track, it reached its peak intensity with maximum sustained winds of 105 kt and a central pressure of 925 hPa south of Ishigakijima Island at 06 UTC on 5 October. After passing around Yonagunijima Island, it moved in a counterclockwise direction to circle off the eastern coast of Taiwan and then moved northwestward around its northern tip with TY intensity the next day. Weakening its intensity, KROSA hit the central part of China with severe tropical storm (STS) intensity before 12 UTC on 7 October. It was downgraded to TD intensity there at 00 UTC the next day. After turning to the east-northeast, it transformed into an extratropical cyclone around the coast of China at 06 UTC the same day. From 8 to 10 October, it moved eastward in the East China Sea then over the sea south of Japan. After turning to the northeast over the sea east of Hachijojima Island on 11 October, it crossed longitude 180 degrees east over the sea south of the Aleutian Islands before 00 UTC on 14 October.



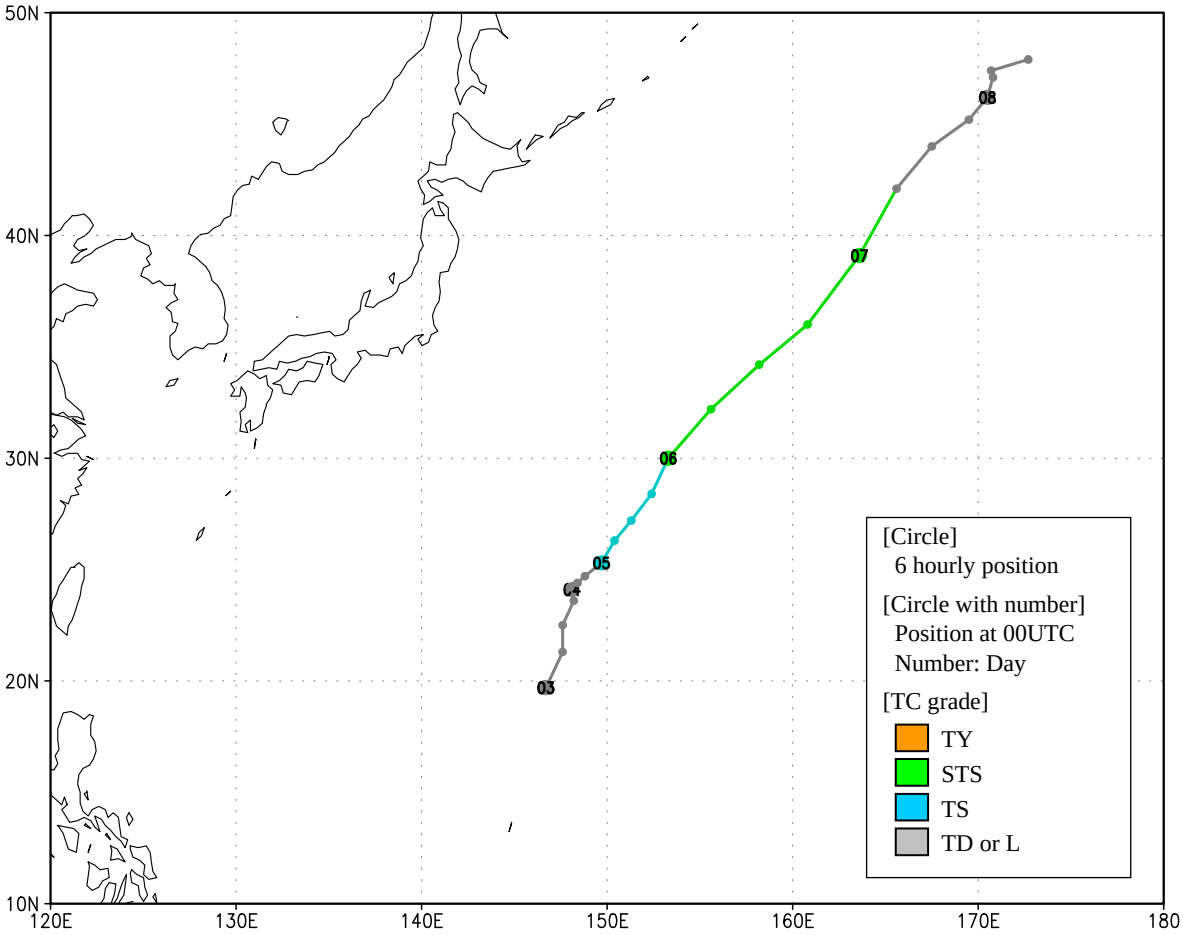
HAIYAN (0716)

HAIYAN formed as a tropical depression (TD) over the sea west of the Midway Islands at 18 UTC on 30 September 2007. After turning in a counterclockwise direction to circle the same waters, it was upgraded to tropical storm (TS) intensity at 00 UTC on 5 October. Moving northwestward, it attained its peak intensity with maximum sustained winds of 40 kt and a central pressure of 994 hPa at 12 UTC on the same day. Turning to the north, it weakened to TD intensity and dissipated over the same waters at 06 UTC on 6 October and 06 UTC on 7 October, respectively.



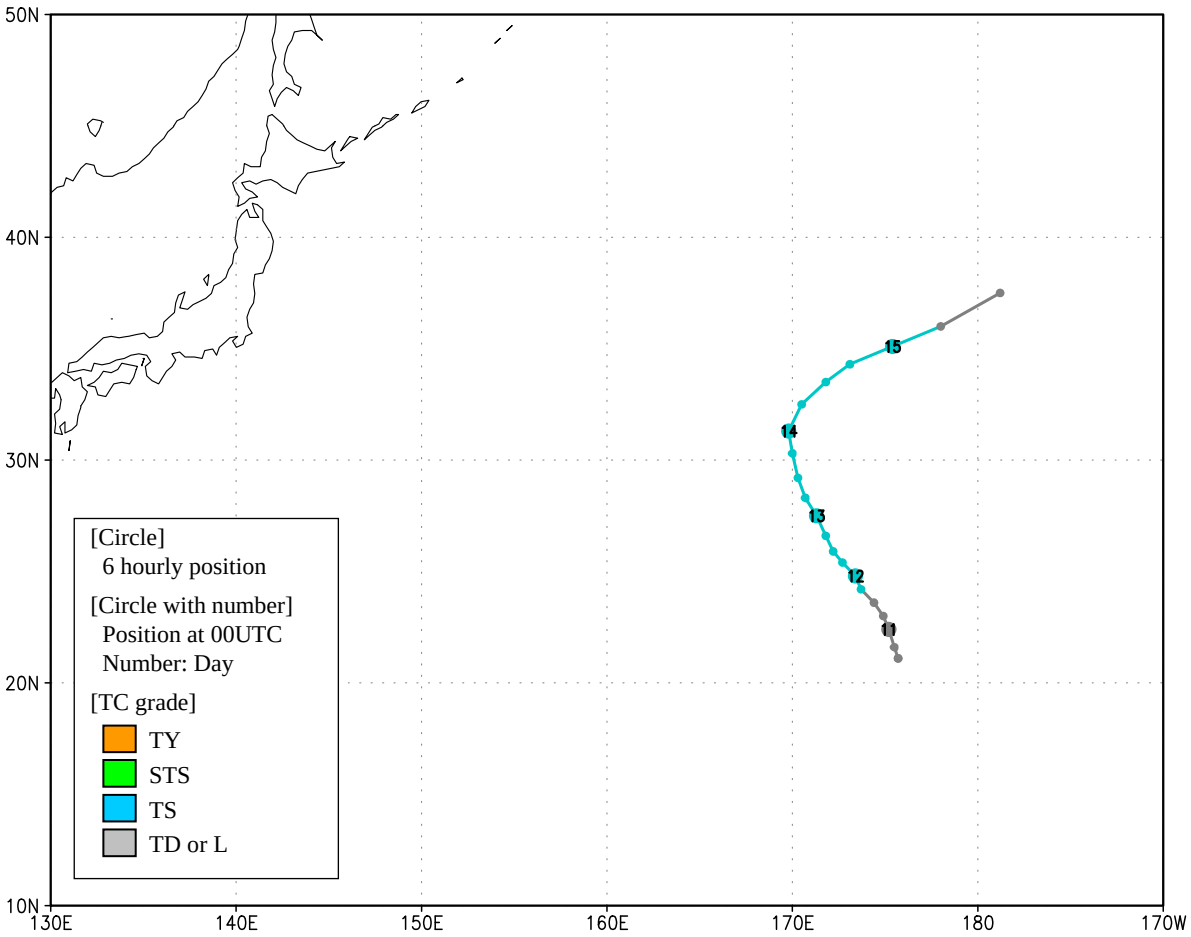
PODUL (0717)

PODUL formed as a tropical depression over the sea around the Mariana Islands at 00 UTC on 3 October 2007. Moving northeastward, it was upgraded to tropical storm (TS) intensity over the sea west of Minamitorishima Island at 00 UTC on 5 October. Keeping its northeastward track, it was upgraded to severe tropical storm (STS) intensity and reached its peak intensity with maximum sustained winds of 55 kt and a central pressure of 985 hPa over the sea east of Japan at 00 and 06 UTC the next day, respectively. Moving northeastward, PODUL transformed into an extratropical cyclone over the sea far east of Japan at 06 UTC on 7 October, and then dissipated over the sea east of the Kurile Islands at 00 UTC on 9 October.



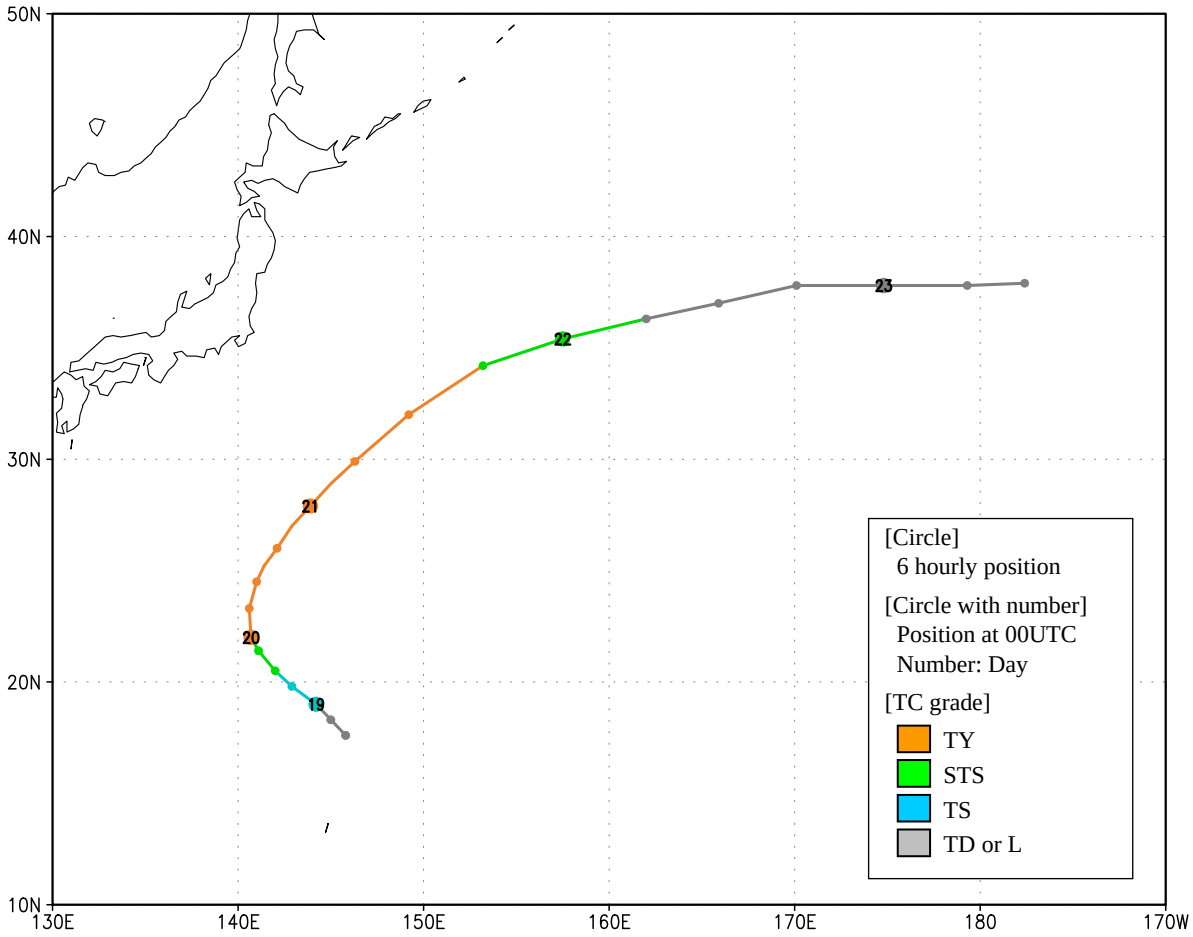
LINGLING (0718)

LINGLING formed as a tropical depression (TD) over the sea east of Wake Island at 12 UTC on 10 October 2007. Moving to the northwest, it was upgraded to tropical storm (TS) intensity over the sea west of the Midway Island at 18 UTC on the next day. Keeping its northwestward track, LINGLING reached its peak intensity with maximum sustained winds of 45kt and a central pressure of 994hPa over the same sea at 12 UTC on 12 October. After recurving over the sea far east of Japan at around 00 UTC on 14 October, LINGLING transformed into an extratropical cyclone over the sea south of the Aleutian Islands at 06UTC on the next day. Keeping its northeastward track, it crossed longitude 180 degrees east over the same sea before 12 UTC on the same day.



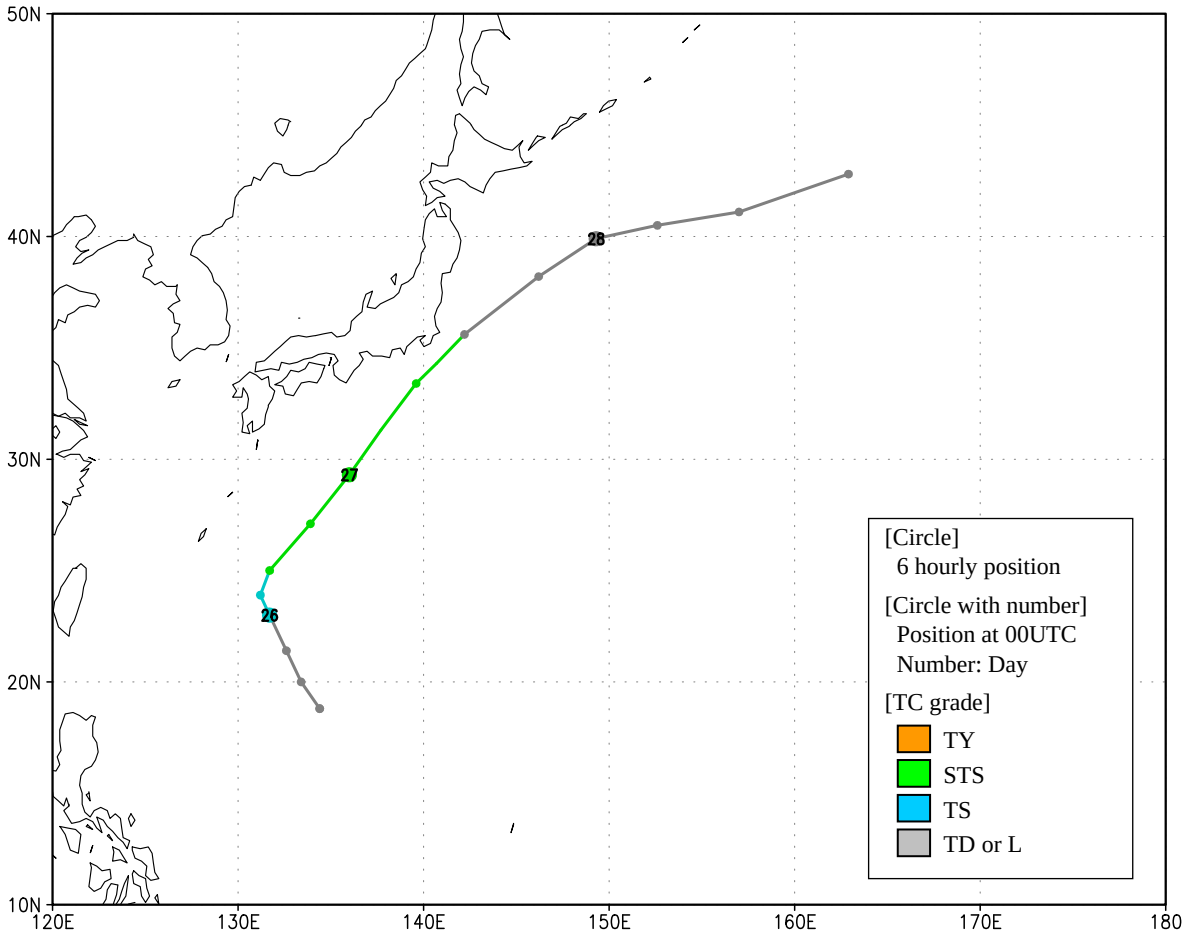
KAJIKI (0719)

KAJIKI formed as a tropical depression (TD) over the sea around the northern part of the Mariana Islands at 12 UTC on 18 October 2007. It moved northwestward and developed to tropical storm (TS) intensity over the same sea at 00 UTC on 19 October. During the recurvature, it was upgraded rapidly to typhoon (TY) intensity south of Iwojima Island at 00 UTC the next day. It passed northeastward around Iwojima Island after 12 UTC on 20 October and then reached its peak intensity with maximum sustained winds of 90 kt and a central pressure of 945 hPa just south of Chichijima Island at 18 UTC the same day. On 21 October, it moved over the sea east of Japan gradually turning to the east and weakening in intensity. It was downgraded to severe tropical storm (STS) intensity at 18 UTC on 21 October and then transformed into an extratropical cyclone far east of Japan at 06 UTC on 22 October. Moving eastward, it crossed longitude 180 degrees east over the sea south of the Aleutian Islands before 12 UTC the next day.



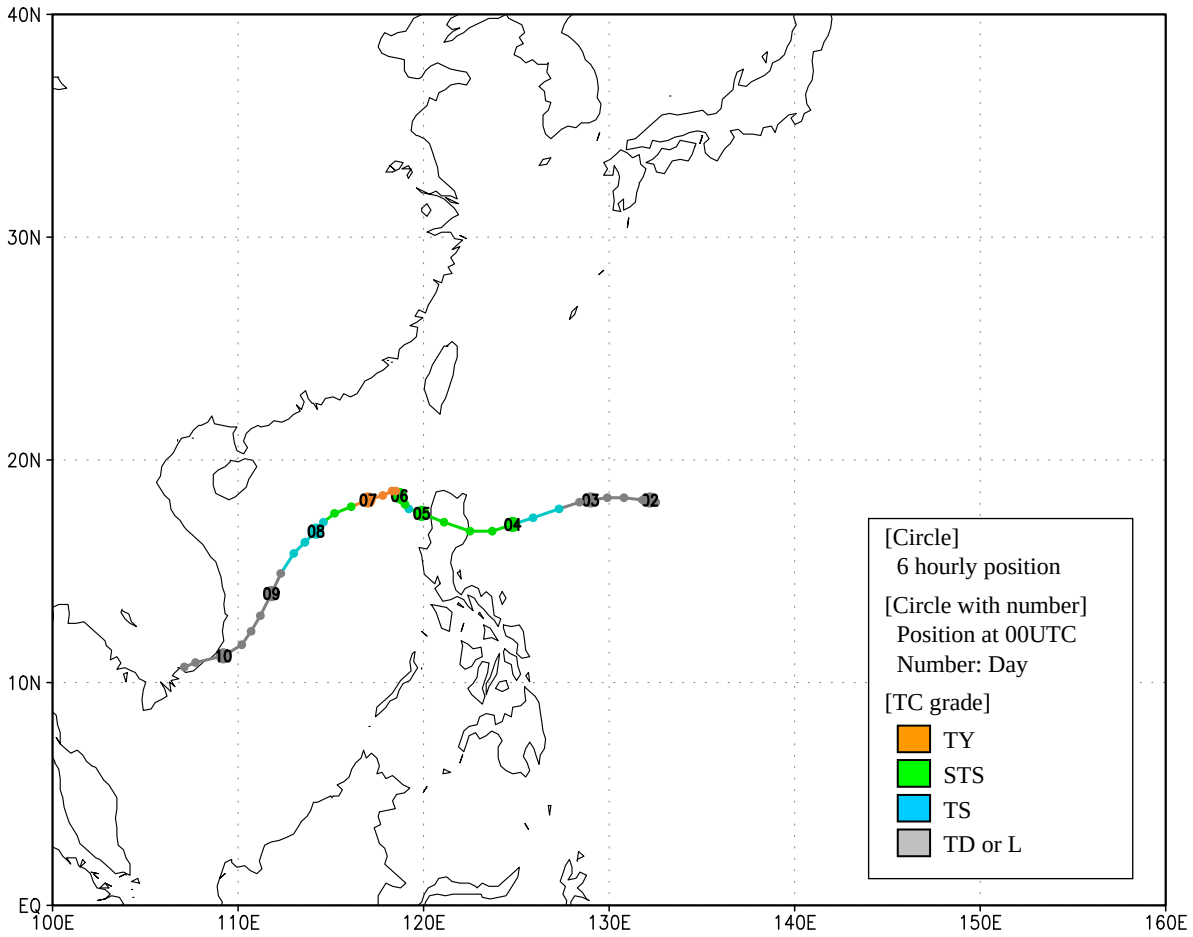
FAXAI (0720)

FAXAI formed as a tropical depression (TD) over the sea east of the Philippines at 06 UTC on 25 October 2007. Moving northwestward, it was upgraded to tropical storm (TS) intensity over the sea south of Minamidaitojima Island at 00 UTC on 26 October. It recurved over the same sea early the same day. Accelerating northeastward, it was upgraded to severe tropical storm (STS) intensity over the same sea at 12 UTC on 26 October and reached its peak intensity with maximum sustained winds of 55 kt and a central pressure of 975 hPa over the sea south of Japan at 00 UTC the next day. Moving its northeastward track quickly, it passed around the Izu Islands with STS intensity and then transformed into an extratropical cyclone over the sea east of Japan at 12 UTC the same day. Turning to the east-northeast, it dissipated over the sea far east of Japan at 00 UTC on 29 October.



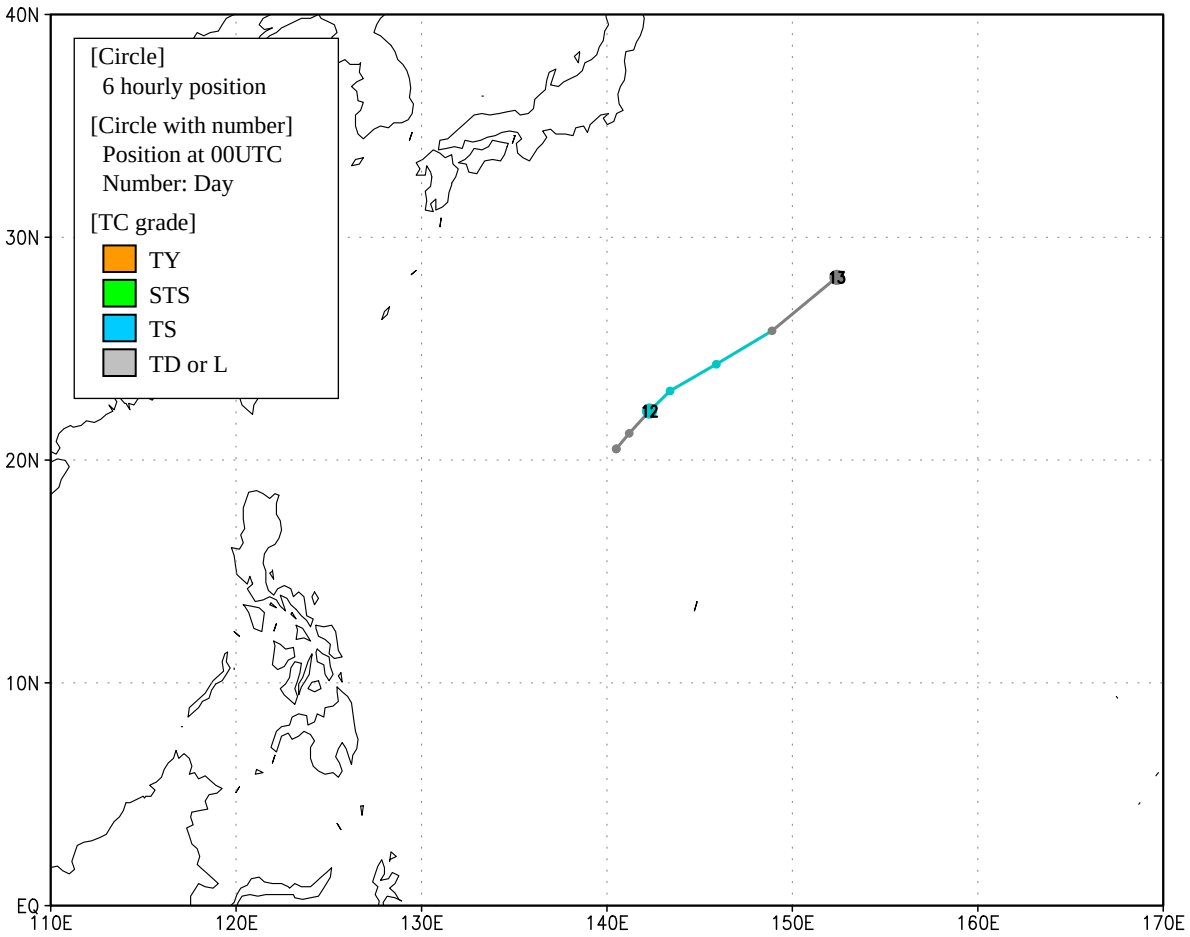
PEIPAH (0721)

PEIPAH formed as a tropical depression (TD) over the sea far east of the Philippines at 18 UTC on 1 November 2007. Moving westward, it was upgraded to tropical storm (TS) intensity over the sea east of the Philippines at 12 UTC on 3 November. Keeping its westward track, it was upgraded to severe tropical storm (STS) intensity over the sea east of Luzon Island at 00 UTC on 4 November, and then hit Luzon Island with STS intensity late the same day. After being downgraded to TS intensity at 06 UTC on 5 November, PEIPAH slowed down and developed again over the sea west of Luzon Island. It was upgraded to typhoon (TY) intensity and then reached its peak intensity with maximum sustained winds of 70 kt and a central pressure of 970 hPa over the same sea at 06 and 12 UTC the next day respectively. After turning to the southwest, it was downgraded to TS intensity over the sea east of Vietnam at 18 UTC on 7 November, and then to TD intensity at 18 UTC the next day. Turning to the west, it hit the southern part of Vietnam early on 10 November and dissipated there at 18 UTC the same day.



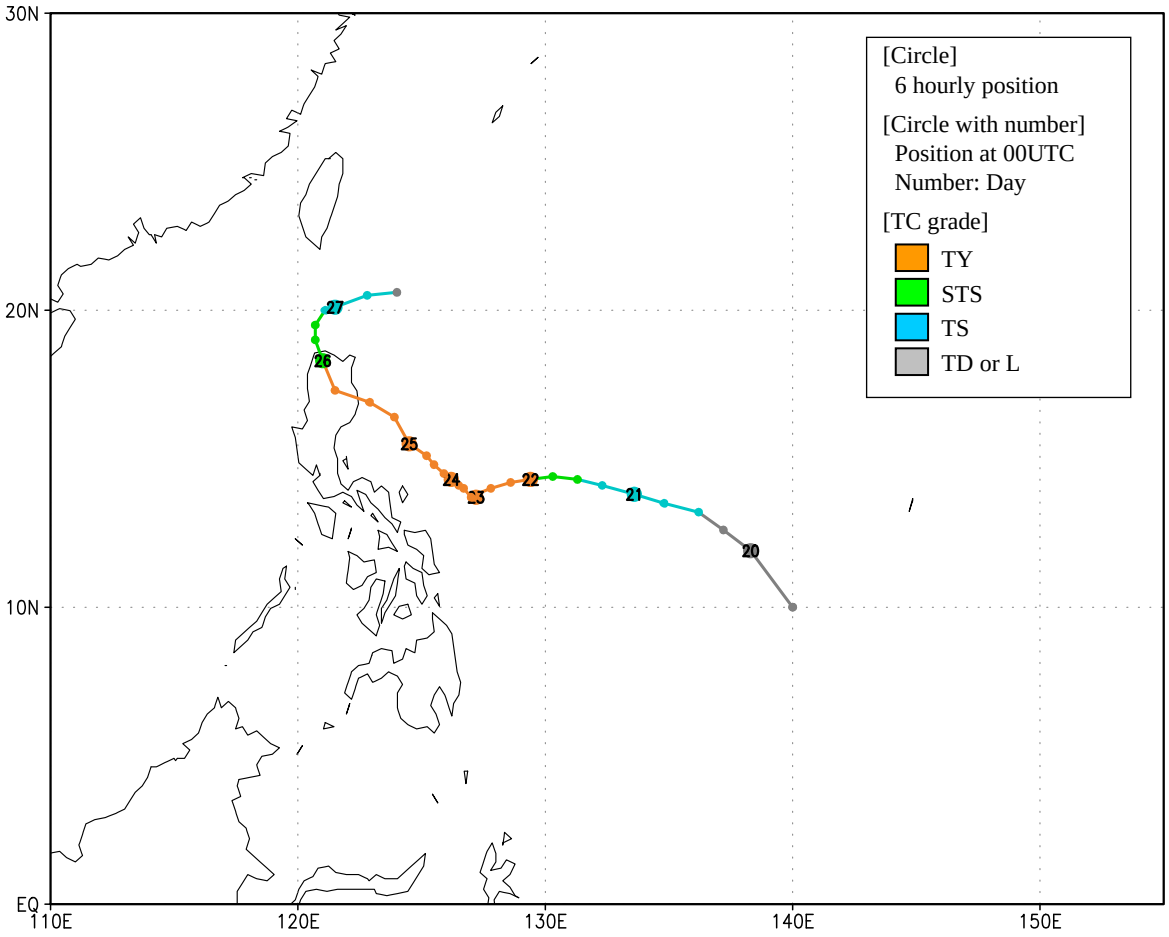
TAPAH (0722)

TAPAH formed as a tropical depression (TD) over the sea south of Iwojima Island at 12 UTC on 11 November 2007. Moving to the northeast, it was upgraded to tropical storm (TS) intensity over the sea southeast of Iwojima Island at 00 UTC the next day. Keeping its northeastward track, TAPAH reached its peak intensity with maximum sustained winds of 35 kt and a central pressure of 996 hPa over the same sea at 06 UTC the same day. Weakening in intensity, it was downgraded to TD intensity over the sea east of Iwojima Island at 18 UTC on 12 November and then dissipated over the sea north of Minamitorishima Island at 06UC the next day.



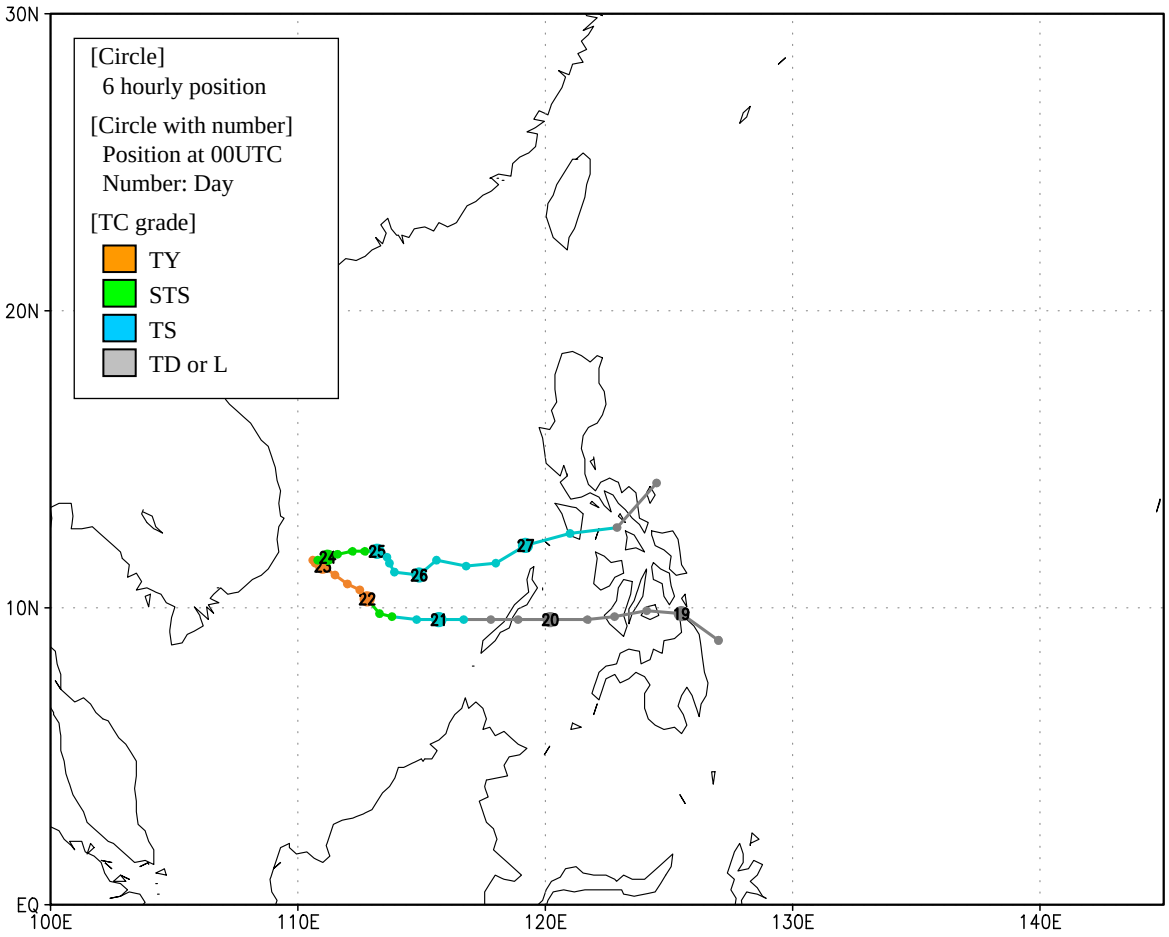
MITAG (0723)

MITAG formed as a tropical depression (TD) over the sea east of the Philippines at 18 UTC on 19 November 2007. Turning from a northwestward to a westward direction, it developed to tropical storm (TS) intensity at 12 UTC the next day. Moving westward, it was upgraded to typhoon (TY) intensity at 00 UTC on 22 October and reached its peak intensity with maximum sustained winds of 80 kt and a central pressure of 955 hPa over the same sea at 12 UTC the same day. After turning to the northwest on 23 October, it hit Luzon Island with TY intensity after 12 UTC on 25 November. After its recurvature, MITAG was downgraded to TS intensity over the sea north of Luzon Island at 18 UTC on 26 October. It was downgraded to TD intensity and dissipated northeast of Luzon Island at 12 and 18 UTC on 27 October, respectively.



HAGIBIS (0724)

HAGIBIS formed as a tropical depression (TD) over the sea east of Mindanao Island at 18 UTC on 18 November 2007. Moving westward, it hit the southern part of the Philippines on 19 November and Palawan Island on the next day. Keeping its westward track, it was upgraded to tropical storm (TS) intensity in the South China Sea at 18 UTC on 20 November. After turning to the west-northwest, it was upgraded to typhoon (TY) intensity at 00 UTC on 22 September and reached its peak intensity with maximum sustained winds of 70 kt and a central pressure of 970 hPa over the same sea at 06 UTC the same day. It then abruptly turned back eastward off the eastern coast of Vietnam on 23 November, and was downgraded to TS intensity in the South China Sea at 00 UTC on 25 November. After hitting Mindoro Island, it weakened to TD intensity in the Sibuyan Sea at 12 UTC on 27 November and dissipated over the sea east of Luzon Island at 00 UTC the next day.



RSMC Tropical Cyclone Best Track Data in 2007 Appendix 1

TY KONG-REY (0701)

30 Mar. - 6 Apr.

Date/Time (UTC)	Center Position Lat (N)	Lon (E)	Central pressure (hPa)	Max Wind (kt)	CI number	Grade
Mar. 30/12	5.8	158.2	1008	-		TD
30/18	6.3	158.1	1004	-		TD
31/00	6.7	157.9	1006	-		TD
31/06	7.1	156.6	1004	-		TD
31/12	7.6	155.5	1004	-		TD
31/18	8.8	154.2	1002	-	2.0	TD
Apr. 01/00	9.7	152.8	1000	35	2.5	TS
01/06	10.2	152.1	996	40	2.5	TS
01/12	10.5	151.4	990	45	3.0	TS
01/18	11.2	150.8	990	50	3.0	STS
02/00	12.2	149.7	990	50	3.0	STS
02/06	13.4	148.9	985	55	3.5	STS
02/12	14.5	147.7	985	55	3.5	STS
02/18	15.2	147.0	985	55	3.5	STS
03/00	16.1	145.6	980	65	4.0	TY
03/06	16.8	144.7	970	70	4.5	TY
03/12	17.7	144.3	960	80	5.0	TY
03/18	18.8	143.9	960	80	5.0	TY
04/00	19.9	144.2	965	80	5.0	TY
04/06	21.0	144.9	970	70	4.5	TY
04/12	21.6	145.9	980	65	4.0	TY
04/18	22.7	147.7	985	55	3.5	STS
05/00	23.8	149.9	990	50	3.0	STS
05/06	25.1	152.5	992	45	2.5	TS
05/12	25.9	155.0	996	40	2.0	TS
05/18	26.6	157.5	998	35	2.0	TS
06/00	27.0	160.0	1004	-	2.0	L
06/06	27.2	162.3	1008	-		L
06/12	27.2	164.3	1012	-		L
06/18	27.1	166.3	1012	-		L
07/00						Dissip.

TY YUTU (0702)

15 May - 24 May

Date/Time (UTC)	Center Position Lat (N)	Lon (E)	Central pressure (hPa)	Max Wind (kt)	CI number	Grade
May 15/06	8.1	146.6	1006	-		TD
15/12	8.2	146.2	1008	-		TD
15/18	8.4	145.4	1006	-		TD
16/00	8.9	144.7	1008	-		TD
16/06	9.0	144.3	1008	-		TD
16/12	9.0	143.2	1008	-	1.5	TD
16/18	8.8	141.9	1006	-	1.5	TD
17/00	8.9	140.7	1006	-	2.0	TD
17/06	9.3	138.9	1006	-	2.5	TD
17/12	9.8	137.9	1006	-	3.0	TD
17/18	10.5	137.1	1002	35	3.0	TS
18/00	11.3	136.2	996	45	3.5	TS
18/06	12.1	134.9	990	55	4.0	STS
18/12	13.0	133.8	980	60	4.0	STS
18/18	14.0	133.0	975	65	4.5	TY
19/00	15.1	132.5	970	70	4.5	TY
19/06	16.2	132.2	960	80	5.0	TY
19/12	17.1	132.3	950	85	5.5	TY
19/18	17.7	132.7	945	90	6.0	TY
20/00	18.2	133.4	945	90	6.0	TY
20/06	19.0	134.3	945	90	6.0	TY
20/12	19.8	135.3	935	95	6.5	TY
20/18	20.8	136.5	935	95	6.5	TY
21/00	21.7	137.8	935	95	6.5	TY
21/06	22.9	139.2	945	90	6.5	TY
21/12	24.0	140.7	950	90	6.0	TY
21/15	24.6	141.5	955	85		TY
21/18	25.2	142.5	960	80	5.0	TY
21/21	25.8	143.6	965	75		TY
22/00	26.3	144.6	970	70	5.0	TY
22/03	26.9	145.5	970	70		TY
22/06	27.4	146.6	975	65	4.5	TY
22/12	28.8	149.5	985	50	4.0	STS
22/18	29.9	152.8	990	45	3.5	TS
23/00	31.0	156.0	992	-	3.0	L
23/06	31.3	160.0	1000	-		L
23/12	32.7	163.9	1000	-		L
23/18	34.4	167.5	994	-		L
24/00	35.4	170.3	996	-		L
24/06	36.2	173.0	994	-		L
24/12	36.3	175.7	994	-		L
24/18	36.4	179.0	998	-		L
25/00	36.6	183.0	1004	-		Out

TY MAN-YI (0704)

7 Jul. - 23 Jul.

Date/Time (UTC)	Center Position Lat (N)	Lon (E)	Central pressure (hPa)	Max Wind (kt)	CI number	Grade
Jul. 07/06	5.6	148.9	1006	-		TD
07/12	6.0	148.5	1004	-		TD
07/18	6.4	147.9	1002	-	1.5	TD
08/00	7.2	147.2	1000	-	1.5	TD
08/06	7.9	146.0	998	-	2.0	TD
08/12	8.5	144.8	998	-	2.0	TD
08/18	9.1	143.6	998	-	2.5	TD
09/00	10.3	142.3	994	35	3.0	TS
09/06	11.0	141.2	990	40	3.0	TS
09/12	11.6	139.9	990	45	3.5	TS
09/18	11.9	139.2	985	50	3.5	STS
10/00	12.0	138.4	980	50	3.5	STS
10/06	12.8	137.3	970	55	4.0	STS
10/12	13.7	136.6	965	60	4.0	STS
10/18	15.0	135.2	960	65	4.5	TY
11/00	16.0	134.1	955	70	5.0	TY
11/06	17.4	133.0	950	75	5.0	TY
11/12	18.9	131.4	945	80	5.5	TY
11/18	19.9	130.0	935	90	6.5	TY
12/00	21.0	129.2	930	95	6.5	TY
12/06	22.2	128.6	930	95	6.5	TY
12/09	23.0	128.2	930	95		TY
12/12	23.5	128.0	930	95	6.5	TY
12/15	24.2	127.8	930	95		TY
12/18	24.9	127.5	930	95	6.5	TY
12/21	25.5	127.4	930	95		TY
13/00	26.1	127.4	930	95	6.5	TY
13/03	26.6	127.6	935	90		TY
13/06	27.4	127.7	940	85	5.5	TY
13/09	28.0	127.7	940	85		TY
13/12	28.5	127.7	945	75	5.0	TY
13/15	28.9	127.9	945	75		TY
13/18	29.4	128.2	945	75	5.0	TY
13/21	30.0	128.7	945	75		TY
14/00	30.4	129.3	945	75	5.0	TY
14/03	31.0	130.2	945	75		TY
14/04	31.2	130.5	945	75		TY
14/05	31.4	130.8	945	75		TY
14/06	31.7	131.2	950	70	5.0	TY
14/09	32.2	132.0	955	70		TY
14/12	32.7	132.8	960	65	4.0	TY
14/15	33.0	133.7	960	65		TY
14/18	33.2	134.8	965	60	3.5	STS
14/20	33.5	135.7	965	60		STS
14/21	33.6	136.1	965	60		STS
15/00	33.9	137.4	975	60	3.5	STS
15/03	34.1	138.7	975	60		STS
15/06	34.6	140.6	980	50	3.0	STS
15/09	34.7	142.4	980	50		STS
15/12	35.0	143.7	985	40	3.0	TS
15/18	35.2	144.9	985	40	2.5	TS
16/00	34.7	145.5	986	-	2.5	L
16/06	35.5	148.8	986	-	2.5	L
16/12	35.9	150.5	986	-	2.5	L
16/18	36.4	151.8	986	-	2.5	L
17/00	36.5	153.0	986	-	2.5	L
17/06	36.5	155.0	986	-		L
17/12	36.7	157.2	986	-		L
17/18	37.0	159.2	986	-		L
18/00	37.6	161.7	986	-		L
18/06	38.8	163.9	984	-		L
18/12	39.3	165.8	984	-		L
18/18	41.4	167.7	984	-		L
19/00	42.8	168.8	984	-		L
19/06	43.5	168.9	984	-		L
19/12	43.9	168.9	988	-		L
19/18	44.3	168.4	992	-		L
20/00	44.0	167.6	992	-		L
20/06	44.0	168.1	996	-		L
20/12	44.2	169.0	1000	-		L
20/18	44.5	170.0	1000	-		L
21/00	44.8	171.7	1004	-		L
21/06	45.2	173.4	1004	-		L
21/12	46.0	174.4	1004	-		L
21/18	47.4	175.0	1004	-		L
22/00	48.6	175.3	1004	-		L
22/06	49.3	175.6	1004	-		L
22/12	49.4	176.0	1004	-		L
22/18	49.3	177.1	1004	-		L
23/00	49.4	178.7	1004	-		L
23/06	49.5	180.1	1006	-		Out

TY TRAJI (0703)

3 Jul. - 6 Jul.

Date/Time (UTC)	Center Position Lat (N)	Lon (E)	Central pressure (hPa)	Max Wind (kt)	CI number	Grade
Jul. 03/00	15.4	111.7	1002	-		TD
03/06	16.5	111.1	1002	-		TD
03/12	17.5	110.6	1000	-		TD
03/18	17.9	110.5	998	-		TD
04/00	18.2	110.3	998	-		TD
04/06	18.5	110.1	996	35		TS
04/12	19.0	109.7	996	35	2.0	TS
04/18	19.6	109.2	994	35	2.5	TS
05/00	20.2	108.6	994	35	2.5	TS
05/06	21.0	108.2	994	35	2.5	TS
05/12	21.4	107.4	994	35	2.0	TS
05/18	22.2	106.7	996	-	1.5	TD
06/00	22.6	105.2	1000	-		TD
06/06						Dissip.

TY USAGI (0705)

27 Jul. - 4 Aug.

Date/Time (UTC)	Center Position Lat (N)	Lon (E)	Central pressure (hPa)	Max Wind (kt)	CI number	Grade
Jul. 27/12	19.0	155.3	1006	-		TD
27/18	18.2	153.3	1004	-		TD
28/00	17.8	150.8	1004	-		TD
28/06	17.5	149.7	1002	-		TD
28/12	17.7	149.4	1002	-	2.0	TD
28/18	18.1	148.4	1002	-	2.0	TD
29/00	18.1	146.6	1002	-	2.5	TD
29/06	18.3	144.5	1000	35	2.5	TS
29/12	18.5	143.8	996	40	3.0	TS
29/18	18.7	143.3	990	45	3.5	TS
30/00	19.2	142.5	985	55	3.5	STS
30/06	19.8	142.0	980	60	4.0	STS
30/12	20.4	141.4	980	65	4.0	TY
30/18	21.3	140.7	975	70	4.5	TY
31/00	21.8	140.3	970	70	4.5	TY
31/06	22.6	139.7	960	75	5.0	TY
31/12	23.4	139.0	955	80	5.5	TY
31/18	24.2	137.9	950	85	6.0	TY
Aug. 01/00	25.1	137.1	945	90	6.0	TY
01/06	26.2	135.9	945	90	6.0	TY
01/12	27.5	135.1	945	90	6.0	TY
01/18	29.1	133.8	945	90	6.0	TY
01/21	29.9	133.2	945	90		TY
02/00	30.6	132.8	945	90	6.0	TY
02/03	31.3	132.3	955	85		TY
02/06	31.8	131.9	960	80	5.0	TY
02/08	32.3	131.7	960	80		TY
02/09	32.5	131.6	965	70		TY
02/12	33.0	131.4	975	60	5.0	STS
02/15	33.6	131.4	985	55		STS
02/16	33.9	131.3	985	55		STS
02/18	34.3	131.3	990	50	4.5	STS
02/21	35.3	131.6	990	45		TS
03/00	35.9	132.1	992	45	4.0	TS
03/03	36.3	132.8	992	45		TS
03/06	36.9	133.5	994	40	3.5	TS
03/09	37.7	134.4	994	40		TS
03/12	38.3	135.1	994	40	3.0	TS
03/15	39.0	135.9	994	40		TS
03/18	39.5	136.7	994	40	3.0	TS
03/21	40.2	137.8	994	40		TS
04/00	40.7	139.0	996	40	2.5	TS
04/03	41.1	140.1	998	35		TS
04/04	41.1	140.4	998	35		TS
04/05	41.2	140.8	1000	35		TS
04/06	41.6	141.6	1000	-	2.0	TD
04/12	42.0	145.4	1000	-	2.0	L
04/18	42.3	148.9	1000	-		L
05/00						Dissip.

TY PABUK (0706)

4 Aug. - 15 Aug.

Date/Time (UTC)	Center Position Lat (N)	Lon (E)	Central pressure (hPa)	Max Wind (kt)	CI number	Grade
Aug. 04/18	18.4	137.5	1006	-		TD
05/00	18.9	136.6	1004	-		TD
05/06	19.6	135.6	1000	35	2.5	TS
05/12	20.2	134.1	996	40	2.5	TS
05/18	20.6	133.0	996	40	2.5	TS
06/00	21.1	131.6	996	40	2.5	TS
06/06	21.4	130.4	992	45	2.5	TS
06/12	21.7	128.6	992	45	2.5	TS
06/18	21.5	126.7	990	50	3.0	STS
06/21	21.6	125.7	985	55		STS
07/00	21.8	124.8	980	60	4.0	STS
07/03	22.1	124.1	980	60		STS
07/06	22.2	123.3	980	60	4.0	STS
07/09	22.1	122.7	975	65		TY
07/12	21.9	122.1	975	65	4.0	TY
07/18	22.1	120.3	980	60	3.5	STS
08/00	22.3	118.6	985	55	3.0	STS
08/06	22.4	117.4	985	50	3.0	STS
08/12	22.1	116.0	990	45	2.5	TS
08/18	22.1	114.8	990	40	2.0	TS
09/00	22.0	113.7	992	35	1.5	TS
09/06	21.6	112.9	992	-	1.5	TD
09/12	21.0	112.8	992	-	1.5	TD
09/18	21.2	113.1	992	-		TD
10/00	21.7	113.4	992	-		TD
10/06	22.3	114.0	990	-		TD
10/12	22.5	113.6	992	-		TD
10/18	22.5	113.2	990	-		TD
11/00	22.6	113.7	992	-		TD
11/06	23.0	114.1	992	-		TD
11/12	23.3	115.0	992	-		TD
11/18	24.5	115.9	994	-		TD
12/00	25.3	117.0	994	-		TD
12/06	25.9	118.8	994	-		TD
12/12	28.0	121.3	994	-		TD
12/18	29.8	122.7	994	-		TD
13/00	30.7	123.3	994	-		TD
13/06	31.7	123.7	994	-		TD
13/12	32.8	124.8	996	-		TD
13/18	34.3	125.6	996	-		TD
14/00	35.7	125.9	998	-		TD
14/06	37.6	125.9	1000	-		TD
14/12	39.8	126.4	1002	-		L
14/18	40.9	128.8	1004	-		L
15/00	42.9	131.9	1006	-		L
15/06	44.4	133.6	1006	-		L
15/12	-	-	-	-		Dissip.

TY WUTIP (0707)

6 Aug. - 8 Aug.

Date/Time (UTC)	Center Position Lat (N)	Lon (E)	Central pressure (hPa)	Max Wind (kt)	CI number	Grade
Aug. 06/12	15.0	130.0	1002	-		TD
06/18	15.0	128.7	1002	-		TD
07/00	15.5	127.7	998	-		TD
07/06	16.4	127.2	998	-	1.5	TD
07/12	17.5	127.3	996	-	2.0	TD
07/18	18.6	126.8	994	-	2.0	TD
08/00	20.0	125.1	992	35	2.5	TS
08/06	21.1	124.1	990	35	2.5	TS
08/09	21.6	123.5	990	35		TS
08/12	22.1	122.9	992	35	2.5	TS
08/15	22.4	122.3	994	35	2.5	TS
08/18	22.9	121.7	994	35	2.0	TS
08/21						Dissip.

TY SEPAT (0708)

12 Aug. - 24 Aug.

Date/Time (UTC)	Center Position Lat (N)	Lon (E)	Central pressure (hPa)	Max Wind (kt)	CI number	Grade
Aug. 12/00	17.6	135.8	1006	-		TD
12/06	17.3	135.6	1004	-		TD
12/12	17.2	135.5	1002	-	2.0	TD
12/18	17.1	135.1	998	35	2.5	TS
13/00	16.9	134.4	992	40	3.0	TS
13/06	16.6	133.8	985	50	3.0	STS
13/12	16.5	133.1	980	55	3.5	STS
13/18	16.5	132.4	975	60	4.0	STS
14/00	16.4	131.6	965	70	4.5	TY
14/06	16.2	130.7	955	75	5.0	TY
14/12	15.8	130.0	950	80	5.5	TY
14/18	15.7	129.2	945	85	5.5	TY
15/00	15.6	128.7	935	95	6.5	TY
15/06	15.7	128.1	930	95	6.5	TY
15/12	16.0	127.8	920	100	6.5	TY
15/18	16.7	127.2	915	105	7.0	TY
16/00	17.3	126.5	910	110	7.0	TY
16/06	17.9	126.1	910	110	7.0	TY
16/12	18.7	125.6	910	110	7.0	TY
16/18	19.4	124.8	910	110	7.0	TY
17/00	20.4	124.2	920	100	7.0	TY
17/06	21.0	123.3	920	100	6.5	TY
17/09	21.4	123.2	920	100		TY
17/12	21.8	122.9	930	95	6.5	TY
17/15	22.2	122.5	930	95		TY
17/18	22.7	122.0	940	90	6.0	TY
17/21	23.0	121.5	950	80		TY
18/00	23.7	120.7	970	65	5.5	TY
18/03	23.7	120.3	975	60		STS
18/06	24.0	119.9	980	55	5.0	STS
18/12	24.4	119.5	980	55	4.5	STS
18/18	24.8	119.0	985	50	4.0	STS
19/00	25.2	118.5	990	45	3.5	TS
19/06	25.6	118.3	992	40	3.5	TS
19/12	26.1	118.0	996	-	3.0	TD
19/18	27.0	117.8	996	-	2.5	TD
20/00	27.0	117.0	998	-	2.0	TD
20/06	27.5	116.7	998	-		TD
20/12	27.8	116.0	1000	-		TD
20/18	27.9	115.3	1000	-		TD
21/00	27.9	115.0	1000	-		TD
21/06	27.8	114.7	1000	-		TD
21/12	27.8	114.5	1000	-		TD
21/18	27.8	114.0	1000	-		TD
22/00	27.7	113.7	1000	-		TD
22/06	27.8	113.2	1000	-		TD
22/12	28.0	112.6	1002	-		TD
22/18	28.1	111.6	1002	-		TD
23/00	28.3	110.1	1004	-		TD
23/06	28.1	108.9	1002	-		TD
23/12	27.6	107.7	1004	-		TD
23/18	26.6	107.0	1004	-		TD
24/00	25.8	106.5	1006	-		TD
24/06	25.0	106.0	1006	-		TD
24/12						Dissip.

TY FITOW (0709)

27 Aug. - 8 Sep.

Date/Time (UTC)	Center Position Lat (N)	Lon (E)	Central pressure (hPa)	Max Wind (kt)	CI number	Grade
Aug. 27/18	16.7	152.5	1004	-		TD
28/00	17.4	153.1	1006	-		TD
28/06	18.3	154.1	1004	-		TD
28/12	19.2	154.8	1002	-		TD
28/18	20.0	155.3	1002	-		TD
29/00	21.0	155.7	1000	35	2.5	TS
29/06	21.7	156.1	996	40	3.0	TS
29/12	22.4	156.8	985	50	3.5	STS
29/18	23.4	156.9	980	55	4.0	STS
30/00	24.0	156.9	975	60	4.0	STS
30/06	24.5	157.0	975	60	4.0	STS
30/12	25.8	156.9	970	65	4.5	TY
30/18	26.3	156.0	970	65	4.5	TY
31/00	26.5	155.2	965	70	4.5	TY
31/06	27.0	154.8	965	70	4.5	TY
31/12	27.5	153.9	965	70	4.5	TY
31/18	27.7	153.2	970	65	4.5	TY
Sep. 01/00	28.0	152.3	970	65	4.5	TY
01/06	28.0	151.7	970	65	4.5	TY
01/12	27.9	150.8	970	65	4.5	TY
01/18	27.8	150.4	970	65	4.5	TY
02/00	27.6	149.8	970	65	4.5	TY
02/06	27.3	148.8	970	65	4.5	TY
02/12	27.1	148.3	970	65	4.5	TY
02/18	27.0	147.7	970	65	4.5	TY
03/00	26.9	147.2	970	65	4.5	TY
03/06	27.1	146.5	970	65	4.5	TY
03/12	27.2	145.7	970	60	4.0	STS
03/15	27.3	145.2	970	60		STS
03/18	27.6	144.4	970	60	4.0	STS
03/21	27.6	143.8	970	60		STS
04/00	27.6	143.4	970	60	4.0	STS
04/03	27.7	142.9	970	60		STS
04/06	27.8	142.5	970	60	4.0	STS
04/09	27.9	142.0	970	60		STS
04/12	28.0	141.5	970	60	4.0	STS
04/15	28.3	141.1	970	60		STS
04/18	28.5	140.7	970	60	4.0	STS
04/21	28.8	140.4	970	65		TY
05/00	29.2	140.0	965	70	4.5	TY
05/03	29.5	139.5	965	70		TY
05/06	29.8	139.3	965	70	4.5	TY
05/09	30.0	139.2	965	70		TY
05/12	30.2	138.9	965	70	4.5	TY
05/15	30.5	138.8	965	70		TY
05/18	30.8	138.6	965	70	4.5	TY
05/21	31.3	138.4	965	70		TY
06/00	32.0	138.4	965	70	4.5	TY
06/03	32.5	138.5	965	70		TY
06/06	33.1	138.5	965	70	4.5	TY
06/09	33.6	138.6	965	70		TY
06/12	34.1	138.7	965	70	4.5	TY
06/14	34.4	138.8	970	65		TY
06/15	34.8	138.9	970	65		TY
06/18	35.6	139.2	970	65	4.0	TY
06/21	36.3	139.5	980	60		STS
07/00	37.3	139.9	985	55	3.5	STS
07/03	38.7	140.3	988	55		STS
07/06	39.8	140.1	988	55	3.0	STS
07/09	40.7	139.9	990	50		STS
07/12	41.1	140.2	992	45	2.5	TS
07/15	41.6	140.7	992	45		TS
07/18	42.4	140.7	994	40	2.0	TS
07/21	43.1	141.0	996	35		TS
08/00	43.4	141.0	998	-	1.5	L
08/06						Dissip.

TY DANAS (0710)

6 Sep. - 12 Sep.

Date/Time (UTC)	Center Position Lat (N)	Lon (E)	Central pressure (hPa)	Max Wind (kt)	CI number	Grade
Sep. 06/00	23.6	161.3	1008	-		TD
06/06	24.4	160.8	1006	-		TD
06/12	25.1	159.7	1006	-		TD
06/18	25.4	158.3	1004	-	2.0	TD
07/00	25.7	157.7	1004	-	2.5	TD
07/06	26.7	157.1	1002	35	3.0	TS
07/12	27.7	156.3	1002	35	3.0	TS
07/18	28.4	155.2	1002	35	3.0	TS
08/00	29.3	154.1	1000	40	3.0	TS
08/06	29.9	152.8	998	45	3.0	TS
08/12	30.3	151.6	998	45	3.0	TS
08/18	31.2	150.6	998	45	3.0	TS
09/00	32.0	149.6	998	45	3.0	TS
09/06	33.2	148.7	998	45	3.0	TS
09/12	34.2	148.4	996	50	3.0	STS
09/18	35.4	148.4	994	50	3.0	STS
10/00	36.7	148.7	994	50	3.5	STS
10/06	38.2	150.2	994	50	3.5	STS
10/12	39.3	152.3	994	50	3.5	STS
10/18	40.4	154.7	990	55	3.5	STS
11/00	41.3	157.9	994	50	3.5	STS
11/06	41.1	161.0	994	50	3.5	STS
11/12	40.6	164.4	994	45	3.0	TS
11/18	40.0	167.6	1000	-	2.5	L
12/00	39.8	170.4	1002	-		L
12/06	39.6	172.9	1002	-		L
12/12	40.6	175.2	1004	-		L
12/18	41.6	177.7	1004	-		L
13/00	41.9	182.0	1000	-		Out

TY NARI (0711)

11 Sep. - 18 Sep.

Date/Time (UTC)	Center Position Lat (N)	Lon (E)	Central pressure (hPa)	Max Wind (kt)	CI number	Grade
Sep. 11/12	18.6	138.8	1004	-		TD
11/18	19.5	137.9	1002	-		TD
12/00	20.1	137.0	1002	-		TD
12/06	20.5	136.3	1002	-		TD
12/12	21.0	135.7	1000	-		TD
12/18	21.4	134.9	1000	-	2.0	TD
13/00	22.1	134.1	996	35	2.5	TS
13/06	22.7	132.9	990	40	3.0	TS
13/12	23.2	132.0	985	50	3.5	STS
13/18	24.0	130.4	965	70	4.5	TY
14/00	24.4	129.4	960	75	5.0	TY
14/03	24.7	128.7	955	75		TY
14/06	25.0	128.1	950	80	5.5	TY
14/09	25.4	127.7	945	85		TY
14/12	25.7	127.2	935	100	6.0	TY
14/15	26.2	126.8	935	100		TY
14/18	26.7	126.5	940	95	6.0	TY
14/21	27.2	126.3	940	95		TY
15/00	27.8	126.2	940	95	6.0	TY
15/03	28.4	126.1	940	95		TY
15/06	29.0	126.1	940	95	6.0	TY
15/09	29.5	126.1	940	95		TY
15/12	30.0	126.2	945	90	5.0	TY
15/15	30.4	126.2	950	85		TY
15/18	31.0	126.3	955	80	5.0	TY
15/21	31.6	126.6	960	75		TY
16/00	32.3	126.7	960	75	5.0	TY
16/03	33.1	126.7	960	75		TY
16/06	33.9	127.2	965	70	4.5	TY
16/09	34.5	127.5	970	65		TY
16/12	35.5	128.0	990	45	4.0	TS
16/18	37.2	130.3	1000	35	3.5	TS
17/00	38.0	132.0	1004	-	3.0	L
17/06	38.6	133.6	1004	-		L
17/12	38.9	136.0	1006	-		L
17/18	39.2	137.5	1008	-		L
18/00	39.0	138.4	1014	-		L
18/06						Dissip.

TY WIPHA (0712)

15 Sep. - 20 Sep.

Date/Time (UTC)	Center Position Lat (N)	Lon (E)	Central pressure (hPa)	Max Wind (kt)	CI number	Grade
Sep. 15/00	19.4	133.6	1002	-		TD
15/06	19.5	132.8	998	-		TD
15/12	19.6	132.3	998	-	1.5	TD
15/18	19.9	131.7	996	-	2.0	TD
16/00	20.1	131.5	994	35	2.5	TS
16/06	20.6	130.6	990	40	3.0	TS
16/12	21.3	130.0	985	50	3.5	STS
16/18	22.0	128.7	975	60	4.0	STS
17/00	22.4	127.8	965	70	4.5	TY
17/03	22.7	127.1	955	80		TY
17/06	22.9	126.8	945	85	5.5	TY
17/09	23.2	126.3	940	90		TY
17/12	23.4	125.7	935	95	6.0	TY
17/15	23.6	125.1	930	95		TY
17/18	23.9	124.6	925	100	6.5	TY
17/21	24.1	124.1	925	100		TY
17/23	24.2	123.9	925	100		TY
18/00	24.4	123.7	925	100	6.5	TY
18/03	25.0	123.2	925	100		TY
18/06	25.7	122.6	930	100	6.5	TY
18/09	25.9	121.9	935	95		TY
18/12	26.2	121.4	950	85	6.5	TY
18/18	27.1	120.8	960	75	5.5	TY
19/00	27.8	119.5	975	60	5.0	STS
19/06	29.0	119.0	992	45	5.0	TS
19/12	30.4	118.9	998	-	4.5	TD
19/18	32.2	119.4	1000	-		TD
20/00	35.1	120.4	1002	-		L
20/06	36.3	121.8	1004	-		L
20/12	37.9	123.9	1006	-		L
20/18						Dissip.

TS FRANCISCO (0713)

21 Sep. - 26 Sep.

Date/Time (UTC)	Center Position Lat (N)	Lon (E)	Central pressure (hPa)	Max Wind (kt)	CI number	Grade
Sep. 21/12	19.5	122.0	1004	-		TD
21/18	19.4	121.4	1002	-		TD
22/00	19.4	120.1	1002	-		TD
22/06	19.6	119.4	1000	-		TD
22/12	19.8	118.3	998	-		TD
22/18	19.7	117.2	994	-		TD
23/00	19.5	116.0	994	-	1.5	TD
23/06	19.4	115.0	992	-	2.0	TD
23/12	19.3	114.0	990	35	2.5	TS
23/18	19.6	112.9	990	40	2.5	TS
24/00	19.8	111.8	990	40	2.5	TS
24/06	19.8	110.6	990	40	2.5	TS
24/12	19.3	109.5	996	35	2.5	TS
24/18	19.0	108.7	996	35	2.0	TS
25/00	19.4	108.3	1000	35	1.5	TS
25/06	20.0	107.6	1002	-	1.0	TD
25/12	20.5	107.1	1004	-		TD
25/18	20.7	105.5	1006	-		TD
26/00	20.7	105.3	1008	-		TD
26/06						Dissip.

TY KROSA (0715)

1 Oct. - 13 Oct.

Date/Time (UTC)	Center Position Lat (N)	Lon (E)	Central pressure (hPa)	Max Wind (kt)	CI number	Grade
Oct. 01/06	17.6	130.6	998	-		TD
01/12	17.3	130.7	998	-	1.5	TD
01/18	17.0	130.8	998	35	2.0	TS
02/00	16.7	131.1	996	40	2.5	TS
02/06	16.5	131.5	990	55	3.0	STS
02/12	16.8	131.3	985	55	3.0	STS
02/18	16.9	130.8	975	55	3.5	STS
03/00	17.0	130.3	965	70	4.0	TY
03/06	17.2	129.9	960	75	5.0	TY
03/12	17.7	129.4	955	80	5.5	TY
03/18	18.3	128.9	945	85	6.0	TY
04/00	18.5	128.0	940	90	6.0	TY
04/06	19.2	127.4	940	90	6.0	TY
04/12	19.9	126.7	935	90	6.5	TY
04/18	20.2	125.8	930	95	6.5	TY
05/00	20.4	125.3	925	100	6.5	TY
05/06	21.0	125.0	925	105	6.5	TY
05/09	21.4	124.8	925	105		TY
05/12	21.8	124.8	925	105	6.5	TY
05/15	22.5	124.5	925	105		TY
05/18	22.8	124.1	925	105	6.5	TY
05/21	23.3	123.8	925	105		TY
06/00	23.7	123.5	925	105	6.5	TY
06/03	24.4	122.9	925	105		TY
06/06	24.6	122.2	935	95	6.5	TY
06/09	23.9	121.7	950	85		TY
06/12	24.0	122.0	960	75	5.5	TY
06/15	25.1	121.9	965	70		TY
06/18	25.5	121.1	965	65	5.0	TY
06/21	25.7	120.7	965	65		TY
07/00	25.8	120.6	970	60	4.5	STS
07/06	26.8	120.4	985	55	4.5	STS
07/12	27.4	120.2	990	45	4.0	TS
07/18	27.6	120.1	994	35	3.5	TS
08/00	27.8	120.1	1000	-	3.0	TD
08/06	28.3	121.1	1002	-	2.5	L
08/12	28.7	122.3	1006	-		L
08/18	29.1	123.3	1008	-		L
09/00	30.5	125.8	1008	-		L
09/06	31.5	128.4	1008	-		L
09/12	32.1	130.5	1010	-		L
09/18	32.9	133.8	1010	-		L
10/00	32.4	136.7	1010	-		L
10/06	32.1	138.9	1010	-		L
10/12	31.9	140.8	1010	-		L
10/18	31.9	142.1	1010	-		L
11/00	31.8	143.4	1010	-		L
11/06	31.8	144.7	1010	-		L
11/12	32.1	146.0	1010	-		L
11/18	33.0	147.3	1010	-		L
12/00	33.9	148.9	1010	-		L
12/06	35.3	151.7	1010	-		L
12/12	36.5	153.6	1010	-		L
12/18	38.3	158.0	1008	-		L
13/00	40.2	161.5	1008	-		L
13/06	41.6	165.9	1004	-		L
13/12	43.8	172.3	1004	-		L
13/18	45.3	177.6	1000	-		L
14/00	47.1	183.3	1000	-		Out

TY LEKIMA (0714)

28 Sep. - 4 Oct.

Date/Time (UTC)	Center Position Lat (N)	Lon (E)	Central pressure (hPa)	Max Wind (kt)	CI number	Grade
Sep. 28/18	17.3	125.0	1000	-		TD
29/00	16.5	122.1	1000	-		TD
29/06	16.4	119.8	998	-		TD
29/12	15.7	118.5	998	-	1.5	TD
29/18	14.9	117.2	996	-	2.0	TD
30/00	14.6	115.8	994	35	2.5	TS
30/06	14.3	114.6	992	40	3.0	TS
30/12	14.2	113.9	992	40	3.0	TS
30/18	14.5	113.3	990	45	3.0	TS
Oct. 01/00	15.0	113.0	985	50	3.0	STS
01/06	15.4	112.9	980	55	3.0	STS
01/12	15.9	112.7	980	55	3.0	STS
01/18	16.3	112.4	980	55	3.0	STS
02/00	17.1	111.7	975	60	3.5	STS
02/06	17.4	110.7	975	60	3.5	STS
02/12	17.6	109.9	980	55	3.5	STS
02/18	17.6	108.8	980	55	3.5	STS
03/00	17.5	108.1	980	55	3.5	STS
03/06	17.6	107.4	980	55	4.0	STS
03/12	17.9	106.5	980	55	4.5	STS
03/18	17.8	105.1	992	40	4.0	TS
04/00	17.6	104.0	996	35	3.5	TS
04/06	17.5	102.7	1000	-	3.0	TD
04/12	17.2	101.7	1000	-		TD
04/18	17.5	100.8	1002	-		TD
05/00	-	-	-	-		Dissip.

TY HAIYAN (0716)

30 Sep. - 7 Oct.

Date/Time (UTC)	Center Position Lat (N)	Lon (E)	Central pressure (hPa)	Max Wind (kt)	CI number	Grade
Spt. 30/18	27.8	172.9	1010	-		TD
Oct. 01/00	28.2	172.2	1010	-		TD
01/06	28.8	171.1	1008	-		TD
01/12	29.1	169.9	1008	-		TD
01/18	29.3	169.0	1008	-		TD
02/00	29.4	168.2	1008	-		TD
02/06	29.0	167.6	1008	-		TD
02/12	28.4	167.8	1008	-		TD
02/18	27.8	168.7	1006	-		TD
03/00	27.8	169.4	1006	-		TD
03/06	27.9	170.0	1006	-		TD
03/12	27.9	170.7	1006	-		TD
03/18	27.8	171.0	1006	-		TD
04/00	27.7	171.3	1004	-		TD
04/06	27.6	171.6	1002	-		TD
04/12	27.5	171.7	1002	-		TD
04/18	27.5	171.9	1002	-		TD
05/00	27.7	172.0	1000	35		TS
05/06	28.0	172.1	996	40		TS
05/12	28.2	171.9	994	40		TS
05/18	28.4	171.6	994	40	2.5	TS
06/00	28.7	171.1	996	35	2.5	TS
06/06	29.3	170.5	1000	-	2.5	TD
06/12	30.2	170.2	1000	-	2.5	TD
06/18	31.7	170.2	1002	-	2.5	TD
07/00	33.6	170.7	1006	-		TD
07/06						Dissip.

STS PODUL (0717)

3 Oct. - 8 Oct.

Date/Time (UTC)	Center Position Lat (N)	Lon (E)	Central pressure (hPa)	Max Wind (kt)	CI number	Grade
Oct. 03/00	19.7	146.7	1008	-		TD
03/06	21.3	147.6	1006	-		TD
03/12	22.5	147.6	1004	-		TD
03/18	23.6	148.2	1002	-		TD
04/00	24.1	148.1	1002	-		TD
04/06	24.2	148.0	1002	-		TD
04/12	24.4	148.4	1002	-		TD
04/18	24.7	148.8	1002	-		TD
05/00	25.3	149.7	1000	35	1.5	TS
05/06	26.3	150.4	1000	35	1.5	TS
05/12	27.2	151.3	996	40	2.0	TS
05/18	28.4	152.4	994	45	2.5	TS
06/00	30.0	153.3	990	50	3.0	STS
06/06	32.2	155.6	985	55	3.0	STS
06/12	34.2	158.2	985	55	3.0	STS
06/18	36.0	160.8	985	55	2.5	STS
07/00	39.1	163.6	990	50	2.0	STS
07/06	42.1	165.6	990	-		L
07/12	44.0	167.5	990	-		L
07/18	45.2	169.5	994	-		L
08/00	46.2	170.5	996	-		L
08/06	47.1	170.8	994	-		L
08/12	47.4	170.7	994	-		L
08/18	47.9	172.7	994	-		L
09/00						Dissip.

TY LINGLING (0718)

10 Oct. - 15 Oct.

Date/Time (UTC)	Center Position Lat (N)	Lon (E)	Central pressure (hPa)	Max Wind (kt)	CI number	Grade
Oct. 10/12	21.1	175.7	1008	-		TD
10/18	21.6	175.5	1008	-		TD
11/00	22.4	175.2	1008	-		TD
11/06	23.0	174.9	1008	-		TD
11/12	23.6	174.4	1006	-		TD
11/18	24.2	173.7	1002	35	2.0	TS
12/00	24.8	173.4	1000	35	2.0	TS
12/06	25.4	172.7	996	40	2.5	TS
12/12	25.9	172.2	994	45	2.5	TS
12/18	26.6	171.8	994	45	2.5	TS
13/00	27.5	171.3	996	45	2.5	TS
13/06	28.3	170.7	998	40	2.5	TS
13/12	29.2	170.3	998	40	2.5	TS
13/18	30.3	170.0	998	40	2.5	TS
14/00	31.3	169.8	1000	35	2.5	TS
14/06	32.5	170.5	1002	35	2.5	TS
14/12	33.5	171.8	1004	35	2.5	TS
14/18	34.3	173.1	1006	35	2.0	TS
15/00	35.1	175.4	1006	35	2.0	TS
15/06	36.0	178.0	1006	-	2.0	L
15/12	37.5	181.2	1008	-		Out

TY FAXAI (0720)

25 Oct. - 28 Oct.

Date/Time (UTC)	Center Position Lat (N)	Lon (E)	Central pressure (hPa)	Max Wind (kt)	CI number	Grade
Oct. 25/06	18.8	134.4	1004	-		TD
25/12	20.0	133.4	1002	-		TD
25/18	21.4	132.6	1000	-		TD
26/00	23.0	131.7	994	35	2.5	TS
26/06	23.9	131.2	990	40	2.5	TS
26/12	25.0	131.7	985	50	3.0	STS
26/18	27.1	133.9	980	50	3.0	STS
27/00	29.3	136.0	975	55	3.0	STS
27/03	31.3	137.7	975	55		STS
27/06	33.4	139.6	975	55	3.0	STS
27/09	34.3	140.7	980	55		STS
27/12	35.6	142.2	988	-	2.5	L
27/18	38.2	146.2	986	-	2.0	L
28/00	39.9	149.3	984	-		L
28/06	40.5	152.6	980	-		L
28/12	41.1	157.0	980	-		L
28/18	42.8	162.9	980	-		L
29/00						Dissip.

TY KAJIKI (0719)

18 Oct. - 23 Oct.

Date/Time (UTC)	Center Position Lat (N)	Lon (E)	Central pressure (hPa)	Max Wind (kt)	CI number	Grade
Oct. 18/12	17.6	145.8	1006	-	1.0	TD
18/18	18.3	145.0	1004	-	1.5	TD
19/00	19.0	144.2	1002	35	2.0	TS
19/06	19.8	142.9	994	40	2.5	TS
19/12	20.5	142.0	990	50	3.0	STS
19/18	21.4	141.1	980	60	4.0	STS
20/00	22.0	140.7	965	75	4.5	TY
20/06	23.3	140.6	955	80	5.0	TY
20/12	24.5	141.0	950	85	5.5	TY
20/15	25.2	141.4	950	85		TY
20/18	26.0	142.1	945	90	6.0	TY
20/21	27.0	142.9	945	90		TY
21/00	27.9	143.9	950	85	6.0	TY
21/03	28.9	145.0	950	85		TY
21/06	29.9	146.3	955	80	6.0	TY
21/12	32.0	149.2	965	70	5.0	TY
21/18	34.2	153.2	975	60	5.0	STS
22/00	35.4	157.5	985	55	4.5	STS
22/06	36.3	162.0	998	-	4.0	L
22/12	37.0	165.9	1002	-		L
22/18	37.8	170.1	1004	-		L
23/00	37.8	174.8	1008	-		L
23/06	37.8	179.3	1010	-		L
23/12	37.9	182.4	1010	-		Out

TY PEIPAH (0721)

1 Nov. - 10 Nov.

Date/Time (UTC)	Center Position Lat (N)	Lon (E)	Central pressure (hPa)	Max Wind (kt)	CI number	Grade
Nov. 01/18	18.1	132.5	1006	-		TD
02/00	18.2	132.2	1006	-		TD
02/06	18.2	131.8	1004	-		TD
02/12	18.3	130.8	1004	-		TD
02/18	18.3	129.9	1004	-		TD
03/00	18.2	129.0	1004	-	1.5	TD
03/06	18.1	128.4	1002	-	2.0	TD
03/12	17.8	127.3	1000	35	2.5	TS
03/18	17.4	125.9	994	45	3.0	TS
04/00	17.1	124.8	992	50	3.0	STS
04/06	16.8	123.7	985	55	3.5	STS
04/12	16.8	122.5	980	60	4.0	STS
04/18	17.2	121.1	985	55	3.5	STS
05/00	17.6	119.9	990	50	3.0	STS
05/06	17.8	119.2	992	45	2.5	TS
05/12	18.0	119.0	990	50	3.0	STS
05/18	18.2	118.8	985	55	3.5	STS
06/00	18.4	118.7	980	60	3.5	STS
06/06	18.6	118.5	975	65	4.0	TY
06/12	18.6	118.3	970	70	4.5	TY
06/18	18.4	117.8	970	70	4.5	TY
07/00	18.2	117.0	975	65	4.5	TY
07/06	17.9	116.1	980	60	4.0	STS
07/12	17.6	115.2	990	50	3.5	STS
07/18	17.2	114.6	990	45	3.0	TS
08/00	16.8	114.2	992	40	3.0	TS
08/06	16.3	113.6	994	35	3.0	TS
08/12	15.8	113.0	998	35	3.0	TS
08/18	14.9	112.3	1002	-	2.5	TD
09/00	14.0	111.8	1004	-	2.0	TD
09/06	13.0	111.2	1004	-	2.0	TD
09/12	12.3	110.7	1004	-	1.5	TD
09/18	11.7	110.2	1004	-	1.5	TD
10/00	11.2	109.2	1006	-	1.5	TD
10/06	10.9	107.7	1006	-		TD
10/12	10.7	107.1	1006	-		TD
10/18						Dissip.

TY TAPAH (0722)

11 Nov. - 13 Nov.

Date/Time		Center Position		Central pressure	Max Wind	CI number	Grade
	(UTC)	Lat (N)	Lon (E)	(hPa)	(kt)		
Nov.	11/12	20.5	140.5	1002	-		TD
	11/18	21.2	141.2	1000	-	2.0	TD
	12/00	22.2	142.3	998	35	2.5	TS
	12/06	23.1	143.4	996	35	2.5	TS
	12/12	24.3	145.9	998	35	2.5	TS
	12/18	25.8	148.9	1000	-	2.5	TD
	13/00	28.2	152.4	1004	-	2.0	TD
	13/06	-	-	-	-		Dissip.

TY MITAG (0723)

19 Nov. - 27 Nov.

Date/Time		Center Position		Central pressure	Max Wind	CI number	Grade
	(UTC)	Lat (N)	Lon (E)	(hPa)	(kt)		
Nov.	19/18	10.0	140.0	1004	-		TD
	20/00	11.9	138.3	1004	-	2.0	TD
	20/06	12.6	137.2	1002	-	2.0	TD
	20/12	13.2	136.2	1000	35	2.5	TS
	20/18	13.5	134.8	1000	35	2.5	TS
	21/00	13.8	133.6	996	40	2.5	TS
	21/06	14.1	132.3	992	45	3.0	TS
	21/12	14.3	131.3	985	50	3.5	STS
	21/18	14.4	130.3	980	55	4.0	STS
	22/00	14.3	129.4	975	65	4.0	TY
	22/06	14.2	128.6	960	75	5.0	TY
	22/12	14.0	127.8	955	80	5.5	TY
	22/18	13.8	127.2	955	80	5.5	TY
	23/00	13.7	127.2	955	80	5.5	TY
	23/06	13.7	127.0	960	75	5.5	TY
	23/12	14.0	126.7	960	75	5.5	TY
	23/18	14.1	126.5	960	75	5.5	TY
	24/00	14.3	126.2	960	75	5.0	TY
	24/06	14.5	125.9	960	75	4.5	TY
	24/12	14.8	125.5	965	75	4.5	TY
	24/18	15.1	125.2	965	70	4.5	TY
	25/00	15.5	124.5	970	70	4.5	TY
	25/06	16.4	123.9	970	70	4.0	TY
	25/12	16.9	122.9	970	70	4.0	TY
	25/18	17.3	121.5	975	65	4.0	TY
	26/00	18.3	121.0	980	60	3.5	STS
	26/06	19.0	120.7	985	55	3.5	STS
	26/12	19.5	120.7	985	50	3.5	STS
	26/18	20.0	121.1	990	45	3.0	TS
	27/00	20.1	121.5	992	40	3.0	TS
	27/06	20.5	122.8	994	35	2.5	TS
	27/12	20.6	124.0	998	-	2.0	TD
	27/18						Dissip.

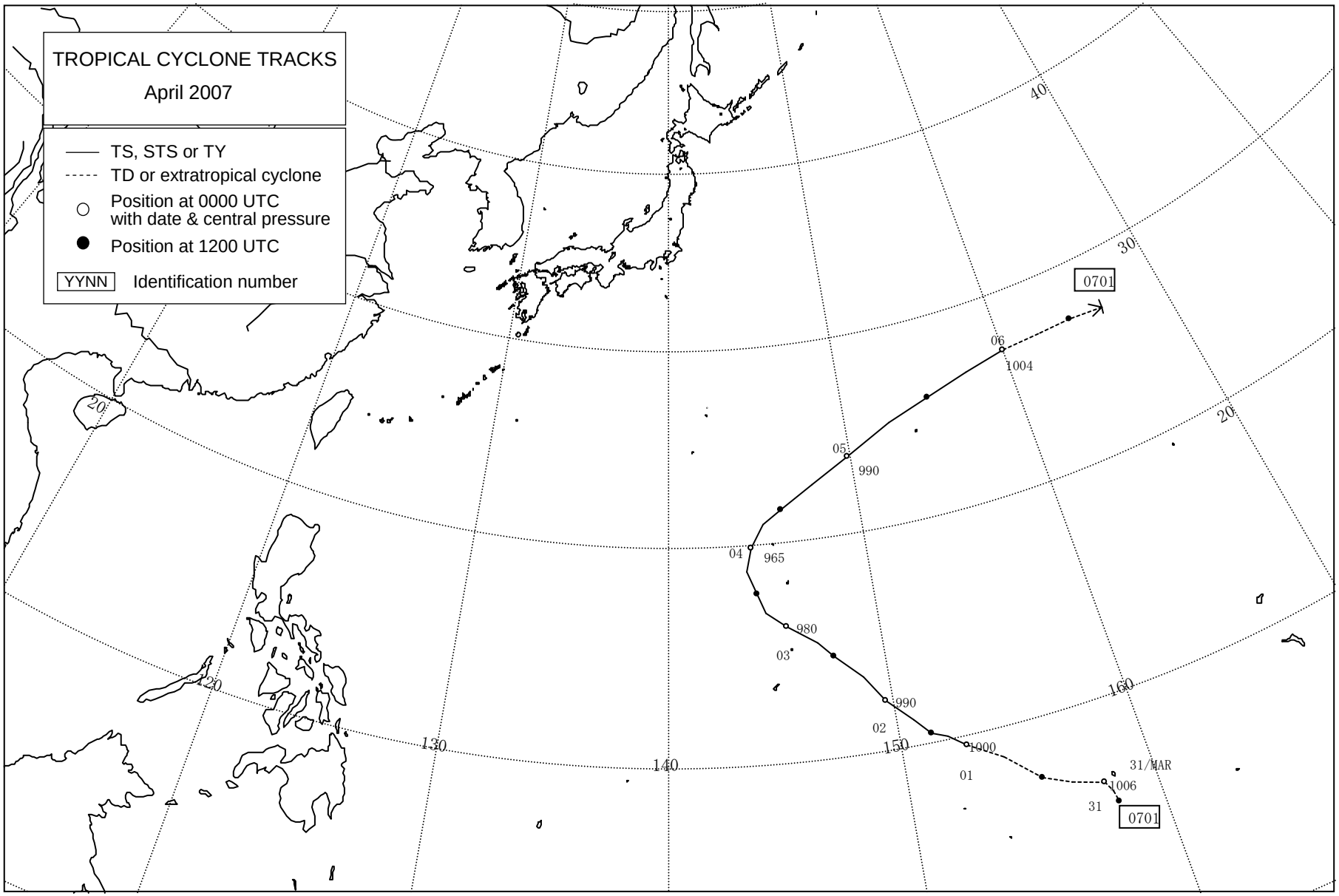
TY HAGIBIS(0724)

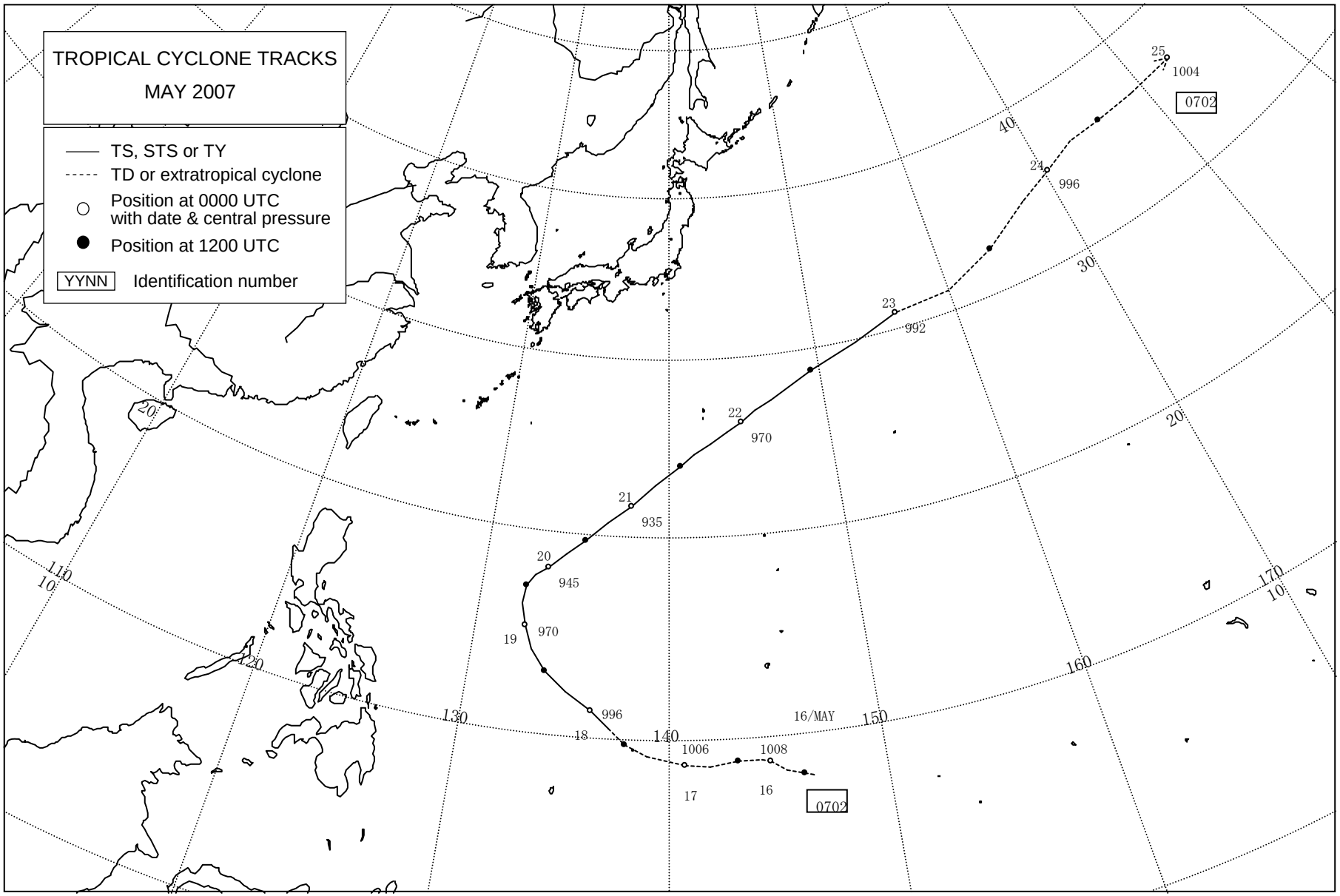
18 Nov. - 27 Nov.

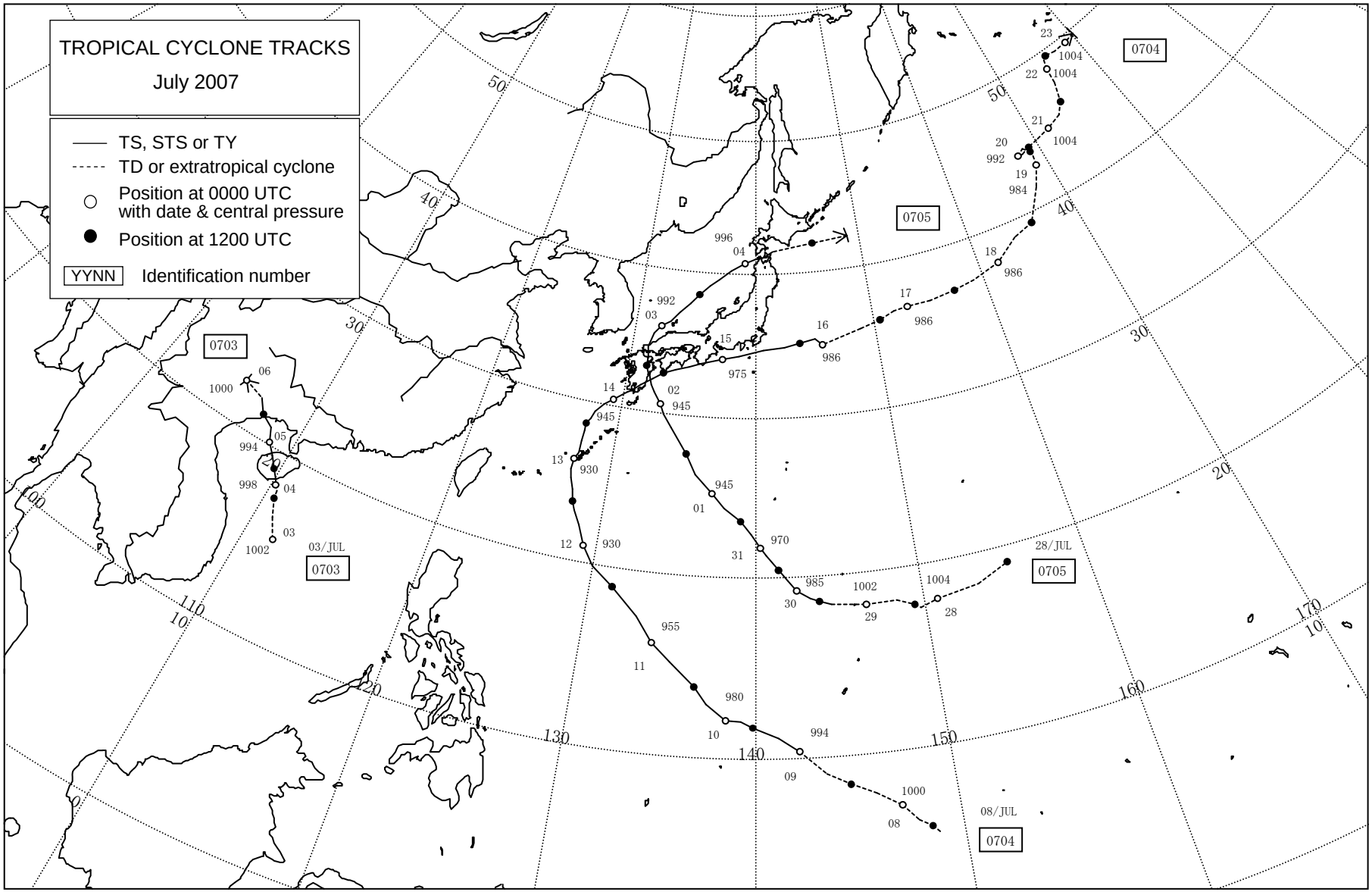
Date/Time		Center Position		Central pressure	Max Wind	CI number	Grade
	(UTC)	Lat (N)	Lon (E)	(hPa)	(kt)		
Nov.	18/18	8.9	127.0	1004	-		TD
	19/00	9.8	125.5	1004	-		TD
	19/06	9.9	124.1	1004	-		TD
	19/12	9.7	122.8	1004	-		TD
	19/18	9.6	121.7	1004	-		TD
	20/00	9.6	120.2	1004	-		TD
	20/06	9.6	118.9	1002	-	1.5	TD
	20/12	9.6	117.8	1002	-	2.0	TD
	20/18	9.6	116.7	1000	35	2.5	TS
	21/00	9.6	115.7	996	40	3.0	TS
	21/06	9.6	114.8	990	45	3.5	TS
	21/12	9.7	113.8	985	50	3.5	STS
	21/18	9.8	113.3	980	60	4.0	STS
	22/00	10.3	112.8	975	65	4.0	TY
	22/06	10.6	112.5	970	70	4.5	TY
	22/12	10.8	112.0	970	70	4.5	TY
	22/18	11.1	111.5	970	70	4.5	TY
	23/00	11.4	111.0	970	70	4.5	TY
	23/06	11.5	110.7	975	65	4.5	TY
	23/12	11.6	110.6	975	65	4.5	TY
	23/18	11.6	110.8	980	60	4.0	STS
	24/00	11.7	111.2	985	55	4.0	STS
	24/06	11.8	111.6	985	55	4.0	STS
	24/12	11.9	112.2	990	50	3.5	STS
	24/18	11.9	112.7	990	50	3.5	STS
	25/00	11.9	113.2	992	45	3.0	TS
	25/06	11.7	113.6	994	40	3.0	TS
	25/12	11.5	113.7	994	40	3.0	TS
	25/18	11.2	113.9	996	35	2.5	TS
	26/00	11.1	114.9	996	35	2.5	TS
	26/06	11.6	115.6	996	35	2.0	TS
	26/12	11.4	116.8	996	35	2.0	TS
	26/18	11.5	118.0	996	35	2.0	TS
	27/00	12.1	119.2	996	35	2.0	TS
	27/06	12.5	121.0	996	35	2.0	TS
	27/12	12.7	122.9	998	-	2.0	TD
	27/18	14.2	124.5	1000	-	1.5	TD
	28/00						Dissip.

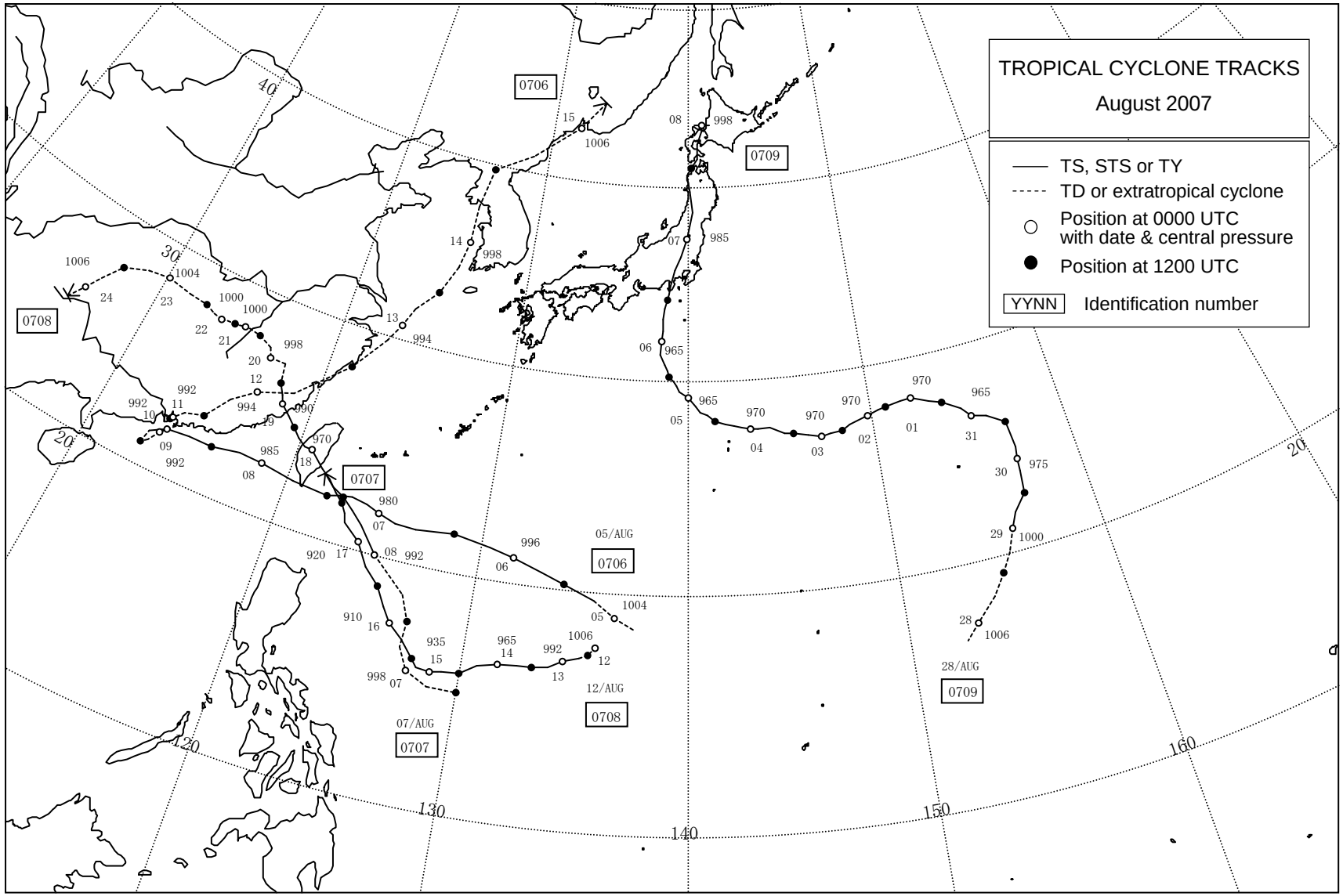
Appendix 2

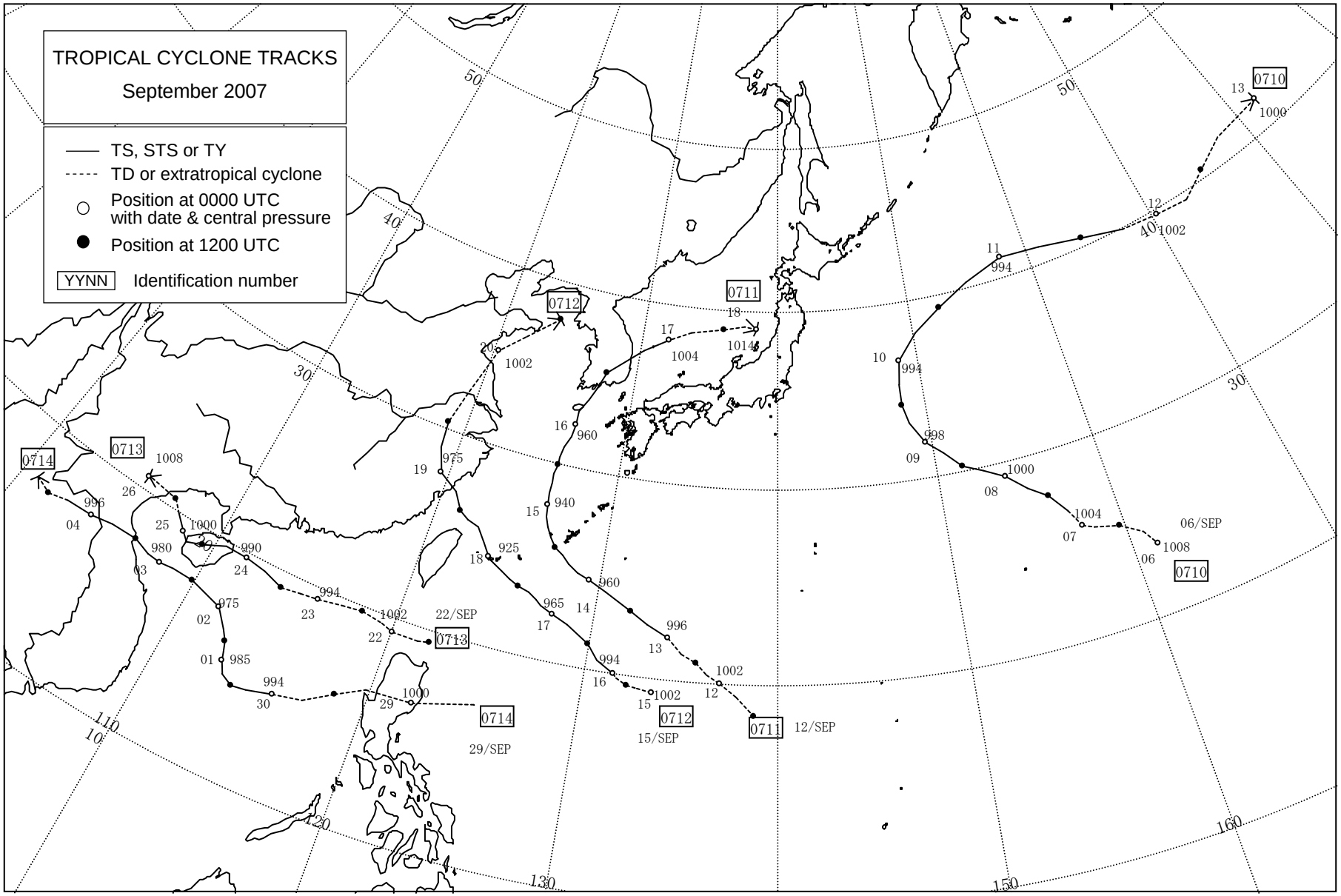
Monthly Tracks of Tropical Cyclones in 2007

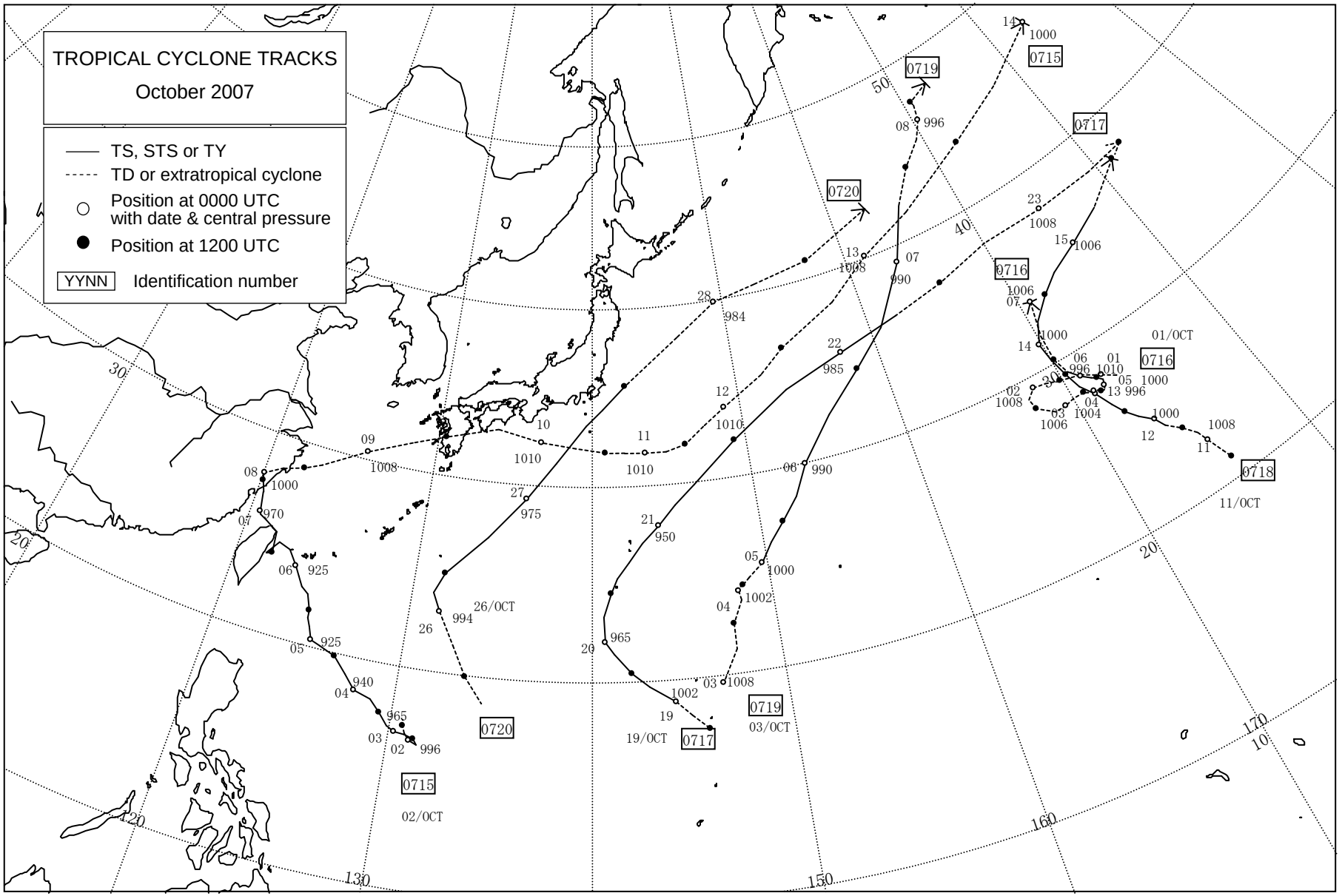

TROPICAL CYCLONE TRACKS
April 2007
TS, STS or TY
TD or extratropical cyclone
Position at 0000 UTC
with date & central pressure
Position at 1200 UTC
YYNN Identification number
0701
06
1004
05
990
04
965
980
03
990
02
1000
01
31/MAR
1006
31
0701
40
30
20
20
120
130
140
150
160

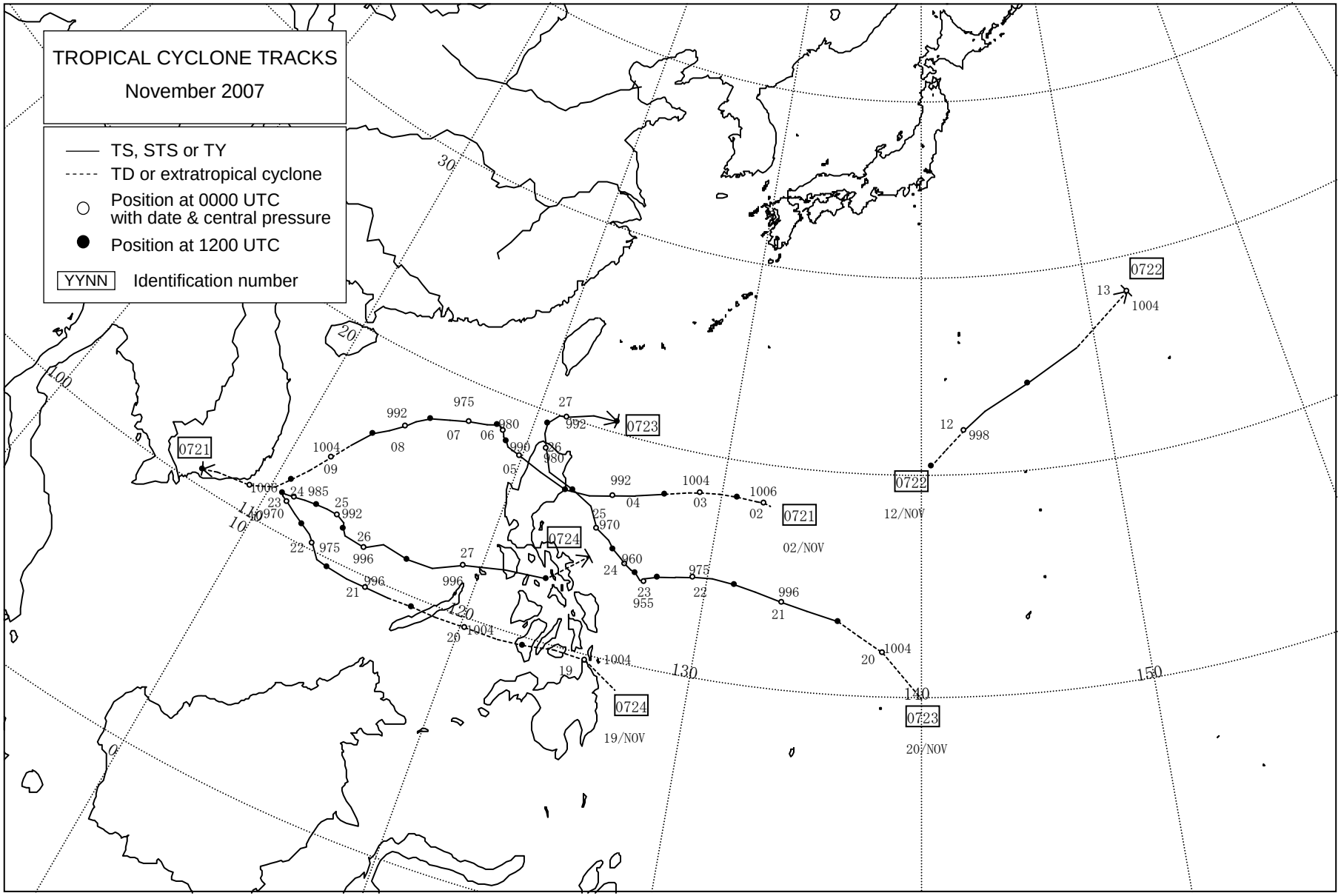

TROPICAL CYCLONE TRACKS
MAY 2007
TS, STS or TY
TD or extratropical cyclone
Position at 0000 UTC
with date & central pressure
Position at 1200 UTC
YYNN Identification number
25
1004
0702
24
996
23
992
22
970
21
935
20
945
19
970
996
18
16/MAY
1006
1008
17
16
0702
40
30
20
10
110
120
130
140
150
160
170


TROPICAL CYCLONE TRACKS
July 2007
TS, STS or TY
TD or extratropical cyclone
Position at 0000 UTC
with date & central pressure
Position at 1200 UTC
YYNN Identification number
0703
0704
0705
03/JUL
28/JUL
08/JUL
50
40
30
20
10
0
100
110
120
130
140
150
160
170


TROPICAL CYCLONE TRACKS
August 2007
TS, STS or TY
TD or extratropical cyclone
Position at 0000 UTC
with date & central pressure
Position at 1200 UTC
YYNN Identification number
0706
0709
0708
0707
05/AUG
0706
12/AUG
0708
07/AUG
0707
28/AUG
0709
40
30
20
120
130
140
150
160
20


TROPICAL CYCLONE TRACKS
September 2007
TS, STS or TY
TD or extratropical cyclone
Position at 0000 UTC with date & central pressure
Position at 1200 UTC
YYNN Identification number
0710
0711
0712
0713
0714
06/SEP
12/SEP
15/SEP
22/SEP
29/SEP
50
40
30
20
10
110
120
130
150
160


TROPICAL CYCLONE TRACKS
October 2007
TS, STS or TY
TD or extratropical cyclone
Position at 0000 UTC
with date & central pressure
Position at 1200 UTC
YYNN Identification number
0715
0716
0717
0718
0719
0720
01/0CT
02/0CT
03/0CT
11/0CT
19/0CT
26/0CT
10
20
30
40
50
120
130
150
160
170


TROPICAL CYCLONE TRACKS
November 2007
TS, STS or TY
TD or extratropical cyclone
Position at 0000 UTC
with date & central pressure
Position at 1200 UTC
YYNN Identification number
0721
0722
0723
0724
02/NOV
12/NOV
19/NOV
20/NOV
100
110
120
130
140
150
10
20
30
0
992
975
980
1004
1006
985
970
996
1001
960
955
998
1004

Appendix 3

Track and Intensity Analysis and Forecast Errors for Each Tropical Cyclone in 2007

Date/Time		Center Position (km)				Central Pressure (hPa)			Max. Wind (kt)		
	(UTC)	T=00	T=24	T=48	T=72	T=24	T=48	T=72	T=24	T=48	T=72
TY KONG-REY (0701)											
Apr.	01/00	0	229	341	523	0	5	15	-5	-15	-25
	01/06	0	254	324	549	5	10	5	-10	-15	-10
	01/12	11	264	368	602	0	20	-5	-5	-25	-5
	01/18	33	151	99	23	-5	20	0	0	-25	-5
	02/00	35	124	92	210	-5	15	0	-5	-25	-5
	02/06	0	98	63	46	5	10	4	-10	-15	-5
	02/12	0	131	123	134	15	-5	0	-20	-5	0
	02/18	0	67	324	570	15	-5	2	-20	0	0
	03/00	0	15	108		5	-5		-20	-5	
	03/06	11	163	341		-5	-7		0	0	
	03/12	0	94	482		-20	-6		10	5	
	03/18	42	78	496		-10	-4		5	5	
	04/00	10	130			-5			0		
	04/06	22	147			-2			0		
	04/12	0	342			-2			5		
	04/18	93	420			0			5		
	05/00	0									
	05/06	0									
	05/12	0									
	05/18	32									
	mean	15	169	264	332	-1	4	3	-4	-10	-7
	sampl	20	16	12	8	16	12	8	16	12	8

Date/Time		Center Position (km)				Central Pressure (hPa)			Max. Wind (kt)		
	(UTC)	T=00	T=24	T=48	T=72	T=24	T=48	T=72	T=24	T=48	T=72
TY YUTU (0702)											
May	17/18	40	116	233	373	10	30	30	-15	-30	-25
	18/00	22	168	248	546	10	25	30	-15	-25	-25
	18/06	0	53	33	113	15	25	20	-20	-25	-20
	18/12	44	78	74	238	20	25	20	-20	-20	-25
	18/18	33	33	137	411	20	25	15	-20	-20	-15
	19/00	0	84	136	393	10	25	10	-15	-20	-15
	19/06	0	62	145	378	5	15	5	-10	-15	-10
	19/12	0	81	136	382	10	20	0	-10	-25	0
	19/18	0	83	143	466	5	10	0	-5	-15	0
	20/00	0	70	212		10	10		-5	-15	
	20/06	0	115	247		0	-5		0	0	
	20/12	0	134	366		-15	-20		5	20	
	20/18	0	127	412		-25	-25		15	25	
	21/00	0	123			-20			10		
	21/06	0	91			-10			5		
	21/12	0	355			-20			20		
	21/18	0	152			-15			15		
	22/00	0									
	22/06	0									
	22/12	49									
	22/18	22									
	mean	10	113	194	367	1	12	14	-4	-13	-15
	sampl	21	17	13	9	17	13	9	17	13	9

Date/Time		Center Position (km)				Central Pressure (hPa)			Max. Wind (kt)		
	(UTC)	T=00	T=24	T=48	T=72	T=24	T=48	T=72	T=24	T=48	T=72
TY USAGI (0705)											
Jul.	29/06	22	160	229	563	12	20	25	-15	-20	-25
	29/12	0	130	196	381	0	0	15	-10	-5	-15
	29/18	21	15	117	293	-5	0	15	-5	-5	-15
	30/00	0	11	121	269	-5	5	15	0	-10	-15
	30/06	38	79	83	69	0	0	0	0	-10	-5
	30/12	0	76	82	67	0	0	-15	-5	-10	15
	30/18	0	67	190	211	0	0	-25	-5	-10	20
	31/00	11	98	257	326	-5	5	-22	-5	-10	20
	31/06	0	152	331	536	-5	-10	-24	-5	0	25
	31/12	0	150	344	617	-5	-20	-9	-5	15	10
	31/18	0	128	200	390	-5	-25	-9	-5	20	10
	01/00	0	152	260	473	0	-12	-2	0	10	0
	01/06	0	45	113		-15	-14		10	15	
	01/12	0	73	80		-20	-9		20	15	
	01/18	0	83	67		-10	-9		10	10	
	02/00	19	69	58		-7	-6		10	5	
	02/06	0	100			-9			10		
	02/12	0	69			-9			10		
	02/18	0	60			-4			5		
	03/00	21	110			-2			0		
	03/06	0									
	03/12	0									
	03/18	0									
	04/00	0									
	mean	6	91	170	350	-5	-5	-3	1	1	2
	sampl	24	20	16	12	20	16	12	20	16	12

Date/Time		Center Position (km)				Central Pressure (hPa)			Max. Wind (kt)		
	(UTC)	T=00	T=24	T=48	T=72	T=24	T=48	T=72	T=24	T=48	T=72
TS TORAJI (0703)											
Jul.	04/06	46	56			2			0		
	04/12	31	232			2			0		
	04/18	31									
	05/00	0									
	05/06	0									
	05/12	0									
	mean	18	144	0	0	2	0	0	0	0	0
	sampl	6	2	0	0	2	0	0	2	0	0

Date/Time		Center Position (km)				Central Pressure (hPa)			Max. Wind (kt)		
	(UTC)	T=00	T=24	T=48	T=72	T=24	T=48	T=72	T=24	T=48	T=72
TY MAN-YI (0704)											
Jul.	09/00	154	135	159	245	0	5	20	5	5	-15
	09/06	55	70	149	167	5	5	10	5	0	-10
	09/12	24	261	172	231	5	5	5	5	0	-10
	09/18	44	92	216	244	5	15	5	5	-10	-10
	10/00	0	106	256	281	5	15	5	-5	-20	-10
	10/06	0	65	156	259	5	5	0	0	-10	-5
	10/12	0	143	188	252	5	5	-5	0	-10	5
	10/18	0	122	165	252	10	10	0	-10	-10	5
	11/00	0	133	164	209	10	10	0	-10	-10	5
	11/06	11	137	200	204	5	0	-5	-10	0	10
	11/12	0	73	126	195	5	-5	-15	-10	10	15
	11/18	0	73	104	189	5	-5	-20	-10	10	20
	12/00	0	98	123	231	-5	-15	-35	0	15	25
	12/06	0	49	127	29	-15	-15	-35	10	15	30
	12/12	0	89	72	192	-15	-15	-20	20	15	30
	12/18	0	35	24	256	-5	0	-10	10	10	20
	13/00	11	19	69		0	-5		5	5	
	13/06	0	66	161		0	-10		10	15	
	13/12	0	60	296		-5	-10		10	20	
	13/18	0	103	237		-5	-10		15	20	
	14/00	0	166			-15			15		
	14/06	9	230			-15			20		
	14/12	0	191			-10			20		
	14/18	0	111			-10			20		
	15/00	28									
	15/06	0									
	15/12	0									
	15/18	48									
	mean	14	110	158	215	-1	-1	-6	5	4	7
	sampl	28	24	20	16	24	20	16	24	20	16

Date/Time		Center Position (km)				Central Pressure (hPa)			Max. Wind (kt)		
	(UTC)	T=00	T=24	T=48	T=72	T=24	T=48	T=72	T=24	T=48	T=72
TY PABUK (0706)											
Aug.	05/06	0	38	266	526	0	0	-20	0	-5	20
	05/12	0	76	274	599	-12	-10	-10	10	5	10
	05/18	59	30	190	300	-10	-15	-5	5	10	10
	06/00	113	138	291	476	0	-20	-7	-5	15	15
	06/06	0	98	190		0	-15		-5	15	
	06/12	0	136	282		0	-10		-5	10	
	06/18	94	152	250		-10	0		5	5	
	07/00	21	170	285		-15	-2		10	10	
	07/06	15	134			-15			15		
	07/12	35	202			-15			15		
	07/18	0	164			-5			5		
	08/00	22	102			-7			10		
	08/06	0									
	08/12	21									
	08/18	0									
	09/00	0									
	mean	24	120	253	475	-7	-9	-10	5	8	14
	sampl	16	12	8	4	12	8	4	12	8	4

Date/Time		Center Position (km)				Central Pressure (hPa)			Max. Wind (kt)		
	(UTC)	T=00	T=24	T=48	T=72	T=24	T=48	T=72	T=24	T=48	T=72
TS WUTIP (0707)											
Aug.	08/00	0									
	08/06	88									
	08/12	118									
	08/18	175									
	mean	95	0	0	0	0	0	0	0	0	0
	sampl	4	0	0	0	0	0	0	0	0	0

Date/Time		Center Position (km)				Central Pressure (hPa)			Max. Wind (kt)		
	(UTC)	T=00	T=24	T=48	T=72	T=24	T=48	T=72	T=24	T=48	T=72
TY SEPAT (0708)											
Aug.	12/18	25	168	433	378	21	45	70	-20	-40	-55
	13/00	11	134	304	179	20	40	55	-20	-35	-40
	13/06	0	139	277	148	25	40	55	-20	-30	-40
	13/12	0	154	185	116	25	50	55	-20	-35	-40
	13/18	0	138	155	130	25	50	50	-20	-35	-35
	14/00	0	154	175	115	20	40	30	-20	-30	-20
	14/06	0	108	101	79	20	35	25	-15	-25	-15
	14/12	0	31	86	53	25	35	15	-15	-25	-10
	14/18	0	54	130	95	30	35	5	-20	-25	-5
	15/00	0	78	94	130	20	10	-25	-10	0	20
	15/06	0	69	151	241	15	5	-45	-10	0	40
	15/12	0	92	129	245	15	-5	-45	-10	5	40
	15/18	0	31	52	172	10	-20	-40	-5	15	35
	16/00	0	61	35	32	-10	-10	-10	10	10	10
	16/06	0	33	112	56	-10	-20	-12	10	20	15
	16/12	0	10	106		-20	-20		15	20	
	16/18	0	46	98		-10	-25		10	25	
	17/00	0	104	135		-30	-25		25	25	
	17/06	0	102	42		-20	-12		20	15	
	17/12	0	32			-20			20		
	17/18	0	35			-20			20		
	18/00	15	30			-10			10		
	18/06	10	32			-7			10		
	18/12	0									
	18/18	0									
	19/00	11									
	19/06	0									
	mean	3	80	147	145	5	13	12	-2	-8	-7
	sampl	27	23	19	15	23	19	15	23	19	15

Date/Time		Center Position (km)				Central Pressure (hPa)			Max. Wind (kt)		
	(UTC)	T=00	T=24	T=48	T=72	T=24	T=48	T=72	T=24	T=48	T=72
TY FITOW (0709)											
Aug.	29/00	22	112	171		17	15		-15	-15	
	29/06	0	81	68	136	15	10	-5	-15	-10	5
	29/12	0	80	41	126	10	5	-10	-10	-5	10
	29/18	0	30	74	171	0	-10	-20	0	10	15
	30/00	10	60	74	201	5	-10	-25	-5	10	15
	30/06	0	95	132	191	0	-15	-30	0	10	20
	30/12	0	118	199	280	-5	-20	-25	5	15	20
	30/18	30	78	142	219	-15	-25	-30	10	15	20
	31/00	10	108	91	169	-10	-20	-25	10	15	15
	31/06	0	59	105	148	-15	-25	-30	10	15	20
	31/12	0	52	149	202	-10	-15	-20	10	10	20
	31/18	0	24	95	210	-5	-10	-15	5	10	15
Sep.	01/00	0	37	30	120	0	-5	-10	0	5	15
	01/06	0	68	104	216	-5	-10	-15	5	10	15
	01/12	0	53	70	229	-5	-10	-15	5	15	15
	01/18	0	68	120	215	-5	-10	-15	0	10	15
	02/00	0	67	113	169	-5	-10	-10	0	10	5
	02/06	0	23	128	215	-5	-10	-10	0	10	5
	02/12	0	45	123	200	-5	-10	-10	5	10	5
	02/18	0	67	135	181	-5	-10	-10	10	15	5
	03/00	23	39	112	175	-10	-10	-10	10	5	5
	03/06	15	77	129	214	-10	-10	-10	10	5	5
	03/12	10	79	133	251	-10	-10	-10	15	5	5
	03/18	10	74	96	290	-10	-10	-10	15	5	10
	04/00	0	22	88	381	-5	-5	-25	-5	-5	10
	04/06	0	44	133	504	0	5	-13	-5	-10	0
	04/12	0	22	115	401	0	5	-7	-5	-10	0
	04/18	0	45	82	244	0	0	-2	-5	-5	0
	05/00	15	117	100		0	0		-5	-10	
	05/06	0	80	75		5	-3		-10	-5	
	05/12	0	81	323		5	-7		-10	0	
	05/18	0	56	309		0	-9		-5	5	
	06/00	0	78			-10			0		
	06/06	0	122			-8			-5		
	06/12	0	92			-7			0		
	06/18	11	111			-4			5		
	07/00	24									
	07/06	0									
	07/12	11									
	07/18	0									
	mean	5	68	121	224	-3	-8	-15	1	5	11
	sampl	40	36	32	27	36	32	27	36	32	27

Date/Time		Center Position (km)				Central Pressure (hPa)			Max. Wind (kt)		
	(UTC)	T=00	T=24	T=48	T=72	T=24	T=48	T=72	T=24	T=48	T=72
STS DANAS (0710)											
Sep.	07/06	0	24			-4			-5		
	07/12	46	106	248	368	-2	-4	0	-5	-5	-10
	07/18	22	101	183	108	-4	0	6	0	-5	-15
	08/00	0	79	170	163	0	4	6	0	-5	-10
	08/06	0	90	108	361	0	4	8	0	-5	-15
	08/12	19	67	171	436	2	4	8	-5	-5	-10
	08/18	19	104	230		4	8		-5	-10	
	09/00	0	66	192		4	4		-5	-5	
	09/06	0	61	151		4	4		-5	-5	
	09/12	28	0	89		0	4		0	0	
	09/18	0	0			2			-5		
	10/00	35	28			-2			0		
	10/06	0	107			0			0		
	10/12	0	173			0			5		
	10/18	0									
	11/00	0									
	11/06	67									
	11/12	40									
	mean	15	72	171	287	0	3	6	-2	-5	-12
	sampl	18	14	9	5	14	9	5	14	9	5

Date/Time		Center Position (km)				Central Pressure (hPa)			Max. Wind (kt)		
	(UTC)	T=00	T=24	T=48	T=72	T=24	T=48	T=72	T=24	T=48	T=72
TY NARI (0711)											
Sep.	13/00	35	248	357		36	50		-40	-50	
	13/06	0	91	110	275	44	50	29	-40	-50	-30
	13/12	0	80	102	240	45	30	-5	-45	-30	5
	13/18	0	59	167	560	35	15	-20	-35	-15	20
	14/00	0	112	315		20	0		-20	0	
	14/06	0	121	216		10	-10		-5	15	
	14/12	0	101	348		10	-15		-5	20	
	14/18	0	263	953		10	-15		-5	20	
	15/00	0	230			5			0		
	15/06	0	136			10			-10		
	15/12	0	155			-15			15		
	15/18	0	350			-15			15		
	16/00	0									
	16/06	0									
	16/12	35									
	16/18	0									
	mean	4	162	321	358	16	13	1	-15	-11	-2
	sampl	16	12	8	3	12	8	3	12	8	3

Date/Time		Center Position (km)				Central Pressure (hPa)			Max. Wind (kt)		
	(UTC)	T=00	T=24	T=48	T=72	T=24	T=48	T=72	T=24	T=48	T=72
TY WIPHA (0712)											
Sep.	16/00	25	142	302	551	20	55	0	-20	-45	0
	16/06	49	144	257		30	35		-25	-30	
	16/12	0	56	233		35	5		-30	-10	
	16/18	0	22	141		40	-5		-30	0	
	17/00	21	11	167		35	-5		-25	5	
	17/06	0	127			30			-25		
	17/12	0	52			-5			5		
	17/18	0	30			-10			5		
	18/00	0	91			-10			15		
	18/06	0									
	18/12	0									
	18/18	20									
	19/00	0									
	mean	9	75	220	551	18	17	0	-14	-16	0
	sampl	13	9	5	1	9	5	1	9	5	1

Date/Time		Center Position (km)				Central Pressure (hPa)			Max. Wind (kt)		
	(UTC)	T=00	T=24	T=48	T=72	T=24	T=48	T=72	T=24	T=48	T=72
TS FRANCISCO (0713)											
Sep.	23/12	0	139			-6			10		
	23/18	54	140			-6			10		
	24/00	52	157			-8			5		
	24/06	15									
	24/12	57									
	24/18	81									
	25/00	43									
	mean	43	145	0	0	-7	0	0	8	0	0
	sampl	7	3	0	0	3	0	0	3	0	0

Date/Time		Center Position (km)				Central Pressure (hPa)			Max. Wind (kt)		
	(UTC)	T=00	T=24	T=48	T=72	T=24	T=48	T=72	T=24	T=48	T=72
STS LEKIMA (0714)											
Sep.	30/00	70	232	259	521	5	5	-5	-10	-10	0
	30/06	79	217	277	452	5	0	-5	-10	-5	0
	30/12	35	177	256	436	5	-5	-5	-10	0	0
	30/18	22	128	137	291	0	-5	-17	0	5	20
Oct.	01/00	39	139	101	301	-5	-10	-16	5	10	20
	01/06	22	24	134		-5	-5		5	5	
	01/12	43	57	211		-10	0		10	0	
	01/18	58	55	201		-5	-7		5	10	
	02/00	15	91	242		0	-6		0	10	
	02/06	11	101			-5			5		
	02/12	21	68			0			0		
	02/18	49	79			-2			5		
	03/00	15	67			-2			0		
	03/06	15									
	03/12	11									
	03/18	21									
	04/00	15									
	mean	32	110	202	400	-1	-4	-10	0	3	8
	sampl	17	13	9	5	13	9	5	13	9	5

Date/Time		Center Position (km)				Central Pressure (hPa)			Max. Wind (kt)		
	(UTC)	T=00	T=24	T=48	T=72	T=24	T=48	T=72	T=24	T=48	T=72
TY KROSA (0715)											
Oct.	01/18	24	92			15			-15		
	02/00	49	79	138	236	25	40	45	-30	-40	-40
	02/06	55	101	137	189	20	30	35	-20	-25	-30
	02/12	0	54	123	184	20	30	30	-20	-20	-30
	02/18	0	57	182	252	25	30	25	-20	-20	-25
	03/00	0	105	172	193	20	25	25	-15	-20	-25
	03/06	0	81	152	282	10	20	15	-10	-20	-15
	03/12	0	84	132	204	10	20	-10	-5	-20	5
	03/18	0	85	68	42	5	15	-5	-10	-20	10
	04/00	0	59	84	60	10	15	-10	-10	-20	15
	04/06	0	49	127	91	10	5	-25	-10	-5	20
	04/12	0	78	11	118	10	-10	-20	-10	10	25
	04/18	0	10	158	210	10	-15	-24	-10	20	35
	05/00	0	35	140		15	-10		-15	15	
	05/06	0	80	105		5	-20		-5	15	
	05/12	0	97	163		-20	-25		15	25	
	05/18	0	60	164		-25	-24		25	35	
	06/00	0	93			-20			25		
	06/06	0	41			-20			15		
	06/12	0	11			-15			15		
	06/18	0	184			-14			20		
	07/00	0									
	07/06	20									
	07/12	37									
	07/18	0									
	mean	7	73	129	172	5	8	7	-4	-6	-5
	sampl	25	21	16	12	21	16	12	21	16	12

Date/Time		Center Position (km)				Central Pressure (hPa)			Max. Wind (kt)		
	(UTC)	T=00	T=24	T=48	T=72	T=24	T=48	T=72	T=24	T=48	T=72
TS HAIYAN (0716)											
Oct.	05/00	0									
	05/06	11									
	05/12	15									
	05/18	35									
	06/00	37									
	mean	19	0	0	0	0	0	0	0	0	0
	sampl	5	0	0	0	0	0	0	0	0	0

Date/Time		Center Position (km)				Central Pressure (hPa)			Max. Wind (kt)		
	(UTC)	T=00	T=24	T=48	T=72	T=24	T=48	T=72	T=24	T=48	T=72
STS PODUL (0717)											
Oct.	05/00	0									
	05/06	23									
	05/12	69									
	05/18	111									
	06/00	0									
	06/06	24									
	06/12	0									
	06/18	0									
	07/00	53									
	mean	31	0	0	0	0	0	0	0	0	0
	sampl	9	0	0	0	0	0	0	0	0	0

Date/Time		Center Position (km)				Central Pressure (hPa)			Max. Wind (kt)		
	(UTC)	T=00	T=24	T=48	T=72	T=24	T=48	T=72	T=24	T=48	T=72
TS LINGLING (0718)											
Oct.	11/18	60	151			2			-5		
	12/00	0	167	391		2	-4		-10	5	
	12/06	0	157	305		0	-4		-5	0	
	12/12	30	200	475		-8	-10		10	10	
	12/18	30	177	537		-8	-10		10	5	
	13/00	0	135	659		-2	-6		5	0	
	13/06	59	170			-4			5		
	13/12	37	227			-6			5		
	13/18	44	124			-6			0		
	14/00	0	201			-2			-35		
	14/06	0									
	14/12	74									
	14/18	158									
	15/00	38									
	mean	38	171	473	0	-3	-7	0	-2	4	0
	sampl	14	10	5	0	10	5	0	10	5	0

Date/Time		Center Position (km)				Central Pressure (hPa)			Max. Wind (kt)		
	(UTC)	T=00	T=24	T=48	T=72	T=24	T=48	T=72	T=24	T=48	T=72
TY KAJIKI (0719)											
Oct.	19/00	0	266	863		35	48		-40	-50	
	19/06	0	62	561		35	30		-35	-30	
	19/12	0	52	595		30	15		-25	-10	
	19/18	0	265	1106		30	10		-25	-5	
	20/00	0	389	1268		15	-5		-10	5	
	20/06	0	539			0			0		
	20/12	0	559			-10			10		
	20/18	0	568			-5			10		
	21/00	0	470			0			0		
	21/06	0									
	21/12	0									
	21/18	0									
	22/00	0									
	mean	0	352	879	0	14	20	0	-13	-18	0
	sampl	13	9	5	0	9	5	0	9	5	0

Date/Time		Center Position (km)				Central Pressure (hPa)			Max. Wind (kt)		
	(UTC)	T=00	T=24	T=48	T=72	T=24	T=48	T=72	T=24	T=48	T=72
STS FAXAI (0720)											
Oct.	26/00	0	84			15			-5		
	26/06	0	331			0			5		
	26/12	0									
	26/18	74									
	27/00	87									
	27/06	0									
	mean	27	208	0	0	8	0	0	0	0	0
	sampl	6	2	0	0	2	0	0	2	0	0

Date/Time		Center Position (km)				Central Pressure (hPa)			Max. Wind (kt)		
	(UTC)	T=00	T=24	T=48	T=72	T=24	T=48	T=72	T=24	T=48	T=72
TY PEIPAH (0721)											
Nov.	03/12	69	256	351	192	10	-15	15	-15	10	-20
	03/18	59	231	194	232	-5	5	20	0	-10	-25
	04/00	11	231	172	245	0	10	5	0	-10	-10
	04/06	0	192	257	341	0	10	0	0	-10	0
	04/12	0	186	313	350	-5	15	-10	5	-15	10
	04/18	0	170	333	329	-5	5	-15	5	-5	20
	05/00	0	222	353	324	0	0	-17	0	0	25
	05/06	21	277	336	302	0	-5	-24	-5	5	30
	05/12	31	273	305	302	5	-15	-28	-10	15	30
	05/18	31	271	325		5	-15		-10	20	
	06/00	11	138	119		5	-12		-5	20	
	06/06	0	46	91		-10	-14		10	25	
	06/12	25	124	224		-20	-18		20	25	
	06/18	22	123			-20			25		
	07/00	86	177			-12			20		
	07/06	116	208			-9			20		
	07/12	65	134			0			0		
	07/18	21									
	08/00	11									
	08/06	25									
	08/12	67									
	mean	32	192	260	291	-4	-4	-6	4	5	7
	sampl	21	17	13	9	17	13	9	17	13	9

Date/Time		Center Position (km)				Central Pressure (hPa)			Max. Wind (kt)		
	(UTC)	T=00	T=24	T=48	T=72	T=24	T=48	T=72	T=24	T=48	T=72
TS TAPAH (0722)											
Nov.	12/00	0									
	12/06	0									
	12/12	158									
	mean	53	0	0	0	0	0	0	0	0	0
	sampl	3	0	0	0	0	0	0	0	0	0

Date/Time		Center Position (km)				Central Pressure (hPa)			Max. Wind (kt)		
	(UTC)	T=00	T=24	T=48	T=72	T=24	T=48	T=72	T=24	T=48	T=72
TY MITAG (0723)											
Nov.	20/12	39	55	40	97	9	30	20	-10	-30	-20
	20/18	0	103	122	239	10	20	5	-10	-20	-5
	21/00	0	81	110	188	5	10	5	-10	-10	-5
	21/06	31	58	151	266	20	10	5	-20	-10	-5
	21/12	58	86	141	242	20	10	0	-20	-10	-5
	21/18	66	92	179	239	10	0	0	-10	0	0
	22/00	0	85	141	202	5	0	-10	-5	0	5
	22/06	22	94	157	138	-5	-5	-15	5	5	10
	22/12	25	113	201	184	-10	-10	-10	5	0	5
	22/18	55	171	232	192	-5	-10	0	5	5	0
	23/00	66	140	167	243	-5	-15	-5	5	5	5
	23/06	31	34	75	95	0	-10	0	0	5	-5
	23/12	15	22	117	116	-15	-5	0	5	0	0
	23/18	11	139	234	175	-15	5	-5	10	-10	5
	24/00	0	132	131	232	-10	10	0	5	-10	5
	24/06	11	87	90	344	-10	0	-2	5	0	10
	24/12	21	25	123		-10	0		5	5	
	24/18	34	32	199		10	0		-10	0	
	25/00	49	109	255		5	-2		-5	5	
	25/06	57	77	269		0	-4		0	10	
	25/12	85	101			0			5		
	25/18	111	102			-5			10		
	26/00	11	46			-7			15		
	26/06	11	46			-9			20		
	26/12	78									
	26/18	67									
	27/00	164									
	27/06	79									
	mean	43	85	157	200		2	-1	0	-3	0
	sampl	28	24	20	16	24	20	16	24	20	16

Date/Time		Center Position (km)				Central Pressure (hPa)			Max. Wind (kt)		
	(UTC)	T=00	T=24	T=48	T=72	T=24	T=48	T=72	T=24	T=48	T=72
TY HAGIBIS (0724)											
Nov.	20/18	44	78	46	57	12	15	5	-15	-20	-10
	21/00	66	25	86	70	15	10	-5	-20	-15	0
	21/06	33	31	134	25	15	0	-10	-20	-5	5
	21/12	40	56	133	110	10	0	-15	-10	-5	10
	21/18	33	99	126	128	5	-5	-15	-10	0	10
	22/00	22	171	183	122	0	-15	-22	0	15	25
	22/06	22	177	162	76	-5	-15	-24	5	15	30
	22/12	59	66	131	249	-5	-20	-24	0	15	25
	22/18	22	100	79	243	-15	-20	-26	10	15	30
	23/00	0	64	11	267	-20	-22	-26	15	20	30
	23/06	25	35	145	165	-10	-19	-21	10	25	30
	23/12	16	132	90	55	-10	-14	-16	10	20	25
	23/18	55	143	66	80	-5	-11	-11	5	20	20
	24/00	22	132	33	109	-2	-6	-11	5	15	20
	24/06	22	31	66	174	-4	-11	-16	10	20	25
	24/12	55	35	60		-4	-11		10	20	
	24/18	79	24	147		-6	-11		15	20	
	25/00	55	40	142	431	-6	-11	-18	15	20	25
	25/06	33	81	162		-11	-16		20	25	
	25/12	24	45			-11			20		
	25/18	22	177			-16			25		
	26/00	11	205	564		-11	-8		20	15	
	26/06	0	216			-11			15		
	26/12	44									
	26/18	33									
	27/00	24	196			-8			15		
	27/06	31									
	27/12										
	27/18										
	28/00	0									
	mean	32	98	128	148	-4	-10	-16	6	12	19
	sampl	28	24	20	16	24	20	16	24	20	16

Monthly and Annual Frequencies of Tropical Cyclones

Monthly and annual frequencies of tropical cyclones that attained TS intensity or higher in the western North Pacific and the South China Sea for 1951 - 2007

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
2004				1	2	5	2	8	3	3	3	2	29
2005	1		1	1	1		5	5	5	2	2		23
2006					1	1	3	7	3	4	2	2	23
2007				1	1		3	4	5	6	4		24
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

Code Forms of RSMC Products

(1) 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
GUST VgVgVg 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
GUST VgVgVg 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
GUST VgVgVg KT
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
GUST VgVgVg KT =

Notes:

a. Underlined parts are 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 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 (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 such as 'N', 'NNE', 'NE' and 'ENE'
SpSpSp	:	Speed of movement
PPPP	:	Central pressure

VmVmVm	:	Maximum sustained wind
VgVgVg	:	Maximum gust wind
RdRdRd	:	Radii of 30knots and 50knots wind
octant	:	Eccentric distribution of wind given in 8 azimuthal direction such as 'NORTH', 'NORTHEAST' and 'EAST'
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
GUST 080KT
50KT 40NM
30KT 240NM NORTHEAST 160NM SOUTHWEST
FORECAST
24HF 160000UTC 14.7N 113.7E 110NM 70%
MOVE WNW 11KT
PRES 965HPA
MXWD 070KT
GUST 100KT
48HF 170000UTC 16.0N 111.0E 170NM 70%
MOVE WNW 07KT
PRES 970HPA
MXWD 065KT
GUST 095KT
72HF 180000UTC 19.5N 110.0E 250NM 70%
MOVE NNW 09KT
PRES 985HPA
MXWD 050KT
GUST 070KT =

(2) 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=84 (or 90)	LaLa.La N LoLoLo.Lo E (or W) appp	HPA	awww KT=

Notes:

a. Underlined parts are fixed.

b. Symbolic letters

i i	:	'20', '21', '22', '23', '24' or '25'
YYGGgg	:	Initial time of the model in UTC
class	:	Intensity classification of the tropical cyclone 'T', 'STS', 'TS' or 'TD'
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 hPa
www	:	Absolute value of change in maximum wind speed from T=0, in knots

c. The prediction terminates in T=84 for Typhoon Model and in T=90 for Global Model. As from 21 November 2007, only Global Model is used and all predictions terminates in T=84.

Example:

```
FXPQ20 RJTD 180600
RSMC GUIDANCE FOR FORECAST
NAME TY 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=
```

(3) 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
YYGGg	:	Time of observation submitting the data for analysis in UTC
nt nt	:	Serial number of the tropical cyclone in order of its formation in the year given in '01' - '99'
LaLaLa	:	Latitude given in 0.1°
Qc	:	Quadrant of the earth. 1: N/E, 2: S/E, 3: S/W and 4: N/W
LoLoLoLo	:	Longitude in 0.1°
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=

(4) 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.=

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

FKPQ i i RJTD YYGGgg	
TC ADVISORY	
DTG:	yyyymmdd/time Z
TCAC:	TOKYO
TC:	name
NR:	number
PSN:	N LaLa.LaLa E LoLoLo.LoLo
MOV:	direction SpSpSp KT
C:	PPPP HPA
MAX WIND:	WWW KT
FCST PSN +6HR:	YY/GGgg Z NLaLa.LaLa ELoLoLo.LoLo*
FCST MAX WIND +6HR:	WWW KT*
FCST PSN +12HR:	YY/GGgg Z NLaLa.LaLa ELoLoLo.LoLo
FCST MAX WIND +12HR:	WWW KT
FCST PSN +18HR:	YY/GGgg Z NLaLa.LaLa ELoLoLo.LoLo*
FCST MAX WIND +18HR:	YY/GGgg Z NLaLa.LaLa ELoLoLo.LoLo*
FCST PSN +24HR:	YY/GGgg Z N LaLa.LaLa E LoLoLo.LoLo
FCST MAX WIND +24HR:	WWW KT
NXT MSG:	yyyymmdd/time Z
RMK:	NIL =

* 6 hour and 18 hour forecasts are added from 22 May 2008.

Notes:

a. Underlined parts are fixed.

b. Abbreviations
DTG : Date and time

TCAC	:	Tropical Cyclone Advisory Centre
TC	:	Tropical Cyclone
NR	:	Number
PSN	:	Position
MOV	:	Movement
C	:	Central 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) in UTC (Using “Z”)
yyyymmdd/time	:	Year(yyyy), month(mm), date(dd), hour and minute (time) in UTC (Using “Z”)
name	:	Name assigned to the tropical cyclone by RSMC Tokyo-Typhoon Center
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 such as 'N', 'NNE', 'NE' and 'ENE'
SpSpSp	:	Speed of movement. “SLW” for less than 3 kt “STNR” for less than 1 kt.
PPPP	:	Central pressure
WWW	:	Maximum sustained wind

Example:

FKPQ30 RJTD 160600
TC ADVISORY

DTG:	20040416/0600Z
TCAC:	TOKYO
TC:	SUDAL
NR:	47
PSN:	N2830 E15855
MOV:	ENE 25KT
C:	985HPA
MAX WIND:	50KT
FCST PSN +12HR:	16/1800Z N3150 E15855
FCST MAX WIND 12HR:	50KT
FCST PSN +18HR:	NIL
FCST MAX WIND 18HR:	NIL
FCST PSN +24HR:	17/0600Z N3500 E16700
FCST MAX WIND 24HR:	45KT
NXT MSG:	20040416/1200Z
RMK:	NIL =

(6) 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 parts are fixed.

b. [1)] REMARKS is given optionally.

c. Symbolic letters

MMM	:	Month in UTC given such as 'JAN' and 'FEB'
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	2.5×2.5 degrees	1.25×1.25 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	For 00 and 12 UTC: 0, 6, 12, 18, 24, 30, 36, 48, 60 and 72 hours	For 00 and 12 UTC: 0 – 84 (every 6 hours) For 12 UTC only: * 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	Globe		Globe
Resolution	2.5×2.5 degrees		1.25×1.25 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) 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	For 00 and 12 UTC: 24, 48 and 72 hours For 12 UTC only: 96 – 192 (every 24 hours) * 96 and 120 only	For 00 and 12 UTC: 0 hours (analysis) * 00UTC only	For 00 and 12 UTC: 0 – 84 (every 6 hours) For 12 UTC only: 96 – 192 (every 12 hours)
Frequency (initial times)	Twice a day (00 and 12 UTC)		Twice a day (00 and 12 UTC)

Area	Globe
Resolution	2.5×2.5 degrees
Levels and elements	Surface (P) 1000hPa (Z) 850hPa (T, U, V) 500hPa (Z) 250hPa (U, V) *Above GPVs consists of ensemble mean and standard deviation of ensemble forecast members.
Forecast hours	0 – 192 hours (every 12 hours)
Frequency (initial times)	Once a day (12 UTC)

Notes:

P:	pressure reduced to mean sea level	R:	total precipitation	RH:	relative humidity
T:	temperature	TTd:	dew point depression	U:	u-component of wind
V:	v-component of wind	Z:	geopotential height	ζ:	relative vorticity
χ:	velocity potential	ψ:	stream function	ω:	vertical velocity

Products/ Data	Satellite data	Typhoon Information	Global Wave Model	Observational data
Contents	MTSAT-1R data (GRIB) • High density atmospheric motion vector (VIS, IR, WV)	Tropical cyclone related information (BUFR) • tropical cyclone analysis data	• Significant wave height • Prevailing wave period • Prevailing wave direction (GRIB) Forecast hours: 0, 6, 12, 18, 24, 30, 36, 42, 48, 54, 60, 66, 72, 78, 84 (for 00 and 12 UTC); 96, 108, 120, 132, 144, 156, 168 ,180 and 192 hours (for 12 UTC)	(a) Surface data (SYNOP, SHIP) (b) Upper-air data (TEMP, parts A-D) (PILOT, parts A-D)
Frequency (initial times)	VIS: twice a day (00 and 06UTC) IR and WV: 4 times a day (00, 06, 12 and 18UTC)	4 times a day (00, 06, 12 and 18 UTC)	Twice a day (00 and 12 UTC)	(a) Mostly 4 times a day (b) Mostly twice a day

Appendix 7

User's Guide to the Attached CD-ROM

Preface

This CD-ROM contains all the texts, tables and charts of the RSMC Annual Report 2007 along with satellite images of the tropical cyclones that attained TS intensity or higher in the western North Pacific and the South China Sea in 2007. This document is a brief user's guide for to the CD-ROM, which was mastered in ISO-9660 format.

Directory and File layout

[Root]
|------ar405eng.exe (Acrobat Reader Installer)
|------Readme.txt (brief explanation of the CD-ROM)
|------TopMenu.exe (start menu setup program)
|------SATAIDmanual.pdf (user manual for the satellite image viewer)
|------Annual_Report
        |---Text (text of Annual Report 2007 in PDF)
        |---Figure (figures for MS PowerPoint)
        |---Table (tables for MS Excel)
        |---Appendix (appendices for MS Excel and PowerPoint)
|------Programs
        |---Gmslpd
                |--Gmslpd.exe (viewer; tropical cyclone version in English)
                |--Gsetup.exe (setup programs)
|------Satellite_Image_Data
        |---T0701 (three-hourly satellite image data)
        |---T0702 (three-hourly satellite image data)
                :
        |---T0724 (three-hourly satellite image data)
|------Andata
        |--Besttrack
                |--E_BST_2007.txt (best track data for 2007)
                |--E_BST_200704.txt (best track data for TCs generated in April 2007)
                        :
                |--E_BST_200611.txt (best track data for TCs generated in November 2007)

How to use the CD-ROM

A start menu will be launched if you enter the CD-ROM or click TopMenu.exe file. The start menu includes buttons marked *Annual Report 2007*, *MTSAT Satellite Image*, *About CD-ROM* and *Close* as well as a *File List Box* for introductory documents. Click the button or the file name of the content you wish to see and follow the instructions on the display.

Hardware/OS requirements for using the CD-ROM:

Hardware : PC/AT compatible
OS : Microsoft Windows ver. 3.1 or later

< Annual Report 2007 >

Annual Report 2007 is provided in two formats as PDF files and MS Word/Excel/PowerPoint files.

- PDF files:

Click the *Annual Report 2007* button to open the text in PDF. If you cannot open the PDF file, install Adobe Acrobat Reader using the installer (ar405eng.exe) in the file list box of the start menu window and try again. Adobe Acrobat Reader (or Adobe Acrobat) is required to view PDF files.

- Word/Excel/PowerPoint files:

The original figures and tables prepared with Microsoft Word, Excel or PowerPoint are contained in the Annual Report folder of the CD-ROM.

< MTSAT Satellite Image >

- Installation of the program for displaying satellite images

Click the *MTSAT Satellite Image* button to run the setup program (Gsetup.exe) for the satellite image viewer. Follow the instructions, and the satellite image viewer *Gmslpd.exe* will be installed onto the computer's hard disk. A list of the tropical cyclones occurring in 2007 is displayed in the selection window of the satellite images for tropical cyclones.

- Displaying satellite images

Choose and click a tropical cyclone from the list to see three-hourly satellite images of it. You can also display the track of the tropical cyclone superimposed onto the satellite image and measure its intensity using the Dvorak method.

- User manual for the viewer

Besides the above features, the viewer has many other useful functions. See the User Manual (SATAIDmanual.pdf) for further details on its use.

- Explanation of satellite image data

Period : From the generation stage to the weakening stage of each tropical cyclone
Images : Infrared images (at 00, 03, 06, 09, 12, 15, 18 and 21 UTC)

	Visible images (at 00, 03, 06, 09 and 21 UTC)
Range	: 40 degrees in both latitude and longitude (The image window moves to follow the track of the tropical cyclone so that its center remains in the middle of the window.)
Time interval	: Three-hourly
Resolution	: 0.08 degrees in both latitude and longitude
Compression of file	: Compressed using the *compress.exe* command of Microsoft Windows

< About CD-ROM >

Click the *About CD-ROM* button to open the *Readme.txt* file.

< Close >

Click the *Close* button to close the start menu window.

< File list box >

Document files can be opened from the file list box in the start menu window. Choose a file and click the *Open* button, or simply double-click the file name.

For further information, please contact:

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