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ANNUAL TYPHOON REPORT



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GUAM, MARIANA ISLANDS

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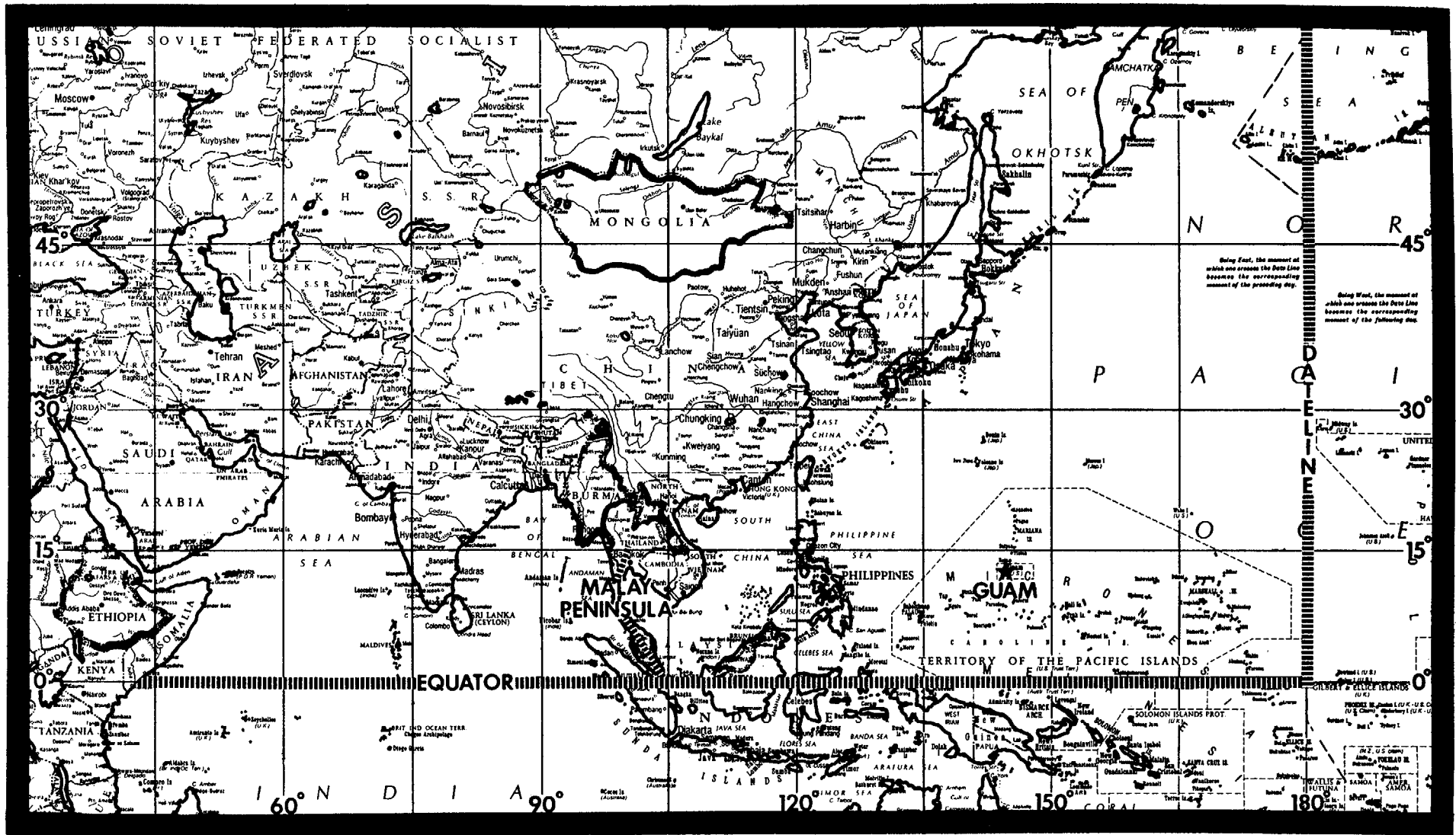
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AREA OF RESPONSIBILITY - JOINT TYPHOON WARNING CENTER, GUAM

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1978
ANNUAL TYPHOON REPORT

*Departed during 1978

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

FOREWORD

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

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

1. Provide continuous meteorological watch of all tropical activity north of the equator, west of the Date Line, and east of the African coast (JTWC area of responsibility) for potential tropical cyclone development;
2. Provide warnings for all significant tropical cyclones in the assigned area of responsibility;
3. Determine tropical cyclone reconnaissance requirements and assign priorities;
4. Conduct an annual post analysis of all tropical cyclones occurring within the area north of the equator from 140W west to the coast of Africa and prepare an Annual Typhoon Report for issuance to interested agencies; and

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

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

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

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

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

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CHAPTER I - OPERATIONAL PROCEDURES

1. GENERAL

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

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

2. DATA SOURCES

a. COMPUTER PRODUCTS:

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

b. CONVENTIONAL DATA:

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

c. AIRCRAFT RECONNAISSANCE:

Aircraft weather reconnaissance data are invaluable in the positioning of centers of developing systems and essential for the accurate determination of the eye/center, maximum intensity, minimum sea-level pressure and radius of significant winds exhibited by tropical cyclones. Winds and pressure height data at the 500 and/or 400 mb level, provided by reconnaissance aircraft while enroute to, or returning from, fix missions, is also used

to supplement the sparse data in the tropics and subtropics. These data are plotted on large-scale sectional charts for each mission flown. A comprehensive discussion of aircraft weather reconnaissance is presented in Chapter II.

d. SATELLITE RECONNAISSANCE:

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

e. RADAR RECONNAISSANCE:

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

3. COMMUNICATIONS

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

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

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

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

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

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

4. ANALYSES

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

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

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

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

5. FORECAST AIDS

a. CLIMATOLOGY:

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

b. OBJECTIVE TECHNIQUES:

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

- (1) TYFN75
- (2) MOHATT 700/500
- (3) FCSTINST
- (4) 12 HR EXTRAPOLATION

(5) CLIMATOLOGY

(6) HPAC

(7) TROPICAL CYCLONE MODEL

(8) INJAH74

(9) CYCLOPS

(10) TYAN78

6. FORECASTING PROCEDURES

a. INITIALIZATION:

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

b. TRACK FORECASTING:

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

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

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

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

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

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

c. INTENSITY FORECASTING:

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

7. WARNINGS

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

tions are verified against the corresponding post analysis "best track" positions. A summary of the verification results for 1978 is presented in Chapter IV.

8. PROGNOSTIC REASONING MESSAGE

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

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

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

9. SIGNIFICANT TROPICAL WEATHER ADVISORY

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

10. TROPICAL CYCLONE FORMATION ALERT

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

CHAPTER II - RECONNAISSANCE & FIXES

1. GENERAL

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

2. RECONNAISSANCE AVAILABILITY

a. Aircraft:

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

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

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

(3) Supplementary fixes.

(4) Synoptic data acquisition."

As in previous years, aircraft reconnaissance provided direct measurements of height, temperature, flight-level winds, sea level pressure, estimated surface winds (when observable) and numerous additional parameters. The meteorological data are gathered by the Aerial Reconnaissance Weather Officers

(ARWO) and dropsonde operators of Detachment 4, Hq AWS who crew with the 54th. These data provide the Typhoon Duty Officer (TDO) indications of changing cyclone characteristics, radius of cyclone associated winds, and present cyclone position and intensity. Another important aspect of this data is its availability for research in tropical cyclone analysis and forecasting. Aircraft reconnaissance will become even more important in years to come when high-resolution tropical cyclone dynamic steering programs will require a dense input of wind and temperature data.

b. Satellite

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

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

c. Radar

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

3. AIRCRAFT RECONNAISSANCE SUMMARY

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

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

TABLE 2-1. AIRCRAFT RECONNAISSANCE EFFECTIVENESS		
EFFECTIVENESS	NUMBER OF FIXES	PERCENT
COMPLETED ON TIME	272	93.8
EARLY	6	2.1
LATE	10	3.4
MISSED	2	0.7
TOTAL	290	100.0

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

4. SATELLITE RECONNAISSANCE SUMMARY

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

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

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

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

TABLE 2-2. POSITION CODE NUMBERS	
PCN	METHOD OF CENTER DETERMINATION/GRIDDING
1	EYE/GEOGRAPHY
2	EYE/EPHEMERIS
3	WELL DEFINED CC/GEOGRAPHY
4	WELL DEFINED CC/EPHEMERIS
5	POORLY DEFINED CC/GEOGRAPHY
6	POORLY DEFINED CC/EPHEMERIS

CC=Circulation Center

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

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

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

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

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

5. RADAR RECONNAISSANCE SUMMARY

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

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

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

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

6. TROPICAL CYCLONE FIX DATA

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

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

FIX NO. - Sequential fix number

TABLE 2-4. FIX PLATFORM SUMMARY

	FIX PLATFORM						TOTAL
	AIRCRAFT	DMSP	NOAA-5	GOES	LAND RADAR	ACFT RADAR	
WESTERN PACIFIC							
TS MADINE	9	29	24	3	-	-	65
TY OLIVE	25	66	23	-	17	-	131
TS POLLY	15	58	12	-	124	-	209
TS ROSE	7	25	7	-	-	-	39
TS SHIRLEY	-	21	6	-	-	-	28
TY TRY	29	84	18	-	-	-	131
TY VIRGINIA	36	85	6	-	42	-	169
TY WENDY	26	130	7	-	100	-	263
TS AGNES	-	63	6	-	50	-	119
TS RONNIE	-	15	4	-	-	-	19
TY CARMEN	22	104	12	-	125	-	263
TS DELIA	6	22	2	-	-	-	30
TD 24	6	24	6	-	2	-	38
TY ELAINE	12	38	14	-	24	-	88
TY FAYE	45	87	6	-	9	-	147
TS GABRIELA	7	36	1	-	-	-	44
TS HESTER	1	11	-	-	-	-	12
TY IRMA	7	41	-	-	72	2	122
TY JUDY	14	50	-	-	-	-	64
TS KIT	12	50	-	-	-	-	62
TY LOLA	17	90	-	-	29	-	136
TY MAMIE	12	38	-	-	-	-	50
TS NINA	16	74	-	-	34	-	124
TY ORA	18	59	-	-	96	-	173
TD 26	-	17	-	-	-	-	17
TD 27	2	28	-	-	-	-	30
TY PHYLLIS	6	58	-	-	-	1	65
TS RITA	43	110	3	5	115	-	276
TS TESS	17	42	-	-	-	-	59
TD 32	-	36	-	-	-	-	36
TY VIOLA	22	70	-	-	-	-	92
TS WINDIE	12	28	-	-	-	-	40
TOTAL	446	1709	157	8	648	4	3172
% OF TOTAL NO. OF FIXES	14.3	53.9	4.9	.3	26.7	.1	100
INDIAN OCEAN							
TC 18-78	-	21	-	-	-	-	21
TC 19-78	-	13	-	-	-	-	13
TC 20-78	-	30	-	6	-	1	37
TC 21-78	-	40	-	6	-	-	46
TOTAL	0	104	0	12	1	0	117
% OF TOTAL NO. OF FIXES	0	88.9	0	10.2	.9	0	100

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

TIME (Z) - GMT time in day, hours and minutes
 FIX POSITION - Latitude and longitude to the nearest tenth of a degree

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

a. Satellite

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

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

FOR TROPICAL TODAY'S T-NUMBER
 CURRENT INTENSITY INDICATION OF ONGOING CHANGE
 PLUS
 T () / () MINUS / S () / () hrs
 LEAVE W
 PAST CHANGE
 AMOUNT OF PAST CHANGE
 HOURS SINCE PREVIOUS OBS.

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

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

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

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

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

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

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

b. Radar

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

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

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

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

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

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

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

c. Aircraft

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

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

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

$$SLP (MB) = .115 (700 \text{ mb HGT} [M]) + 645$$

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

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

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

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

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

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

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

CHAPTER III - SUMMARY OF TROPICAL CYCLONES

1. WESTERN NORTH PACIFIC TROPICAL CYCLONES

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

Even though the 1978 season had a near-average number of cyclones (Tables 3-2 and 3-3), it was a season full of surprises. Ten of the tropical storms and typhoons exhibited erratic movement. Typhoon Carmen remained quasi-stationary for three days over the East China Sea. Typhoon Faye executed a large anticyclonic loop and subsequently underwent explosive deepening as the surface central pressure fell 18 mb in six hours. The most ill-behaved typhoon of the season, Trix, truly lived up to her name. As Tropical Storm Kit crossed Luzon, the surface circulation dissipated while the mid- and upper-level circulations continued across and eventually became aligned with a secondary or "lee-side" low that had formed

west of Luzon. Tropical Storms Hester and Phyllis attained post-recirculation speeds of 40 kt (74 km/hr) and 50 kt (93 km/hr), respectively, in extratropical transition. Typhoons Virginia and Mamie were unusually compact and could, thus, be termed midget typhoons. Virginia also traveled the farthest north (47N) while retaining tropical characteristics. Having first been detected in the central Pacific near 175W, Super Typhoon Rita traveled a record distance for the season (4142 nm (7671 km)), and was second overall only to Typhoon Sarah of 1976 (4499 nm (8332 km)).

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

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

TABLE 3-1.

WESTERN NORTH PACIFIC

1978 SIGNIFICANT TROPICAL CYCLONES

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

1978 TOTALS

131**



715

216

** OVERLAPPING DAYS INCLUDED ONLY ONCE IN SUM

JFWC



TABLE 3-2.


 FREQUENCY OF TYPHOONS BY MONTH AND YEAR
 

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

JTWC

TABLE 3-3.


 FREQUENCY OF TROPICAL STORMS AND TYPHOONS BY MONTH AND YEAR
 

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

JTWC

TABLE 3-4.

FORMATION ALERT SUMMARY

WESTERN NORTH PACIFIC

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

MONTHLY DISTRIBUTION

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

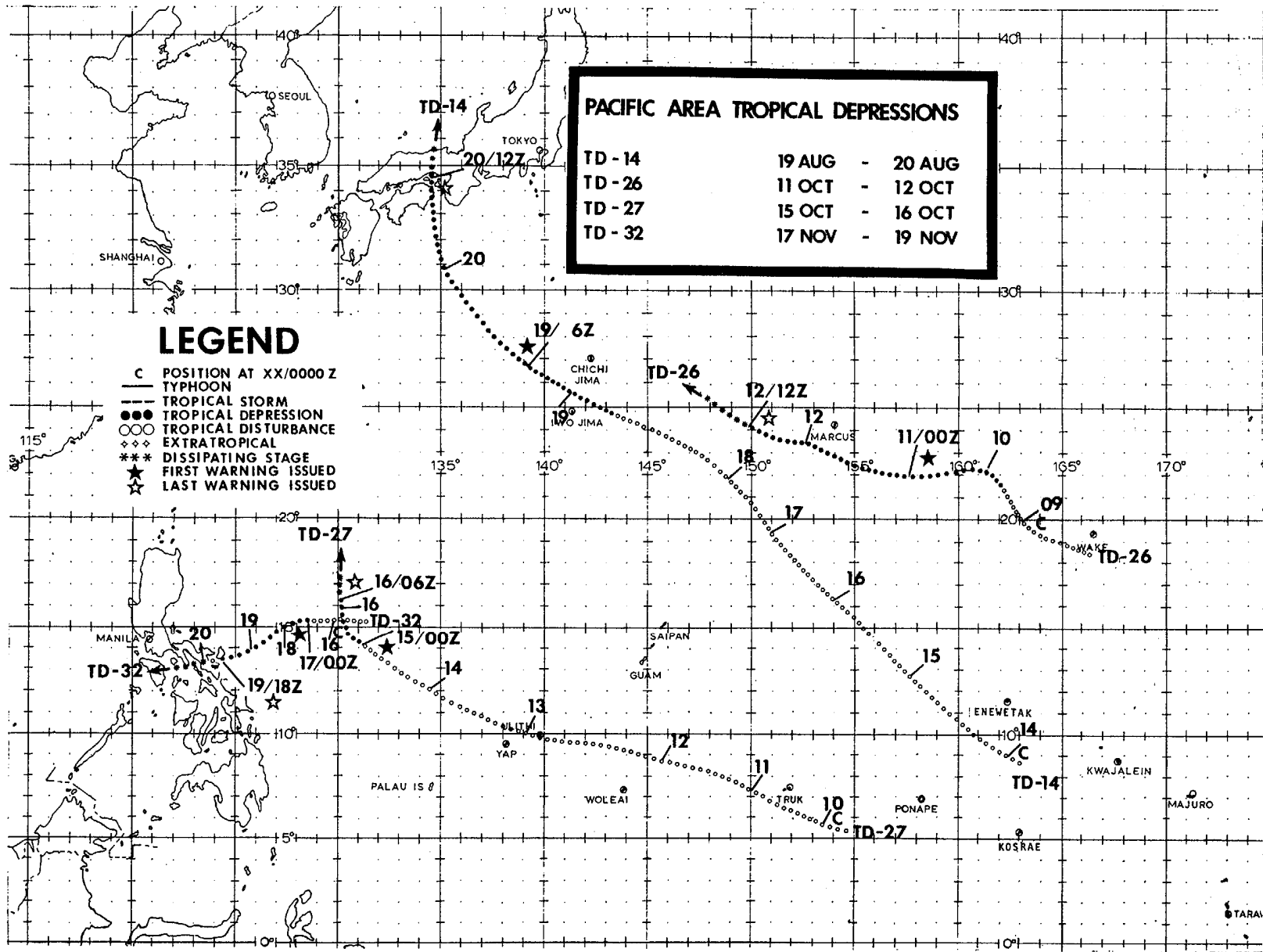
TABLE 3-5.

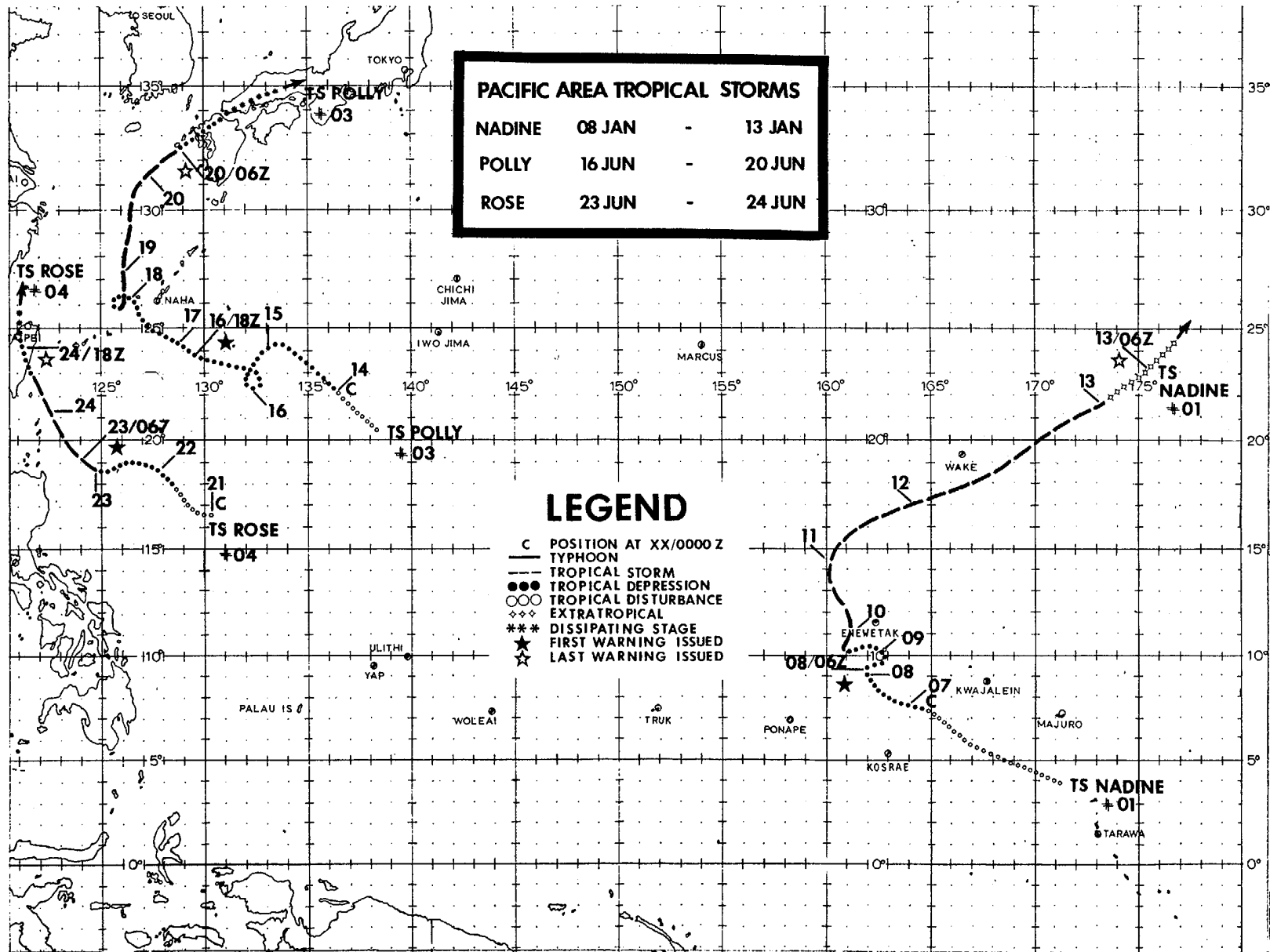
WARNING SUMMARY

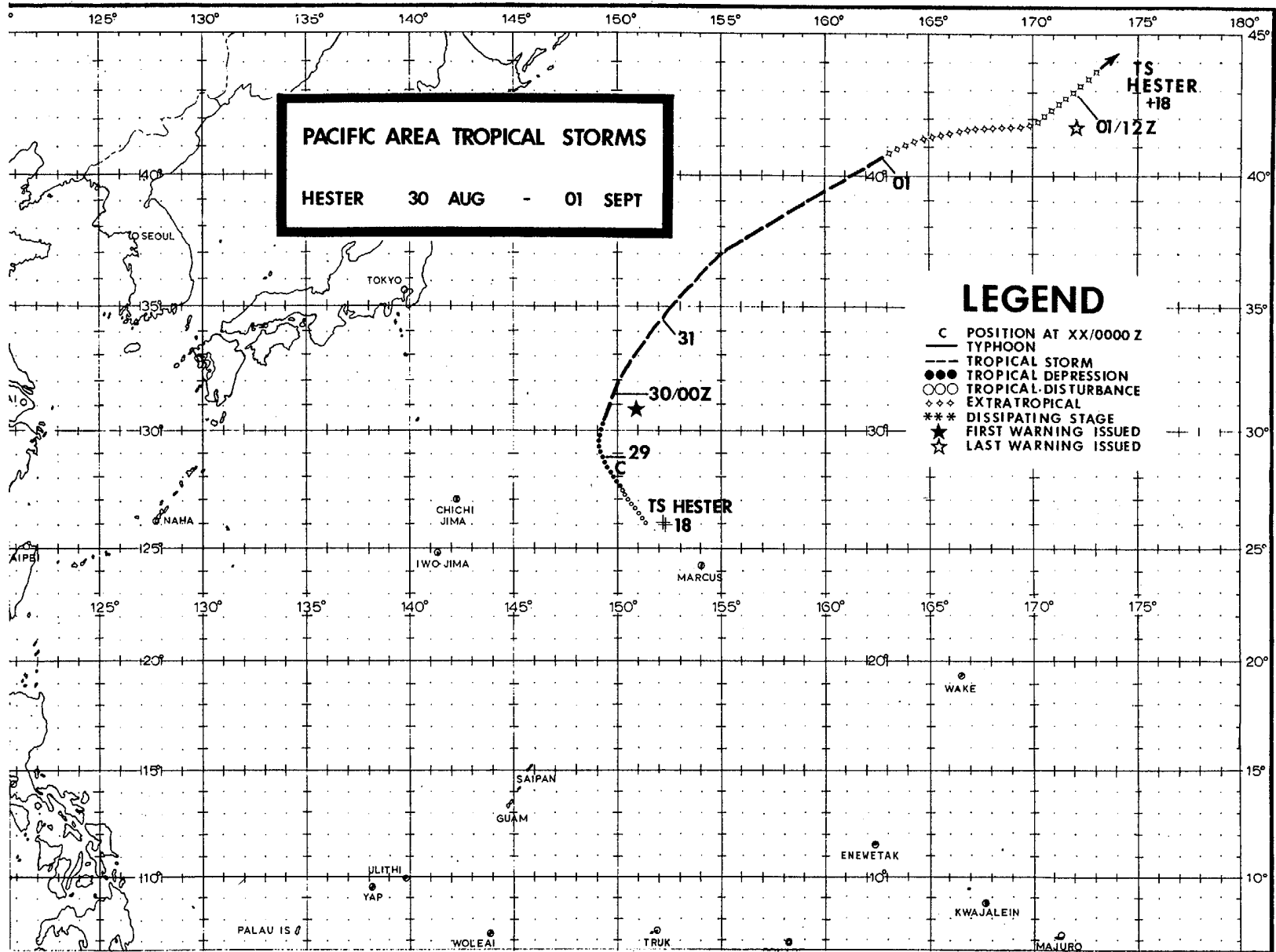
WESTERN NORTH PACIFIC

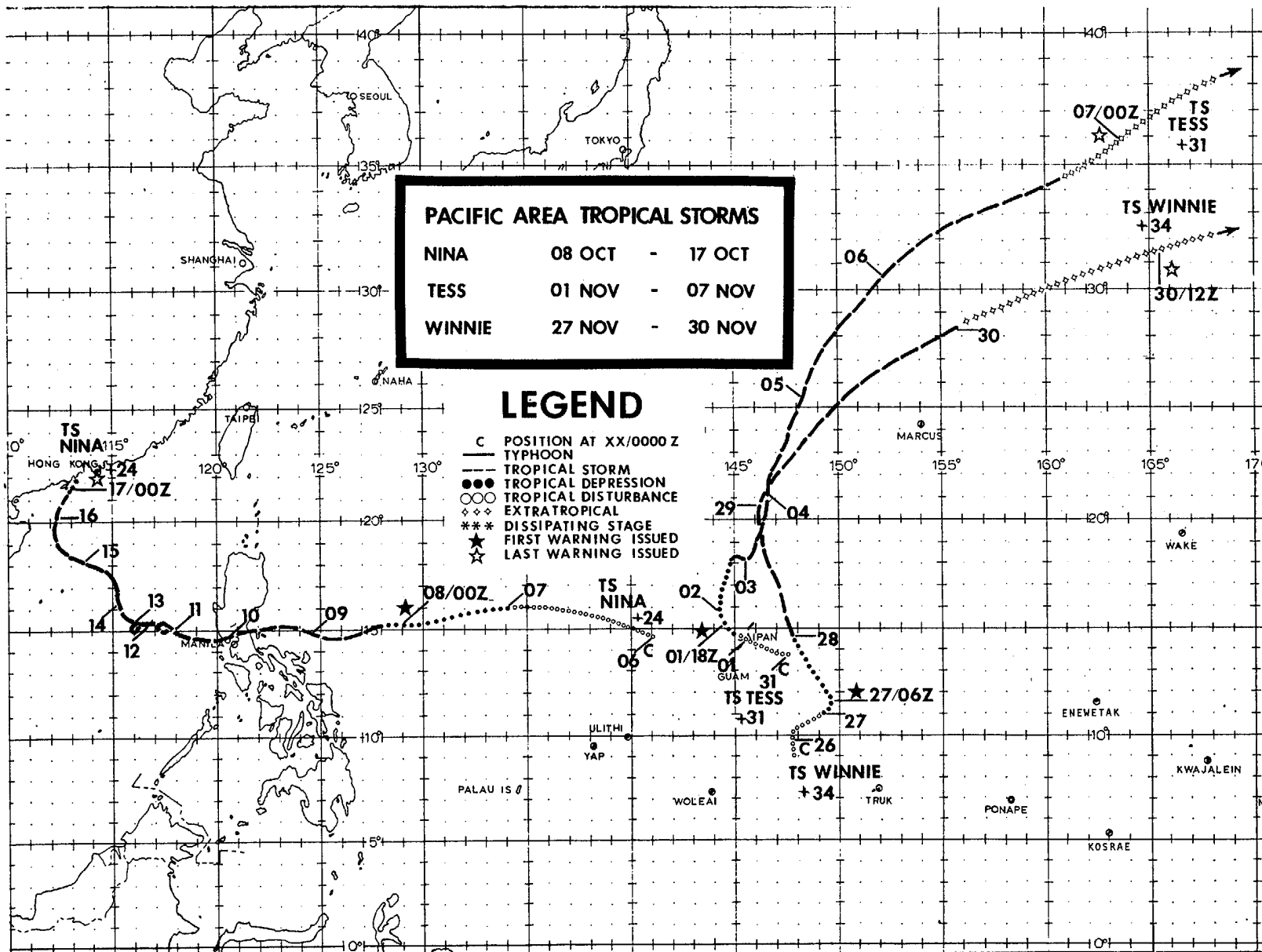
	<u>1978</u>	<u>AVERAGE 1959-1977</u>
TOTAL NUMBER OF WARNINGS	715	669
NUMBER OF WARNING DAYS	131	141
NUMBER OF WARNING DAYS WITH 2 OR MORE CYCLONES	46	46
NUMBER OF WARNING DAYS WITH 3 OR MORE CYCLONES	16	9
TROPICAL DEPRESSIONS	4	5
TROPICAL STORMS	13	11
TYPHOONS	15	19
TOTAL TROPICAL CYCLONES	32	35

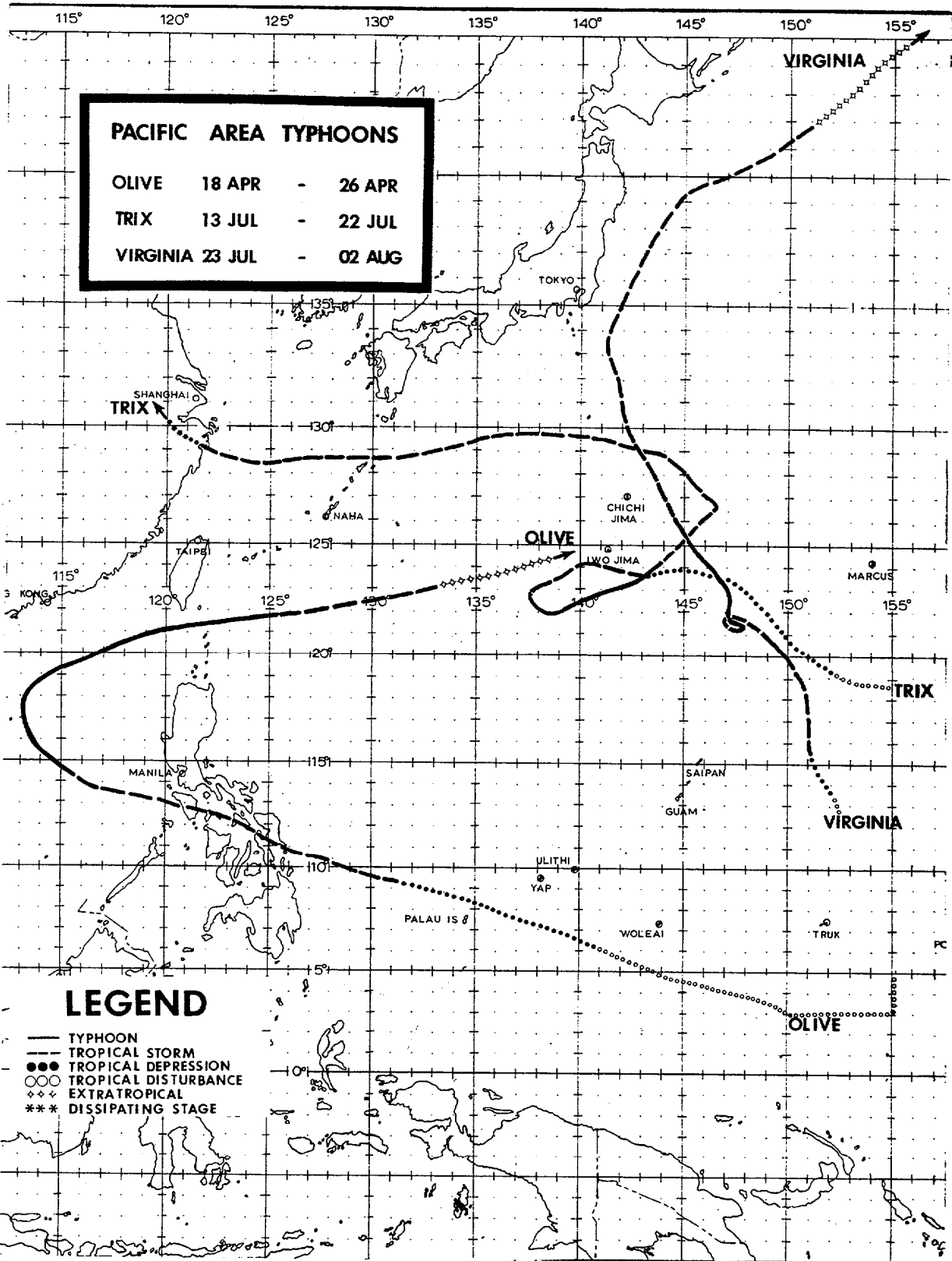
JTWC



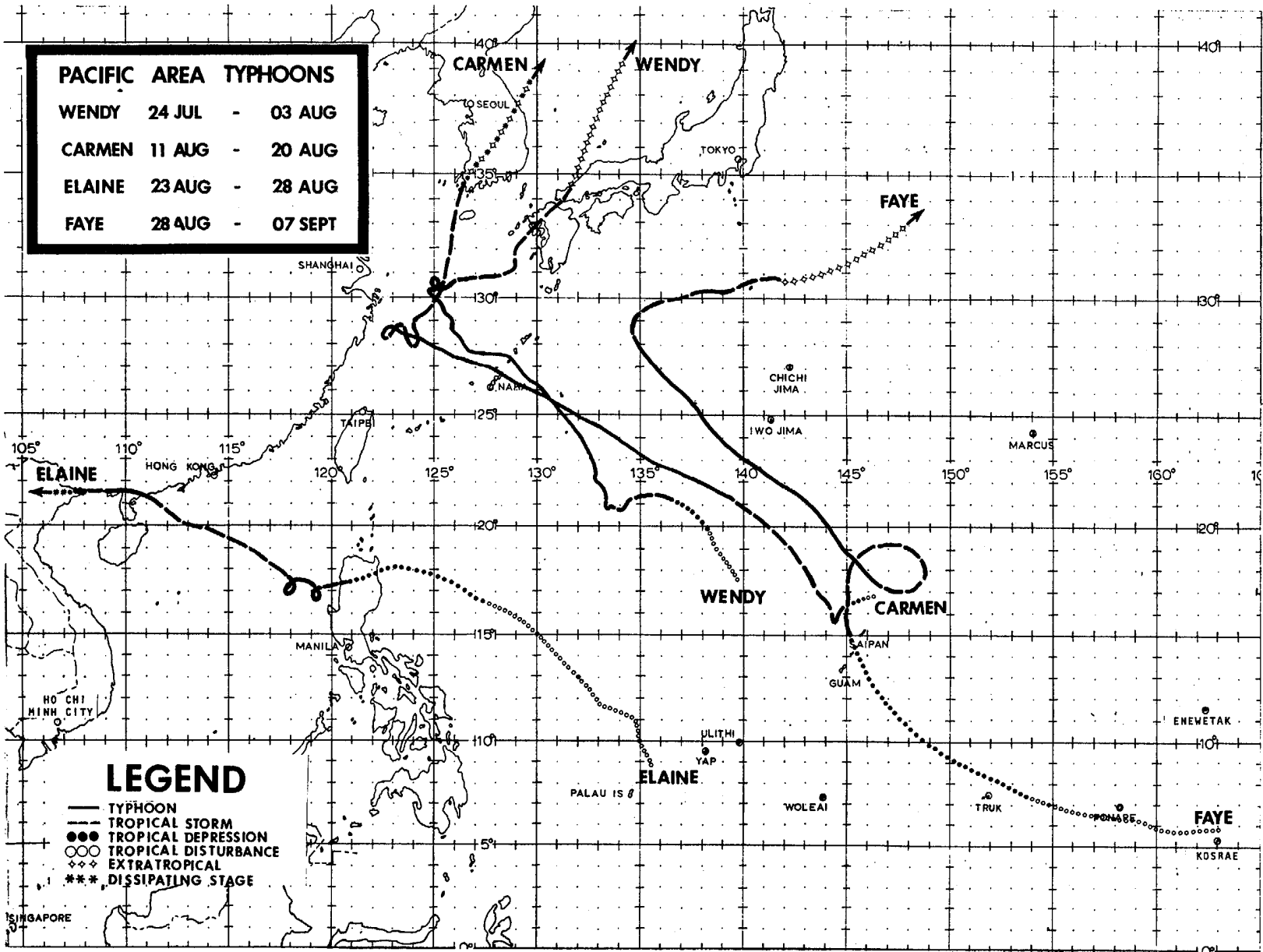






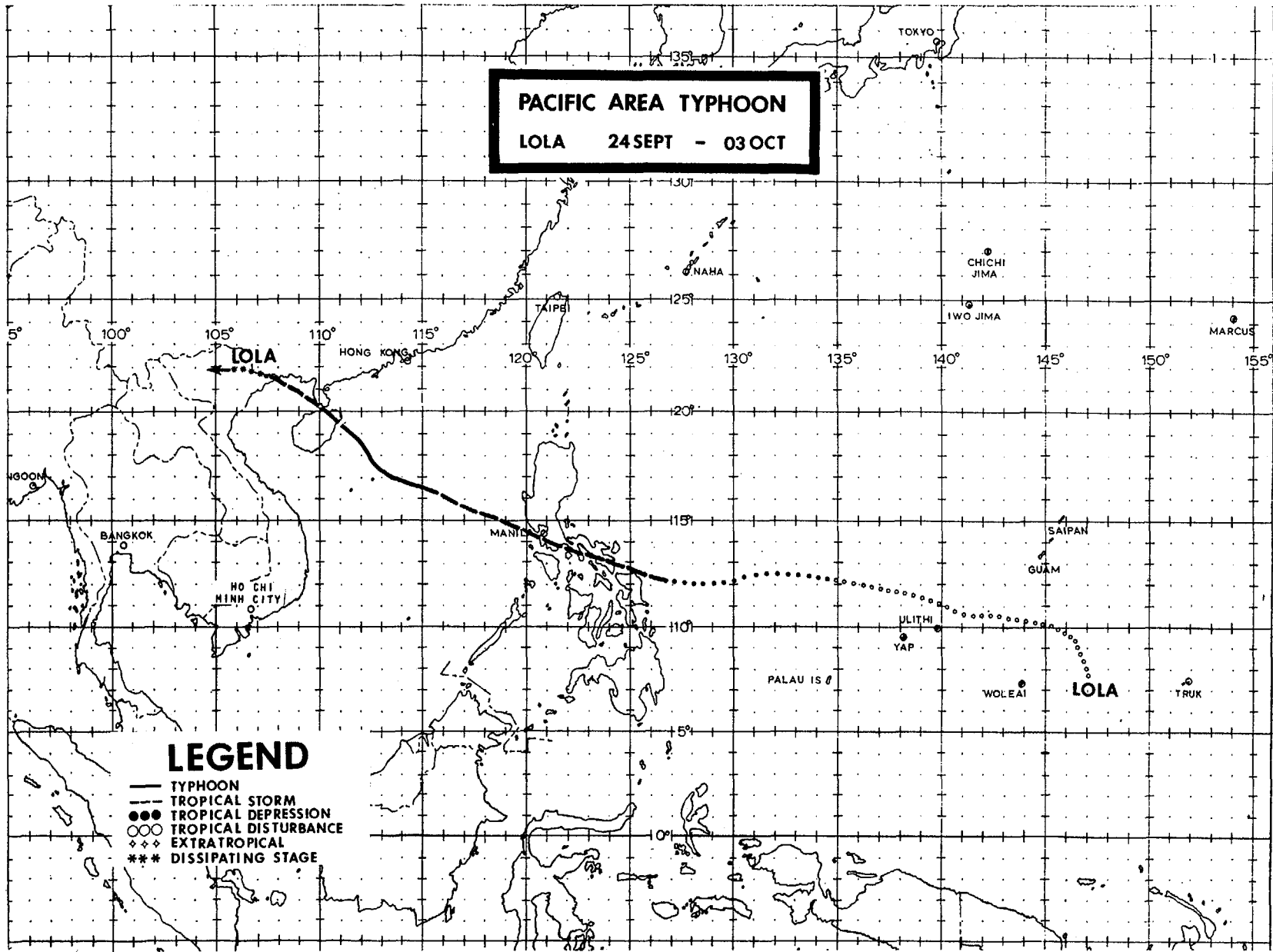


PACIFIC AREA TYPHOONS		
WENDY	24 JUL -	03 AUG
CARMEN	11 AUG -	20 AUG
ELAINE	23 AUG -	28 AUG
FAYE	28 AUG -	07 SEPT



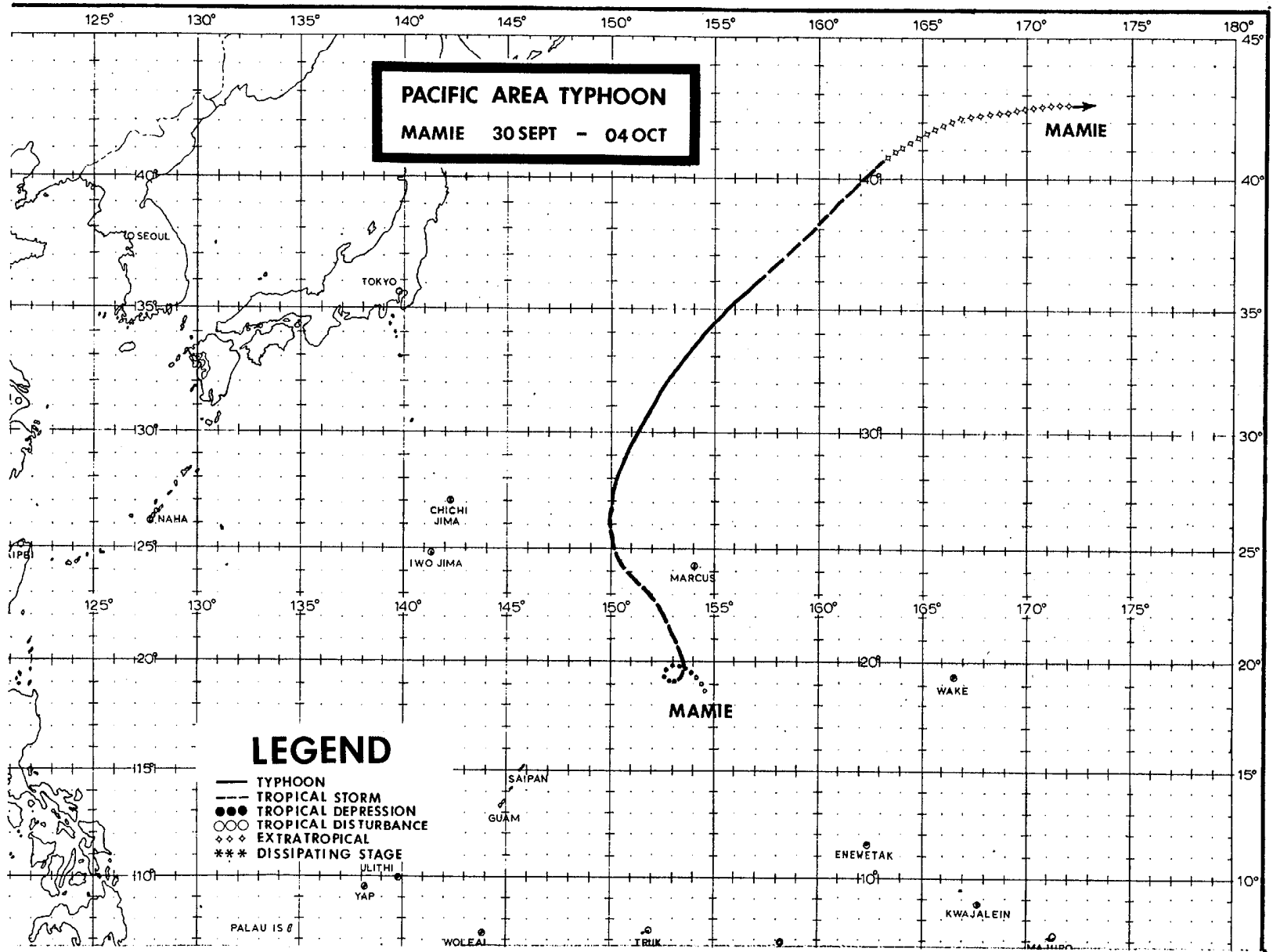
PACIFIC AREA TYPHOON
LOLA 24 SEPT - 03 OCT

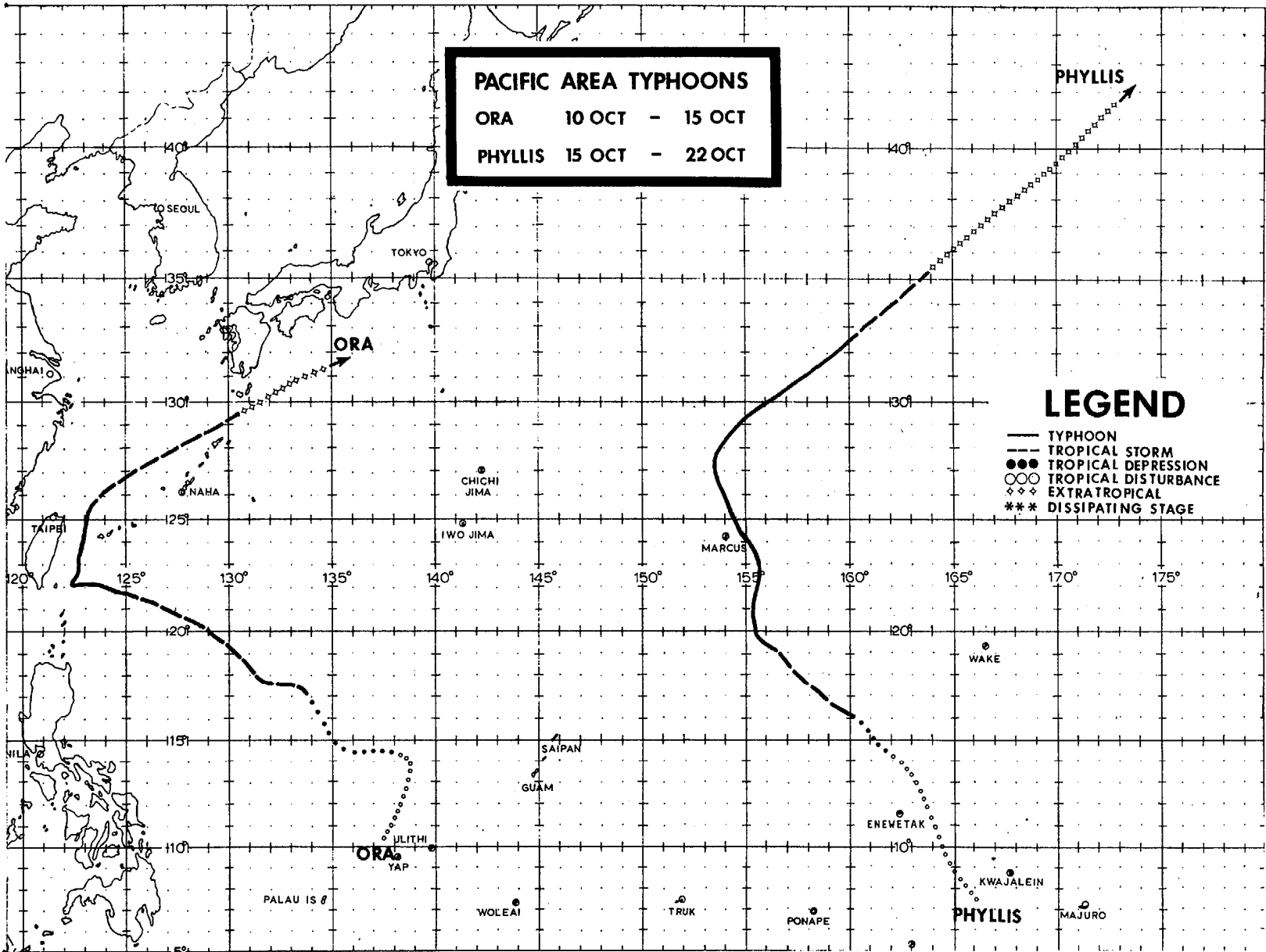
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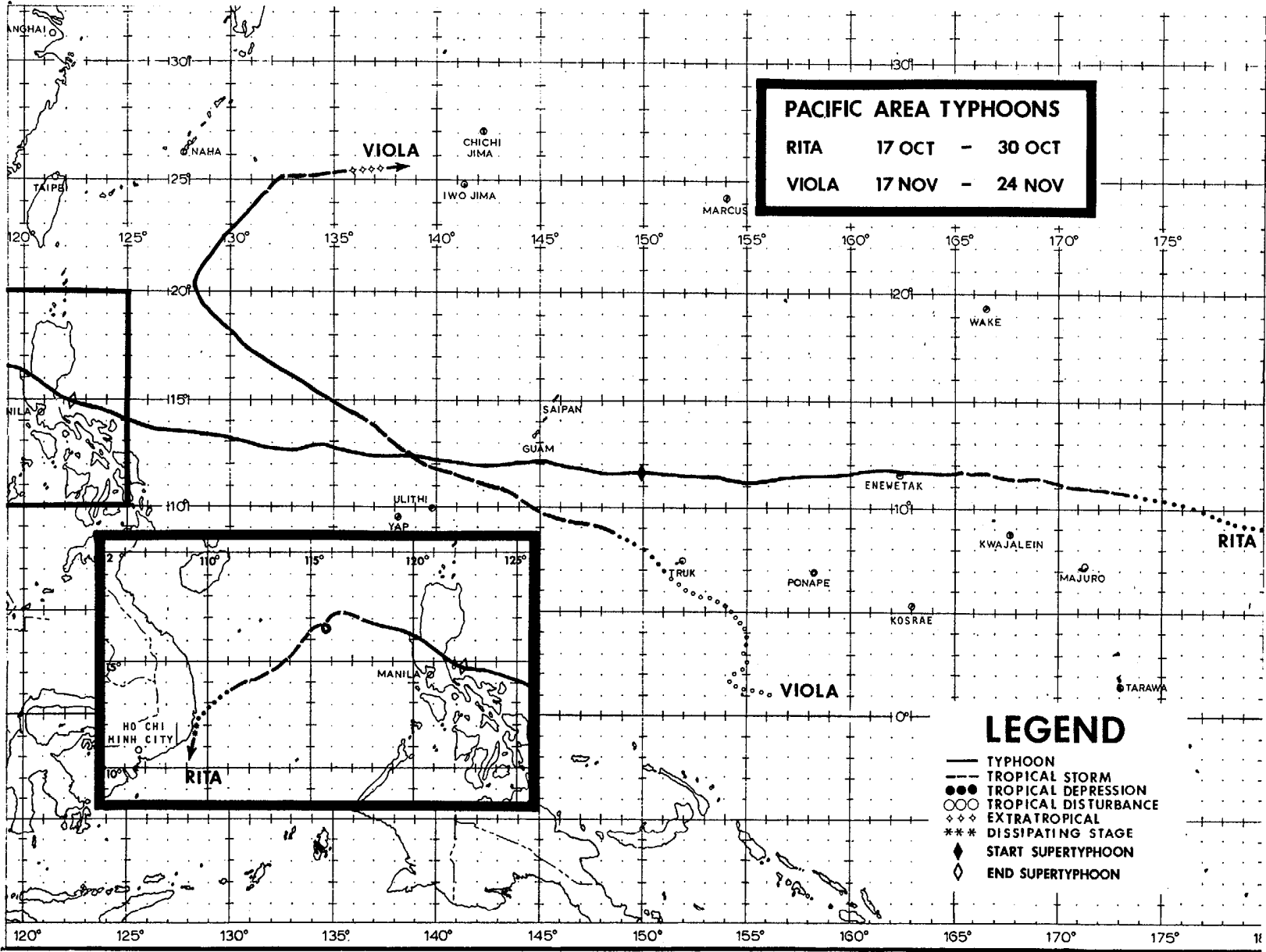


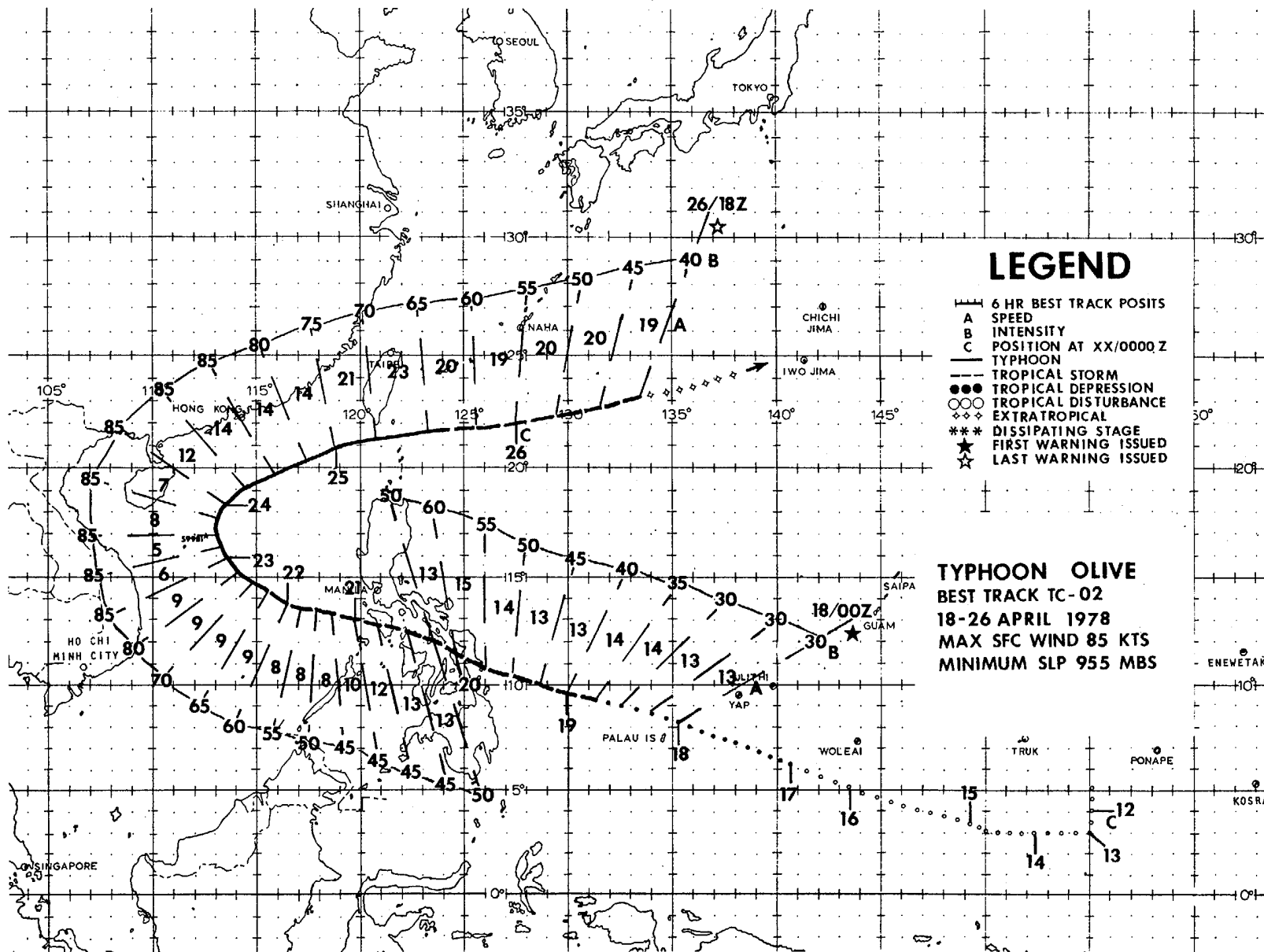
LEGEND

- TYPHOON
- - - TROPICAL STORM
- TROPICAL DEPRESSION
- TROPICAL DISTURBANCE
- ◇◇◇ EXTRATROPICAL
- *** DISSIPATING STAGE









LEGEND

- 6 HR BEST TRACK POSITS
- A SPEED
- B INTENSITY
- C POSITION AT XX/0000 Z
- TYPHOON
- TROPICAL STORM
- TROPICAL DEPRESSION
- TROPICAL DISTURBANCE
- ◆◆◆ EXTRATROPICAL
- *** DISSIPATING STAGE
- ★ FIRST WARNING ISSUED
- ☆ LAST WARNING ISSUED

TYPHOON OLIVE
 BEST TRACK TC-02
 18-26 APRIL 1978
 MAX SFC WIND 85 KTS
 MINIMUM SLP 955 MBS

TYPHOON OLIVE

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

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

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

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

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

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

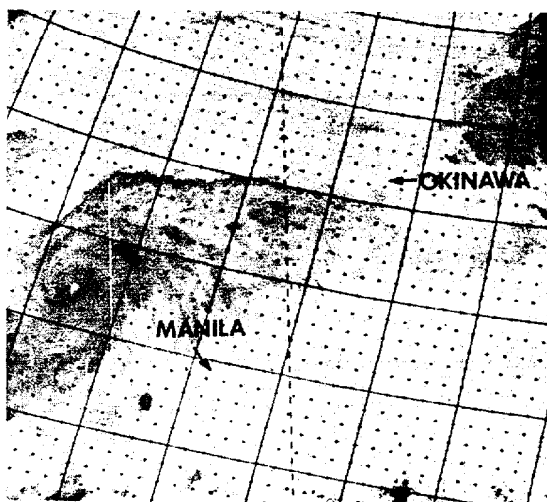


FIGURE 3-2. Infrared imagery of Typhoon Olive at maximum intensity of 85 kt (44 m/sec) during recurvature, 23 April 1978, 1158Z. (NOAA-5 imagery)

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

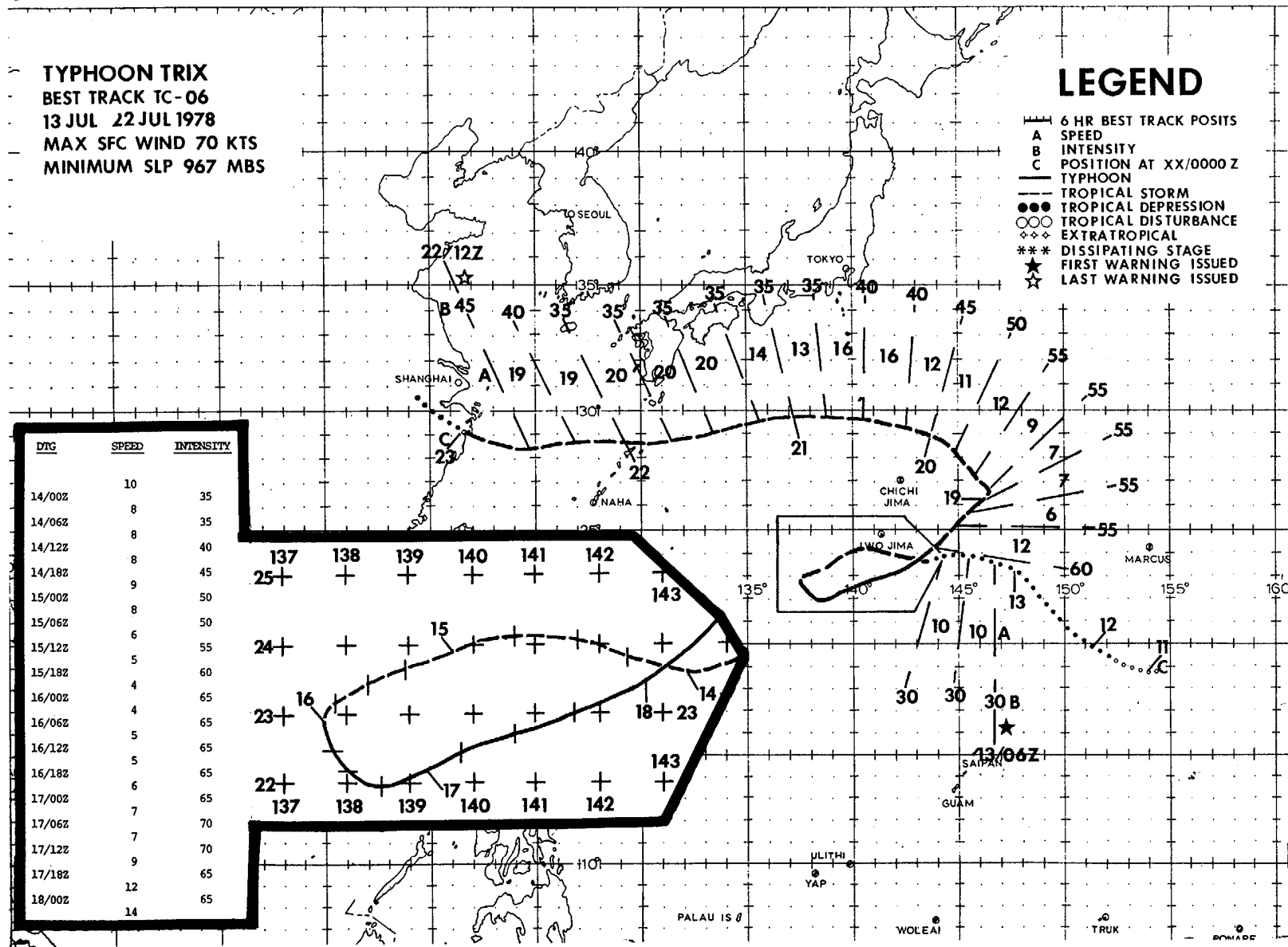
FIGURE 3-1. Three-hourly surface synoptic observations from the Paracel Islands during passage of Typhoon Olive.

100° 105° 110° 115° 120° 125° 130° 135° 140° 145° 150° 155° 160°

TYPHOON TRIX
BEST TRACK TC-06
13 JUL 22 JUL 1978
MAX SFC WIND 70 KTS
MINIMUM SLP 967 MBS

LEGEND

- 6 HR BEST TRACK POSITS
- A SPEED
- B INTENSITY
- C POSITION AT XX/0000 Z
- TYPHOON
- TROPICAL STORM
- TROPICAL DEPRESSION
- TROPICAL DISTURBANCE
- ◇◇◇ EXTRATROPICAL
- *** DISSIPATING STAGE
- ★ FIRST WARNING ISSUED
- ☆ LAST WARNING ISSUED



DTG	SPEED	INTENSITY
14/00Z	10	35
14/06Z	8	35
14/12Z	8	40
14/18Z	8	45
15/00Z	9	50
15/06Z	8	50
15/12Z	6	55
15/18Z	5	60
16/00Z	4	65
16/06Z	4	65
16/12Z	5	65
16/18Z	6	65
17/00Z	7	65
17/06Z	7	70
17/12Z	9	70
17/18Z	12	65
18/00Z	14	65

26

TYPHOON TRIX

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

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

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

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

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

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

$$V_{max} = 6.7(1010. - MSLP) \exp 0.644$$

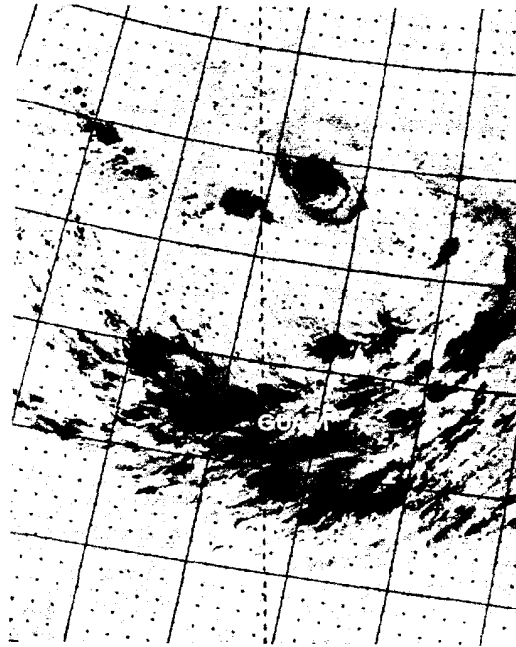


FIGURE 3-3. Infrared image of Trix at tropical storm intensity, 14 July 1978, 2220Z. The cloudiness over Guam in the deep convergent southwest flow is quite a distance from Trix, signifying the large extent of the cyclonic circulation in which Trix was embedded. (DMSP imagery)

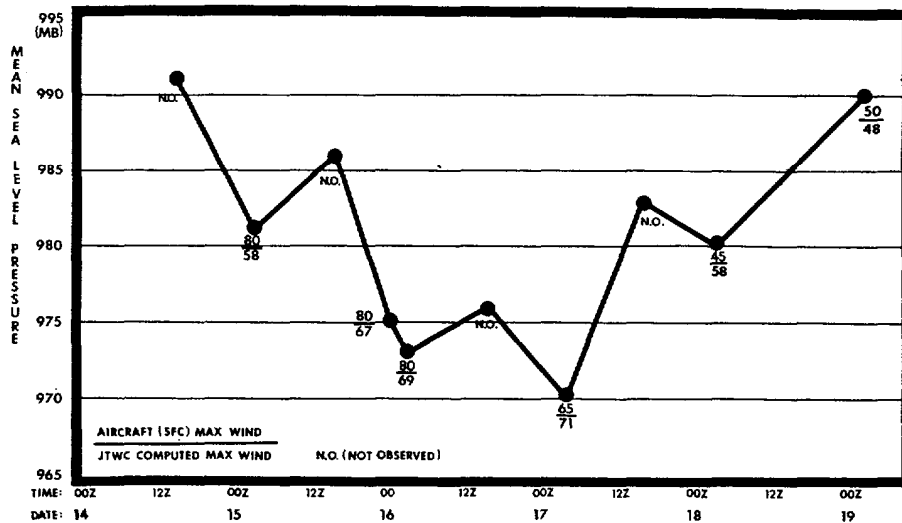


FIGURE 3-4. Time cross section of Trix's minimum sea level pressure.

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

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

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

A large, subtropical high pressure center began building near 40N-170W at 0000Z on the

19th. This feature finally provided the necessary strong easterlies to break Trix out of her loop by 0600Z on the 19th. Prior to this change in track, Trix had weakened again to tropical storm strength (on the 18th at 1200Z).

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

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

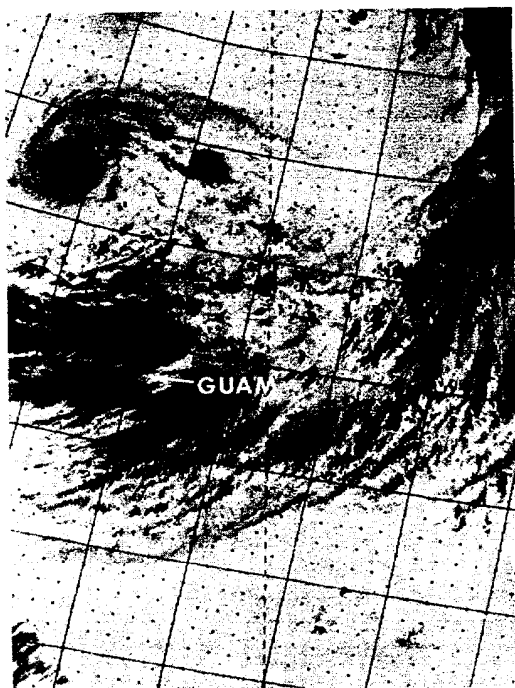


FIGURE 3-5 . Infrared image of Trix at typhoon intensity, still very compact, and still embedded in the larger circulation, 16 July 1978, 0107Z. (DMSP imagery).

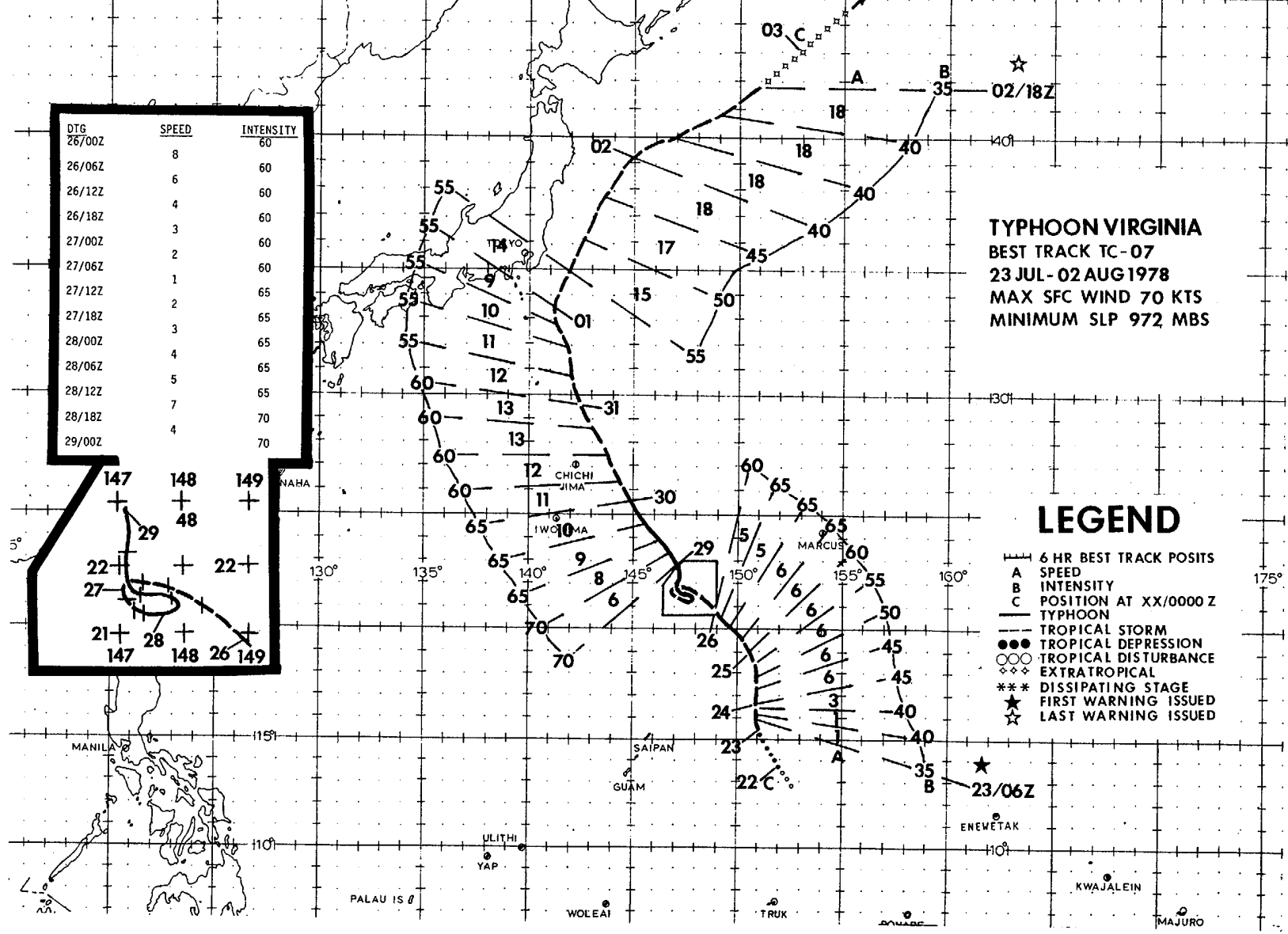
5° 120° 125° 130° 135° 140° 145° 150° 155° 160° 165° 170° 175°

DTG	SPEED	INTENSITY
26/00Z		60
26/06Z	8	60
26/12Z	6	60
26/18Z	4	60
27/00Z	3	60
27/06Z	2	60
27/12Z	1	65
27/18Z	2	65
28/00Z	4	65
28/06Z	5	65
28/12Z	7	65
28/18Z	4	70
29/00Z	4	70

TYPHOON VIRGINIA
 BEST TRACK TC-07
 23 JUL - 02 AUG 1978
 MAX SFC WIND 70 KTS
 MINIMUM SLP 972 MBS

LEGEND

- 6 HR BEST TRACK POSITS
- A SPEED
- B INTENSITY
- C POSITION AT XX/0000 Z
- TYPHOON
- - - TROPICAL STORM
- TROPICAL DEPRESSION
- TROPICAL DISTURBANCE
- *** DISSIPATING STAGE
- ★ FIRST WARNING ISSUED
- ☆ LAST WARNING ISSUED



29

TYPHOON VIRGINIA

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

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

Virginia and Wendy intensified simultaneously (Fig. 3-6). Because Wendy's circulation was so much larger, Virginia was expected to travel in a counter-clockwise direction

about Wendy. Virginia did travel as predicted for the first four days, but the speed of movement was slower than expected. During the next two days, Wendy moved northwestward away from Virginia and interaction between the two storms became less noticeable. Virginia continued to decrease in speed of movement and then executed a loop; Wendy and Virginia were separated by over 800 nm (1482 km) during the loop.

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

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

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

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

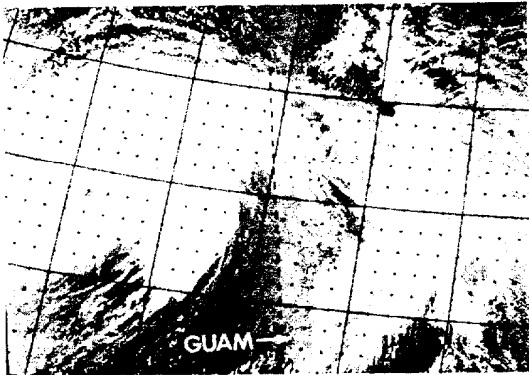


FIGURE 3-6. Early stages of Typhoons Wendy (left) and Virginia (right), 26 July 1978, 0133Z. (DMSPI imagery)

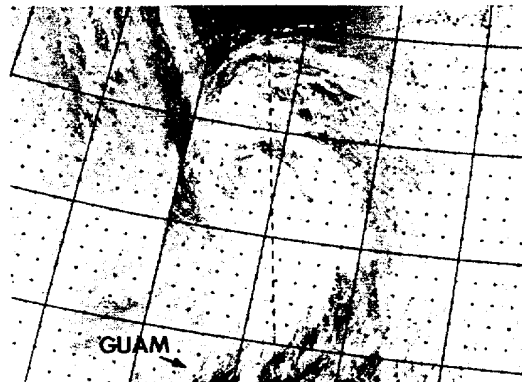
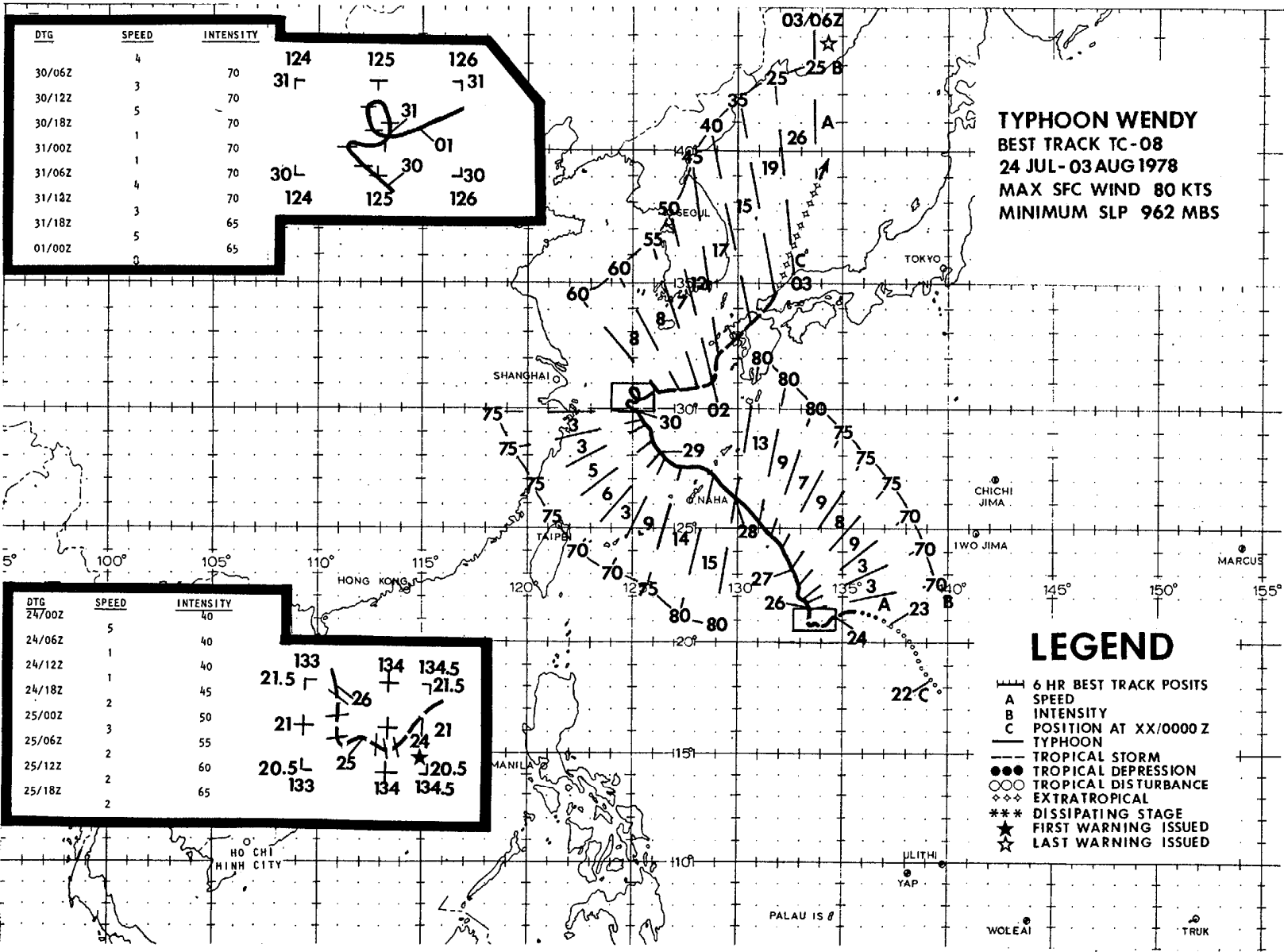


FIGURE 3-7. Typhoon Virginia at maximum intensity of 70 kt (36 m/sec) while undergoing strong TUTT interaction, 28 July 1978, 2141Z. (DMSPI imagery)



TYPHOON WENDY

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

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

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

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

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

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

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

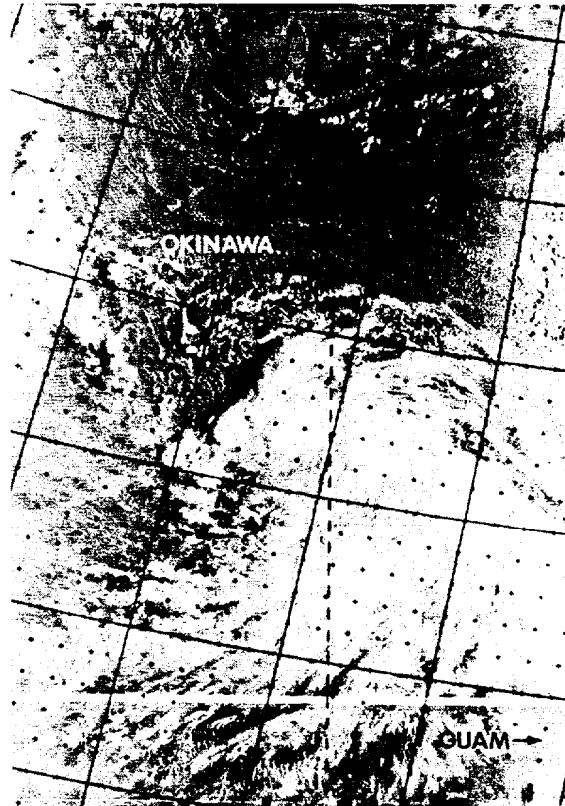
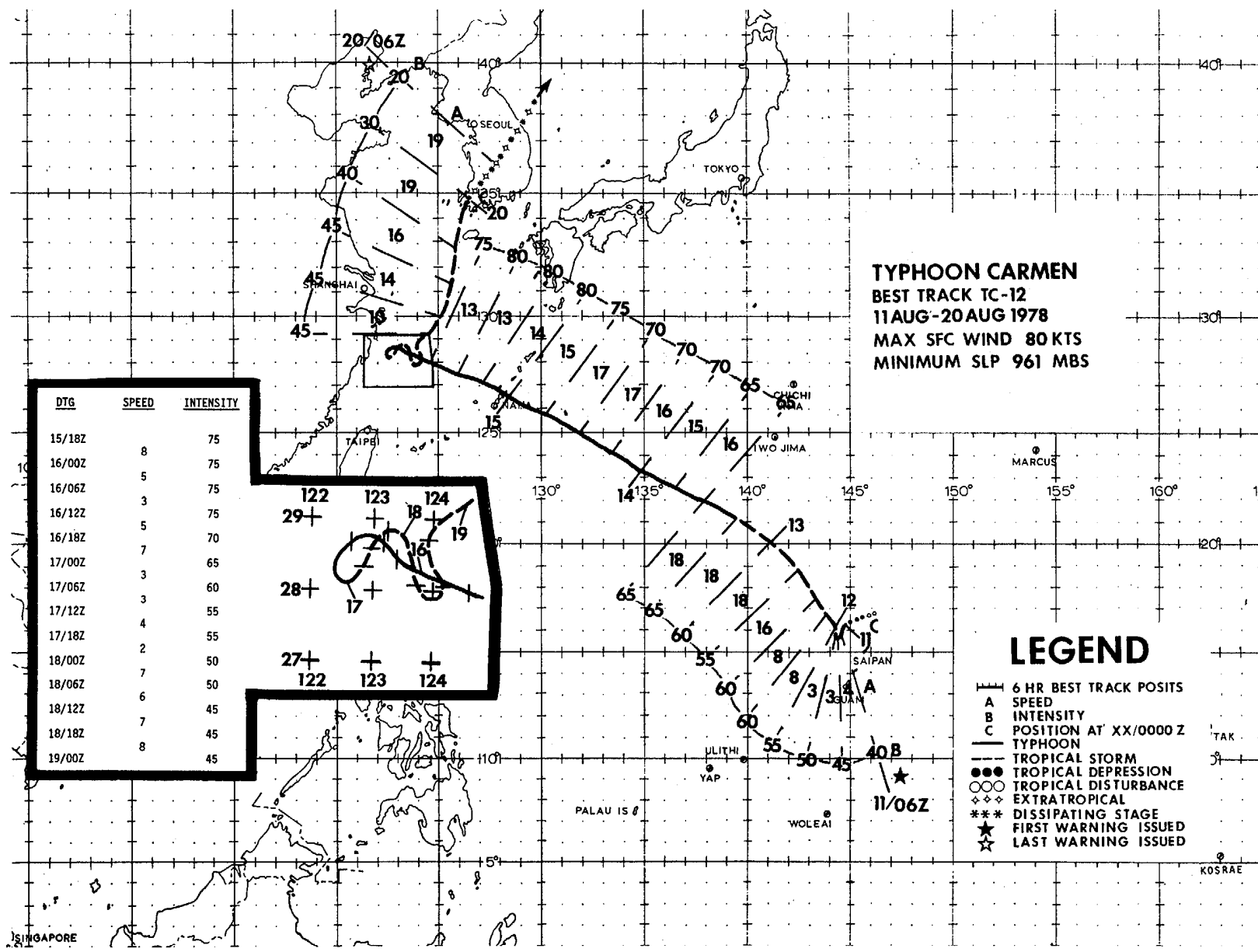


FIGURE 3-8 . Wendy as a young tropical storm, 23 July 1978, 2117Z. Typical of circulations in the monsoon trough, maximum cloudiness exists in the deep southwesterlies just south of the trough axis. (DMSP imagery)



SINGAPORE

KOSRAE

TYPHOON CARMEN

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

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

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

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

The TUTT also influenced Carmen's development rate. At 120000Z, Carmen was beginning to accelerate to the north-northwest with an intensity of 55 kt (28 m/sec). Three days later she had only intensified to

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

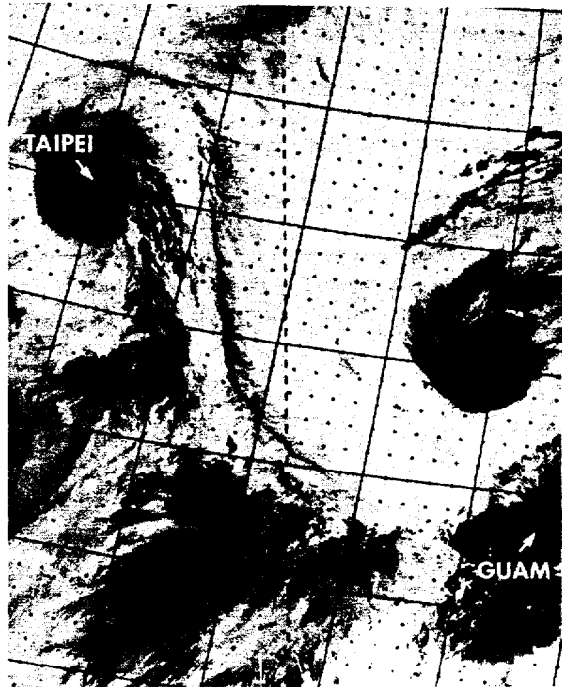


FIGURE 3-9. Infrared image of Typhoon Carmen (right) and Tropical Storm Della (left), 12 August 1978, 2134Z. (DMSP imagery)

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

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

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

26 nm (48 km) north of Kadena AB with little damage to DoD facilities.

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

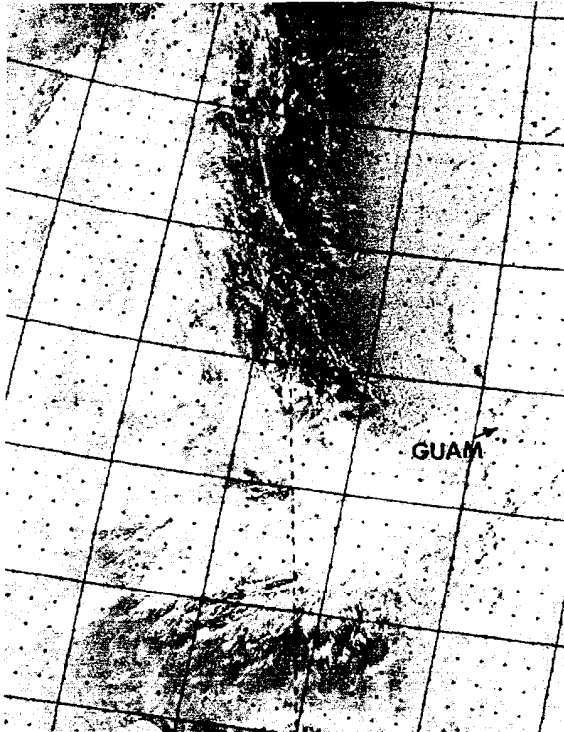


FIGURE 3-10. Restricted upper-level outflow over Carmen's western and southern quadrants, 11 August 1978, 2243Z. (DMSP imagery)

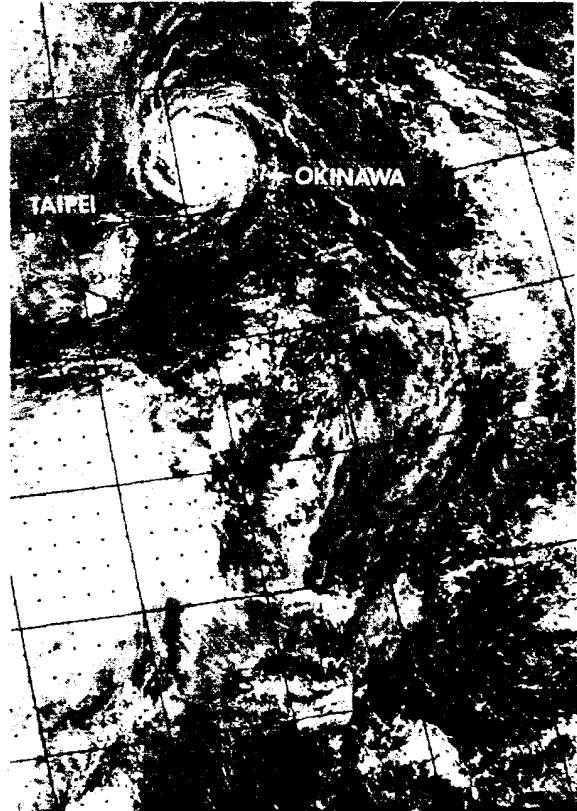
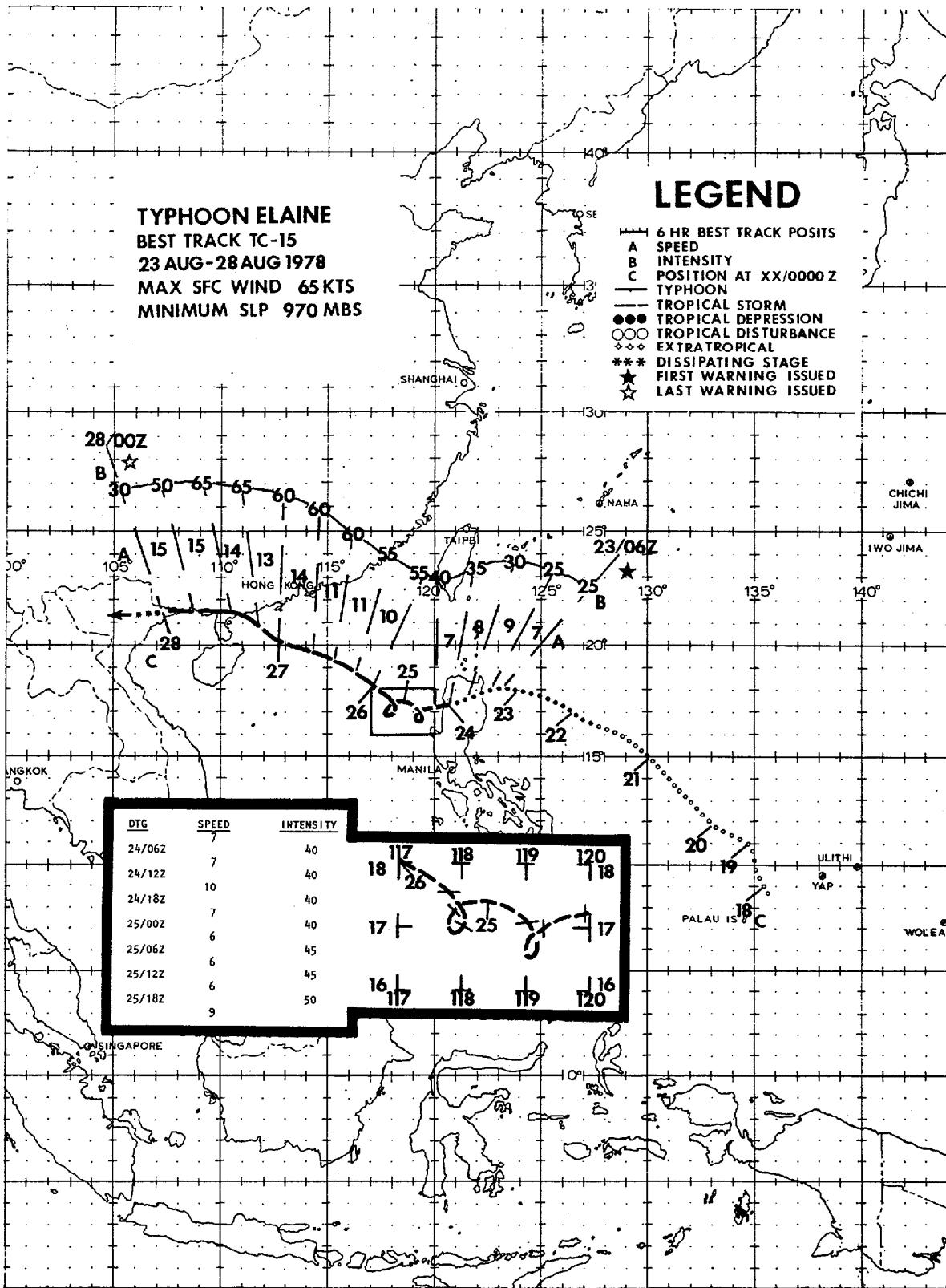


FIGURE 3-11. Carmen's small areal extent, 15 August 1978, 1505Z. (DMSP imagery)

TYPHOON ELAINE
BEST TRACK TC-15
23 AUG-28 AUG 1978
MAX SFC WIND 65 KTS
MINIMUM SLP 970 MBS

LEGEND

- 6 HR BEST TRACK POSITS
- A SPEED
- B INTENSITY
- C POSITION AT XX/0000 Z
- TYPHOON
- - - TROPICAL STORM
- TROPICAL DEPRESSION
- TROPICAL DISTURBANCE
- ◇◇◇ EXTRATROPICAL
- *** DISSIPATING STAGE
- ★ FIRST WARNING ISSUED
- ☆ LAST WARNING ISSUED



DTG	SPEED	INTENSITY
24/06Z	7	40
24/12Z	7	40
24/18Z	10	40
25/00Z	7	40
25/06Z	6	45
25/12Z	6	45
25/18Z	9	50

TYPHOON ELAINE

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

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

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

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

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

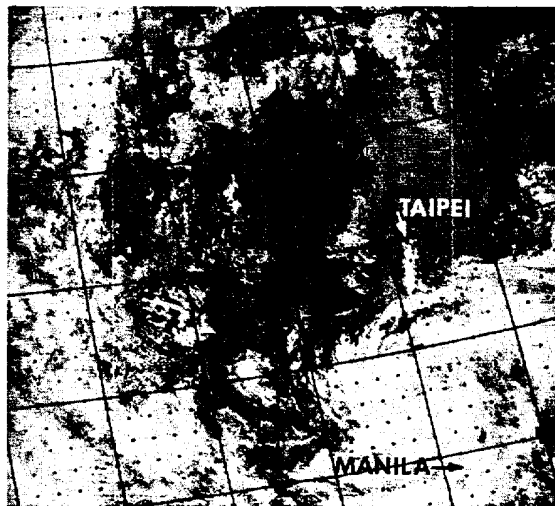
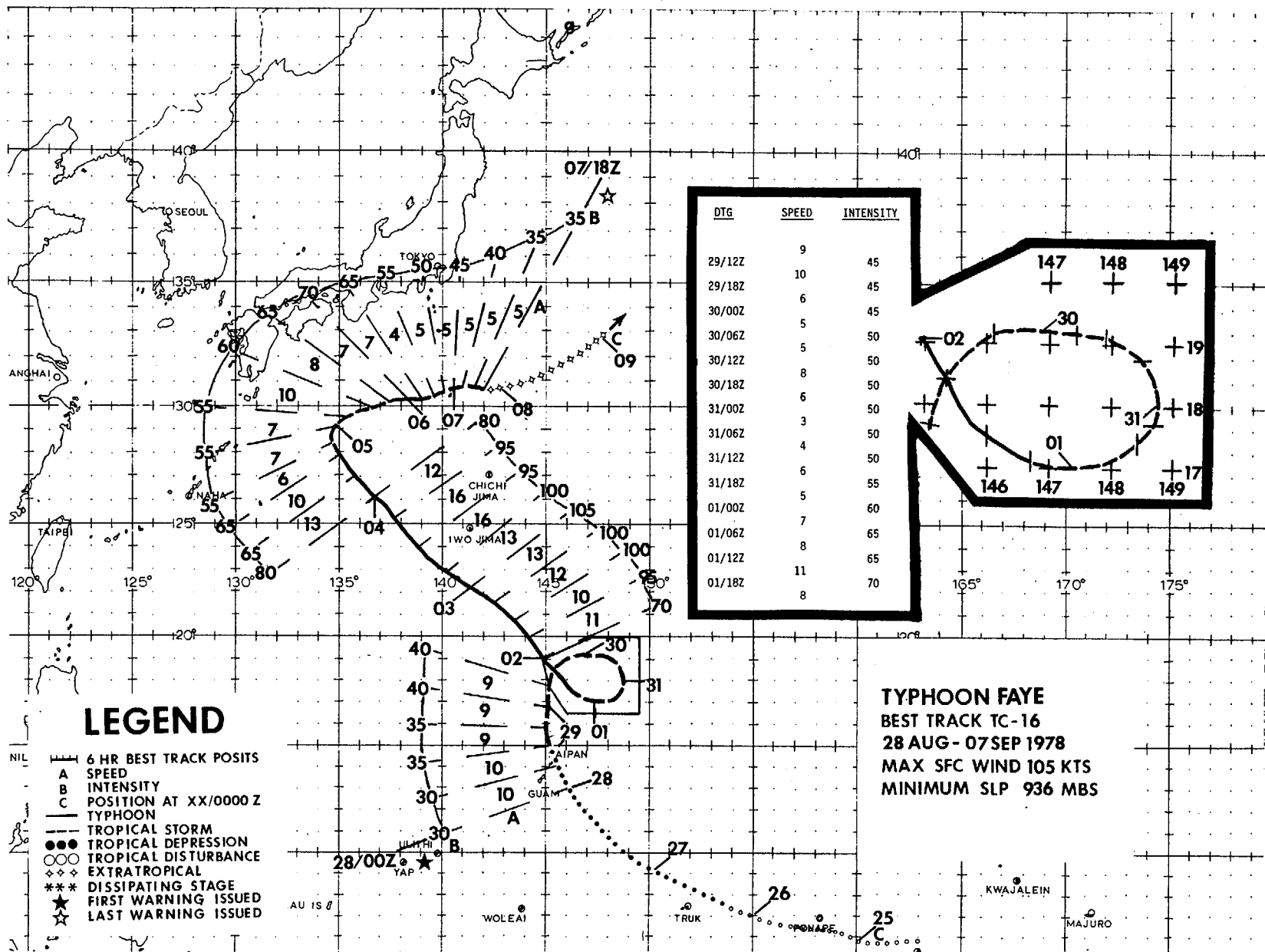


FIGURE 3-12. Visual imagery at 0134Z on 25 August 1978, showing Elaine's typical satellite signature during her erratic movement period, 24 - 25 August 1978. (NOAA-5 imagery)



LEGEND

- NIL |---| 6 HR BEST TRACK POSITS
- A |---| SPEED
- B |---| INTENSITY
- C |---| POSITION AT XX/0000 Z
- TYPHOON
- - - TROPICAL STORM
- TROPICAL DEPRESSION
- TROPICAL DISTURBANCE
- ◇◇◇ EXTRATROPICAL
- *** DISSIPATING STAGE
- ★ FIRST WARNING ISSUED
- ☆ LAST WARNING ISSUED

DTG	SPEED	INTENSITY
29/12Z	9	45
29/18Z	10	45
30/00Z	6	45
30/06Z	5	45
30/12Z	5	50
30/18Z	8	50
31/00Z	6	50
31/06Z	3	50
31/12Z	4	50
31/18Z	6	50
01/00Z	7	60
01/06Z	8	65
01/12Z	11	65
01/18Z	8	70

TYPHOON FAYE
 BEST TRACK TC-16
 28 AUG - 07 SEP 1978
 MAX SFC WIND 105 KTS
 MINIMUM SLP 936 MBS

TYPHOON FAYE

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

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

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

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

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

By 291200Z Faye began to execute a rare, anticyclonic loop. The 300000Z, 500 mb analysis (Fig. 3-15) showed that Faye was now positioned between two high pressure centers: one located between Marcus Island and the Volcano Islands, and the other located south of Guam. This pattern was the result of the combined influence of Gloria, Hester, Faye, and a long-wave, mid-level trough that was developing far to the northeast of Faye. It was now possible for Faye to choose one of

two routes: (1) move north-northeast in the weakness between Marcus Island and Wake Island; or (2) move west-northwest along the southern periphery of the high pressure center to her north.

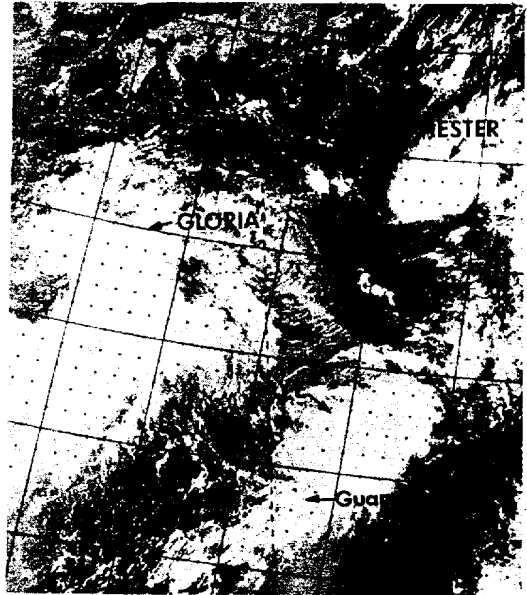
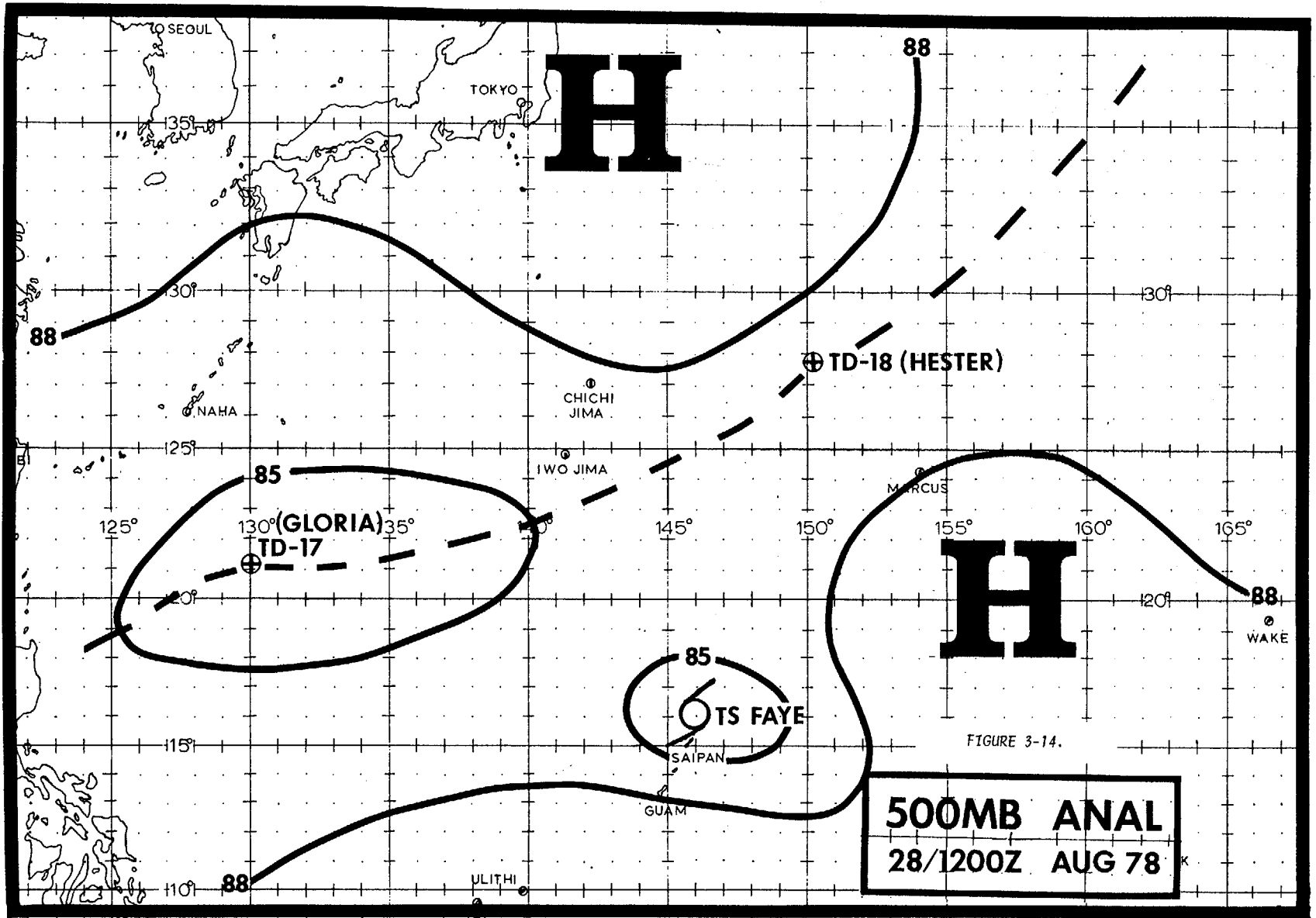


FIGURE 3-13. Tropical Storm Faye just prior to executing an anticyclonic loop north of Guam, while at an intensity of 40 kt (21 m/sec). TS Gloria is southeast of Okinawa and TS Hester is northwest of Marcus Island, 29 August 1978, 0137Z. (DMSP imagery)

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

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

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



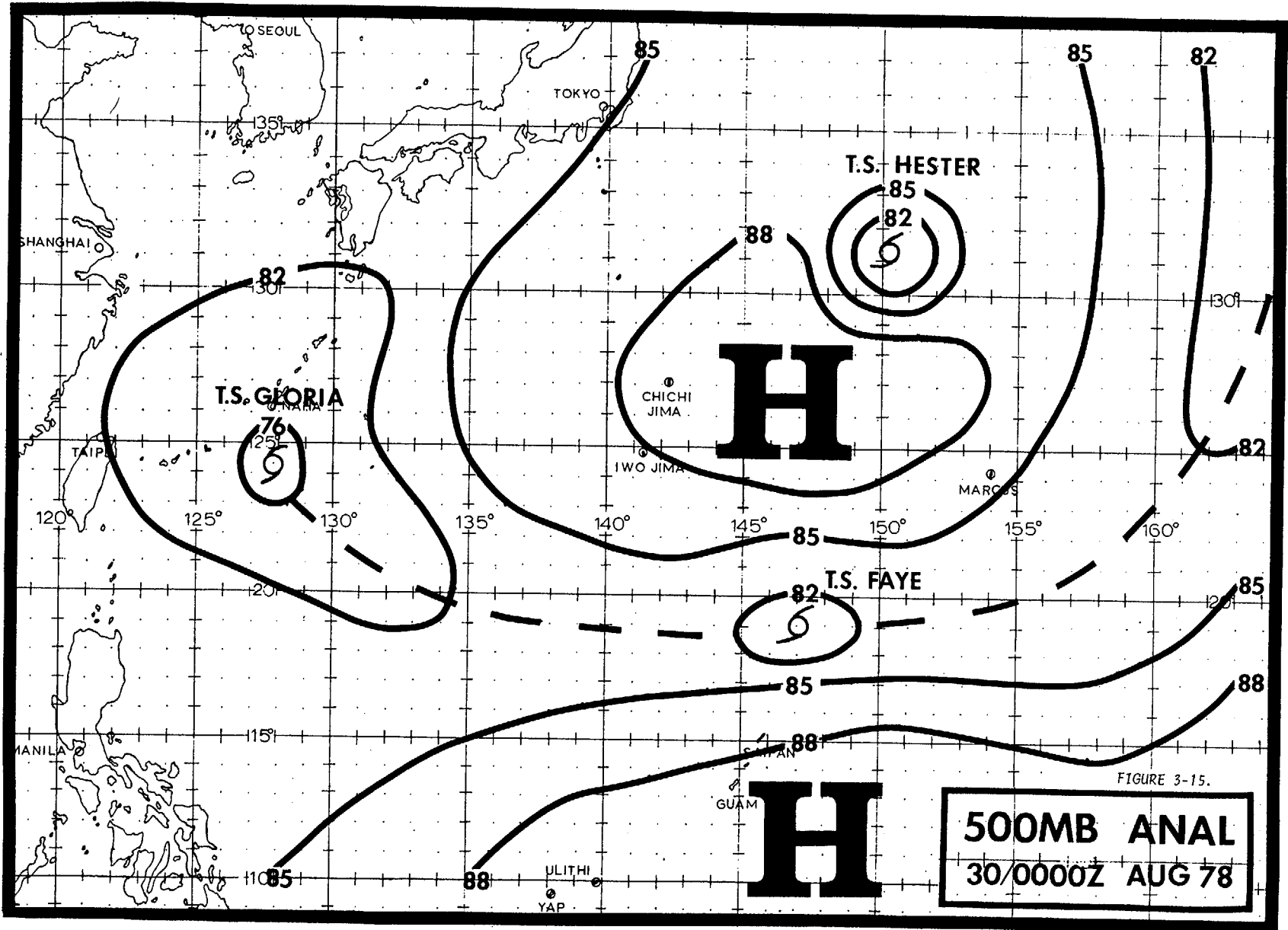


FIGURE 3-15.
500MB ANAL
30/0000Z AUG 78

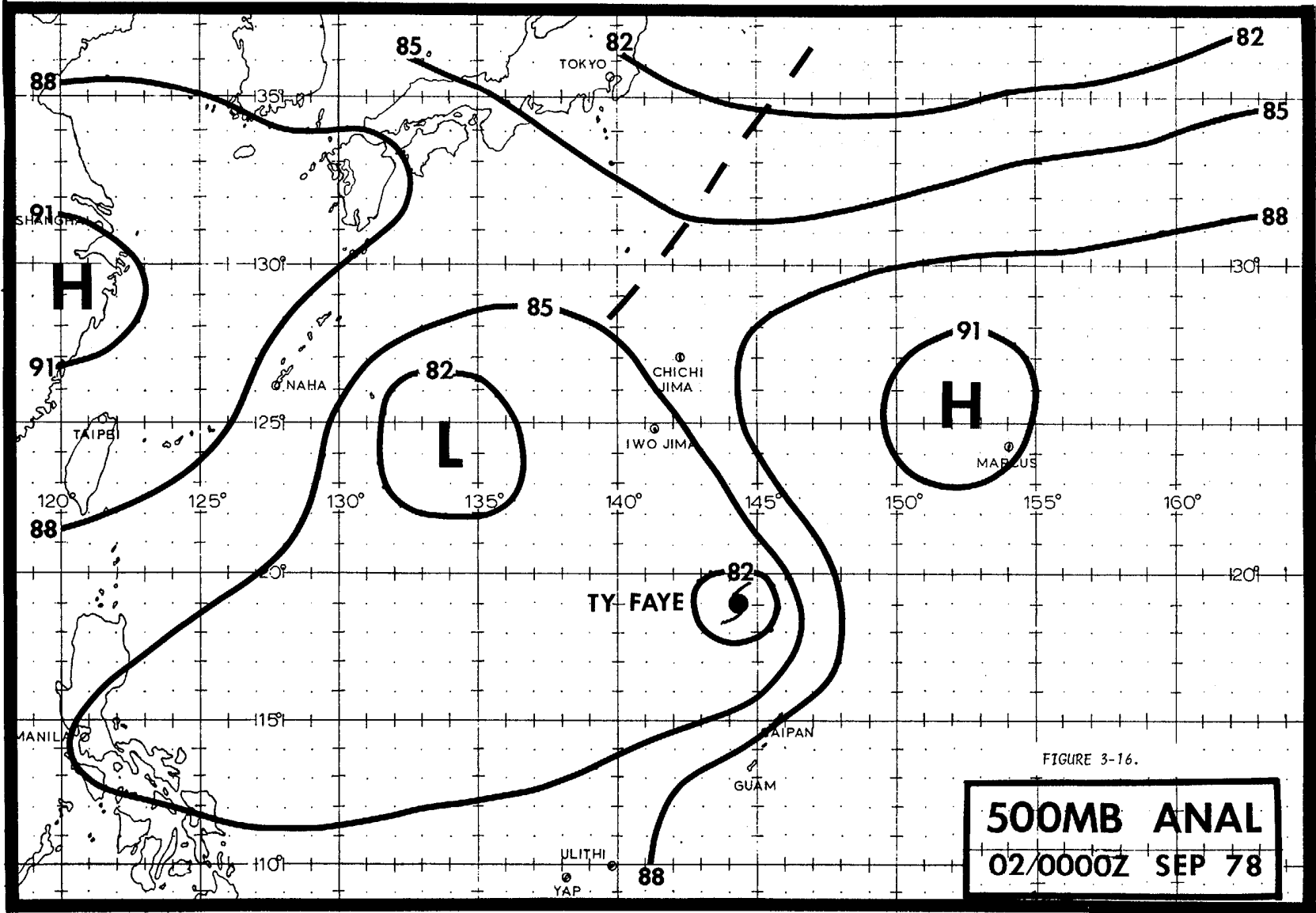


FIGURE 3-16.

500MB ANAL
02/0000Z SEP 78

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

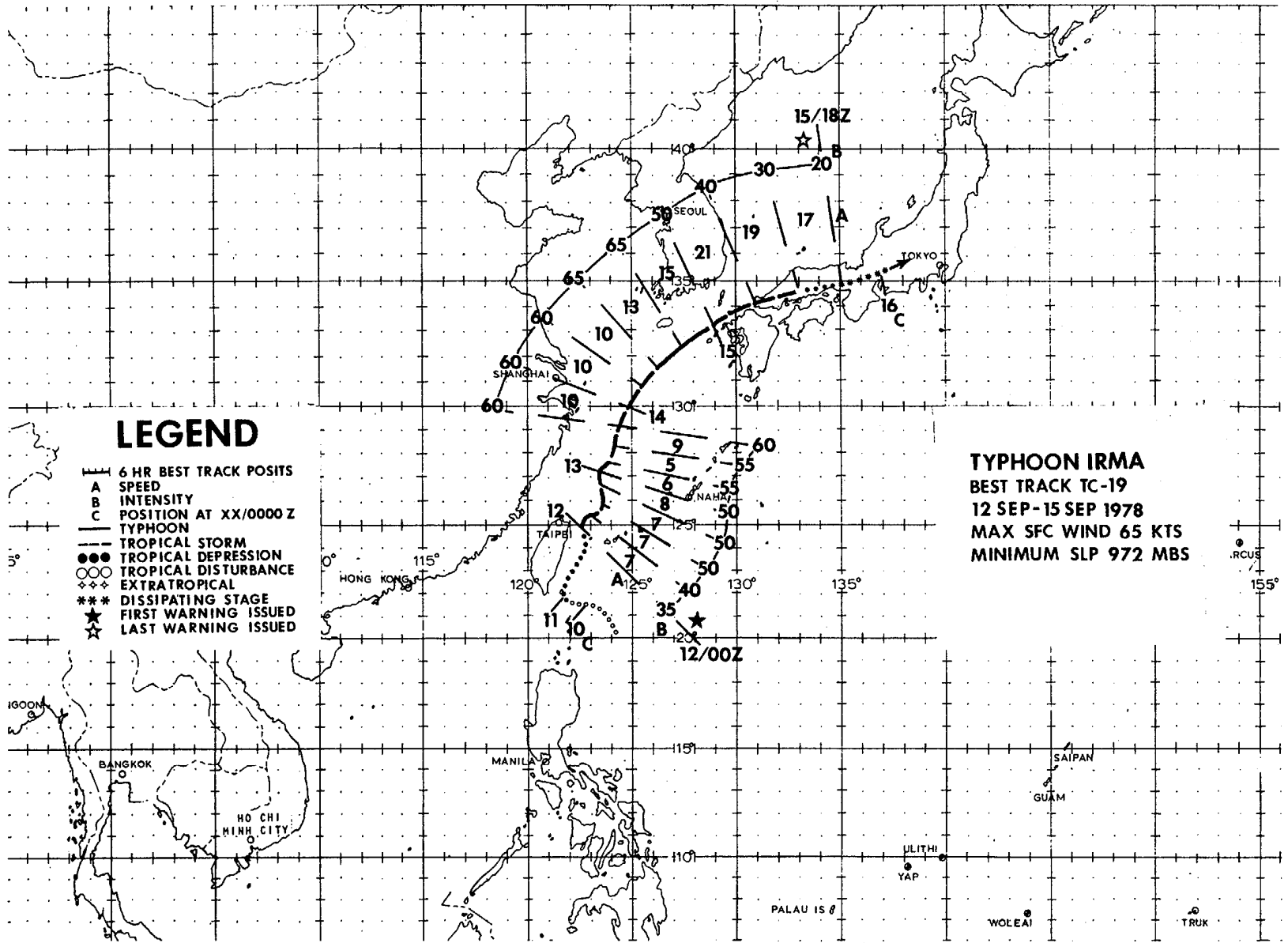
Normally a system would be expected to accelerate after crossing the ridge axis, but in this case the mid-latitude westerly jet stream was located considerably to the north; the mid-level steering was therefore very weak and Faye actually continued a slowing trend. Likewise, a tropical system would be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

The reason for Faye's reintensification was related to the weak, upper-level flow pattern. During Faye's period of reintensification, mid- and upper-level winds were

basically zonal and light, thereby minimizing the cold air entrainment. Reconnaissance aircraft reports indicated that Faye was distinctly warm core during this period. Because of the weak flow between 500 and 200 mb, vertical wind shear was small and, thus, Faye was able to maintain vertical organization longer than was anticipated.

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

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



LEGEND

- 6 HR BEST TRACK POSITS
- A SPEED
- B INTENSITY
- C POSITION AT XX/0000 Z
- TYPHOON
- TROPICAL STORM
- TROPICAL DEPRESSION
- ○ ○ TROPICAL DISTURBANCE
- × × × EXTRATROPICAL
- *** DISSIPATING STAGE
- ★ FIRST WARNING ISSUED
- ☆ LAST WARNING ISSUED

TYPHOON IRMA
 BEST TRACK TC-19
 12 SEP-15 SEP 1978
 MAX SFC WIND 65 KTS
 MINIMUM SLP 972 MBS

TYPHOON IRMA

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

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

Irma remained a typhoon for only 12 hours becoming the shortest-lived typhoon of the season. The 140000Z, 500 mb analysis indicated that Irma was north of the broad subtropical ridge axis, building in behind her, and she was accelerating northeastward. Her

maximum forward speed of 21 kt (39 km/hr) was obtained while tracking through the Tsushima Straits prior to making landfall on Honshu.

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

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

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

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

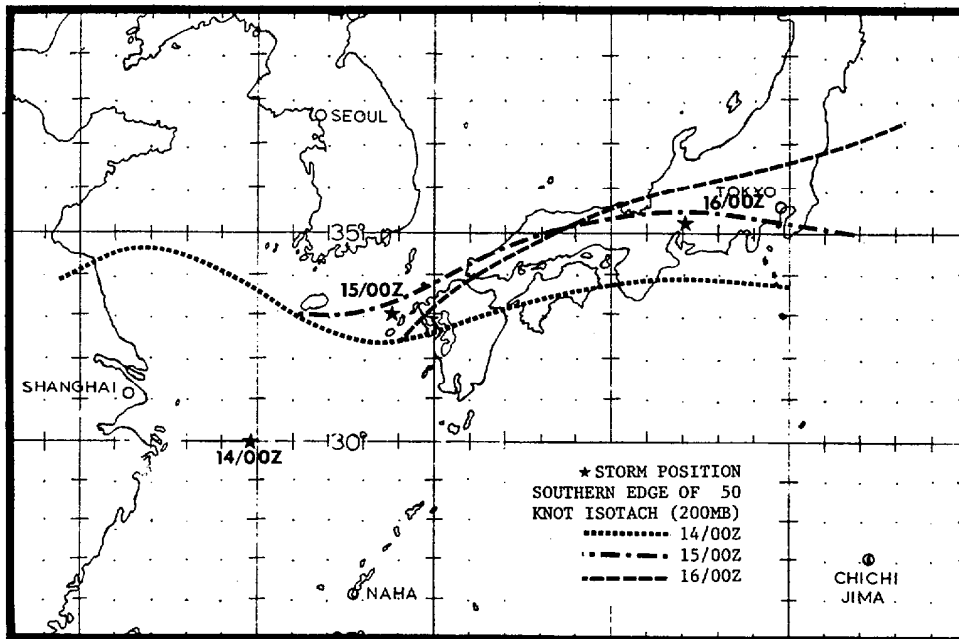
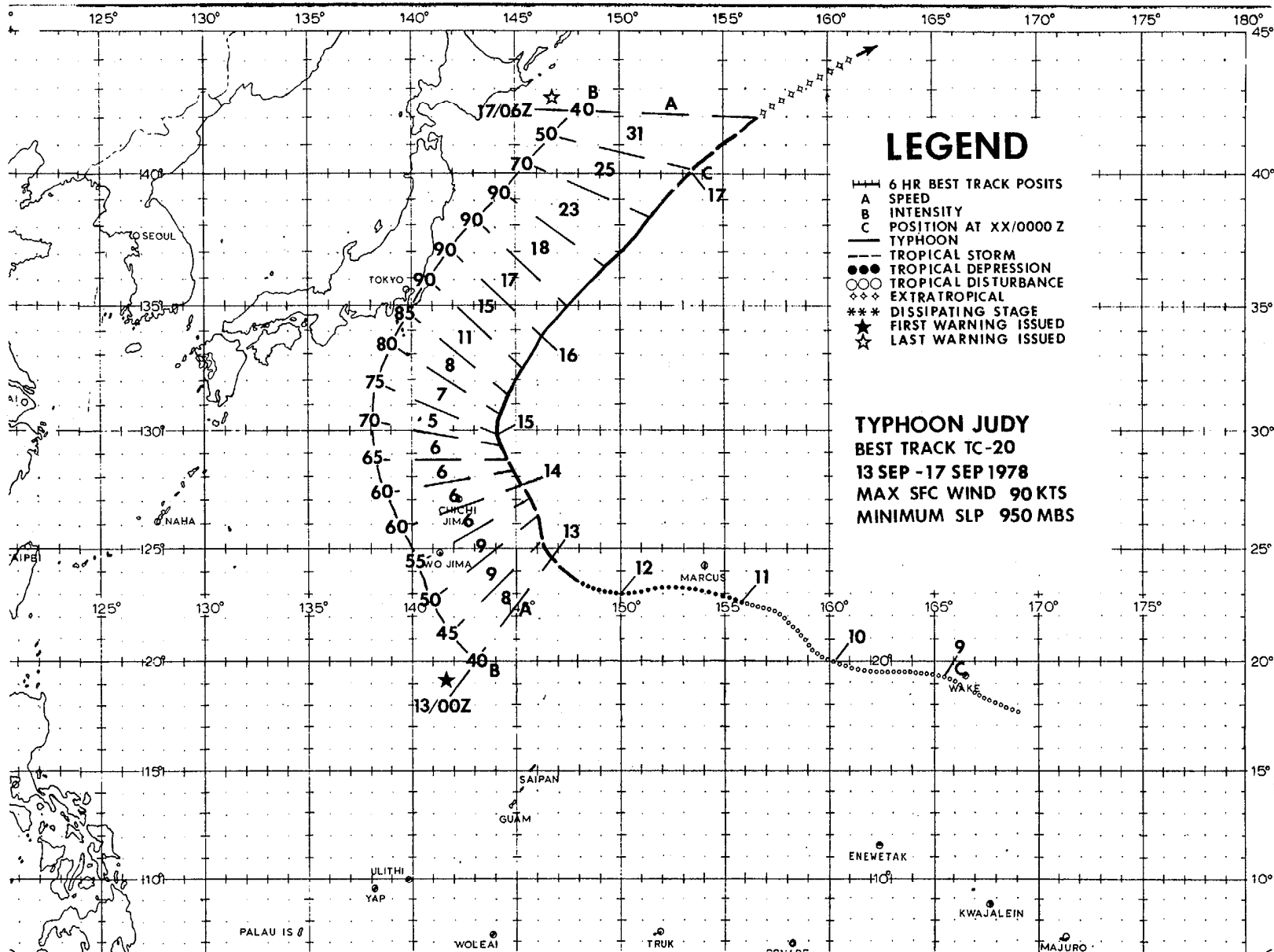


FIGURE 3-17. Irma's positions relative to the southern boundary of the 200 mb, 50 kt isotach from 140000Z to 160000Z September 1978.



TYPHOON JUDY

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

of the subtropical ridge axis. Although part of a two-storm situation with Typhoon Irma (Fig. 3-20), Judy never appeared to be influenced by Irma's presence. Warnings on Judy showed excellent continuity. From the second warning on, a recurvature path was forecast. This was due in part to the early detection which provided considerable history in Judy's past track before the first warning was issued. As a result, the forecast errors for Typhoon Judy were considerably better than average for cyclones undergoing recurvature. The intensity forecasts for Judy, however, always lagged her true intensification rate. The maximum intensity of 90 kt (46 m/sec) which Judy attained after recurvature was not foreseen, nor was the rate at which Judy weakened.

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

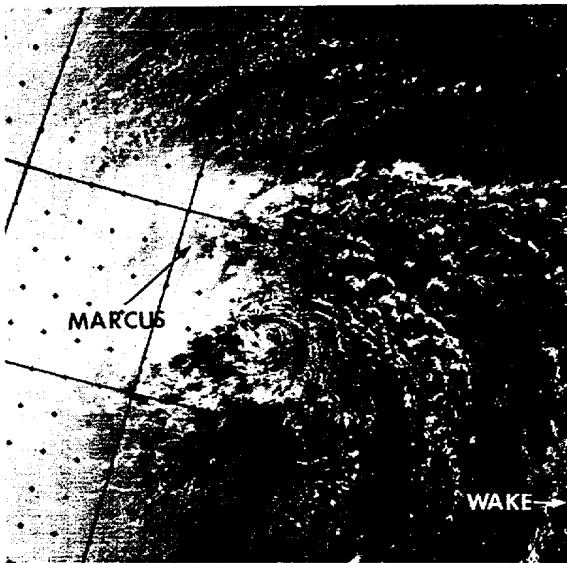


FIGURE 3-18. Tropical Disturbance which developed into Typhoon Judy. At this time the disturbance lacked vertical development, 10 September 1978, 2049Z. (DMSP imagery)

From the time of the first warning until the last, Judy's track was one of classical recurvature, slowing in forward movement to 5 kt (9 km/hr) at the recurvature point and accelerating to 31 kt (57 km/hr) under strong westerly upper-level steering north

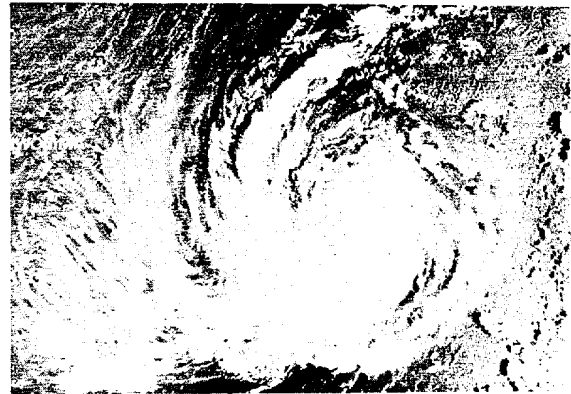


FIGURE 3-19. Judy was at tropical storm intensity at this time, 12 September 1978, 2156Z. (DMSP imagery)

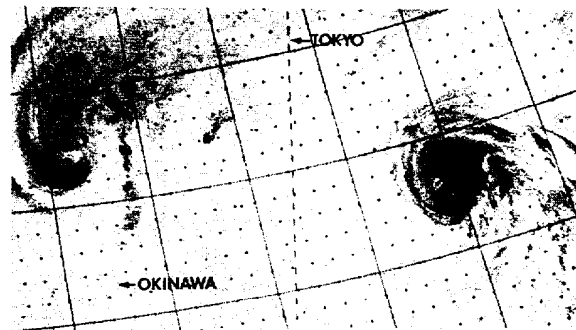
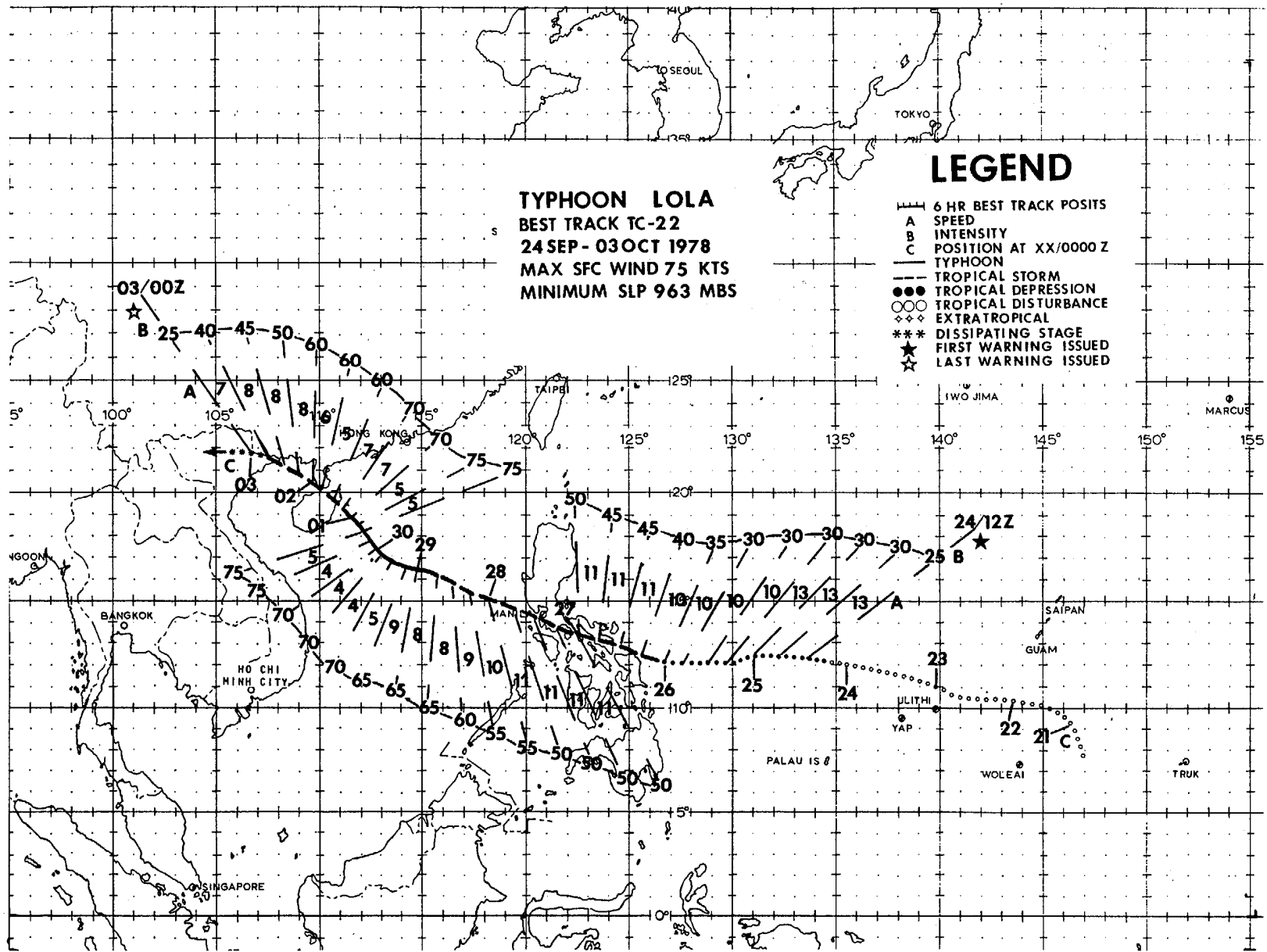


FIGURE 3-20. Infrared imagery of Typhoons Judy (right) and Irma (left), 14 September 1978, 1438Z. (DMSP imagery)



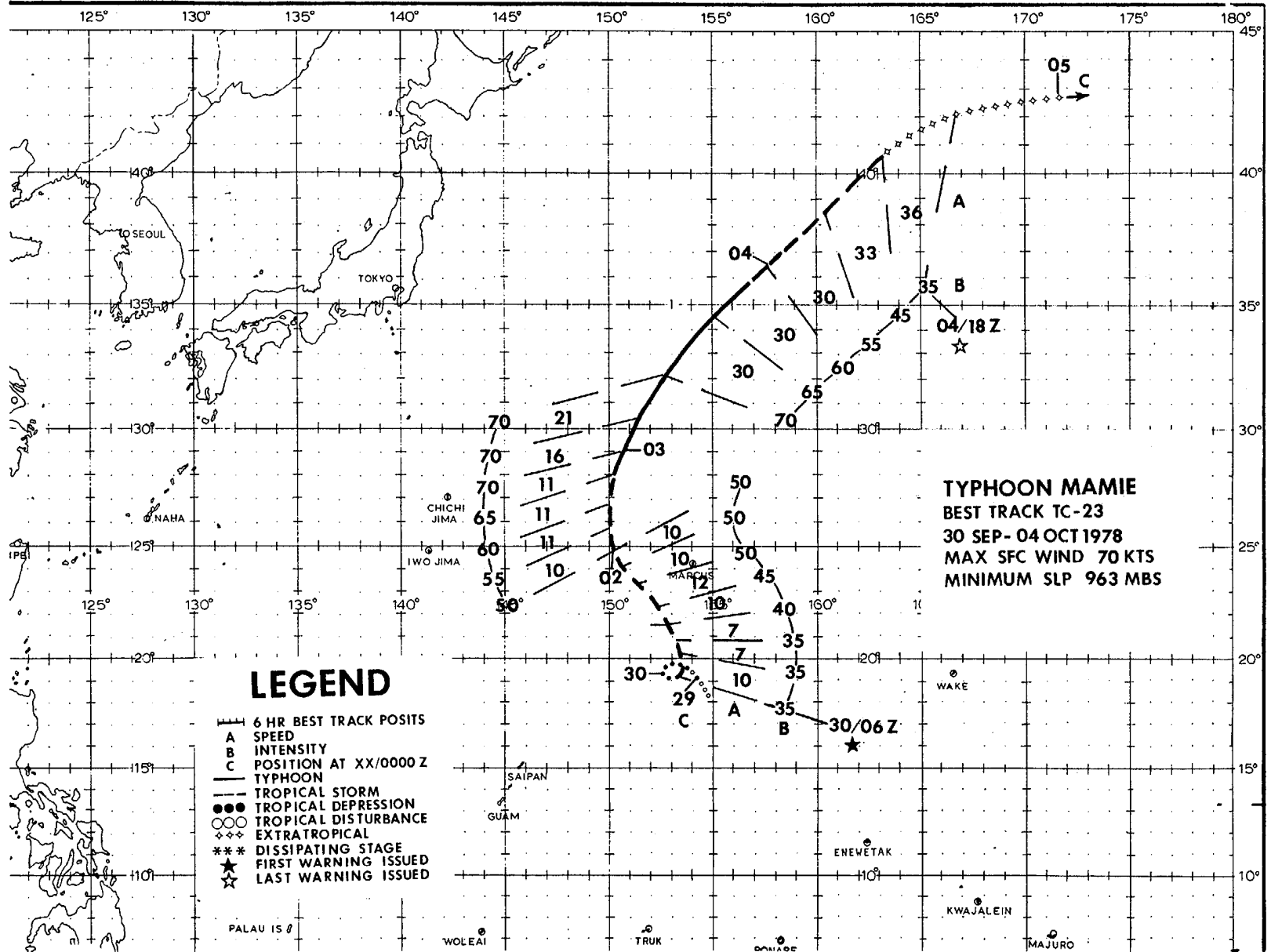
TYPHOON LOLA

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

During the 24th and 25th, TD-22 maintained a westward movement within the near equatorial trough on a heading 10 degrees north of the trough axis. This westward movement toward the central Philippines was supported by easterlies along the southern periphery of the mid-tropospheric subtropical ridge. Aircraft data at 252100Z positioned the circulation 110 nm (205 km) east of Samar. Increased organization and a central pressure of 995 mb were noted which resulted in upgrading the system to Tropical Storm Lola at 260000Z. Landfall was made on the southeastern tip of Luzon at 261500Z. Lola's subsequent track during the 27th took her along the southern coast of Luzon passing over the cities of Legaspi and Batangas. The closest point of approach (CPA) to Manila occurred at 271000Z as Lola passed 35 nm (65 km) to the southwest. At this time, the International Airport at Manila reported 30 kt (15 m/sec) sustained winds with gusts to 50 kt (26 m/sec). The Naval Weather Service Environmental Detachment (NWSED) at Cubi Pt. recorded maximum sustained winds of 40 kt (21 m/sec) with a peak gust of 59 kt (30 m/sec) at 271241Z. Nineteen deaths and heavy

property damage in the southern Tagalog and Bicol regions were attributed to Lola's passage. As Lola exited into the South China Sea, the 500 mb analysis indicated a short wave trough in the westerlies over China extending as far south as 27N with a weakness in the subtropical ridge forming over southern China. By 280000Z, the trough extended to 23N along 105E and the subtropical high center east of the weakness had moved eastward across the northern Philippines. This caused Lola's dominant mid-level steering flow to become southeasterly which resulted in her more climatological northwest track over the South China Sea. Supported by good upper-tropospheric outflow and strong low-level energy input, gradual intensification occurred from 271800Z through 301800Z. Based on aircraft data, Lola was upgraded to typhoon intensity at 281800Z. During the 29th and 30th of September, Lola reached maximum intensity with sustained winds of 75 kt (39 m/sec) and a minimum pressure of 963 mb. The mid-tropospheric ridge began strengthening westward resulting in Lola's track becoming more west-northwest toward Hainan Island. Landfall over Hainan occurred at 010900Z October, 10 nm (19 km) southeast of Wenchang.

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



TYPHOON MAMIE

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

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

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

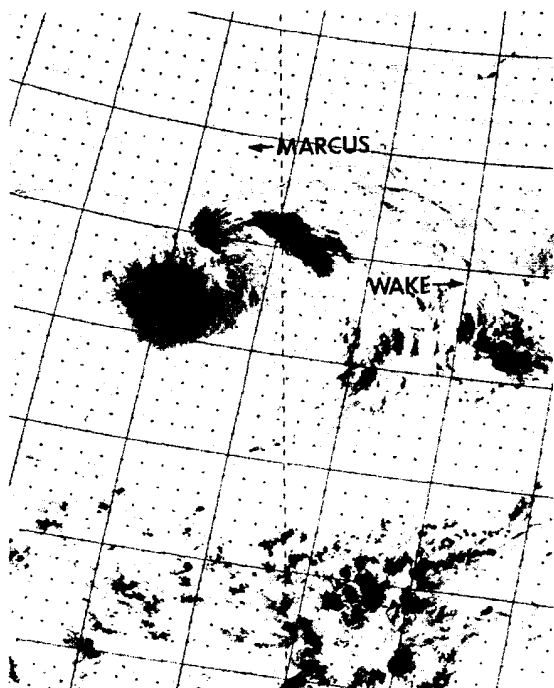


FIGURE 3-21. Infrared imagery of TD-23 (Mamie) at 30 kt (15 m/sec) intensity, 30 September 1978, 0035Z. (DMSP imagery)

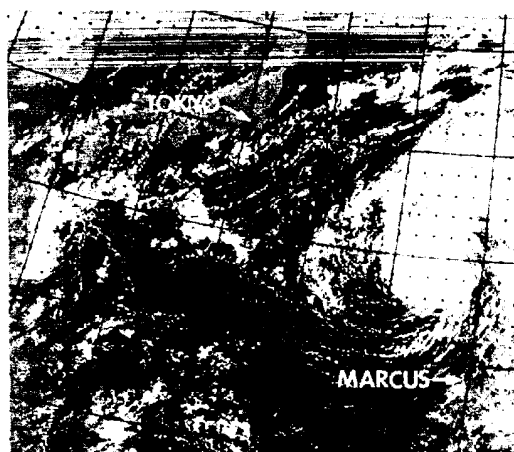
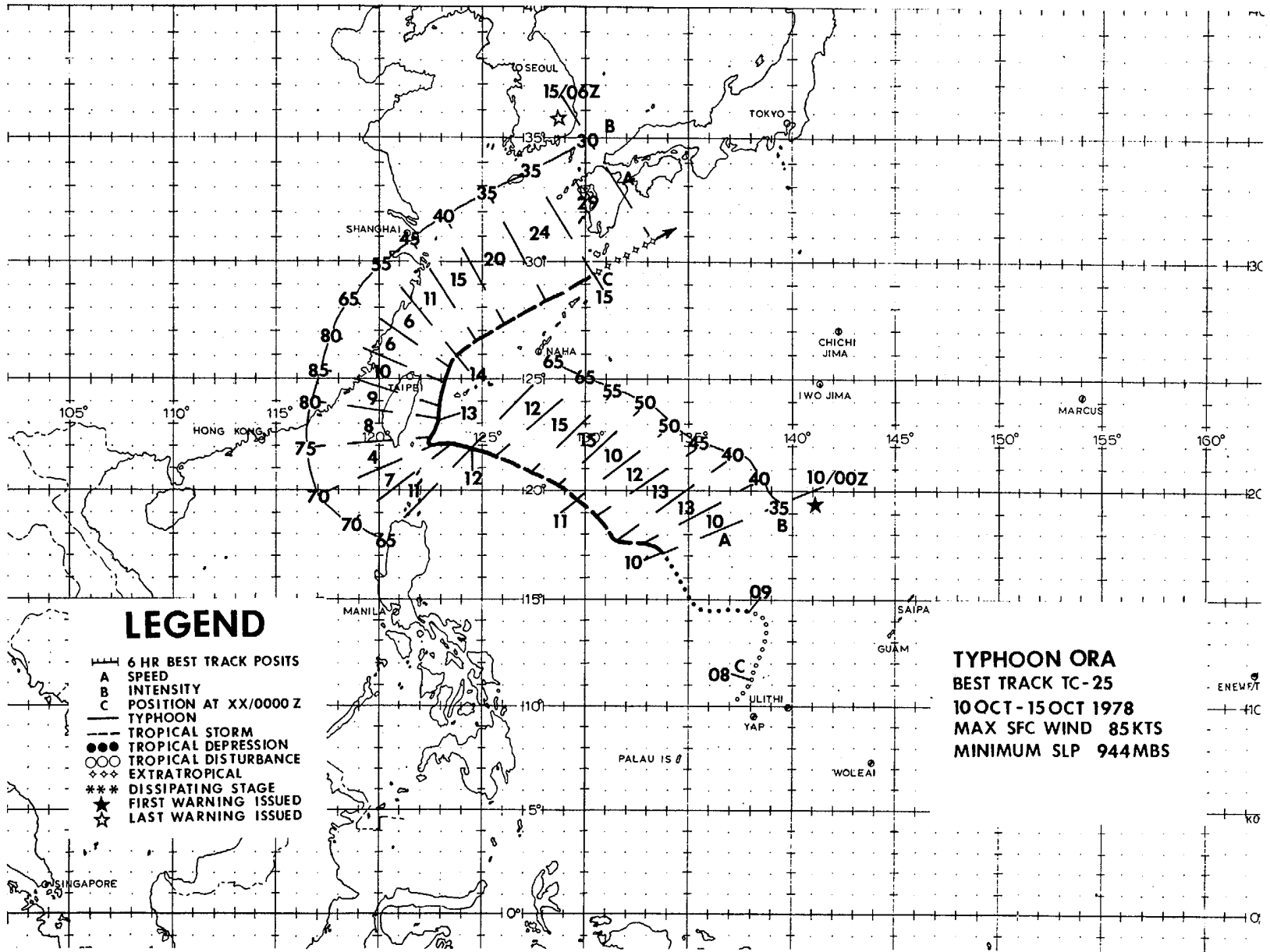


FIGURE 3-22. Typhoon Mamie, remaining compact, moving northeasterly while at maximum intensity of 70 kt (36 m/sec), 03 October 1978, 0123Z. (DMSP imagery)



LEGEND

- 6 HR BEST TRACK POSITS
- A SPEED
- B INTENSITY
- C POSITION AT XX/0000 Z
- TYPHOON
- - - TROPICAL STORM
- TROPICAL DEPRESSION
- TROPICAL DISTURBANCE
- ◇◇◇ EXTRATROPICAL
- *** DISSIPATING STAGE
- ★ FIRST WARNING ISSUED
- ☆ LAST WARNING ISSUED

TYPHOON ORA
BEST TRACK TC-25
10 OCT - 15 OCT 1978
MAX SFC WIND 85KTS
MINIMUM SLP 944MBS

ENEMY
 41C
 KO

TYPHOON ORA

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

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

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

Computer aids, climatology and the current synoptic situation supported a northward

track; the JTWC forecast showed Ora recurring to the north-northeast around the western periphery of the high pressure cell that was centered near Marcus Island.

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

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

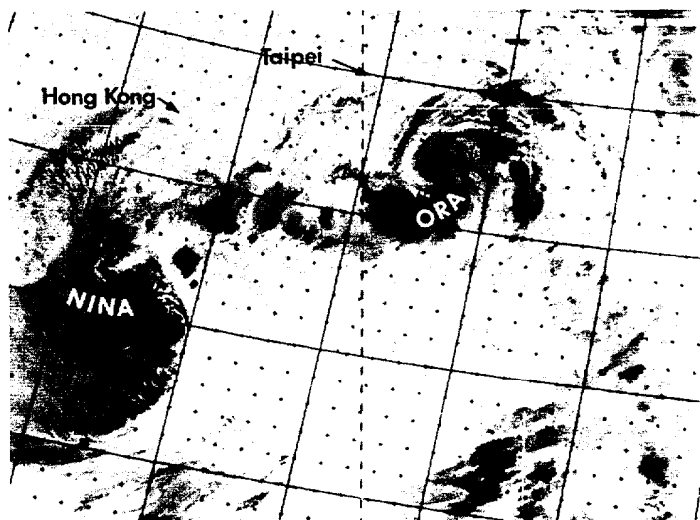


FIGURE 3-23. Infrared image of Typhoon Ora and Tropical Storm Nina during Fujiwhara interaction, 11 October 1978, 2342Z. Post-analysis showed that when the feeder band connecting the two cyclones disappeared, interaction ceased and Ora later turned north. (DMSP imagery)

As Ora approached the east coast of Taiwan, hourly radar fixes from Ishigaki-Shima, Miyako-Jima and Hua-lien indicated deceleration and by 121200Z, Ora had slowed to 4 kt (7 km/hr). By this time, Tropical Storm Nina had evidently weakened to the point where she no longer had any major influence on Ora's movement. The break in the ridge axis then became the controlling factor in determining Ora's track. Westward movement was forecast, in keeping with the upper-air, numerical progs that showed the ridge building back. Fortunately for Taiwan, this ridge failed to build back and Ora veered sharply to the north never making landfall on Taiwan (Fig. 3-24). When unexpected, northward movement was noted, an amended forecast was issued. Without constant reconnaissance, it

is conceivable that the change in Ora's movement would not have been noticed until the next scheduled, 6-hourly fix.

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

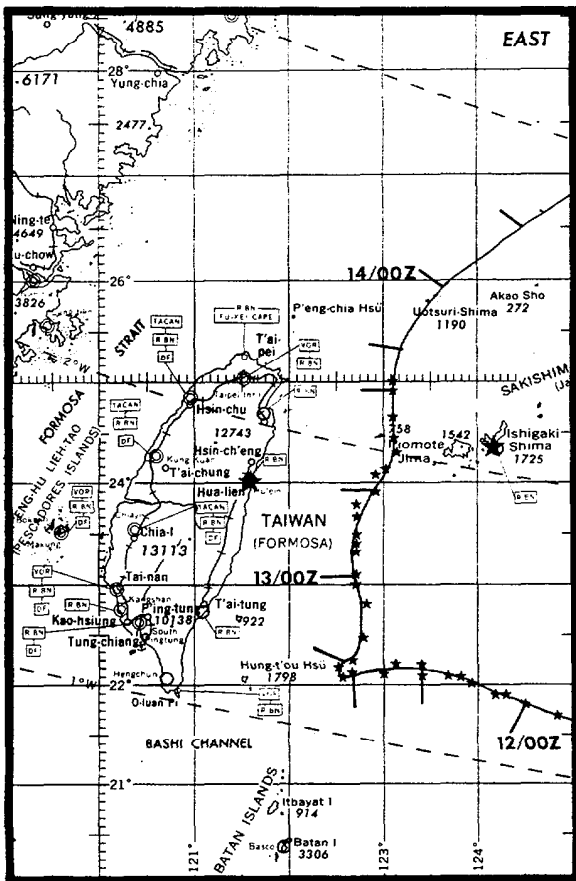


FIGURE 3-24. Hourly radar fixes show Ora's sudden turn to the North after 121200Z October 1978.

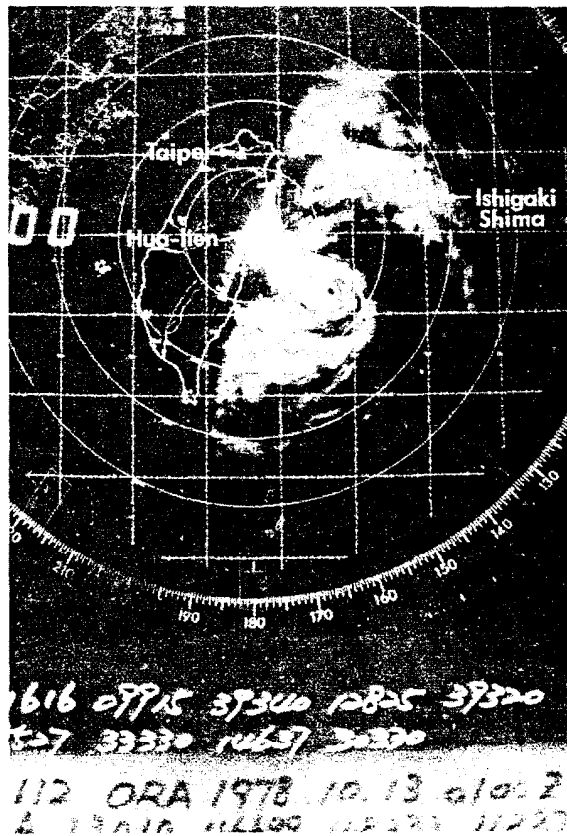
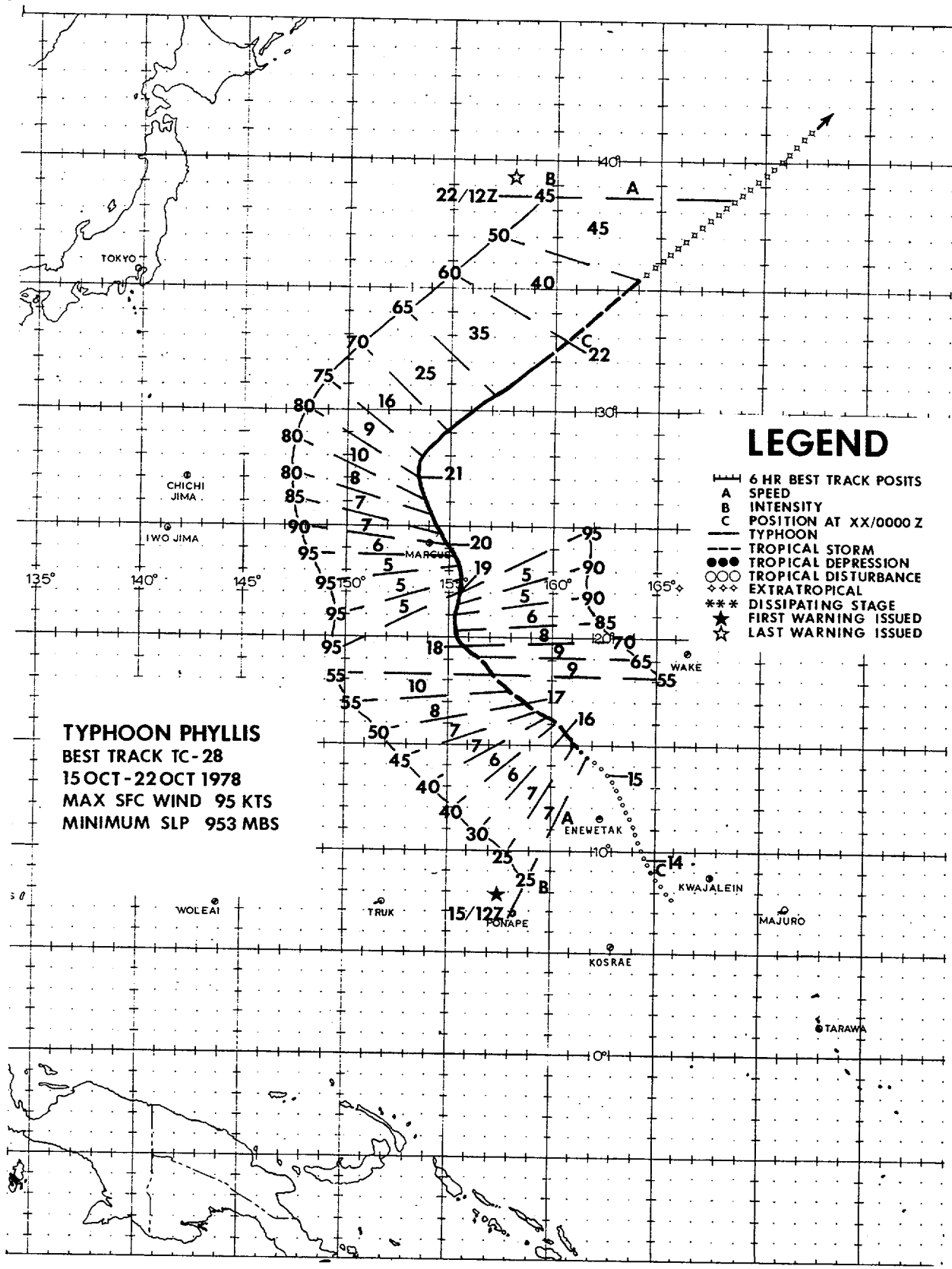


FIGURE 3-25. Hua-Lien radar presentation of Typhoon Ora at 130100Z October just prior to her reaching maximum intensity. (Photograph courtesy of the Central Weather Bureau, Taipei, Taiwan.)



TYPHOON PHYLLIS

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

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

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

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

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

force winds around Phyllis as she became extratropical.

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

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

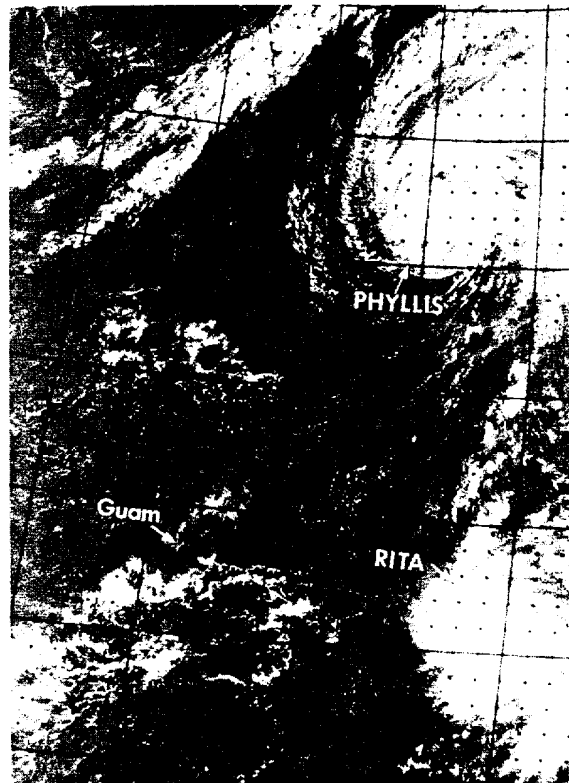
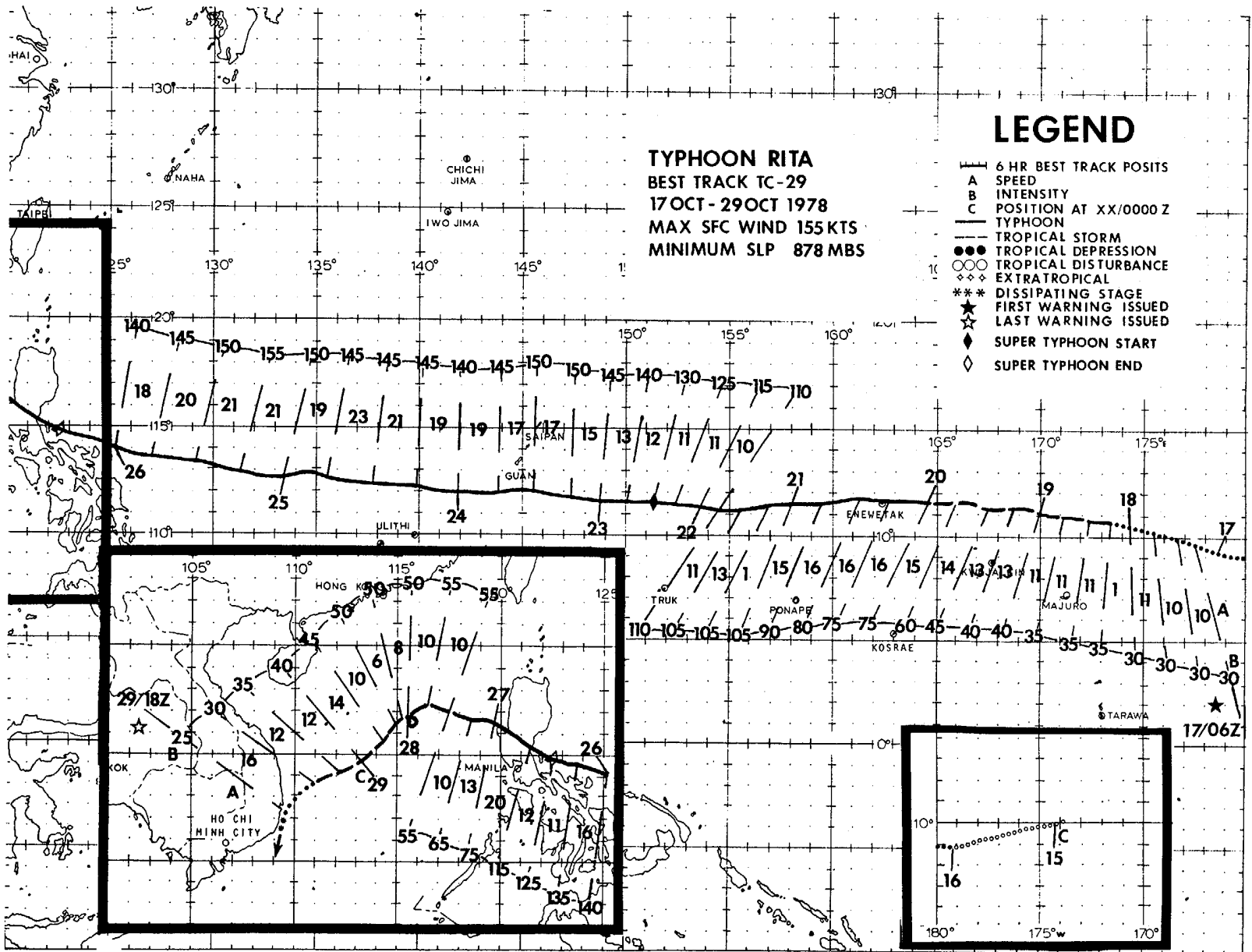


FIGURE 3-26. Typhoon Phyllis at her recurvature point, Typhoon Rita on a track toward Guam and the STR builds in between them as noted by the weakness in the band of showers connecting the two compact typhoons, 21 October 1978, 0106Z. (DMSP imagery)



TYPHOON RITA
BEST TRACK TC-29
17 OCT - 29 OCT 1978
MAX SFC WIND 155 KTS
MINIMUM SLP 878 MBS

LEGEND

- 6 HR BEST TRACK POSITS
- A SPEED
- B INTENSITY
- C POSITION AT XX/0000 Z
- TYPHOON
- TROPICAL STORM
- TROPICAL DEPRESSION
- TROPICAL DISTURBANCE
- ◇◇◇ EXTRATROPICAL
- *** DISSIPATING STAGE
- ★ FIRST WARNING ISSUED
- ☆ LAST WARNING ISSUED
- ◆ SUPER TYPHOON START
- ◇ SUPER TYPHOON END

57

17/06Z

TYPHOON RITA

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

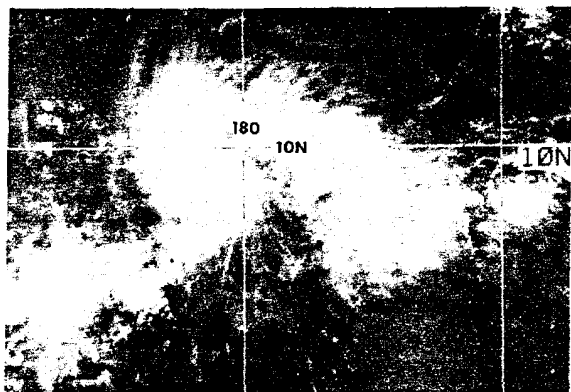


FIGURE 3-27. Rita, as she appeared just before issuance of her first warning, 16 October 1978, 2245Z. (DMSP imagery from AFGWC, Offutt AFB, NE)

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

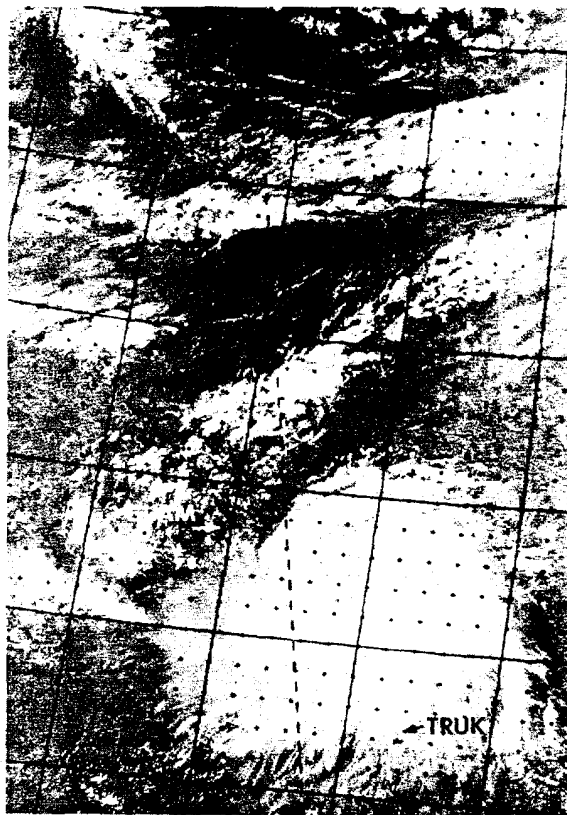


FIGURE 3-28. Rita, at 145 kt (75 m/sec) intensity, 16 hours before her closest point of approach to Guam, 22 October 1978, 2212Z. (DMSP imagery)

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

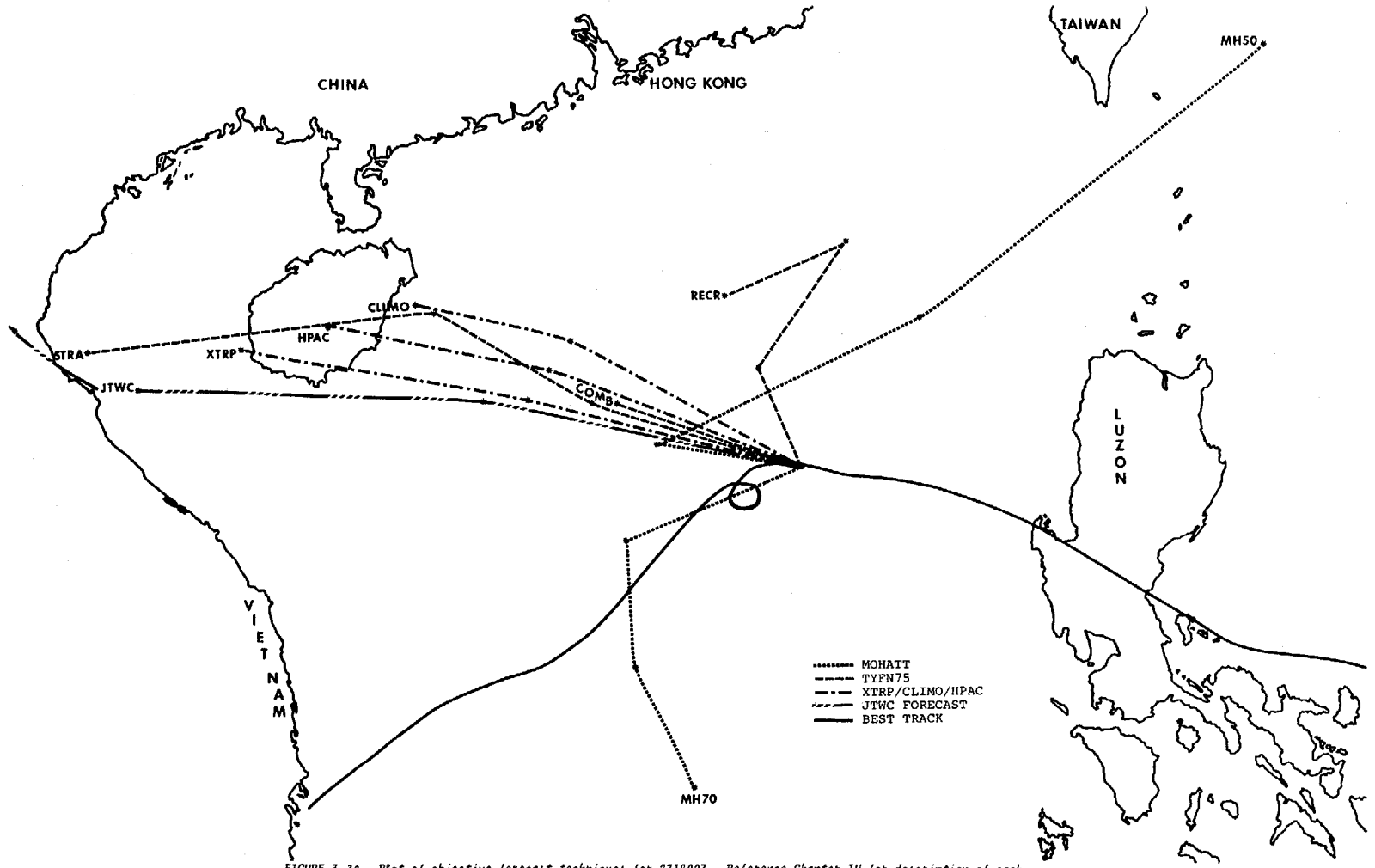


FIGURE 3-30. Plot of objective forecast techniques for 271200Z. Reference Chapter IV for description of each objective technique. Each * represents a 24-hour forecast segment. The solid line represents Rita's best track.

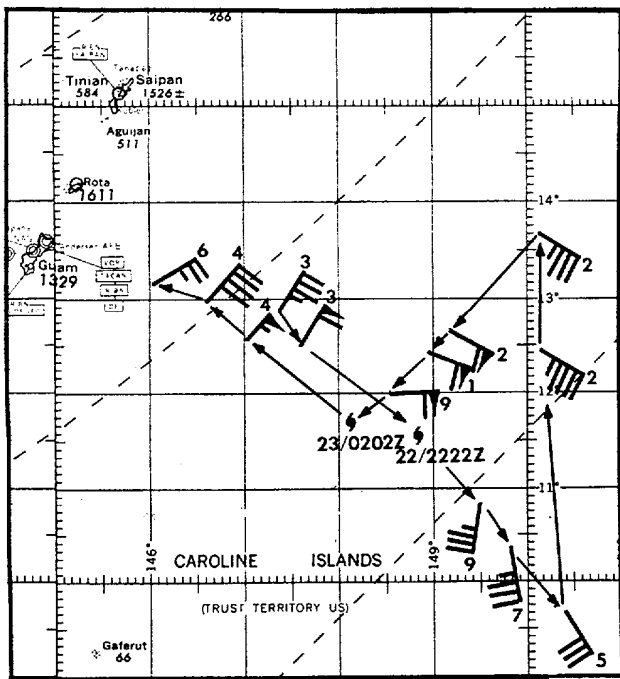


FIGURE 3-29. Plot of aircraft reconnaissance data. Typhoon positions are noted at 230200Z and 222222Z. Wind barbs are the estimated surface winds from the ARWO aboard the aircraft. The tens digit of the wind direction is also plotted with the wind barbs.

showed a 185 nm (343 km) radius for over-30-kt (15 m/sec) winds and 100 nm (185 km) radius for over-50-kt (26 m/sec) winds in Rita's northern semicircle. Actual surface reports from the southern tip of Guam indicated the over-50-kt (26 m/sec) radius was actually only 70 nm (130 km). The over-30-kt (15 m/sec) wind radius was also too large as judged by the nine hour duration of sustained 30 kt (15 m/sec) winds at NASA Dan Dan.

If the over-30-kt (15 m/sec) wind radius had been 185 nm (343 km), the duration of sustained 30 kt (15 m/sec) winds would have been closer to 19 hours. It was evident that the wind field did not expand as forecast.

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

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

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

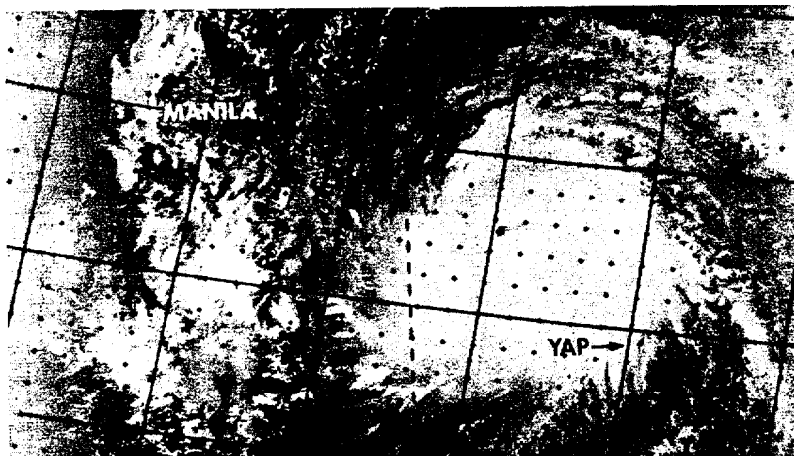
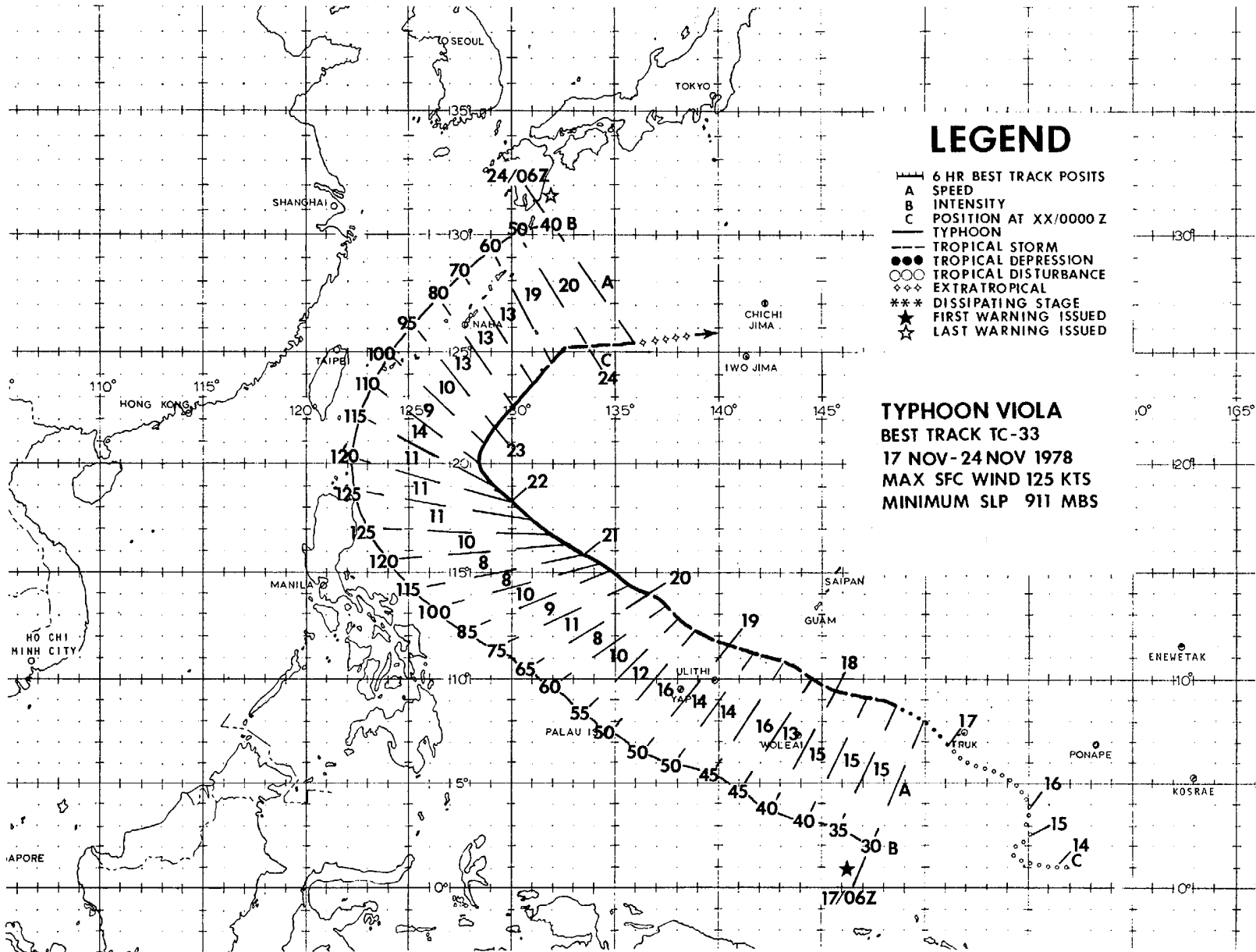


FIGURE 3-31. Rita, at 150 kt (77 m/sec) intensity, 6 hours prior to her peak intensity, 24 October 1978, 2319Z. (DMSP imagery).



TYPHOON VIOLA

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

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

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

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

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

Up to this point JTWC's forecasts had been verifying quite well. While Viola was forecast to cross the northern tip of Luzon,

the break in the ridge near the Philippines was continually monitored and the prospects for Viola to recurve were evaluated with the issuance of each warning.

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

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

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

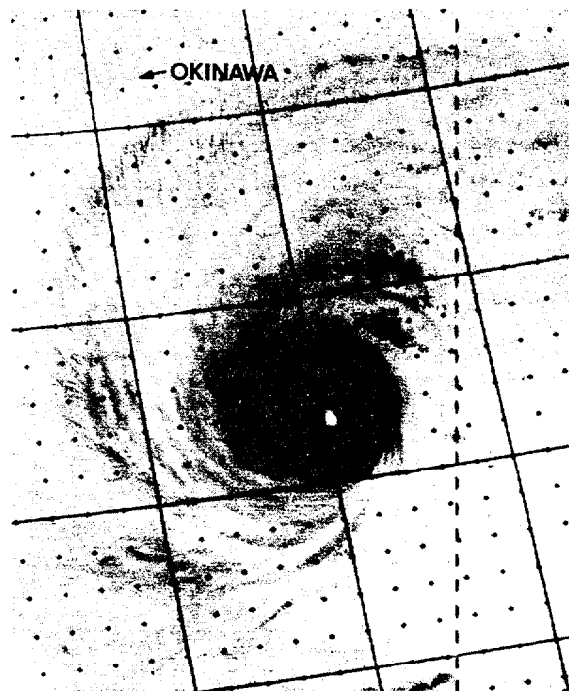


FIGURE 3-32. Infrared image of Typhoon Viola nearing her maximum intensity of 125 kt (64 m/sec), 21 November 1978, 0945Z. (DMSP imagery)

2. NORTH INDIAN OCEAN TROPICAL CYCLONES

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

Tropical Cyclone (TC) 18-78 occurred just prior to the start of the southwest monsoon season over Southeast Asia. Steering flow was weak which caused forecasting the speed of movement to be difficult. The lack of

surface observations forced reliance on the interpretation of satellite data for position and intensity. TC 18-78 made landfall on Burma with estimated, maximum sustained winds of 50 kt (26 m/sec). News reports stated, "the town of Kyaukpyu reported 90% property damage and the coastal village of Narakway was demolished when estimated peak wind gusts of 80 to 100 mph were experienced." These extreme winds, although estimated, could have been produced by squall lines or tornados.

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

TABLE 3-6.

NORTH INDIAN OCEAN AREA

1978 TROPICAL CYCLONES

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

JJWC

TABLE 3-7.

FREQUENCY OF NORTH INDIAN OCEAN CYCLONES BY MONTH AND YEAR

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

*1971-1974 REPRESENT BAY OF BENGAL CYCLONES ONLY

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

TABLE 3-8.

WARNING SUMMARY

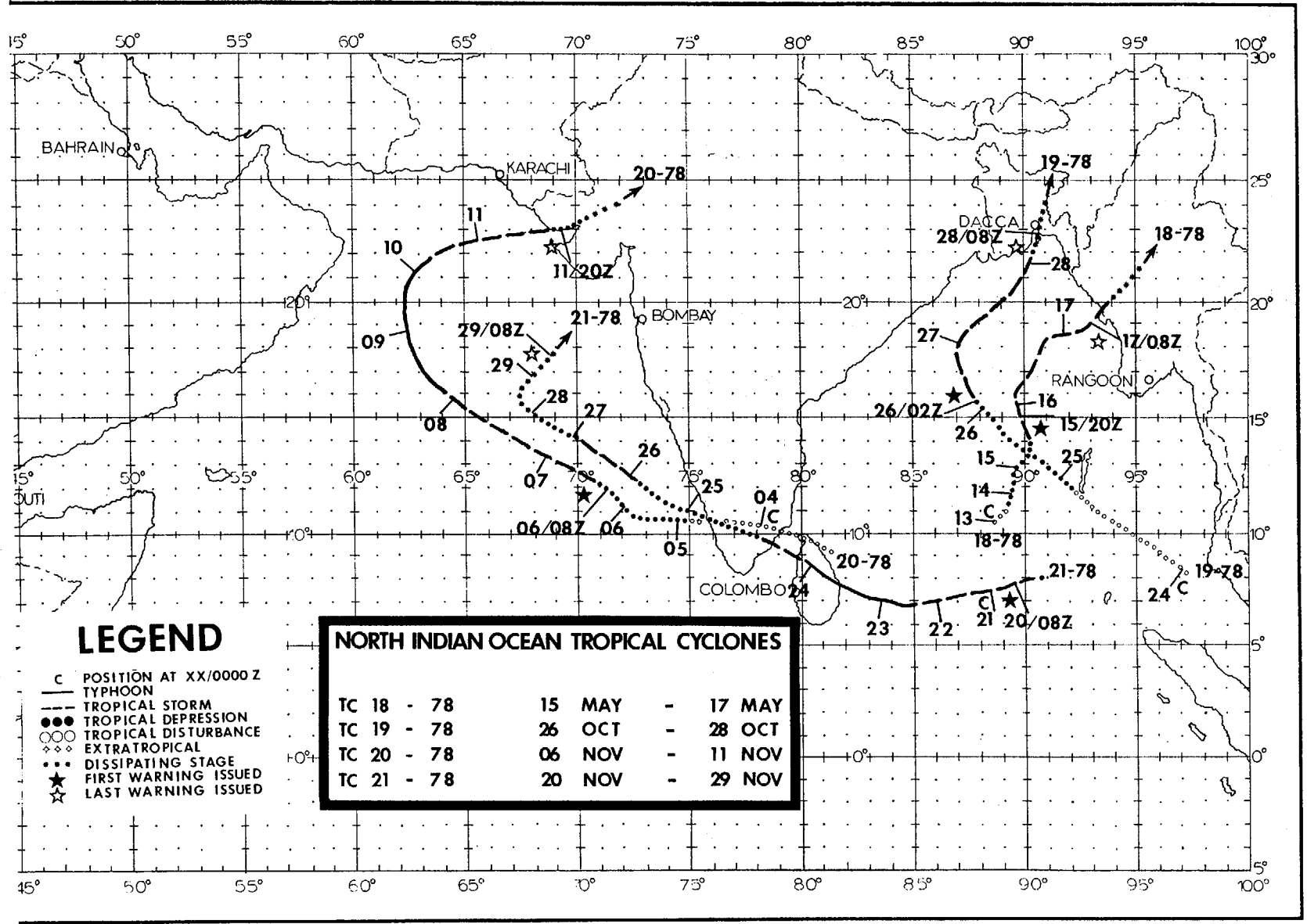


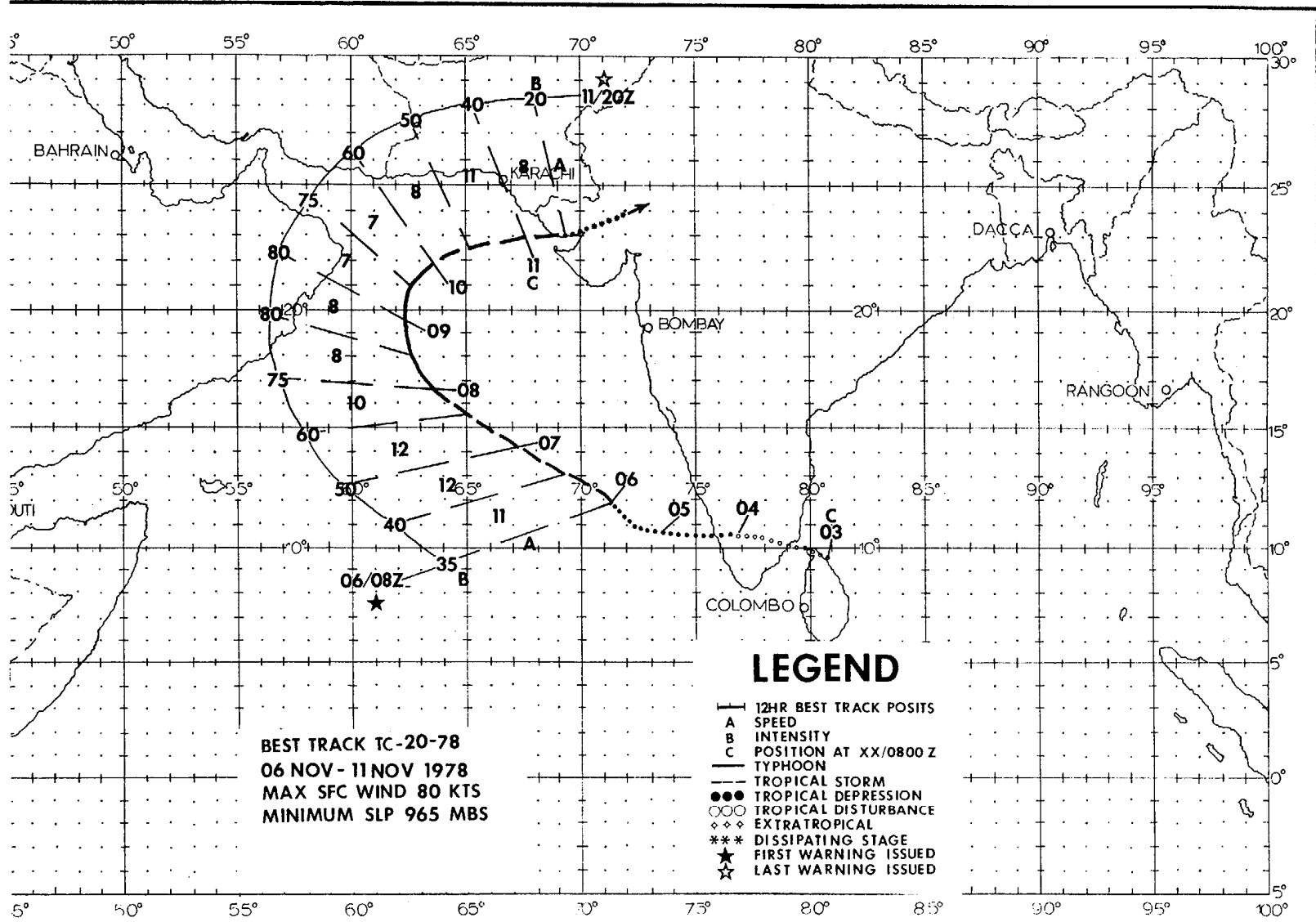
NORTH INDIAN OCEAN

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

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

JJWC





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

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

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

By the 9th of November, the mid-level subtropical ridge axis in the Arabian Sea was oriented east-west along 19N. Recurvature around this axis occurred during the 9th concurrent with TC 20-78's maximum intensity of 80 kt (41 m/sec) at 090900Z. TC 20-78 then moved northeastward into an area

dominated by strong westerlies aloft. The strong vertical shear that resulted caused the system to weaken to tropical storm intensity by 100800Z (Fig. 3-33). By the 11th, the strong vertical wind shear had reduced the cyclone to a shallow system noted on satellite imagery as spiral bands of low clouds and minimum to no deep convection - "an exposed low level circulation". Continued dissipation caused the satellite fixes to decrease in accuracy and conventional data, being sparse, aided little in pinpointing the center. As a result, the landfall of TC 20-78 on north-west India could only be approximated.

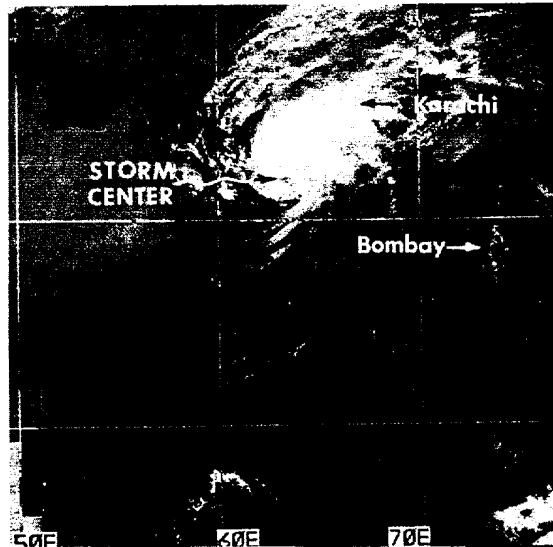
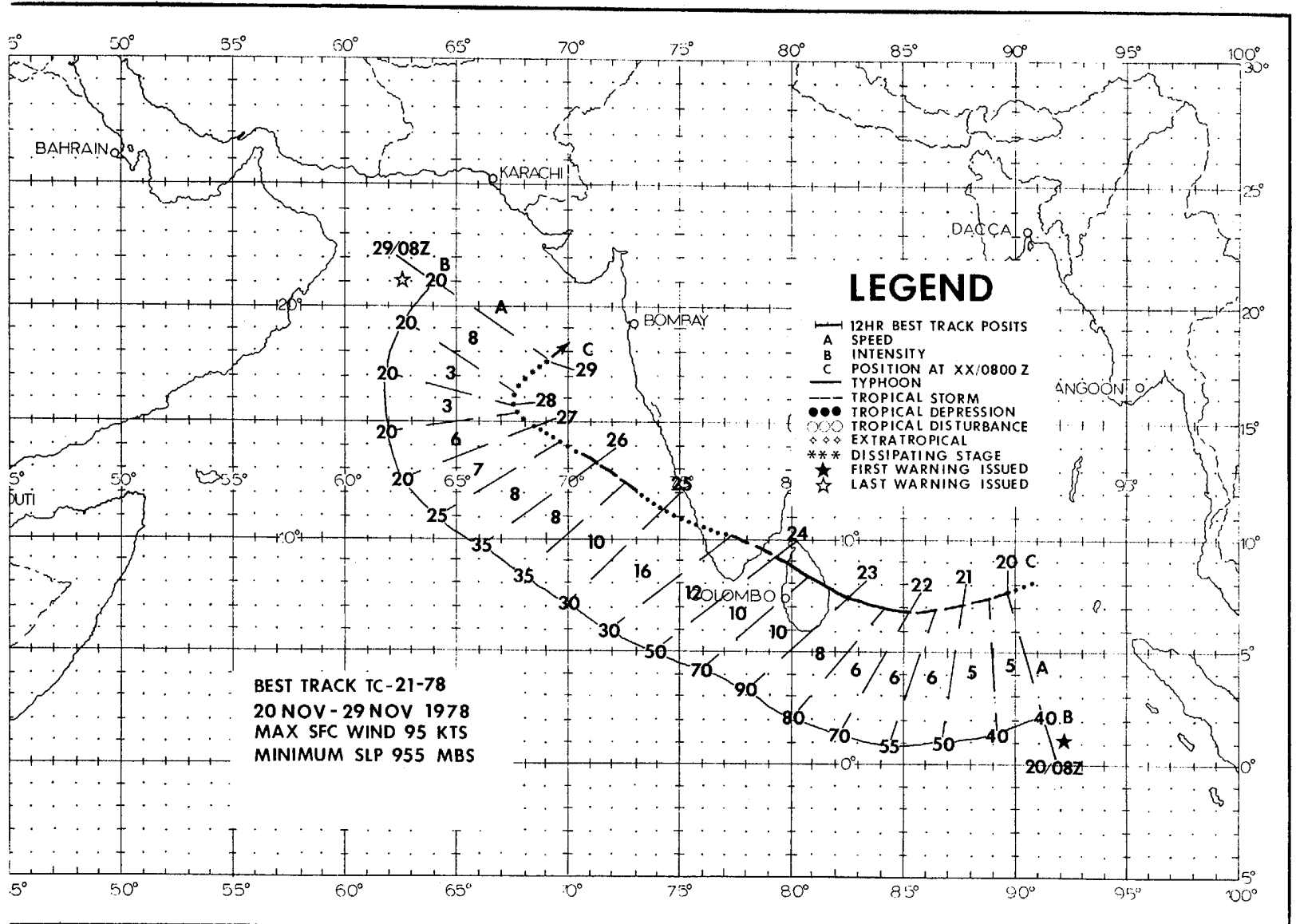


FIGURE 3-33. TC 20-78, 260 nm (482 km) southwest of Karachi on 10 November 1978 at 0659Z. The concentration of convective activity to one side of the cyclone and the cirrus showing unidirectional, upper-air flow are typical of cyclones in strong, vertical shear environments. A cyclonic circulation is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



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

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

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

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

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

During the subsequent 48-hour period, the high pressure cell over central India

migrated eastward into the Bay of Bengal to a position north of the cyclone. Northerly 500 mb winds reported by stations along the

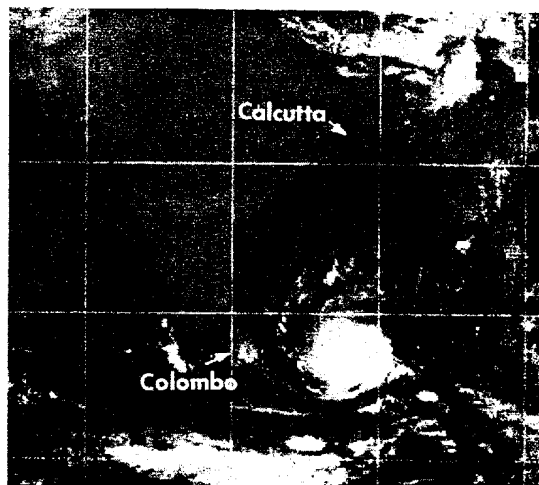


FIGURE 3-34. Infrared image of TC 21-78 at 50 kt (26 m/sec) intensity moving slowly toward Sri-Lanka, 21 November 1978, 0542Z. (DMSP imagery from AFGWC; Offutt AFB, Nebraska as received by FWF Suitland, Maryland)

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

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

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

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

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

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

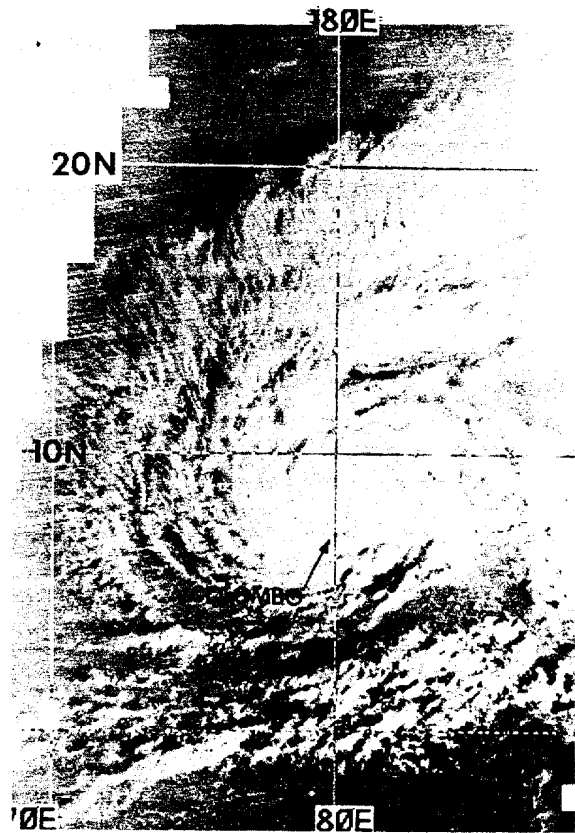


FIGURE 3-35. TC 21-78 located over north-central Sri-Lanka, 24 November 1978, 0118Z. (DMSP imagery from AFGWC, Offutt AFB, Nebraska)

3. CENTRAL NORTH PACIFIC TROPICAL CYCLONES

The Central Pacific Hurricane Center (CPHC) personnel saw 1978 as the most active tropical cyclone year on record for their area of responsibility (north of the equator from 140W to 180). Table 3-9 details the seven tropical cyclones that either formed in the central Pacific area or moved in from the eastern Pacific area. Table 3-10 shows the central Pacific tropical cyclone "season" is

well-defined and that 1978 was a record year for the number of tropical storms and hurricanes. This season not only set a record number of occurrences but also produced a cyclone with an exceptional length of travel and persistence of hurricane intensity (Fico), as well as one of the two most intense hurricanes on record in the central Pacific (Susan). Table 3-11 is a warning summary for the central North Pacific.

TABLE 3-9.

CENTRAL NORTH PACIFIC

1978 SIGNIFICANT TROPICAL CYCLONES

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

* Warning period while in central Pacific area.

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

*** Overlapping days included once in sum.

TABLE 3-10.

FREQUENCY OF CENTRAL PACIFIC STORMS BY MONTH AND YEAR (NUMBERS IN PARENTHESES INDICATE STORMS REACHING HURRICANE INTENSITY)

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

TABLE 3-11.

WARNING SUMMARY

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

JIWC

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

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

GOES-3 imagery (Fig. 3-36) depicts three cyclones; John, Kristy, and Miriam. At the time of this satellite photograph, John was at tropical storm intensity and subsequently

weakened further and meandered west-southwestward to 170W.

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

An individual summary of Hurricane Fico follows.

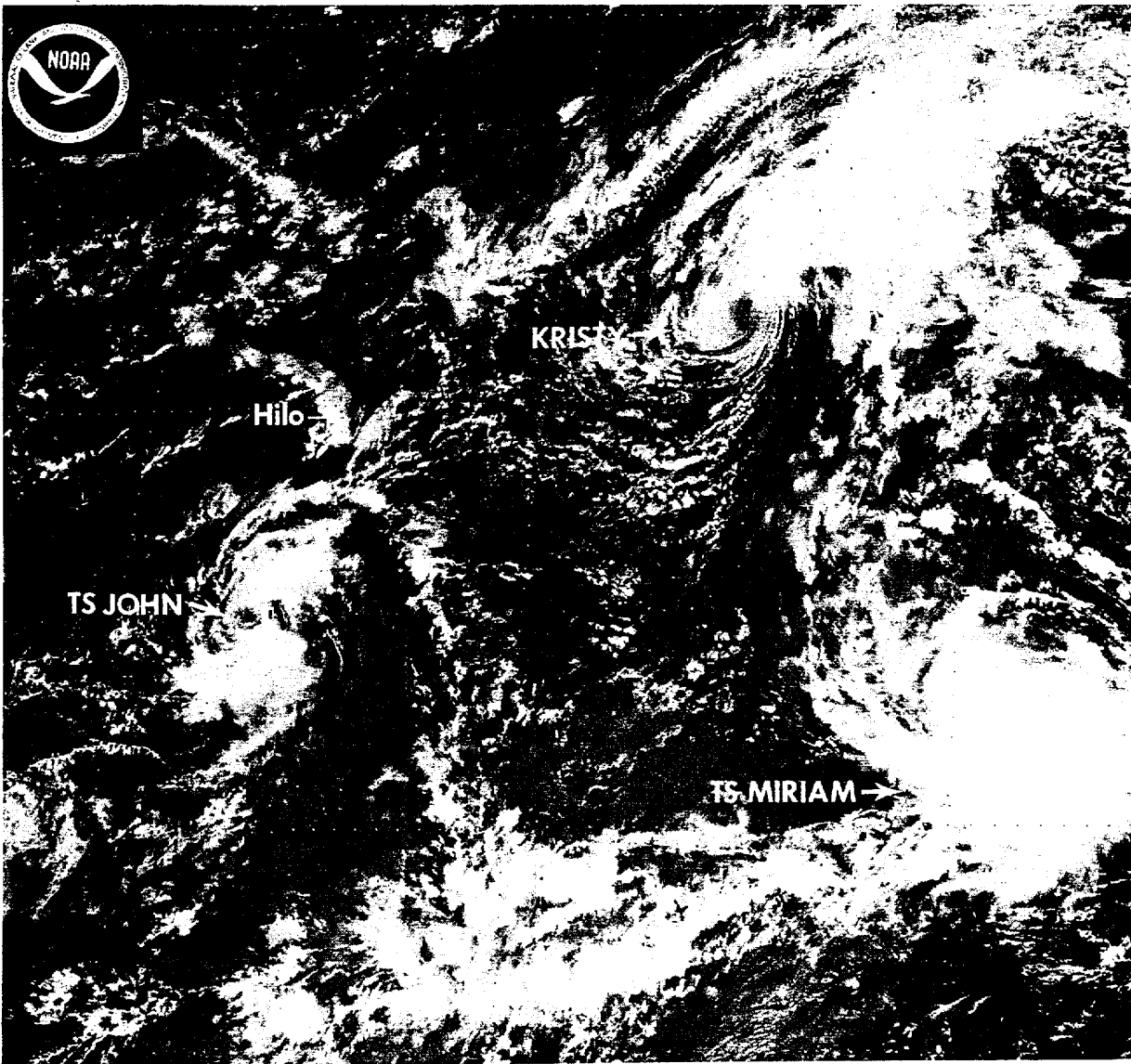


FIGURE 3-36. Tropical Storm John (downgraded from Hurricane John) is centered 240 nm (417 km) south-southwest of South Point, Hawaii. Kristy, downgraded to a tropical disturbance, 600 nm (1120 km) east-northeast of Hilo, Hawaii, and Tropical Storm Miriam 925 nm (1714 km) southeast of Hilo, Hawaii, 27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

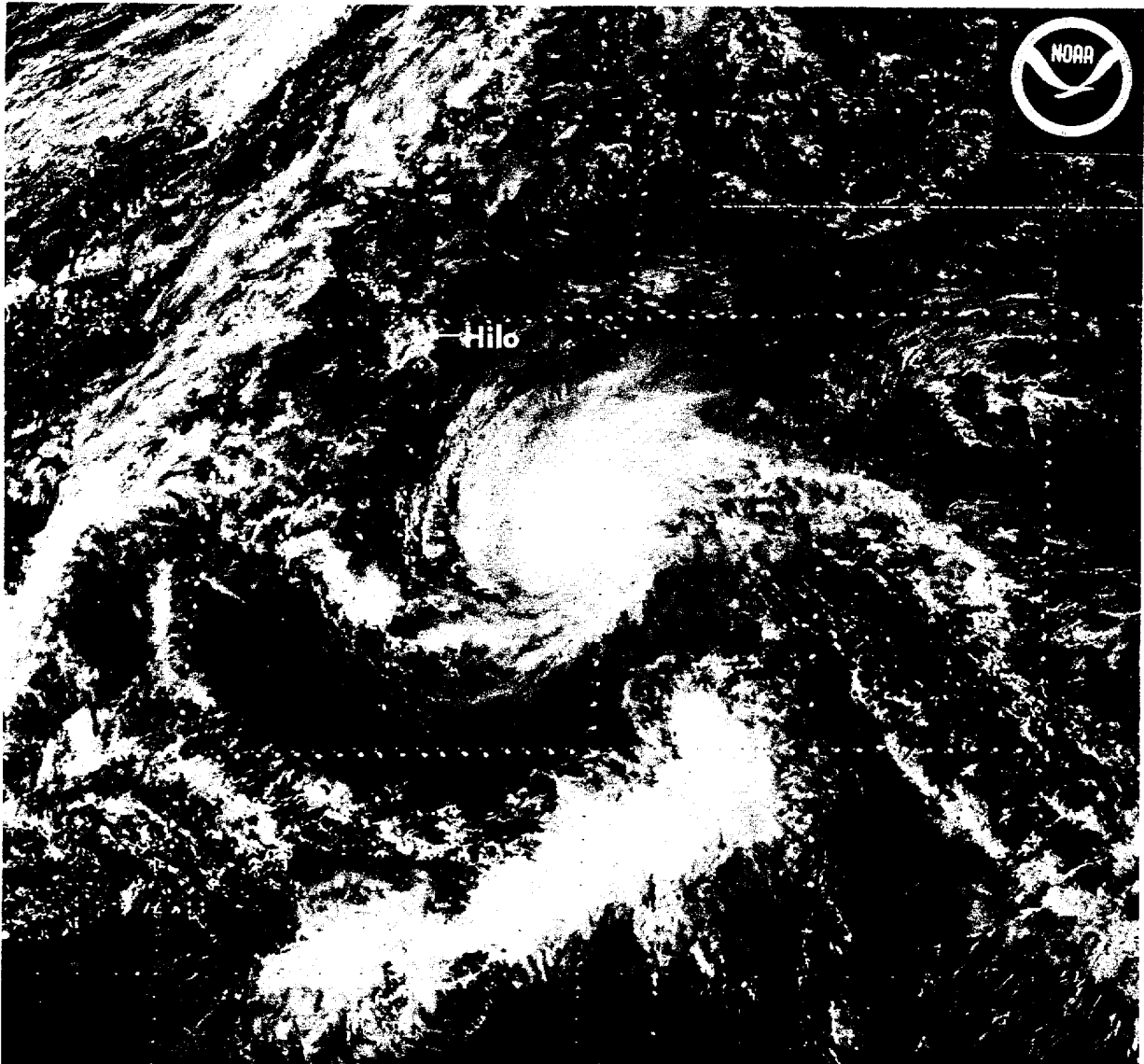
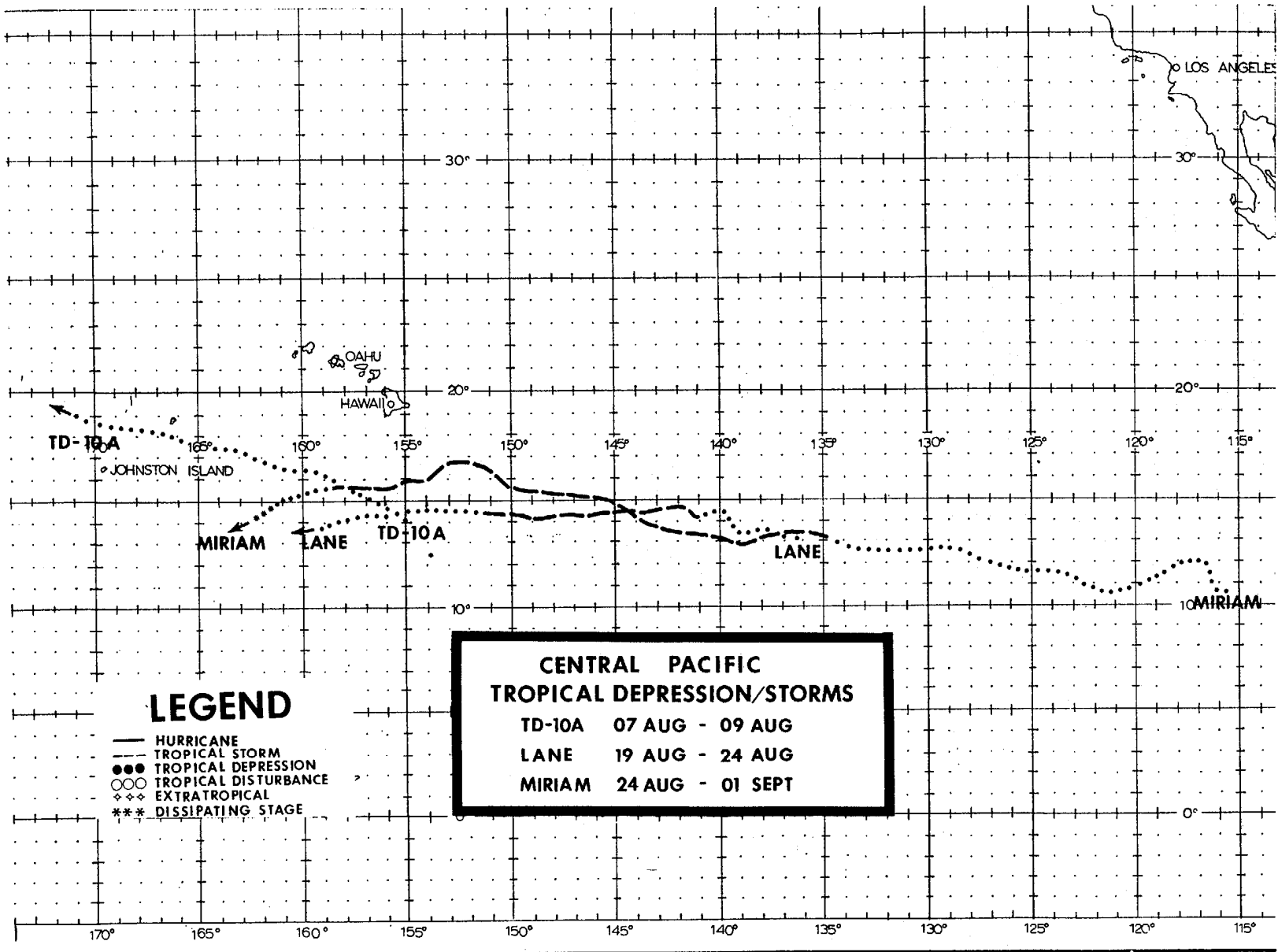
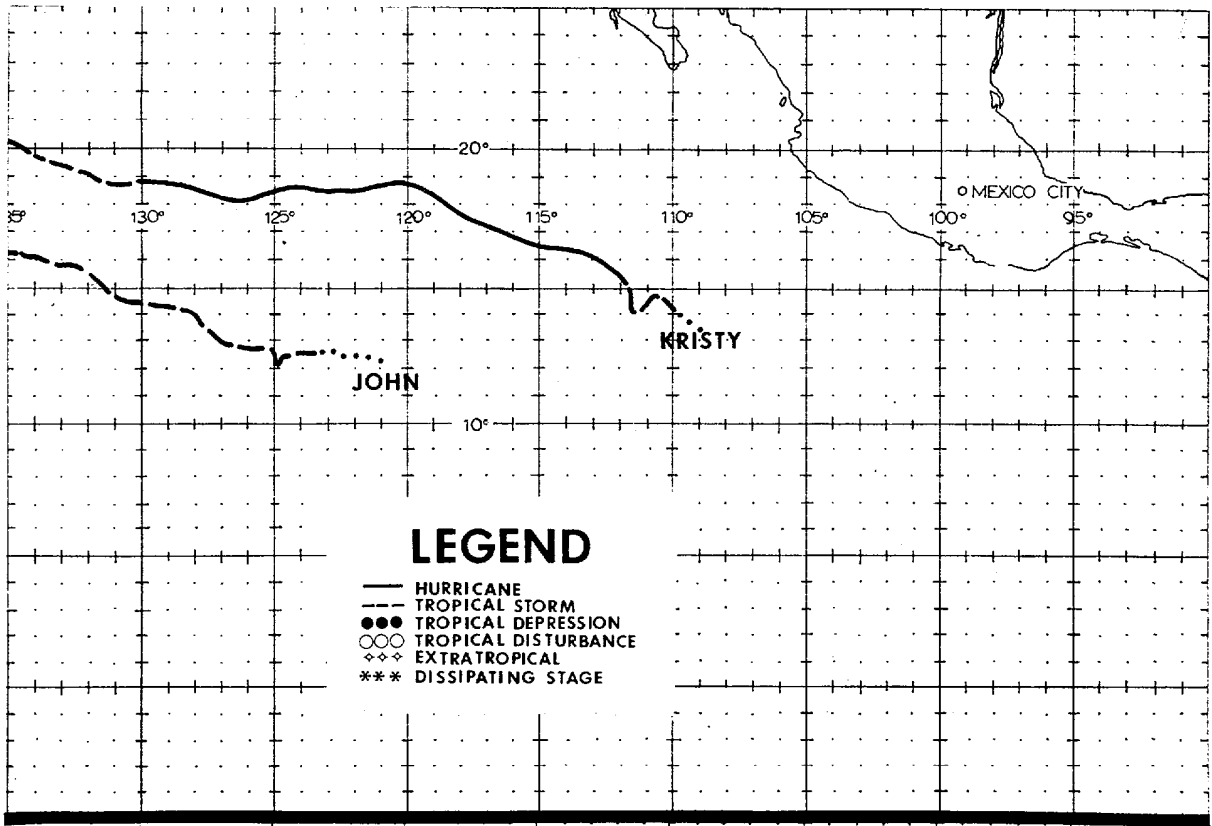


FIGURE 3-37. Hurricane Susan at 120 kt (62 m/sec) maximum intensity, 22 October 1978, 0016Z. (GOES imagery from SFSS, Honolulu, Hawaii)



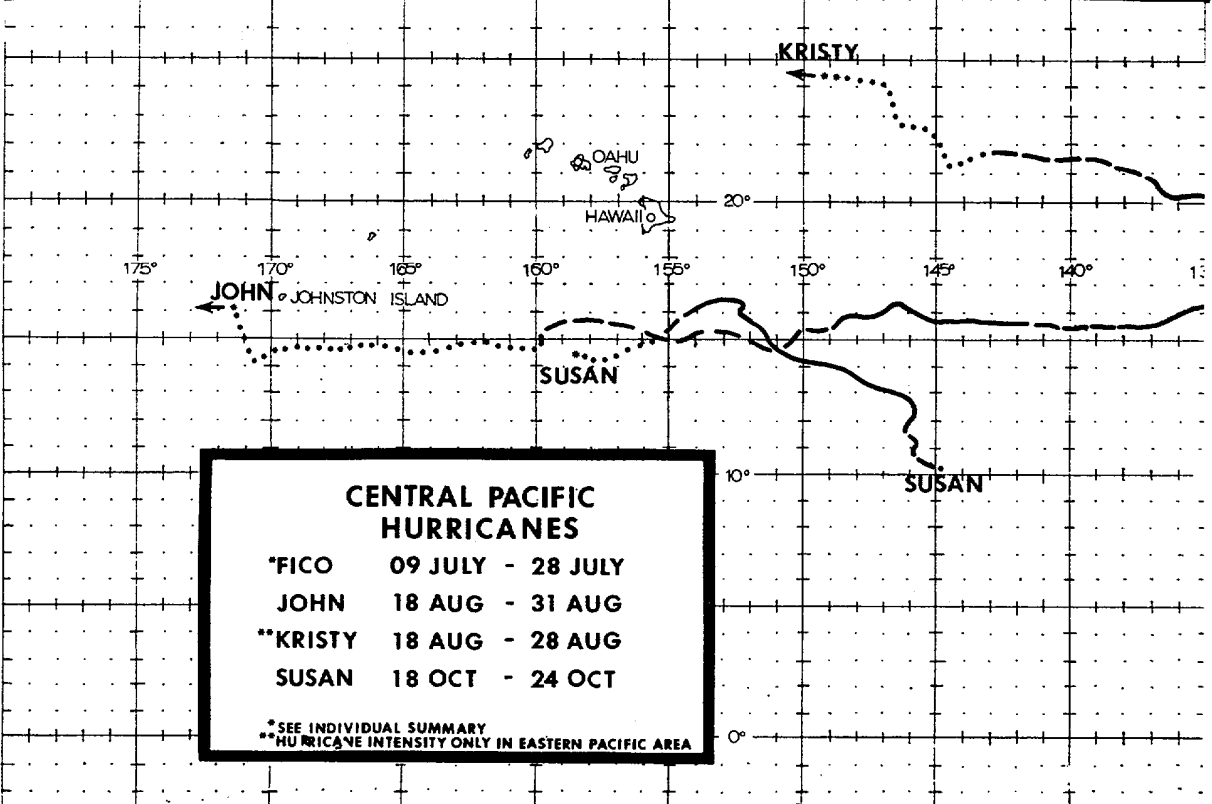
LEGEND

- HURRICANE
- - - TROPICAL STORM
- TROPICAL DEPRESSION
- TROPICAL DISTURBANCE
- ◇◇◇ EXTRATROPICAL
- *** DISSIPATING STAGE



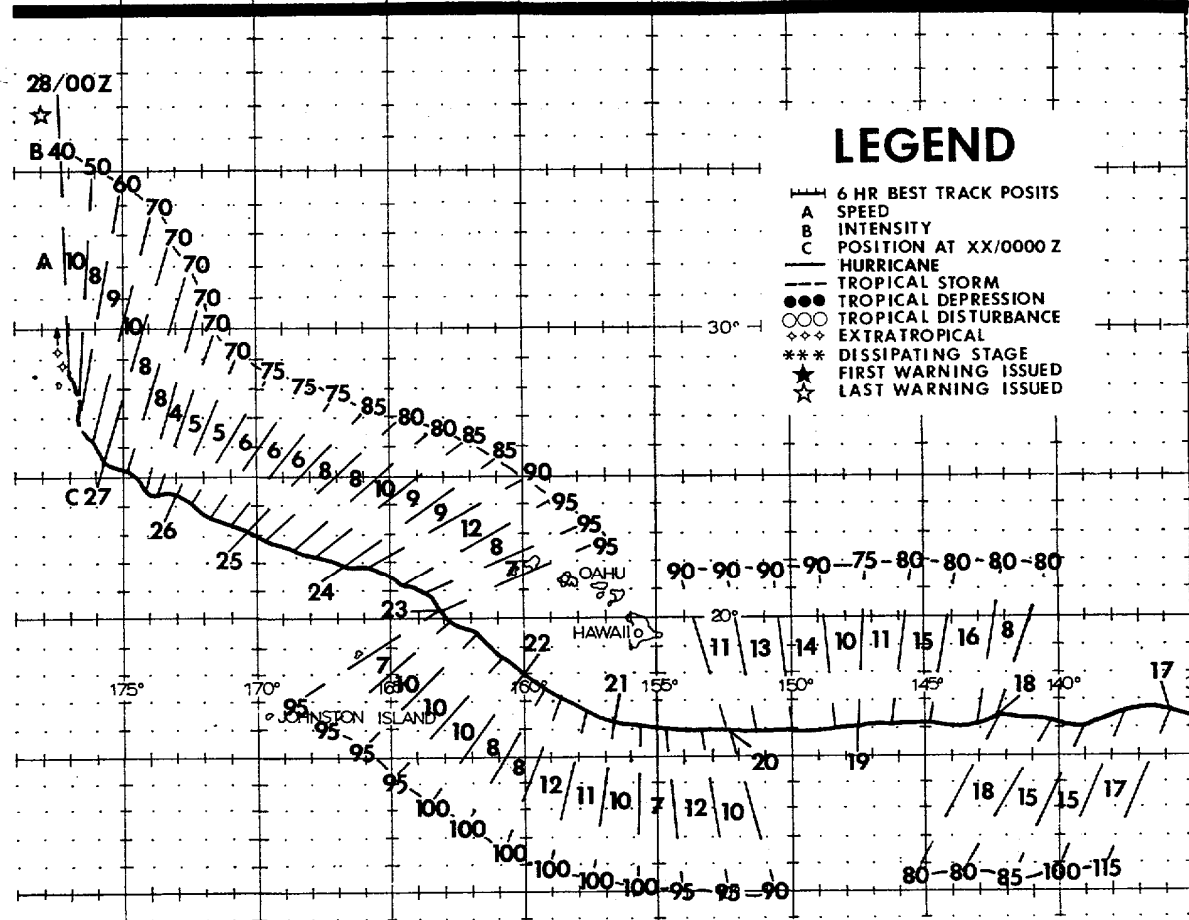
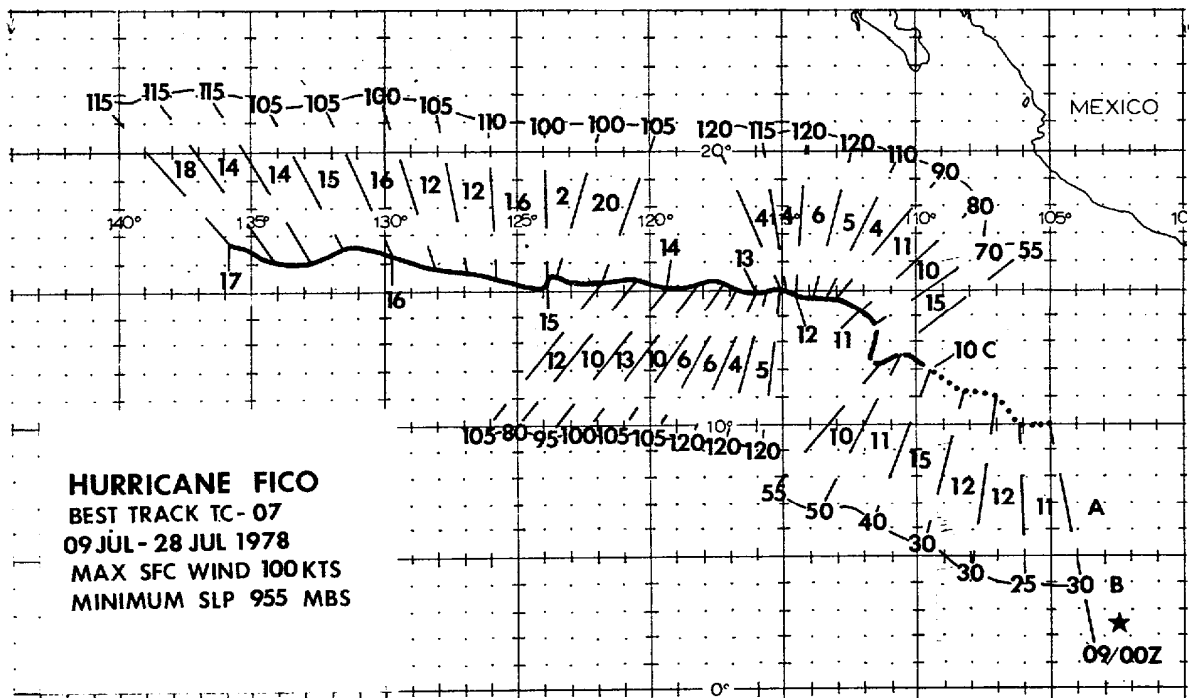
LEGEND

- HURRICANE
- - - TROPICAL STORM
- TROPICAL DEPRESSION
- TROPICAL DISTURBANCE
- ◇◇◇ EXTRATROPICAL
- *** DISSIPATING STAGE



CENTRAL PACIFIC HURRICANES	
*FICO	09 JULY - 28 JULY
JOHN	18 AUG - 31 AUG
**KRISTY	18 AUG - 28 AUG
SUSAN	18 OCT - 24 OCT

* SEE INDIVIDUAL SUMMARY
 ** HURRICANE INTENSITY ONLY IN EASTERN PACIFIC AREA



HURRICANE FICO

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

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

reported. Very short period surf of similar heights reached southern Oahu and southern Kauai on the following day.

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

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

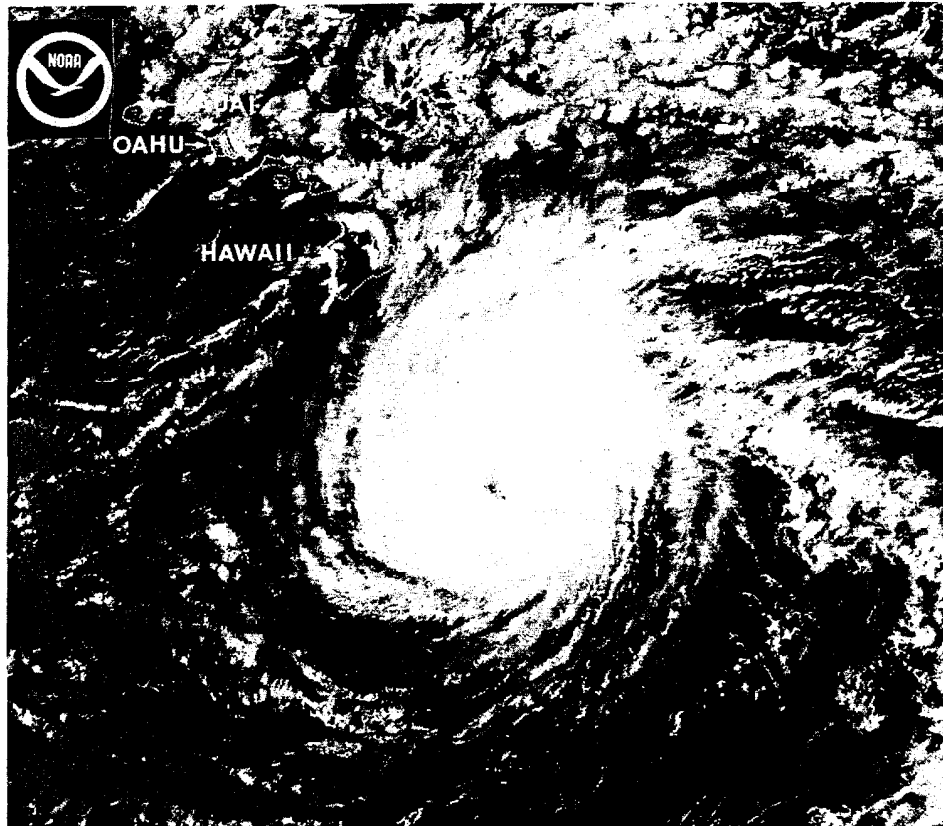


FIGURE 3-38. Hurricane Fico threatening Hawaii, 20 July 1978, 0115Z.
(GOES imagery from SFSS, Honolulu, HI)

CHAPTER IV - SUMMARY OF FORECAST VERIFICATION

1. ANNUAL FORECAST VERIFICATION

a. Western North Pacific Area

Forecast positions at warning times and 24-, 48- and 72-hour valid times were verified against corresponding best tracks and vector errors and right angle errors were calculated (Table 4-1). Annual, mean errors are listed in Table 4-2 for comparison. Frequency distributions of the vector errors of

the 24-, 48- and 72-hour forecasts on all 1978 cyclones are shown in Figure 4-1 and annual, mean vector errors are graphed in Figure 4-2. Previous reports have shown a graph of the annual, mean vector errors for typhoons when best track intensity at verifying time was 35 kt or greater. This, subset, error graph is shown in Figure 4-3. Mean vector errors shown in Figure 4-3 are lower than those depicted in Figure 4-2; nonetheless, similar trends are evident from year to year.

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

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

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

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

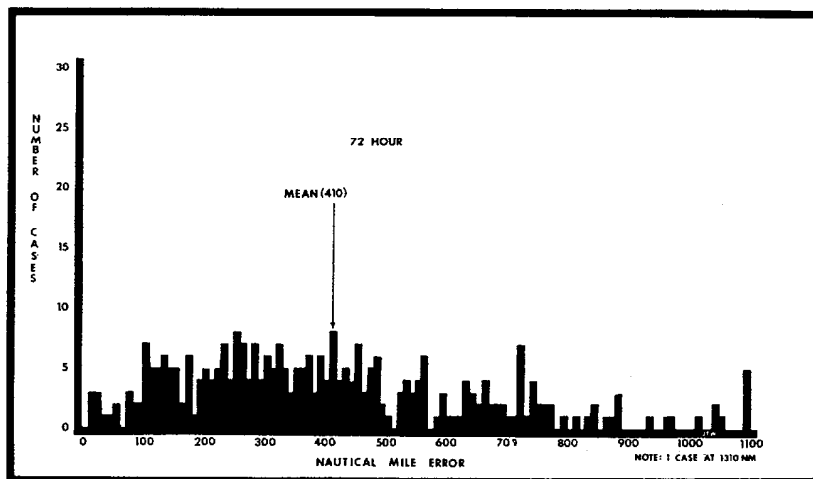
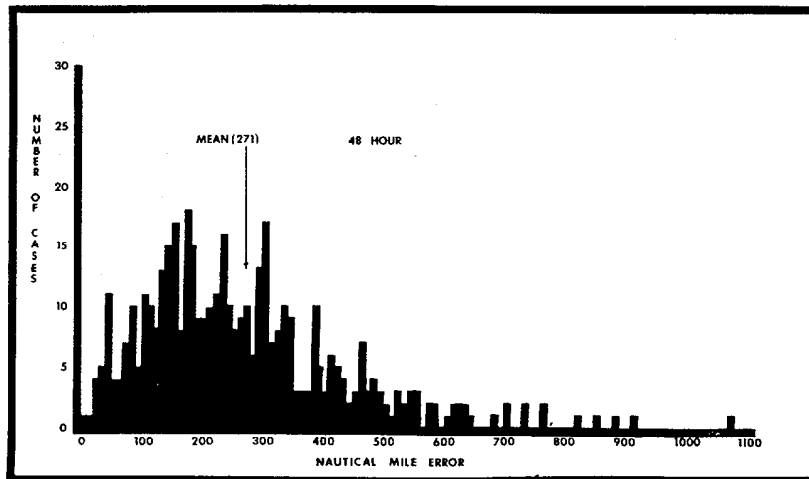
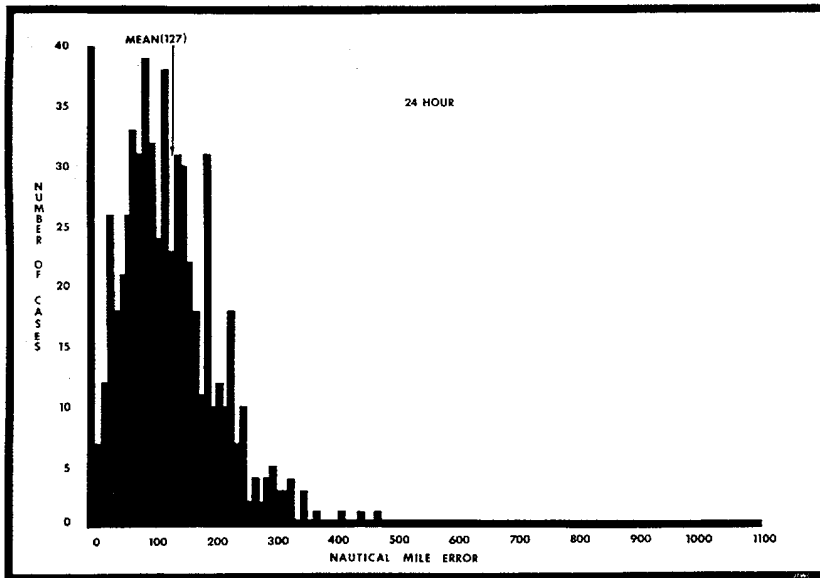


FIGURE 4-1. Frequency distribution of 1978 24-, 48-, and 72-hour forecast vector errors for all significant tropical cyclones in the western North Pacific.

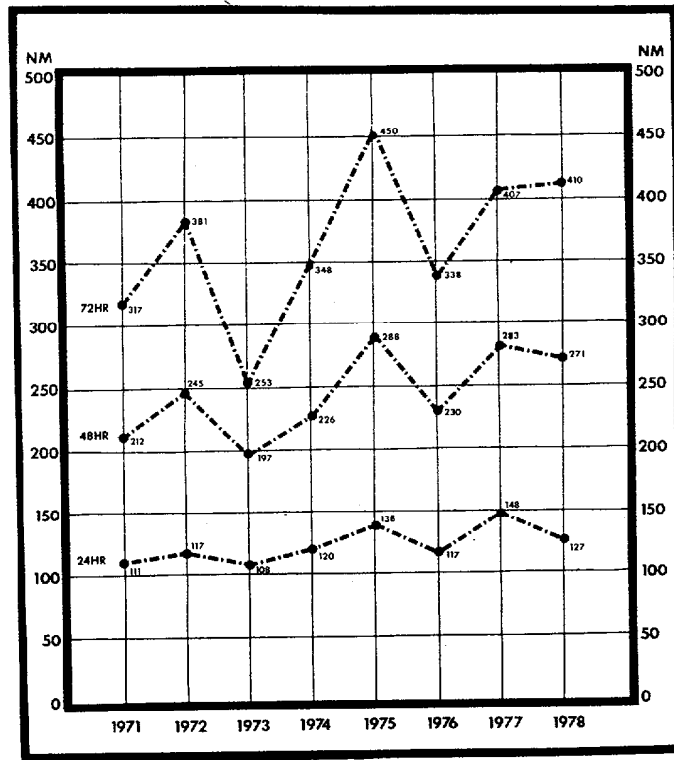


FIGURE 4-2. Annual mean vector errors (nm) for all cyclones in the western North Pacific.

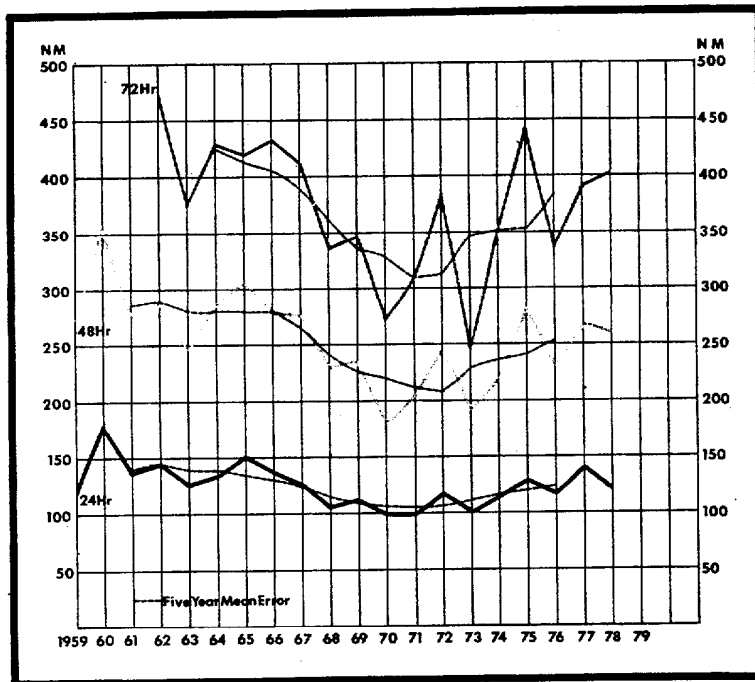


FIGURE 4-3. Annual mean vector errors (nm) for western North Pacific typhoons only when best track intensities were greater than 34 knots at time of verification.

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

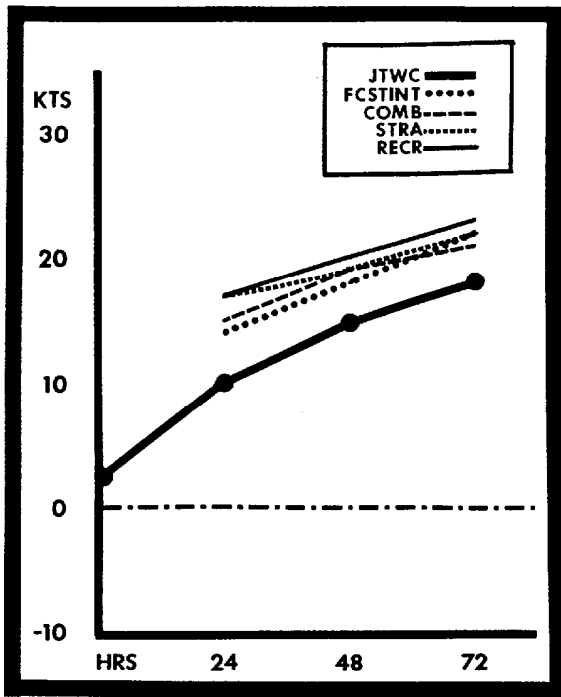


FIGURE 4-4. Comparison of average intensity errors (magnitude) for all cyclones in the western North Pacific.

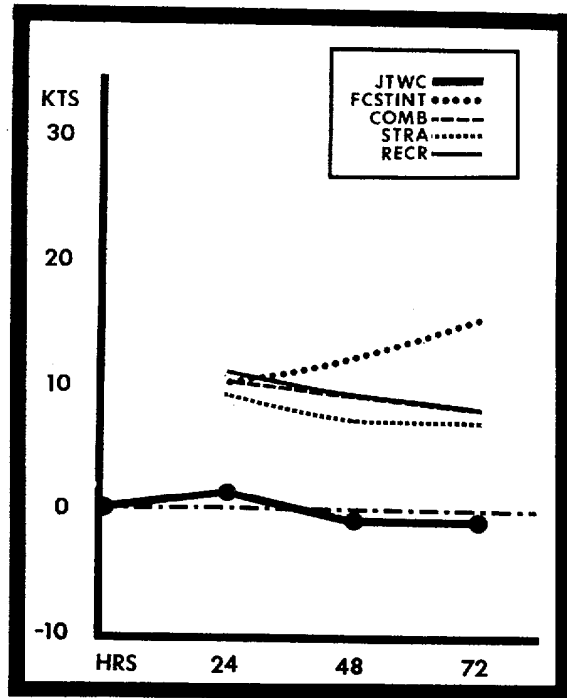


FIGURE 4-5. Comparison of average intensity errors (biases) for all cyclones in the western North Pacific.

b. North Indian Ocean Area

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

Forecast intensities were not verified.

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

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

JTWC

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

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

JTWC

INDIAN OCEAN FORECAST ERRORS

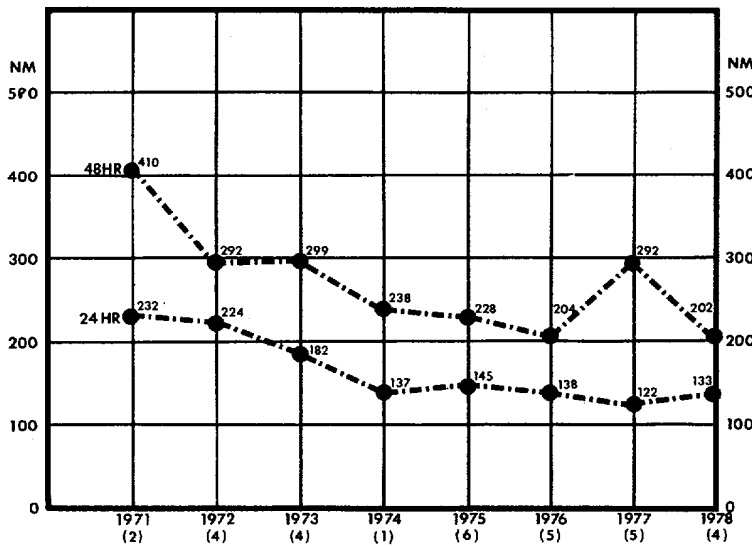


FIGURE 4-6. Annual mean vector errors (nm) for all cyclones in the North Indian Ocean.

2. COMPARISON OF OBJECTIVE TECHNIQUES

a. General

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

b. Description of Objective Techniques

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

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

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

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

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

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

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

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

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

c. Testing and Results

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

TABLE 4-5.

24-HOUR

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

NUMBER OF CASES

X-AXIS TECHNIQUE ERROR

Y-AXIS TECHNIQUE ERROR

ERROR DIFFERENCE Y-X

48-HOUR

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

JTWC - OFFICIAL JTWC FORECAST

STRA - STRAIGHT (TYPN 75)

RECR - RECURVE (TYPN 75)

COMB - COMBINED (TYPN 75)

MH70 - HURRIC 700-HR PRCG

MH50 - HURRIC 500-HR PRCG

TCMW - TROPICAL CYCLONE MODEL (SAME WARNING)

TCMD - TROPICAL CYCLONE MODEL (SAME DATA)

XTRP - 12-HOUR EXTRAPOLATION

HPAC - MEAN OF XTRP AND CLIMATOLOGY

72-HOUR

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

24-HOUR

	JTWC	INJA	MH7ø	MH5ø	XTRP	HPAC
JTWC	28 133 133 0					
INJA	20 136 117 -18	23 132 132 0				
MH7ø	9 128 222 95	8 122 245 123	10 219 219 0			
MH5ø	7 131 251 120	6 117 282 165	7 236 251 15	7 251 251 0		
XTRP	25 119 137 18	22 128 159 31	9 203 133 -69	6 231 109 -123	28 151 151 0	
HPAC	22 117 114 -1	18 119 124 5	6 246 134 -111	3 331 105 -225	24 144 123 -20	24 123 123 0

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

48-HOUR

	JTWC	INJA	MH7ø	MH5ø	XTRP	HPAC
JTWC	17 202 202 0					
INJA	11 194 202 8	14 231 231 0				
MH7ø	3 99 149 49	3 270 263 -6	4 224 224 0			
MH5ø	3 168 246 78	3 310 270 -39	3 279 186 -93	4 243 243 0		
XTRP	16 200 244 44	13 214 298 85	3 149 304 155	3 246 330 84	19 286 286 0	
HPAC	15 205 191 -13	12 211 225 13	2 82 88 6	2 287 201 -85	18 276 221 -54	18 221 221 0

JTWC - OFFICIAL JTWC FORECAST
INJA - ANALOG
MH7ø - MOHATT 700-MB PROG
MH5ø - MOHATT 500-MB PROG
XTRP - 12-HOUR EXTRAPOLATION
HPAC - MEAN OF XTRP AND CLIMATOLOGY

TABLE 4-6.

CHAPTER V - RESEARCH & DEVELOPMENT SUMMARY

1. GENERAL

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

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

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

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

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

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

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

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

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

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

5. ESTABLISHMENT OF THE JTWC TROPICAL CYCLONE DATA BASE

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

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

6. NEDS/COMPUTER APPLICATIONS

(Staff, FLEWEACEN/JTWC)

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

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

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

7. BASIC STREAMLINE ANALYSIS AND TROPICAL CYCLONE FORECASTING TECHNIQUES GUIDE

(Guay, G., FLEWEACEN/JTWC)

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

8. STATISTICAL EVALUATION OF JTWC OBJECTIVE TECHNIQUES

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

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

9. JTWC FORECAST CONFIDENCE STATEMENTS

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

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

10. THE TRANSITIONING OF TROPICAL CYCLONES TO EXTRATROPICAL CYCLONES

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

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

ANNEX A - TROPICAL CYCLONE TRACK DATA

1. WESTERN NORTH PACIFIC CYCLONE TRACK DATA

TROPICAL STORM NADINE

(January)

BEST TRACK	WARNING				24 HOUR FORECAST				48 HOUR FORECAST				72 HOUR FORECAST					
	POSIT	WIND	ERRORS		POSIT	WIND	ERRORS		POSIT	WIND	ERRORS		POSIT	WIND	ERRORS			
			DST	WIND			DST	WIND			DST	WIND			DST	WIND		
100182	7.5	164.6	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
100002	7.6	164.0	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
100062	7.6	163.5	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
100122	8.0	163.0	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
100182	8.5	162.5	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
100002	9.0	162.0	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
100062	9.2	162.0	30	9.3	161.7	25	19	-5	10.4	154.7	30	127	0	4.3	155.9	35	342	-5
100122	9.5	162.4	30	9.3	161.7	25	43	-5	10.1	161.2	30	17	0	10.2	158.7	35	186	-5
100182	9.6	162.9	30	9.3	161.7	25	77	-5	10.4	160.7	30	23	-5	10.2	158.3	35	239	-10
100002	10.2	162.8	30	10.2	163.1	25	18	-5	11.3	161.3	30	21	-5	10.0	157.3	35	280	-10
100062	10.3	161.9	30	10.8	161.7	25	32	-5	10.3	157.0	30	22	-10	4.8	153.5	35	525	-10
100122	10.2	161.5	30	10.3	161.3	30	13	0	10.4	157.1	35	24	-5	10.2	153.0	40	585	-10
100182	10.1	161.0	35	10.0	160.7	30	19	-5	9.6	156.7	40	31	-5	10.2	152.4	45	707	-10
110002	11.0	161.1	35	11.1	161.5	35	24	0	12.0	158.8	40	16	0	12.4	154.8	45	603	-10
110062	11.7	161.1	40	11.6	161.2	35	19	-5	12.2	157.4	45	23	0	12.8	154.0	50	769	-5
110122	12.7	160.6	40	12.3	160.7	40	25	0	14.3	157.9	45	22	-5	13.2	153.7	50	918	-10
110182	13.0	160.1	45	13.5	159.9	45	13	0	15.2	156.9	50	34	-5	13.6	153.2	50	1079	-10
111002	14.4	160.1	45	14.2	160.1	45	12	0	17.2	160.2	40	23	-15	20.5	162.7	35	589	-15
111062	15.2	160.6	45	15.1	161.0	45	24	0	18.3	164.0	35	13	-20	0.0	0.0	0	0	0
111122	15.9	161.4	50	16.0	161.4	45	6	-5	19.1	164.4	45	23	-15	0.0	0.0	0	0	0
111182	16.5	162.7	55	16.6	162.7	55	6	0	18.4	167.1	45	22	-15	0.0	0.0	0	0	0
112002	17.1	164.3	55	17.4	164.2	55	19	0	19.6	170.5	45	19	-5	0.0	0.0	0	0	0
112062	17.8	166.3	55	17.7	166.1	55	13	0	0.0	0.0	0	0	0	0.0	0.0	0	0	0
112122	18.8	168.6	60	18.6	168.0	55	59	-5	0.0	0.0	0	0	0	0.0	0.0	0	0	0
112182	20.2	170.8	60	20.3	170.7	60	8	0	0.0	0.0	0	0	0	0.0	0.0	0	0	0
113002	21.6	173.2	60	21.6	173.0	60	11	0	0.0	0.0	0	0	0	0.0	0.0	0	0	0

ALL FORECASTS

	24-HR	48-HR	72-HR
AVG FORECAST POSIT ERROR	23.	185.	381.
AVG WIND ANGLE ERROR	15.	109.	718.
AVG INTENSITY MAGNITUDE ERROR	2.	7.	9.
AVG INTENSITY BIAS	-2.	-7.	-11.
NUMBER OF FORECASTS	20	16	12
	3	1	0

TYPHOON OLIVE

(April)

BEST TRACK	WARNING				24 HOUR FORECAST				48 HOUR FORECAST				72 HOUR FORECAST					
	POSIT	WIND	ERRORS		POSIT	WIND	ERRORS		POSIT	WIND	ERRORS		POSIT	WIND	ERRORS			
			DST	WIND			DST	WIND			DST	WIND			DST	WIND		
410002	3.5	149.0	15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
410062	3.8	147.6	15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
410122	4.3	146.2	15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
410182	4.7	144.8	15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
410002	5.0	143.5	15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
410062	5.3	142.8	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
410122	5.0	142.3	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
410182	5.0	141.5	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
410002	6.2	140.8	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
410062	6.8	139.3	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
410122	7.4	137.7	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
410182	7.9	136.5	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
410002	8.4	135.2	30	8.5	135.0	30	13	0	10.5	130.3	40	59	0	12.4	125.0	55	88	-5
410062	8.7	133.9	30	8.9	134.0	30	13	0	11.4	129.4	45	96	0	13.5	125.1	55	138	5
410122	9.0	132.6	30	9.2	132.4	30	21	0	11.2	128.4	45	76	-5	12.9	124.4	55	137	10
410182	9.4	131.2	35	9.2	131.5	35	21	0	10.6	126.5	50	32	-5	12.7	122.6	55	99	10
410002	9.0	129.9	40	9.7	129.5	35	24	-5	11.4	124.5	40	8	-20	12.5	120.7	40	72	-5
410062	10.0	128.6	45	10.1	128.4	45	13	0	11.8	123.2	45	13	-5	12.8	119.3	40	42	-5
410122	10.4	127.4	50	10.4	127.1	50	6	0	12.0	122.4	45	34	0	13.2	118.5	40	39	-10
410182	10.8	126.0	55	10.5	126.2	50	13	-5	12.3	122.0	40	74	-5	13.5	118.4	45	76	-10
420002	11.3	124.6	60	11.3	124.8	60	12	0	12.2	121.4	40	116	-5	13.9	117.0	45	70	-15
420062	11.9	123.4	50	11.5	123.2	50	27	0	12.8	118.9	45	30	0	14.2	115.0	50	35	-15
420122	12.4	122.1	45	12.3	122.2	45	8	0	13.4	117.7	45	13	-5	14.0	113.8	50	65	-20
420182	12.0	120.9	45	12.9	121.0	45	8	0	14.4	116.4	50	64	-5	15.7	112.8	50	40	-25
421002	13.2	119.7	45	13.2	119.0	45	6	0	14.8	114.7	55	113	-5	16.2	110.8	60	162	-25
421062	13.3	118.8	45	13.1	118.8	50	12	5	13.5	114.5	60	80	-5	15.4	111.3	65	177	-20
421122	13.5	117.9	50	13.5	117.4	55	6	5	14.3	113.9	65	62	-5	14.0	109.5	65	252	-20
421182	13.0	117.1	55	13.5	116.9	55	13	0	14.4	112.6	65	112	-15	14.8	108.1	70	340	-45
422002	13.6	116.4	60	13.9	116.4	60	6	0	15.1	111.3	65	51	-20	14.4	110.1	70	228	-15
422062	14.3	115.6	65	14.2	115.5	65	8	0	15.5	112.5	75	67	-10	14.8	110.1	80	285	-5

422122	14.8	114.9	70	14.8	114.7	70	12	0	16.5	111.8	75	80	10	18.2	109.4	80	383	-5	20.1	107.4	80	886	15
422182	15.3	114.3	80	15.5	114.7	80	13	0	18.0	111.7	80	87	-5	20.6	110.2	80	398	-20	0.0	0.0	0	-0	0
423002	15.9	113.6	85	16.0	113.5	85	8	0	18.4	111.3	85	120	0	21.0	110.4	85	404	10	23.4	112.1	40	847	-15
423062	16.4	113.2	85	16.7	112.8	85	21	0	19.1	111.2	85	180	0	21.7	111.1	80	340	10	0.0	0.0	0	-0	0
423122	17.0	113.1	85	17.0	112.8	85	17	0	19.2	111.4	85	201	0	21.7	111.1	75	305	10	24.1	118.3	65	726	20
423182	17.7	113.7	85	17.4	113.7	85	18	0	19.7	113.5	80	215	0	22.3	116.1	75	316	15	25.0	120.2	65	721	25
424002	18.4	113.5	85	18.5	113.4	85	8	0	21.7	116.1	80	157	5	24.5	120.3	70	417	15	0.0	0.0	0	-0	0
424062	19.1	114.5	85	19.1	114.5	85	0	0	21.4	114.0	80	101	10	23.3	125.0	85	252	15	0.0	0.0	0	-0	0
424122	19.7	116.0	85	19.7	115.7	85	17	0	21.9	120.8	75	135	10	23.9	127.2	85	243	20	0.0	0.0	0	-0	0
424182	20.2	117.3	80	20.2	117.3	80	0	0	22.4	123.2	85	124	5	24.5	130.5	55	169	15	0.0	0.0	0	-0	0
425002	20.7	118.7	75	20.9	118.7	75	12	0	23.1	125.7	80	115	5	0.0	0.0	0	-0	0	0.0	0.0	0	-0	0
425062	21.2	120.8	70	21.4	120.7	70	35	0	23.4	127.0	80	158	0	0.0	0.0	0	-0	0	0.0	0.0	0	-0	0
425122	21.5	123.2	65	21.5	123.7	65	28	0	23.4	134.0	85	143	0	0.0	0.0	0	-0	0	0.0	0.0	0	-0	0
425182	21.7	125.4	60	21.8	125.4	60	28	0	23.4	137.0	85	205	5	0.0	0.0	0	-0	0	0.0	0.0	0	-0	0
426002	22.0	127.4	55	22.0	127.5	55	6	0	0.0	0.0	0	-0	0	0.0	0.0	0	-0	0	0.0	0.0	0	-0	0
426062	22.5	129.5	50	22.2	129.3	50	21	0	0.0	0.0	0	-0	0	0.0	0.0	0	-0	0	0.0	0.0	0	-0	0
426122	22.9	131.5	45	22.8	131.3	45	13	0	0.0	0.0	0	-0	0	0.0	0.0	0	-0	0	0.0	0.0	0	-0	0
426182	23.3	133.3	40	23.3	133.4	40	27	0	0.0	0.0	0	-0	0	0.0	0.0	0	-0	0	0.0	0.0	0	-0	0

	ALL FORECASTS				TYPHOONS WHILE OVER 35 KTS			
	MMNG	24-HR	48-HR	72-HR	MMNG	24-HR	48-HR	72-HR
AVG FORECAST POSIT ERROR	14.	100.	224.	378.	14.	100.	224.	378.
AVG RIGHT ANGLE ERROR	10.	62.	129.	215.	4.	67.	124.	215.
AVG INTENSITY MAGNITUDE ERROR	1.	5.	14.	17.	1.	5.	14.	17.
AVG INTENSITY BIAS	0.	-3.	-6.	-9.	0.	-3.	-6.	-9.
NUMBER OF FORECASTS	36	32	28	20	33	32	28	20
		17	15	12				

TROPICAL STORM POLLY
(June)

	BEST TRACK				WARNING ERRORS				24 HOUR FORECAST ERRORS				48 HOUR FORECAST ERRORS				72 HOUR FORECAST ERRORS						
	POSIT	WIND	POSIT	WIND	POSIT	WIND	POSIT	WIND	POSIT	WIND	POSIT	WIND	POSIT	WIND	POSIT	WIND	POSIT	WIND					
013122	20.3	138.3	15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0					
013182	21.2	137.3	15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0					
014002	22.2	136.3	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0					
014062	23.0	135.5	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0					
014122	23.8	134.5	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0					
014182	24.3	133.8	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0					
015002	24.1	133.1	15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0					
015062	23.7	132.7	15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0					
015122	23.3	132.3	15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0					
015182	22.8	132.0	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0					
016002	22.4	132.4	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0					
016062	23.0	132.4	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0					
016122	23.5	131.0	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0					
016182	23.9	129.7	30	23.7	129.4	30	26	0	25.5	124.7	40	124	15	28.3	123.5	45	161	5	30.9	126.7	35	378	-15
017002	24.4	128.9	30	24.3	128.3	30	33	0	28.0	124.0	40	167	10	32.2	127.0	40	245	0	35.7	133.0	35	378	-15
017062	24.6	128.2	30	25.0	128.7	30	24	0	27.4	126.0	40	901	-5	29.5	124.7	30	111	-15	0.0	0.0	0	-0	0
017122	25.0	127.4	25	24.9	127.4	30	12	5	27.1	125.1	40	84	-5	29.2	124.0	30	125	20	0.0	0.0	0	-0	0
017182	25.4	127.0	25	25.4	126.4	30	11	5	28.0	124.7	40	99	10	30.8	125.1	25	78	-25	0.0	0.0	0	-0	0
018002	26.1	126.3	30	26.5	125.8	40	36	0	29.7	124.4	40	156	10	31.6	125.1	25	112	-20	0.0	0.0	0	-0	0
018062	25.9	126.1	35	25.6	126.0	35	8	0	28.4	124.9	45	72	0	32.3	126.4	35	127	-5	0.0	0.0	0	-0	0
018122	26.5	126.1	35	26.6	126.0	35	8	0	29.3	125.7	45	38	-5	32.9	128.2	40	114	10	0.0	0.0	0	-0	0
018182	26.9	126.1	40	27.0	126.1	40	6	0	30.5	126.6	50	13	0	0.0	0.0	0	-0	0	0.0	0.0	0	-0	0
019002	27.5	126.0	40	27.4	126.0	40	6	0	29.4	126.3	50	114	5	0.0	0.0	0	-0	0	0.0	0.0	0	-0	0
019062	28.2	126.1	45	27.9	126.1	45	18	0	31.7	127.4	50	90	10	0.0	0.0	0	-0	0	0.0	0.0	0	-0	0
019122	29.1	126.4	50	29.1	126.5	50	5	0	33.0	128.7	45	88	15	0.0	0.0	0	-0	0	0.0	0.0	0	-0	0
019182	30.3	126.5	50	30.1	126.4	50	13	0	0.0	0.0	0	-0	0	0.0	0.0	0	-0	0	0.0	0.0	0	-0	0
020002	31.5	127.3	45	31.7	127.7	45	13	0	0.0	0.0	0	-0	0	0.0	0.0	0	-0	0	0.0	0.0	0	-0	0
020062	32.5	128.9	40	32.5	128.4	45	25	5	0.0	0.0	0	-0	0	0.0	0.0	0	-0	0	0.0	0.0	0	-0	0
020122	33.4	130.4	30	33.2	130.5	30	13	0	0.0	0.0	0	-0	0	0.0	0.0	0	-0	0	0.0	0.0	0	-0	0

	ALL FORECASTS			
	MMNG	24-HR	48-HR	72-HR
AVG FORECAST POSIT ERROR	16.	93.	139.	288.
AVG RIGHT ANGLE ERROR	10.	50.	93.	47.
AVG INTENSITY MAGNITUDE ERROR	1.	8.	13.	13.
AVG INTENSITY BIAS	1.	2.	-4.	-13.
NUMBER OF FORECASTS	16	12	8	2
		8	7	1

TROPICAL STORM ROSE

(June)

	BEST TRACK		WARNING				24 HOUR FORECAST				48 HOUR FORECAST				72 HOUR FORECAST			
	POSIT	WIND	POSIT	WIND	DST	WIND	POSIT	WIND	DST	WIND	POSIT	WIND	DST	WIND	POSIT	WIND	DST	WIND
02100Z	10.0	130.4	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
02100Z	10.7	129.7	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
02112Z	10.3	129.0	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
02118Z	10.0	128.5	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
02200Z	10.7	127.0	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
02200Z	10.0	127.0	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
02212Z	10.0	126.4	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
02218Z	10.0	125.6	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
02300Z	10.0	124.0	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
02300Z	10.1	124.0	20	18.0	124.0	20	19.	-5.	19.0	121.0	20	18.0	30.	0.0	0.0	0.	-0.	0.
02312Z	10.0	123.4	20	18.0	123.0	20	19.	0.	19.0	120.0	20	22.0	30.	0.0	0.0	0.	-0.	0.
02318Z	20.5	122.0	20	18.0	123.0	20	10.0	0.	19.0	120.0	20	22.0	40.	0.0	0.0	0.	-0.	0.
02400Z	21.4	122.5	20	21.5	122.0	20	6.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
02400Z	22.3	122.0	20	22.0	122.0	20	37.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
02412Z	23.0	121.5	20	22.0	121.0	20	21.	5.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
02418Z	24.3	121.1	20	24.1	121.0	20	16.	5.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.

	ALL FORECASTS			
	WIND	24-HR	48-HR	72-HR
AVG FORECAST POSIT ERROR	17.	235.	0.	0.
AVG WIND ANGLE ERROR	21.	142.	0.	0.
AVG INTENSITY MAGNITUDE ERROR	2.	35.	0.	0.
AVG INTENSITY BIAS	1.	35.	0.	0.
NUMBER OF FORECASTS	7	3	0	0

TROPICAL STORM SHIRLEY

(June)

	BEST TRACK		WARNING				24 HOUR FORECAST				48 HOUR FORECAST				72 HOUR FORECAST			
	POSIT	WIND	POSIT	WIND	DST	WIND	POSIT	WIND	DST	WIND	POSIT	WIND	DST	WIND	POSIT	WIND	DST	WIND
02000Z	11.1	129.5	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
02000Z	11.2	128.7	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
02012Z	11.3	127.5	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
02018Z	11.3	126.5	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
02100Z	11.3	125.0	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
02100Z	11.3	124.1	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
02112Z	11.3	122.8	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
02118Z	11.1	121.0	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
02200Z	10.7	119.2	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
02200Z	10.4	117.8	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
02212Z	10.3	117.0	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
02218Z	10.8	117.3	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
02300Z	10.5	117.4	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
02300Z	10.0	116.0	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
02412Z	11.4	115.2	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
02418Z	12.1	113.0	30	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
03000Z	12.0	112.2	35	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
03000Z	13.3	110.7	35	13.4	111.7	35	35.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
03012Z	13.5	109.3	35	13.4	109.5	35	13.	10.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
03018Z	14.1	108.1	30	13.7	108.1	30	24.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.

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

TYPHOON VIRGINIA

(July-August)

HRS 1 TRACK				WARNING				24 HOUR FORECAST				48 HOUR FORECAST				72 HOUR FORECAST							
POSIT	WIND	POSIT	WIND	ERRORS	POSIT	WIND	ERRORS	POSIT	WIND	ERRORS	POSIT	WIND	ERRORS	POSIT	WIND	ERRORS	POSIT	WIND	ERRORS				
				USI WIND			USI WIND			USI WIND			USI WIND			USI WIND			USI WIND				
720001	13.1	152.0	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	0.0	0.0	0.	-0.	0.		
720002	14.1	151.7	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	0.0	0.0	0.	-0.	0.		
720021	14.0	151.4	30	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	0.0	0.0	0.	-0.	0.		
720022	15.1	151.3	30	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	0.0	0.0	0.	-0.	0.		
720003	15.5	151.1	35	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	0.0	0.0	0.	-0.	0.		
720061	15.9	151.0	35	10.1	150.4	40.	13.	5.	18.2	144.2	30.	11.9	5.	20.0	140.5	00.	204.	-5.	21.2	143.0	70.	245.	10.
720121	10.1	151.0	40	10.5	150.7	45.	24.	5.	18.5	144.0	35.	12.1	5.	20.3	140.3	00.	191.	-5.	21.3	142.0	70.	240.	10.
720181	10.3	151.0	40	10.6	150.4	50.	29.	10.	18.7	144.3	00.	8.7	5.	20.0	140.7	05.	151.	0.	21.3	143.0	70.	240.	10.
720004	10.0	151.0	45	10.0	151.0	55.	0.	0.	17.5	150.9	00.	8.7	0.	14.3	149.3	05.	98.	5.	14.6	146.9	70.	190.	10.
720062	17.2	151.0	45	17.1	151.0	55.	0.	0.	18.5	150.5	00.	8.9	0.	14.4	149.2	70.	120.	10.	14.5	145.7	70.	143.	10.
720122	17.0	151.0	50	17.5	151.0	55.	18.	5.	19.2	150.3	05.	0.0	0.	20.1	148.0	70.	90.	10.	20.3	145.5	70.	115.	5.
720182	18.4	150.8	55	18.4	150.8	55.	0.	0.	19.4	148.9	05.	0.0	0.	20.2	148.0	70.	115.	10.	20.4	145.0	70.	241.	10.
720005	18.9	150.5	60	19.0	150.8	55.	8.	-5.	20.4	148.8	05.	2.0	0.	21.2	148.0	70.	63.	10.	21.7	143.1	70.	247.	10.
720063	19.0	150.1	65	19.4	150.0	55.	13.	0.	21.2	148.0	70.	21.	10.	22.4	145.2	70.	115.	15.	23.2	142.0	70.	336.	10.
720123	20.1	149.7	65	20.3	149.7	55.	25.	0.	22.4	147.1	75.	11.5	10.	24.0	142.5	00.	302.	15.	24.5	138.8	80.	438.	15.
720183	20.5	149.4	65	20.7	149.7	55.	14.	0.	22.4	147.1	75.	4.2	10.	23.7	144.1	00.	239.	15.	24.7	140.8	80.	376.	10.
720006	20.9	148.9	60	21.2	149.0	55.	19.	5.	23.0	147.7	75.	8.7	10.	24.5	145.1	00.	239.	15.	24.7	140.2	80.	401.	10.
720064	21.4	148.3	60	21.4	148.5	55.	11.	0.	23.3	147.0	05.	10.0	0.	24.0	144.4	70.	263.	5.	25.0	139.7	05.	415.	-5.
720124	21.7	147.8	60	22.0	147.9	55.	19.	5.	23.4	147.1	05.	18.0	0.	24.0	142.0	70.	342.	5.	24.9	137.8	05.	448.	0.
720184	21.1	147.3	60	21.9	147.2	55.	13.	5.	23.1	144.0	05.	18.9	0.	24.0	141.3	00.	336.	-10.	24.3	137.0	55.	448.	-10.
720007	21.7	147.0	60	22.3	146.0	55.	4.2	0.	23.3	144.3	05.	22.3	0.	24.0	141.3	00.	337.	-10.	24.0	137.0	55.	443.	-10.
720065	21.5	147.1	60	22.1	147.2	55.	3.6	5.	23.7	145.5	05.	18.0	0.	24.0	142.0	00.	259.	-5.	24.8	138.7	55.	366.	-5.
720125	23.4	147.2	65	22.0	146.4	55.	4.0	0.	23.3	144.3	05.	15.0	0.	24.4	142.9	00.	205.	-15.	24.8	139.0	55.	248.	-5.
720185	21.3	147.4	65	22.0	146.4	55.	5.0	0.	23.5	145.0	05.	11.5	-5.	24.7	143.1	00.	150.	-5.	24.9	138.8	55.	252.	-5.
720008	21.3	147.7	65	21.6	147.5	55.	21.	0.	22.5	147.0	05.	1.2	-5.	24.0	145.1	00.	48.	-5.	24.5	142.3	00.	146.	0.
720066	21.5	147.8	65	21.5	147.5	55.	17.	0.	22.4	147.8	05.	7.2	-5.	24.5	140.5	00.	150.	0.	24.0	143.9	00.	244.	5.
720126	21.0	147.3	65	22.1	147.1	55.	32.	0.	23.6	147.4	05.	3.2	0.	24.3	143.5	00.	126.	0.	24.7	141.5	00.	249.	5.
720186	22.2	147.1	70	22.2	147.0	55.	6.	-5.	23.4	147.4	05.	7.2	0.	24.5	143.7	00.	240.	0.	24.8	141.0	00.	412.	5.
720009	22.7	147.1	70	22.3	146.0	70.	24.	0.	23.2	147.0	75.	13.0	10.	24.0	143.0	70.	248.	15.	24.0	141.5	75.	454.	20.
720067	23.3	146.9	70	22.9	146.9	70.	24.	0.	24.2	145.9	75.	14.9	10.	24.0	144.1	70.	313.	20.	27.0	141.9	75.	472.	20.
720127	23.9	146.3	65	24.0	146.4	70.	12.	5.	26.2	147.1	75.	10.0	10.	27.0	142.7	70.	244.	20.	27.2	140.1	75.	551.	25.
720187	24.0	145.6	65	24.7	145.0	70.	12.	5.	26.4	143.9	75.	12.0	15.	27.1	141.0	70.	335.	20.	27.4	139.3	75.	649.	30.
730001	25.4	145.0	65	25.4	145.0	70.	0.	0.	27.4	142.1	75.	12.1	15.	24.1	139.4	70.	284.	20.	24.9	136.1	75.	748.	35.
730068	26.3	144.4	60	26.0	144.4	70.	18.	10.	28.7	142.0	75.	14.9	20.	24.7	139.5	70.	333.	20.	30.6	136.6	75.	842.	35.
730128	27.4	143.8	60	26.9	143.9	70.	30.	10.	29.3	141.0	70.	15.1	15.	30.1	138.3	70.	389.	25.	31.7	135.5	75.	842.	35.
730188	28.5	143.2	60	28.0	143.2	55.	30.	5.	30.4	140.7	05.	14.0	10.	32.0	138.1	55.	428.	20.	33.5	135.5	55.	843.	30.
730002	29.5	142.5	60	29.1	142.7	55.	26.	5.	30.6	140.9	05.	18.0	10.	37.3	140.9	55.	210.	15.	0.0	0.0	0.	-0.	0.
730069	30.7	142.0	55	30.8	141.8	55.	12.	10.	35.7	140.6	05.	19.	10.	34.1	142.8	50.	195.	10.	0.0	0.0	0.	-0.	0.
730129	31.7	141.9	55	31.9	141.4	55.	24.	10.	35.8	140.7	05.	9.0	15.	34.1	142.9	50.	295.	10.	0.0	0.0	0.	-0.	0.
730189	32.7	141.4	55	32.4	141.4	55.	12.	10.	36.4	141.0	00.	10.1	15.	34.7	144.7	50.	311.	15.	0.0	0.0	0.	-0.	0.
800001	33.0	141.2	55	33.8	140.9	55.	19.	10.	37.5	141.4	00.	19.0	20.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
800062	34.9	141.5	55	34.7	141.6	55.	19.	10.	38.1	144.3	55.	16.2	15.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
800122	36.2	142.5	50	35.4	142.7	55.	26.	15.	38.4	144.0	55.	12.2	15.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
800182	37.7	143.4	45	37.4	143.3	55.	19.	20.	39.4	144.8	50.	13.1	15.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
802002	39.1	144.9	40	39.1	144.4	50.	23.	20.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
802062	39.9	146.9	40	40.1	147.1	55.	15.	15.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
802122	40.7	149.0	40	40.5	148.9	55.	13.	15.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
802182	41.0	151.0	35	41.2	151.4	50.	4.0.	15.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.

	ALL FORECASTS				TYPHOONS WHILE OVER JS RIS			
	MMAG	24-HR	48-HR	72-HR	MMAG	24-HR	48-HR	72-HR
AVG FORECAST POSIT ERROR	20.	112.	231.	309.	20.	112.	231.	309.
AVG MIGHT ANGLE ERROR	12.	63.	127.	243.	12.	63.	127.	243.
AVG INTENSITY MAGNITUDE ERROR	6.	8.	11.	13.	6.	8.	11.	13.
AVG INTENSITY BIAS	6.	7.	8.	10.	0.	7.	8.	10.
NUMBER OF FORECASTS	43	39	35	31	43	39	35	31

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TYPHOON WENDY
(July-August)

	BEST TRACK				WARNING				24 HOUR FORECAST				48 HOUR FORECAST				72 HOUR FORECAST			
	POSIT	WIND	POSIT	WIND	WIND	USI	WIND	ERRORS	POSIT	WIND	USI	WIND	ERRORS	POSIT	WIND	USI	WIND	ERRORS		
122002	18.4	139.2	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
122002	19.0	138.7	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
122122	19.8	138.2	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
122182	20.5	137.7	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
123002	20.9	137.2	30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
123062	21.2	136.7	35	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
123122	21.4	136.2	35	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
123182	21.5	135.4	35	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
124002	21.2	134.4	40	21.4	133.4	30	51	-10	21.7	129.7	45	228	-5	23.2	125.6	55	443	-15		
124062	20.8	134.1	40	20.8	134.1	35	0	-5	20.4	131.4	45	112	-10	21.8	127.7	55	311	-15		
124122	20.7	134.0	40	20.5	133.5	40	29	0	21.0	130.5	50	102	-10	22.3	126.8	60	349	-10		
124182	20.8	133.9	45	20.5	134.4	45	33	0	20.9	133.5	55	25	-10	21.0	130.3	60	168	-15		
125002	20.9	133.7	50	20.9	133.4	50	6	0	21.0	132.0	60	63	-10	21.3	128.7	70	242	-5		
125062	20.9	133.4	55	20.9	133.3	55	6	0	21.0	131.8	65	96	-5	21.4	128.6	75	243	0		
125122	21.1	133.4	60	20.9	133.1	60	21	0	21.1	131.8	70	87	0	21.7	128.4	75	243	-5		
125182	21.3	133.4	65	21.0	133.7	65	25	0	21.1	132.7	70	96	-5	21.8	130.1	75	215	-5		
126002	21.5	133.4	70	21.6	134.0	65	34	-5	22.4	132.8	75	34	0	22.9	130.5	75	211	-5		
126062	21.0	133.3	70	21.7	133.1	70	13	0	21.9	130.9	80	139	5	22.1	129.1	85	365	5		
126122	21.9	133.1	70	22.0	132.8	70	18	0	22.4	130.5	80	142	0	22.7	128.2	85	297	10		
126182	22.0	132.8	75	22.3	132.3	75	33	0	22.7	130.2	80	181	0	23.1	128.1	85	301	15		
127002	23.3	132.5	75	23.3	132.3	75	11	0	25.0	130.5	80	382	0	24.5	126.3	85	191	15		
127062	24.0	132.0	75	24.0	132.2	75	11	0	26.0	130.2	80	107	0	27.4	128.0	85	136	10		
127122	24.6	131.5	80	24.4	131.8	75	20	-5	26.5	129.6	80	139	0	27.8	127.2	85	131	10		
127182	25.3	131.0	80	25.3	130.9	80	5	0	27.3	128.2	85	102	15	28.8	124.6	85	60	10		
128002	26.4	130.0	80	26.2	130.1	80	13	0	28.4	124.8	85	40	15	30.2	122.5	85	136	10		
128062	27.2	129.7	80	27.1	128.4	75	8	-5	29.4	124.3	75	92	0	30.5	120.2	80	238	-20		
128122	27.0	127.3	75	27.7	127.5	75	12	0	30.0	123.1	75	140	0	30.7	118.6	70	310	-50		
128182	27.9	126.4	70	28.1	126.1	70	20	0	30.0	121.6	70	193	-25	30.0	0.0	0.0	0.0	0.0		
129002	28.2	126.2	70	28.3	125.7	70	27	0	30.0	121.6	70	181	-25	30.0	0.0	0.0	0.0	0.0		
129062	28.0	125.8	75	28.7	125.6	70	12	-5	30.4	123.7	70	60	0	31.4	121.6	80	185	-20		
129122	29.4	125.5	75	29.1	125.9	70	27	-5	31.0	125.2	70	52	0	32.4	122.9	70	144	0		
129182	29.0	125.3	75	29.8	125.6	70	20	-5	31.7	124.1	70	98	0	32.6	121.6	70	214	5		
130002	29.9	125.1	75	30.2	125.1	70	18	-5	31.8	123.0	70	132	0	32.6	120.3	80	293	-15		
130062	30.1	124.8	70	30.4	124.8	70	18	0	31.4	122.8	70	127	0	32.1	120.3	80	307	-10		
130122	30.3	124.6	70	30.4	124.8	70	12	0	31.4	123.7	70	74	0	32.4	121.0	80	325	-10		
130182	30.3	125.1	70	30.3	124.4	70	10	0	31.0	124.3	65	47	0	32.1	122.5	80	294	-5		
131002	30.5	125.1	70	30.3	124.9	70	16	0	31.7	125.2	65	73	0	33.4	126.3	60	182	10		
131062	30.6	125.1	70	30.3	124.7	70	27	0	31.7	125.6	60	65	0	33.4	126.6	60	145	15		
131122	30.7	124.9	70	30.9	125.2	70	19	0	32.3	125.7	60	114	0	34.5	127.6	60	156	20		
131182	30.5	125.0	65	30.5	125.0	65	0	0	31.1	125.2	60	149	5	32.6	125.9	60	308	25		
801002	30.5	125.5	65	30.5	125.2	65	15	0	31.1	125.3	60	172	10	0.0	0.0	0.0	0.0	0.0		
801062	30.7	126.1	60	30.7	125.9	65	10	5	32.3	127.2	60	96	15	0.0	0.0	0.0	0.0	0.0		
801122	30.8	127.1	60	30.8	126.3	60	41	0	32.1	127.8	60	159	20	0.0	0.0	0.0	0.0	0.0		
801182	30.9	128.1	55	31.1	127.2	60	48	5	33.3	128.9	55	155	20	0.0	0.0	0.0	0.0	0.0		
802002	31.2	128.8	50	31.5	128.5	50	24	0	0.0	0.0	0.0	0	0	0.0	0.0	0.0	0.0	0.0		
802062	32.2	129.1	45	32.3	129.0	45	8	0	0.0	0.0	0.0	0	0	0.0	0.0	0.0	0.0	0.0		
802122	33.5	130.5	40	32.8	129.8	45	55	5	0.0	0.0	0.0	0	0	0.0	0.0	0.0	0.0	0.0		
802182	34.0	131.6	35	33.8	131.4	40	49	5	0.0	0.0	0.0	0	0	0.0	0.0	0.0	0.0	0.0		

	ALL FORECASTS				TYPHOONS WHILE OVER 35 KTS			
	MMHG	24-HR	48-HR	72-HR	MMHG	24-HR	48-HR	72-HR
AVG FORECAST POSIT ERROR	21.	112.	235.	328.	21.	117.	235.	328.
AVG KIUMI ANGLE ERROR	12.	75.	188.	249.	12.	75.	188.	269.
AVG INTENSITY MAGNITUDE ERROR	2.	6.	12.	11.	2.	6.	12.	11.
AVG INTENSITY BIAS	-1.	0.	-2.	3.	0.	0.	-2.	3.
NUMBER OF FORECASTS	40	36	30	19	40	36	30	19

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TROPICAL STORM AGNES

(July)

BEST TRACK				WARNING				24 HOUR FORECAST				48 HOUR FORECAST				72 HOUR FORECAST						
POSIT	WIND	ERRORS		POSIT	WIND	ERRORS		POSIT	WIND	ERRORS		POSIT	WIND	ERRORS		POSIT	WIND	ERRORS				
TIME	DIR	WIND	DIR	TIME	DIR	WIND	DIR	TIME	DIR	WIND	DIR	TIME	DIR	WIND	DIR	TIME	DIR	WIND	DIR			
12000Z	10.5	114.7	29	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
12000Z	17.3	115.2	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
12012Z	18.0	115.0	27	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
12018Z	18.0	115.0	30	18.6	115.4	30	23	0.0	20.8	113.0	30	101.0	0.0	21.8	111.2	30	142.0	-20.0	0.0	0.0		
12000Z	19.3	115.9	30	19.4	115.9	30	36	0.0	21.8	113.8	30	30.0	-5.0	22.4	111.1	25	159.0	-20.0	0.0	0.0		
12000Z	20.1	115.0	35	20.4	115.0	30	18	-5.0	22.4	115.7	35	30.0	-10.0	25.0	114.1	20	234.0	-25.0	0.0	0.0		
12012Z	21.0	115.7	35	21.0	115.7	30	12	-5.0	23.4	114.9	40	130.0	-3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
12018Z	21.4	115.5	40	21.5	115.6	35	8	-5.0	23.7	114.9	40	130.0	-3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
12000Z	21.5	114.0	45	21.6	114.4	45	8	0.0	22.7	113.0	35	85.0	-1.0	23.7	111.0	40	174.0	-25.0	0.0	0.0		
12006Z	21.5	114.4	45	21.7	114.5	45	13	0.0	22.7	112.4	30	85.0	-1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
12012Z	21.5	114.0	50	21.5	113.8	30	18	0.0	21.1	111.2	35	85.0	1.0	20.8	109.0	45	169.0	0.0	20.4	107.0	45	418.0
12018Z	21.5	113.7	50	21.4	113.7	35	6	0.0	21.2	112.0	30	21.0	5.0	21.0	110.0	45	159.0	-5.0	20.6	107.9	45	343.0
12000Z	21.5	113.3	45	21.3	113.3	35	0	10.0	21.2	111.8	45	13.0	0.0	21.0	109.0	40	187.0	-5.0	20.8	107.5	35	427.0
12006Z	21.5	112.7	45	21.3	112.8	30	6	5.0	21.5	110.8	40	10.0	-5.0	22.1	108.0	30	294.0	-15.0	0.0	0.0	0.0	0.0
12012Z	21.5	112.3	45	21.3	112.3	30	6	5.0	21.6	110.3	40	11.0	-5.0	22.2	108.4	30	335.0	-15.0	0.0	0.0	0.0	0.0
12018Z	20.9	111.0	45	21.1	111.7	30	13	5.0	21.2	109.3	40	18.0	-1.0	21.8	108.8	40	352.0	-25.0	0.0	0.0	0.0	0.0
12000Z	20.9	111.0	45	20.4	111.4	30	0	0.0	21.0	110.3	40	140.0	-5.0	21.5	107.9	30	395.0	-10.0	0.0	0.0	0.0	0.0
12006Z	20.0	111.8	45	20.4	111.8	30	0	5.0	20.4	111.8	45	100.0	0.0	21.2	110.5	40	271.0	10.0	0.0	0.0	0.0	0.0
12012Z	20.4	112.0	45	20.7	112.0	30	18	0.0	20.7	112.0	45	142.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12018Z	20.4	112.4	50	20.4	112.4	30	0	0.0	20.4	112.4	45	159.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12000Z	20.5	112.9	45	20.6	112.4	45	6	0.0	20.0	112.0	35	159.0	-5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12006Z	20.0	113.7	45	20.8	113.7	45	0	0.0	22.8	113.0	45	81.0	15.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12012Z	21.5	114.4	45	21.5	114.4	45	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12018Z	22.1	114.0	45	22.1	114.9	45	17	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13000Z	22.0	114.9	40	22.1	114.6	40	17	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13006Z	23.4	115.1	30	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

ALL FORECASTS

	24-HR	48-HR	72-HR	
AVG FORECAST POSIT ERROR	10.	97.	243.	410.
AVG NIGHT ANGLE ERROR	7.	59.	191.	309.
AVG INTENSITY MAGNITUDE ERROR	3.	8.	15.	2.
AVG INTENSITY BIAS	1.	-5.	-13.	-2.
NUMBER OF FORECASTS	27	18	12	3

10	97	243	410
7	59	191	309
3	8	15	2
1	-5	-13	-2
27	18	12	3
10	6	0	

TROPICAL STORM BONNIE

(August)

BEST TRACK				WARNING				24 HOUR FORECAST				48 HOUR FORECAST				72 HOUR FORECAST					
POSIT	WIND	ERRORS		POSIT	WIND	ERRORS		POSIT	WIND	ERRORS		POSIT	WIND	ERRORS		POSIT	WIND	ERRORS			
TIME	DIR	WIND	DIR	TIME	DIR	WIND	DIR	TIME	DIR	WIND	DIR	TIME	DIR	WIND	DIR	TIME	DIR	WIND	DIR		
00000Z	22.5	122.0	15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
00006Z	22.2	120.5	15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
00012Z	21.8	119.3	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
00018Z	21.5	118.4	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
00000Z	21.2	117.0	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
00006Z	20.8	116.7	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
00012Z	20.2	115.9	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
00018Z	19.5	115.1	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
01000Z	18.9	114.5	30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
01006Z	18.4	113.4	30	18.3	113.6	30	13	0.0	18.2	112.8	35	230.0	-5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
01012Z	18.2	112.3	30	18.3	112.7	30	8	0.0	18.1	109.0	40	90.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
01018Z	18.0	111.2	35	18.2	111.3	35	13	0.0	18.4	107.4	40	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
01000Z	17.8	110.0	35	18.3	109.4	35	41	0.0	18.5	105.3	30	50.0	5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
01006Z	17.7	108.7	40	18.1	109.0	40	29	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
01012Z	17.7	107.4	40	18.0	107.4	40	34	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
01018Z	17.7	106.3	40	18.1	106.4	40	42	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
01200Z	17.0	105.0	25	18.1	106.0	35	64	10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

ALL FORECASTS

	24-HR	48-HR	72-HR	
AVG FORECAST POSIT ERROR	31.	121.	0.	0.
AVG NIGHT ANGLE ERROR	20.	30.	0.	0.
AVG INTENSITY MAGNITUDE ERROR	1.	3.	0.	0.
AVG INTENSITY BIAS	1.	0.	0.	0.
NUMBER OF FORECASTS	8	2	0	0

31	121	0	0
20	30	0	0
1	3	0	0
1	0	0	0
8	2	0	0

TYPHOON CARMEN

(August)

BEST TRACK				WARNING				24 HOUR FORECAST				48 HOUR FORECAST				72 HOUR FORECAST			
POSIT	WIND	POSIT	WIND	DST	ERRORS	POSIT	WIND	DST	ERRORS	POSIT	WIND	DST	ERRORS	POSIT	WIND	DST	ERRORS		
010122	16.0 145.5	20	0.0 0.0	0.0	-0.0	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	-0.0		
010102	16.0 145.1	25	0.0 0.0	0.0	-0.0	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	-0.0		
011002	16.2 144.9	35	0.0 0.0	0.0	-0.0	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	-0.0		
011002	15.9 144.0	40	15.5 144.3	40	29.0	0.0	15.5 142.3	35	110.0	-0.0	16.7 139.7	35	263.0	0.0	16.4 130.9	70	392.0		
011102	15.0 144.4	45	15.7 144.0	45	24.0	0.0	15.9 141.9	35	120.0	0.0	17.0 139.0	35	305.0	5.0	16.5 136.1	75	453.0		
011102	15.0 144.4	50	15.8 144.7	45	11.0	-0.0	15.8 143.0	30	19.0	0.0	16.0 141.4	30	488.0	5.0	16.9 139.2	75	738.0		
012002	16.1 144.4	55	15.5 144.3	55	13.0	-0.0	15.8 143.0	35	288.0	5.0	16.0 141.4	30	373.0	0.0	16.9 139.2	75	817.0		
012002	16.7 143.9	60	16.5 144.0	55	13.0	-0.0	16.1 142.0	35	250.0	0.0	16.0 140.3	30	400.0	0.0	20.7 137.6	75	680.0		
012122	17.4 143.3	65	17.8 143.6	55	29.0	-0.0	20.4 141.4	35	211.0	0.0	22.0 138.2	30	389.0	0.0	22.5 134.7	75	502.0		
012102	18.0 142.4	65	18.5 142.0	55	21.0	0.0	20.8 139.5	35	203.0	0.0	21.9 136.2	30	405.0	-5.0	22.7 132.8	75	544.0		
013002	20.0 141.1	60	19.8 141.2	55	13.0	-0.0	22.6 139.9	35	126.0	-0.0	23.8 132.9	30	278.0	-10.0	24.2 128.7	75	393.0		
013002	21.1 139.5	65	20.9 139.7	65	14.0	0.0	23.5 132.0	30	75.0	0.0	24.4 129.6	30	203.0	-5.0	24.2 124.6	75	207.0		
013122	22.0 137.9	65	22.0 138.0	65	6.0	0.0	23.9 132.0	30	70.0	0.0	24.8 127.9	30	172.0	-5.0	24.5 122.2	75	142.0		
013102	22.0 136.4	65	22.0 136.5	65	13.0	0.0	24.7 130.8	30	107.0	-0.0	25.1 125.2	30	170.0	0.0	24.4 120.7	75	131.0		
014002	23.4 134.9	70	23.2 134.6	70	20.0	0.0	24.7 127.4	30	128.0	-10.0	24.8 121.5	30	151.0	0.0	0.0 0.0	0.0	-0.0		
014002	24.1 133.4	70	24.2 133.4	70	6.0	0.0	26.7 126.4	35	50.0	-0.0	30.3 121.2	30	157.0	-25.0	0.0 0.0	0.0	-0.0		
014122	25.0 131.9	70	24.9 131.7	70	12.0	0.0	27.3 124.9	35	50.0	-0.0	31.4 120.1	30	227.0	-45.0	0.0 0.0	0.0	-0.0		
014102	25.9 130.2	75	25.8 130.1	70	8.0	-0.0	29.0 124.0	35	60.0	0.0	0.0 0.0	0.0	-0.0	0.0	0.0	0.0	-0.0		
015002	26.5 128.7	80	26.6 128.6	75	8.0	-0.0	29.8 122.5	35	112.0	0.0	0.0 0.0	0.0	-0.0	0.0	0.0	0.0	-0.0		
015002	27.1 127.3	80	27.2 127.2	75	8.0	-0.0	29.8 121.6	30	122.0	-15.0	0.0 0.0	0.0	-0.0	0.0	0.0	0.0	-0.0		
015122	27.0 125.9	80	27.6 125.4	75	8.0	-0.0	29.6 120.4	30	150.0	-45.0	0.0 0.0	0.0	-0.0	0.0	0.0	0.0	-0.0		
015102	28.0 124.6	75	28.0 124.6	75	0.0	0.0	0.0 0.0	0.0	-0.0	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	-0.0		
016002	28.3 123.8	75	28.3 123.6	75	11.0	0.0	29.7 120.3	30	150.0	5.0	0.0 0.0	0.0	-0.0	0.0	0.0	0.0	-0.0		
016002	28.5 123.4	75	28.5 122.9	75	26.0	0.0	0.0 0.0	0.0	-0.0	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	-0.0		
016122	28.7 123.2	75	28.5 122.4	75	24.0	0.0	29.7 120.5	30	140.0	-25.0	0.0 0.0	0.0	-0.0	0.0	0.0	0.0	-0.0		
016102	28.7 122.7	70	28.9 122.4	65	13.0	-0.0	29.9 121.0	30	137.0	-15.0	0.0 0.0	0.0	-0.0	0.0	0.0	0.0	-0.0		
017002	28.2 122.0	65	28.7 122.5	60	30.0	0.0	29.4 123.5	30	30.0	10.0	32.0 126.0	30	184.0	5.0	34.8 129.5	40	132.0		
017002	28.3 122.8	60	28.5 122.7	60	13.0	0.0	29.5 123.5	35	80.0	5.0	32.0 126.0	30	128.0	5.0	0.0 0.0	0.0	-0.0		
017122	28.0 123.0	55	28.5 122.4	55	12.0	0.0	29.4 123.5	30	80.0	5.0	32.1 126.1	30	49.0	0.0	0.0 0.0	0.0	-0.0		
017102	28.0 123.3	55	28.6 123.0	55	20.0	0.0	29.8 123.9	30	60.0	5.0	32.7 126.8	30	52.0	5.0	0.0 0.0	0.0	-0.0		
018002	28.0 123.5	50	29.2 123.5	50	24.0	0.0	30.6 124.6	35	80.0	0.0	33.5 127.7	30	89.0	10.0	0.0 0.0	0.0	-0.0		
018002	28.1 123.7	50	28.7 123.4	50	36.0	0.0	30.6 124.6	35	40.0	0.0	0.0 0.0	0.0	-0.0	0.0	0.0	0.0	-0.0		
018122	28.1 124.1	45	28.3 124.0	45	13.0	0.0	30.1 125.1	35	82.0	0.0	0.0 0.0	0.0	-0.0	0.0	0.0	0.0	-0.0		
018102	28.7 124.0	45	28.4 124.1	45	19.0	0.0	30.3 125.2	30	150.0	0.0	0.0 0.0	0.0	-0.0	0.0	0.0	0.0	-0.0		
019002	29.2 124.5	45	29.2 124.2	45	16.0	0.0	31.5 125.8	30	203.0	10.0	0.0 0.0	0.0	-0.0	0.0	0.0	0.0	-0.0		
019002	30.0 125.1	45	29.6 124.7	45	32.0	0.0	0.0 0.0	0.0	-0.0	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	-0.0		
019122	31.4 125.6	45	30.8 125.8	45	48.0	0.0	0.0 0.0	0.0	-0.0	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	-0.0		
019102	32.9 125.8	40	31.8 126.0	40	66.0	0.0	0.0 0.0	0.0	-0.0	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	-0.0		
020002	34.0 126.8	30	34.7 126.4	30	21.0	0.0	0.0 0.0	0.0	-0.0	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	-0.0		

	ALL FORECASTS				TYPHOONS WHILE OVER 35 KTS			
	MMNG	24-HR	48-HR	72-HR	MMNG	24-HR	48-HR	72-HR
AVG FORECAST POSIT ERROR	19.	124.	250.	429.	19.	127.	259.	456.
AVG RIGHT ANGLE ERROR	10.	56.	129.	260.	10.	58.	131.	278.
AVG INTENSITY MAGNITUDE ERROR	1.	6.	7.	3.	1.	6.	7.	2.
AVG INTENSITY BIAS	-1.	-3.	-3.	0.	0.	-3.	-4.	-0.
NUMBER OF FORECASTS	36	30	19	12	35	29	18	11

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TROPICAL STORM BELLA

(August)

BEST TRACK				WARNING				24 HOUR FORECAST				48 HOUR FORECAST				72 HOUR FORECAST			
POSIT	WIND	POSIT	WIND	DST	ERRORS	POSIT	WIND	DST	ERRORS	POSIT	WIND	DST	ERRORS	POSIT	WIND	DST	ERRORS		
010002	12.7 128.8	20	0.0 0.0	0.0	-0.0	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	-0.0		
010002	13.0 129.5	20	0.0 0.0	0.0	-0.0	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	-0.0		
010122	14.8 129.7	25	0.0 0.0	0.0	-0.0	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	-0.0		
010102	15.5 129.4	25	0.0 0.0	0.0	-0.0	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	-0.0		
011002	16.3 128.7	30	0.0 0.0	0.0	-0.0	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	-0.0		
011002	17.2 127.8	30	17.1 127.9	30	8.0	0.0	19.4 125.2	40	133.0	0.0	21.3 122.4	35	248.0	25.0	0.0 0.0	0.0	-0.0		
011122	18.3 126.9	30	18.4 127.0	30	8.0	0.0	20.8 123.3	30	90.0	5.0	22.2 119.1	30	180.0	35.0	0.0 0.0	0.0	-0.0		
011102	19.4 126.0	30	19.2 126.2	30	16.0	0.0	21.6 122.8	30	115.0	5.0	0.0 0.0	0.0	-0.0	0.0	0.0	0.0	-0.0		
012002	20.7 125.2	35	20.0 125.2	30	42.0	-0.0	22.4 121.0	45	115.0	0.0	0.0 0.0	0.0	-0.0	0.0	0.0	0.0	-0.0		
012002	21.7 124.5	40	21.9 124.4	40	13.0	0.0	26.0 121.0	30	58.0	50.0	0.0 0.0	0.0	-0.0	0.0	0.0	0.0	-0.0		
012122	22.4 123.4	45	23.4 123.7	45	62.0	0.0	27.7 120.4	30	167.0	35.0	0.0 0.0	0.0	-0.0	0.0	0.0	0.0	-0.0		
012102	23.1 121.5	45	23.1 122.6	45	60.0	0.0	0.0 0.0	0.0	-0.0	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	-0.0		
013002	24.1 122.0	45	23.8 121.8	45	21.0	0.0	0.0 0.0	0.0	-0.0	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	-0.0		
013002	25.1 120.6	30	25.4 120.5	30	19.0	0.0	0.0 0.0	0.0	-0.0	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	-0.0		
013122	25.3 118.8	25	25.5 119.5	25	40.0	0.0	0.0 0.0	0.0	-0.0	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	-0.0		

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

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TROPICAL DEPRESSION 14

(August)

BEST TRACK				WARNING				24 HOUR FORECAST ERRORS				48 HOUR FORECAST ERRORS				72 HOUR FORECAST ERRORS			
POSIT	WIND			POSIT	WIND	DST	WIND	POSIT	WIND	DST	WIND	POSIT	WIND	DST	WIND	POSIT	WIND	DST	WIND
814002	9.0	162.2	10	0.0	0.0	0.	-0.	0.0	0.0	0.	-0.	0.0	0.0	0.	-0.	0.0	0.0	0.	-0.
814062	9.8	161.0	10	0.0	0.0	0.	-0.	0.0	0.0	0.	-0.	0.0	0.0	0.	-0.	0.0	0.0	0.	-0.
814122	10.8	159.6	10	0.0	0.0	0.	-0.	0.0	0.0	0.	-0.	0.0	0.0	0.	-0.	0.0	0.0	0.	-0.
814182	11.0	158.6	10	0.0	0.0	0.	-0.	0.0	0.0	0.	-0.	0.0	0.0	0.	-0.	0.0	0.0	0.	-0.
815002	12.7	157.5	10	0.0	0.0	0.	-0.	0.0	0.0	0.	-0.	0.0	0.0	0.	-0.	0.0	0.0	0.	-0.
815062	13.0	156.7	10	0.0	0.0	0.	-0.	0.0	0.0	0.	-0.	0.0	0.0	0.	-0.	0.0	0.0	0.	-0.
815122	14.5	155.8	10	0.0	0.0	0.	-0.	0.0	0.0	0.	-0.	0.0	0.0	0.	-0.	0.0	0.0	0.	-0.
815182	15.4	155.0	15	0.0	0.0	0.	-0.	0.0	0.0	0.	-0.	0.0	0.0	0.	-0.	0.0	0.0	0.	-0.
816002	16.1	154.0	15	0.0	0.0	0.	-0.	0.0	0.0	0.	-0.	0.0	0.0	0.	-0.	0.0	0.0	0.	-0.
816062	17.0	153.0	10	0.0	0.0	0.	-0.	0.0	0.0	0.	-0.	0.0	0.0	0.	-0.	0.0	0.0	0.	-0.
816122	17.8	152.2	10	0.0	0.0	0.	-0.	0.0	0.0	0.	-0.	0.0	0.0	0.	-0.	0.0	0.0	0.	-0.
816182	18.7	151.3	10	0.0	0.0	0.	-0.	0.0	0.0	0.	-0.	0.0	0.0	0.	-0.	0.0	0.0	0.	-0.
817002	19.4	150.7	10	0.0	0.0	0.	-0.	0.0	0.0	0.	-0.	0.0	0.0	0.	-0.	0.0	0.0	0.	-0.
817062	20.0	150.4	15	0.0	0.0	0.	-0.	0.0	0.0	0.	-0.	0.0	0.0	0.	-0.	0.0	0.0	0.	-0.
817122	20.6	149.9	15	0.0	0.0	0.	-0.	0.0	0.0	0.	-0.	0.0	0.0	0.	-0.	0.0	0.0	0.	-0.
817182	21.3	149.4	15	0.0	0.0	0.	-0.	0.0	0.0	0.	-0.	0.0	0.0	0.	-0.	0.0	0.0	0.	-0.
818002	21.9	148.9	15	0.0	0.0	0.	-0.	0.0	0.0	0.	-0.	0.0	0.0	0.	-0.	0.0	0.0	0.	-0.
818062	23.0	147.5	15	0.0	0.0	0.	-0.	0.0	0.0	0.	-0.	0.0	0.0	0.	-0.	0.0	0.0	0.	-0.
818122	23.9	145.4	20	0.0	0.0	0.	-0.	0.0	0.0	0.	-0.	0.0	0.0	0.	-0.	0.0	0.0	0.	-0.
818182	24.7	143.2	25	0.0	0.0	0.	-0.	0.0	0.0	0.	-0.	0.0	0.0	0.	-0.	0.0	0.0	0.	-0.
819002	25.6	141.1	30	0.0	0.0	0.	-0.	0.0	0.0	0.	-0.	0.0	0.0	0.	-0.	0.0	0.0	0.	-0.
819062	26.7	139.1	30	26.7	139.0	30.	5.	0.	30.9	132.4	35.	147.	10.	0.0	0.0	0.	-0.	0.0	0.0
819122	28.0	137.5	30	27.8	137.4	30.	13.	0.	32.2	132.0	35.	190.	15.	0.0	0.0	0.	-0.	0.0	0.0
819182	29.4	136.1	30	28.4	135.7	30.	76.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.0	0.0
820002	30.9	135.0	30	31.0	135.1	30.	8.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.0	0.0
820062	32.6	134.5	25	32.3	134.5	25.	18.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.0	0.0
820122	34.6	134.5	20	34.5	133.0	25.	30.	5.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.0	0.0

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

TYPHOON ELAINE

(August)

	BEST TRACK			WARNING			24 HOUR FORECAST				48 HOUR FORECAST				72 HOUR FORECAST			
	POSIT	WIND		POSIT	WIND	ERRORS DST WIND	POSIT	WIND	ERRORS DST WIND	POSIT	WIND	ERRORS DST WIND	POSIT	WIND	ERRORS DST WIND	POSIT	WIND	ERRORS DST WIND
81800Z	9.0	135.5	15	0.0	0.0	0. -0. 0.	0.0	0.0	0. -0. 0.	0.0	0.0	0. -0. 0.	0.0	0.0	0. -0. 0.	0.0	0.0	0. -0. 0.
81806Z	9.5	135.2	15	0.0	0.0	0. -0. 0.	0.0	0.0	0. -0. 0.	0.0	0.0	0. -0. 0.	0.0	0.0	0. -0. 0.	0.0	0.0	0. -0. 0.
81812Z	10.0	135.0	15	0.0	0.0	0. -0. 0.	0.0	0.0	0. -0. 0.	0.0	0.0	0. -0. 0.	0.0	0.0	0. -0. 0.	0.0	0.0	0. -0. 0.
81818Z	10.5	134.9	15	0.0	0.0	0. -0. 0.	0.0	0.0	0. -0. 0.	0.0	0.0	0. -0. 0.	0.0	0.0	0. -0. 0.	0.0	0.0	0. -0. 0.
81900Z	11.0	134.7	15	0.0	0.0	0. -0. 0.	0.0	0.0	0. -0. 0.	0.0	0.0	0. -0. 0.	0.0	0.0	0. -0. 0.	0.0	0.0	0. -0. 0.
81906Z	11.2	134.4	15	0.0	0.0	0. -0. 0.	0.0	0.0	0. -0. 0.	0.0	0.0	0. -0. 0.	0.0	0.0	0. -0. 0.	0.0	0.0	0. -0. 0.
81912Z	11.3	134.0	15	0.0	0.0	0. -0. 0.	0.0	0.0	0. -0. 0.	0.0	0.0	0. -0. 0.	0.0	0.0	0. -0. 0.	0.0	0.0	0. -0. 0.
81918Z	11.5	133.6	15	0.0	0.0	0. -0. 0.	0.0	0.0	0. -0. 0.	0.0	0.0	0. -0. 0.	0.0	0.0	0. -0. 0.	0.0	0.0	0. -0. 0.
82000Z	11.8	133.0	15	0.0	0.0	0. -0. 0.	0.0	0.0	0. -0. 0.	0.0	0.0	0. -0. 0.	0.0	0.0	0. -0. 0.	0.0	0.0	0. -0. 0.
82006Z	12.0	132.3	15	0.0	0.0	0. -0. 0.	0.0	0.0	0. -0. 0.	0.0	0.0	0. -0. 0.	0.0	0.0	0. -0. 0.	0.0	0.0	0. -0. 0.
82012Z	13.4	131.8	15	0.0	0.0	0. -0. 0.	0.0	0.0	0. -0. 0.	0.0	0.0	0. -0. 0.	0.0	0.0	0. -0. 0.	0.0	0.0	0. -0. 0.
82018Z	14.1	130.9	20	0.0	0.0	0. -0. 0.	0.0	0.0	0. -0. 0.	0.0	0.0	0. -0. 0.	0.0	0.0	0. -0. 0.	0.0	0.0	0. -0. 0.
82100Z	14.9	130.1	20	0.0	0.0	0. -0. 0.	0.0	0.0	0. -0. 0.	0.0	0.0	0. -0. 0.	0.0	0.0	0. -0. 0.	0.0	0.0	0. -0. 0.
82106Z	15.7	129.2	20	0.0	0.0	0. -0. 0.	0.0	0.0	0. -0. 0.	0.0	0.0	0. -0. 0.	0.0	0.0	0. -0. 0.	0.0	0.0	0. -0. 0.
82112Z	16.1	128.2	20	0.0	0.0	0. -0. 0.	0.0	0.0	0. -0. 0.	0.0	0.0	0. -0. 0.	0.0	0.0	0. -0. 0.	0.0	0.0	0. -0. 0.
82118Z	16.6	127.3	25	0.0	0.0	0. -0. 0.	0.0	0.0	0. -0. 0.	0.0	0.0	0. -0. 0.	0.0	0.0	0. -0. 0.	0.0	0.0	0. -0. 0.
82200Z	16.9	126.5	25	0.0	0.0	0. -0. 0.	0.0	0.0	0. -0. 0.	0.0	0.0	0. -0. 0.	0.0	0.0	0. -0. 0.	0.0	0.0	0. -0. 0.
82206Z	17.4	125.8	25	0.0	0.0	0. -0. 0.	0.0	0.0	0. -0. 0.	0.0	0.0	0. -0. 0.	0.0	0.0	0. -0. 0.	0.0	0.0	0. -0. 0.
82212Z	17.7	125.2	25	0.0	0.0	0. -0. 0.	0.0	0.0	0. -0. 0.	0.0	0.0	0. -0. 0.	0.0	0.0	0. -0. 0.	0.0	0.0	0. -0. 0.
82218Z	17.9	124.6	25	0.0	0.0	0. -0. 0.	0.0	0.0	0. -0. 0.	0.0	0.0	0. -0. 0.	0.0	0.0	0. -0. 0.	0.0	0.0	0. -0. 0.
82300Z	18.0	123.8	25	0.0	0.0	0. -0. 0.	0.0	0.0	0. -0. 0.	0.0	0.0	0. -0. 0.	0.0	0.0	0. -0. 0.	0.0	0.0	0. -0. 0.
82306Z	18.1	123.1	25	18.2	123.7	25. 8.	19.5	120.1	30. 13.2	-10.	20.0	117.0	40. 20.4	-5.	21.0	113.6	45. 20.1	-10.
82312Z	18.0	122.4	25	18.3	122.3	25. 19.	19.3	119.1	30. 13.8	-10.	20.1	115.8	40. 22.1	-5.	20.8	112.6	45. 17.6	-15.
82318Z	17.6	121.5	30	18.4	121.4	30. 48.	19.3	118.3	35. 13.9	-5.	19.9	115.0	40. 21.4	-10.	20.5	111.9	45. 14.1	-15.
82400Z	17.4	120.7	35	17.6	120.3	35. 26.	18.1	117.0	40. 9.2	0.	18.0	113.7	45. 19.5	-10.	19.4	110.4	50. 14.1	-10.
82406Z	17.3	120.0	40	17.1	119.7	40. 21.	16.8	115.9	45. 11.2	0.	16.8	112.6	50. 24.2	-5.	17.2	109.4	55. 25.9	-10.
82412Z	17.0	119.3	40	16.9	119.2	40. 8.	16.5	115.4	45. 15.2	0.	16.6	111.7	50. 26.0	-10.	17.3	108.0	55. 26.5	-10.
82418Z	17.1	119.1	40	16.6	118.8	40. 34.	15.4	116.4	45. 14.9	-5.	15.0	112.7	50. 30.1	-10.	15.4	109.0	55. 36.5	-5.
82500Z	17.5	118.5	40	17.1	118.8	40. 29.	17.1	118.8	50. 11.2	-5.	17.2	117.2	50. 30.3	-10.	17.2	115.4	55. 53.3	-5.
82506Z	17.3	117.9	45	17.4	118.1	45. 13.	17.5	117.6	50. 10.7	-5.	17.4	115.7	55. 30.3	-10.	0.0	0.0	0. -0. 0.	0.
82512Z	17.1	118.1	45	17.2	118.1	45. 6.	17.5	117.4	50. 16.2	-10.	17.4	115.8	55. 39.0	-10.	0.0	0.0	0. -0. 0.	0.
82518Z	17.5	117.8	50	17.2	118.1	50. 25.	17.7	117.2	55. 20.2	0.	17.4	115.2	60. 42.4	10.	0.0	0.0	0. -0. 0.	0.
82600Z	18.1	117.1	55	18.3	116.8	55. 21.	17.9	112.9	65. 13.2	5.	17.5	109.5	65. 27.4	35.	0.0	0.0	0. -0. 0.	0.
82606Z	18.8	116.3	55	18.5	115.7	55. 38.	18.4	111.4	65. 15.1	0.	0.0	0.0	0. -0. 0.	0.	0.0	0.0	0. -0. 0.	0.
82612Z	19.3	115.3	60	19.3	115.2	60. 6.	21.3	111.6	65. 6.2	0.	0.0	0.0	0. -0. 0.	0.	0.0	0.0	0. -0. 0.	0.
82618Z	19.8	114.3	60	20.2	114.2	60. 25.	21.4	112.0	65. 18.4	15.	0.0	0.0	0. -0. 0.	0.	0.0	0.0	0. -0. 0.	0.
82700Z	20.1	112.8	60	20.2	112.9	60. 8.	21.0	108.1	50. 6.4	20.	0.0	0.0	0. -0. 0.	0.	0.0	0.0	0. -0. 0.	0.
82706Z	20.9	111.8	65	20.7	111.8	65. 12.	0.0	0.0	0. -0. 0.	0.	0.0	0.0	0. -0. 0.	0.	0.0	0.0	0. -0. 0.	0.
82712Z	21.5	110.4	65	21.6	110.8	65. 23.	0.0	0.0	0. -0. 0.	0.	0.0	0.0	0. -0. 0.	0.	0.0	0.0	0. -0. 0.	0.
82718Z	21.5	108.7	50	21.8	109.5	50. 48.	0.0	0.0	0. -0. 0.	0.	0.0	0.0	0. -0. 0.	0.	0.0	0.0	0. -0. 0.	0.
82800Z	21.5	107.1	30	21.7	106.7	30. 25.	0.0	0.0	0. -0. 0.	0.	0.0	0.0	0. -0. 0.	0.	0.0	0.0	0. -0. 0.	0.

	ALL FORECASTS	TYPHOONS WHILE OVER 35 KTS			
	MMNG	24-HR	48-HR	72-HR	
AVG FORECAST POSIT ERROR	22.	132.	278.	263.	21.
AVG MIGHT ANGLE ERROR	15.	77.	157.	174.	12.
AVG INTENSITY MAGNITUDE ERROR	0.	6.	11.	13.	0.
AVG INTENSITY BIAS	0.	-1.	-3.	-5.	0.
NUMBER OF FORECASTS	20	16	12	8	16

3 1 6

TYPHOON FAYE
(August-September)

BEST TRACK				WARNING				24 HOUR FORECAST				48 HOUR FORECAST				72 HOUR FORECAST							
POSIT	WIND	POSIT	WIND	ERRORS DST WIND	POSIT	WIND	ERRORS DST WIND	POSIT	WIND	ERRORS DST WIND	POSIT	WIND	ERRORS DST WIND	POSIT	WIND	ERRORS DST WIND							
820002	5.7 160.1	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
820002	6.1 158.8	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
820122	6.3 157.5	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
820182	6.5 156.3	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
820002	7.0 155.0	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
820062	7.4 153.8	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
820122	7.9 152.6	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
820182	8.5 151.4	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
821002	9.1 150.3	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
821062	9.9 149.1	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
821122	10.8 148.0	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
821182	11.9 147.0	30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
822002	13.0 146.0	30	12.9	145.9	30	8.0	0.0	16.6	143.0	45	12.9	5.0	18.4	139.7	55	41.0	10.0	21.2	137.2	65	68.0	15.0	
820062	14.0 145.5	30	14.1	145.4	30	8.0	0.0	18.3	143.5	45	10.0	5.0	22.0	141.8	55	30.0	5.0	25.5	140.2	65	66.7	15.0	
820122	15.0 145.2	35	15.0	145.1	35	6.0	0.0	17.9	144.0	45	8.0	0.0	21.2	142.5	50	33.0	0.0	24.0	141.1	55	61.0	5.0	
820182	16.0 145.0	35	16.0	144.8	35	13.0	0.0	19.6	142.8	45	19.4	0.0	22.4	140.5	50	49.4	0.0	25.0	138.1	55	72.5	0.0	
822002	16.8 145.1	40	16.7	144.4	35	13.0	5.0	20.3	143.4	35	18.1	10.0	23.1	141.7	60	52.2	10.0	26.2	138.2	60	75.4	0.0	
822062	17.0 145.1	40	17.7	145.0	35	8.0	5.0	21.0	144.0	35	22.4	5.0	24.1	141.0	60	55.5	0.0	26.7	138.7	60	69.2	-5.0	
822122	18.4 145.4	45	18.3	145.0	35	23.0	0.0	21.4	144.3	35	28.0	5.0	24.3	142.2	60	58.6	10.0	26.3	138.1	60	69.2	-5.0	
822182	19.1 146.2	45	19.0	146.0	35	32.0	0.0	23.4	146.5	35	30.9	5.0	27.4	145.8	60	63.4	5.0	31.4	145.5	60	77.7	-10.0	
830002	19.2 146.4	45	19.9	146.4	35	50.0	0.0	23.4	147.5	35	32.6	5.0	27.4	147.2	60	61.5	-5.0	30.8	147.9	60	72.3	-10.0	
830062	19.2 147.5	50	19.2	147.2	35	17.0	5.0	20.4	149.0	35	17.5	15.0	23.8	151.0	60	46.7	0.0	27.3	150.8	70	56.6	25.0	
830122	19.0 147.9	50	19.3	148.0	35	19.0	5.0	19.9	150.6	35	19.2	15.0	21.9	153.8	60	51.1	0.0	25.0	155.7	70	71.9	-30.0	
830182	18.7 148.5	50	18.7	148.7	35	11.0	5.0	17.8	151.0	35	18.3	10.0	17.5	153.1	60	44.1	-5.0	17.8	155.1	70	74.2	-30.0	
831002	18.0 148.8	50	17.7	149.2	35	29.0	5.0	16.8	150.4	35	20.2	5.0	15.8	153.0	60	50.0	-30.0	15.7	154.9	70	83.1	-35.0	
831062	17.6 148.7	50	17.7	148.4	35	13.0	5.0	15.8	149.7	35	18.9	5.0	15.1	151.5	60	50.8	-30.0	15.8	153.6	70	87.0	-30.0	
831122	17.3 148.5	50	17.2	148.8	35	18.0	5.0	15.3	149.3	35	23.0	0.0	14.8	150.0	60	51.1	-35.0	14.7	150.8	70	87.4	-25.0	
831182	17.0 147.0	55	17.2	148.1	35	17.0	0.0	17.1	148.2	35	9.0	-15.0	14.3	144.0	60	22.5	-40.0	19.8	143.2	65	44.7	-30.0	
901002	17.0 147.5	60	16.8	147.4	35	13.0	-5.0	15.3	148.2	35	10.1	-10.0	17.4	142.8	60	29.3	-40.0	14.0	141.0	70	48.3	-10.0	
901062	17.1 146.7	65	17.1	146.7	35	0.0	0.0	18.0	144.0	35	12.0	-25.0	19.2	142.2	70	25.0	-25.0	20.7	139.8	80	43.8	-15.0	
901122	17.5 146.0	65	17.5	146.1	35	4.0	0.0	18.0	143.0	35	11.4	-30.0	20.5	140.7	70	23.4	-20.0	21.7	137.6	80	39.1	-15.0	
901182	18.4 145.4	70	18.3	145.2	35	13.0	-5.0	20.7	142.2	35	5.1	-30.0	22.8	138.1	75	14.6	-20.0	24.6	133.9	80	23.1	-25.0	
902002	19.0 144.9	70	19.0	144.8	35	6.0	0.0	22.0	142.6	35	7.2	-20.0	24.9	141.0	80	23.7	-10.0	27.5	140.8	90	32.5	-40.0	
902062	20.0 144.2	95	19.8	144.7	35	13.0	0.0	22.8	142.1	35	11.0	-10.0	25.7	140.8	130	28.4	65	28.5	140.8	130	24.9	75.0	
902122	20.7 143.5	100	20.8	143.4	100	8.0	0.0	24.2	141.2	35	13.1	35.0	27.7	140.8	130	30.7	65	31.0	141.2	130	24.9	70.0	
902182	21.5 142.5	100	21.5	142.8	105	17.0	5.0	25.2	140.4	35	15.1	35.0	28.7	140.2	130	28.9	75	31.9	141.7	130	24.5	65.0	
903002	22.1 141.3	105	22.2	141.2	110	8.0	5.0	25.7	138.5	35	9.4	45.0	28.7	138.2	115	17.4	60	31.4	139.7	105	10.5	35.0	
903062	22.9 140.1	100	22.8	140.1	110	6.0	10.0	26.1	136.8	35	8.0	50.0	29.1	136.0	105	4.3	50	31.7	137.7	95	11.2	30.0	
903122	24.0 138.8	95	23.6	139.1	110	29.0	15.0	27.2	136.2	105	7.2	40.0	30.5	136.4	100	1.9	40	32.4	139.1	95	12.7	40.0	
903182	25.2 137.6	95	25.1	137.8	100	12.0	5.0	29.5	135.7	90	8.4	35.0	32.0	137.3	90	14.9	25	34.4	140.8	85	23.6	35.0	
904002	26.1 136.8	80	26.1	136.8	80	0.0	0.0	30.2	135.2	70	6.0	15.0	33.1	137.5	85	17.7	-5	35.1	142.5	60	28.1	15.0	
904062	27.0 135.7	65	27.0	135.7	65	0.0	0.0	30.6	132.6	60	15.2	5.0	34.1	134.4	80	32.9	-25	35.0	0.0	0.0	0.0	-0.0	0.0
904122	27.8 135.0	65	28.0	135.1	55	13.0	-10.0	32.3	133.9	45	17.1	-15.0	34.5	137.5	35	51.5	-20	0.0	0.0	0.0	0.0	-0.0	0.0
904182	28.4 134.7	55	28.7	134.5	35	21.0	0.0	32.3	133.2	35	21.0	-20.0	34.5	137.8	25	30.7	-25	0.0	0.0	0.0	0.0	-0.0	0.0
905002	29.1 134.9	55	29.4	134.7	30	21.0	-5.0	33.0	130.0	30	16.0	-30.0	35.5	146.4	35	42.4	-10	0.0	0.0	0.0	0.0	-0.0	0.0
905062	29.6 135.4	55	30.0	135.4	30	24.0	-5.0	33.0	140.0	30	17.2	-20.0	36.0	147.8	35	40.0	-5	0.0	0.0	0.0	0.0	-0.0	0.0
905122	30.0 136.5	60	30.3	135.8	45	4.0	-15.0	32.6	140.0	35	14.0	-20.0	36.4	147.5	30	41.2	-5	0.0	0.0	0.0	0.0	-0.0	0.0
905182	30.1 137.4	65	30.2	137.3	60	8.0	-5.0	31.2	142.7	30	14.0	0.0	37.8	151.2	40	48.5	5	0.0	0.0	0.0	0.0	-0.0	0.0
906002	30.2 138.2	70	30.2	138.2	65	0.0	-5.0	31.3	143.2	30	14.2	15.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.0	0.0
906062	30.2 139.0	65	30.2	139.0	70	0.0	5.0	31.0	144.6	35	18.2	15.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.0	0.0
906122	30.3 139.5	55	30.2	139.8	70	17.0	15.0	31.3	145.5	30	20.0	15.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.0	0.0
906182	30.5 140.0	50	30.2	140.5	65	31.0	15.0	31.0	146.1	35	21.2	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.0	0.0
907002	30.7 140.5	45	30.4	140.7	35	21.0	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.0	0.0
907062	30.7 141.1	40	30.8	140.9	45	12.0	5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.0	0.0
907122	30.6 141.6	35	30.8	141.5	40	13.0	5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.0	0.0
907182	30.6 142.0	35	30.7	142.2	40	12.0	5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.0	0.0

	ALL FORECASTS				TYPHOONS WHILE OVER 35 KTS			
	WNING	24-HR	48-HR	72-HR	WNING	24-HR	48-HR	72-HR
AVG FORECAST POSIT ERROR	15.	158.	360.	514.	15.	158.	360.	514.
AVG HIGH ANGLE ERROR	12.	113.	285.	390.	12.	113.	285.	396.
AVG INTENSITY MAGNITUDE ERROR	4.	17.	21.	26.	5.	17.	21.	26.
AVG INTENSITY BIAS	2.	5.	3.	9.	0.	4.	3.	9.
NUMBER OF FORECASTS	44	40	36	29	42	40	36	29

TROPICAL STORM GLORIA

(August-September)

	BEST TRACK		WARNING				24 HOUR FORECAST ERRORS				48 HOUR FORECAST ERRORS				72 HOUR FORECAST ERRORS			
	POSIT	WIND	POSIT	WIND	DST	WIND	POSIT	WIND	DST	WIND	POSIT	WIND	DST	WIND	POSIT	WIND	DST	WIND
020122	20.9	130.4	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
020182	20.9	129.4	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
029002	21.0	129.3	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
029062	21.5	128.5	25	21.3	128.7	30.	16.	5.	22.3	128.9	40.	20.	0.	23.5	122.8	55.	48.	25.
029122	22.2	128.0	30	21.6	128.7	40.	34.	0.	22.3	128.5	40.	21.	0.	23.5	123.8	55.	49.	25.
029182	23.1	128.0	35	22.5	127.4	45.	49.	0.	23.6	128.6	45.	21.	10.	25.1	123.5	55.	51.	30.
030002	23.0	128.7	40	24.2	128.4	40.	36.	0.	27.7	130.7	45.	7.	15.	0.0	0.0	0.	-0.	0.
030062	23.0	128.4	40	24.6	128.4	40.	0.	0.	27.8	129.8	45.	2.	15.	0.0	0.0	0.	-0.	0.
030122	23.4	128.0	40	25.2	128.4	40.	20.	0.	28.1	129.4	40.	7.	10.	0.0	0.0	0.	-0.	0.
030182	25.3	128.8	35	26.4	128.5	35.	17.	0.	30.3	128.8	35.	14.	10.	0.0	0.0	0.	-0.	0.
031002	27.2	129.4	30	27.5	129.2	30.	21.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
031062	28.0	130.2	30	28.0	130.1	30.	5.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
031122	28.8	131.0	30	28.7	130.4	40.	12.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
031182	29.7	131.6	25	29.5	131.3	30.	20.	5.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.

ALL FORECASTS

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

TROPICAL STORM HESTER

(August-September)

	BEST TRACK		WARNING				24 HOUR FORECAST ERRORS				48 HOUR FORECAST ERRORS				72 HOUR FORECAST ERRORS			
	POSIT	WIND	POSIT	WIND	DST	WIND	POSIT	WIND	DST	WIND	POSIT	WIND	DST	WIND	POSIT	WIND	DST	WIND
020062	26.8	150.8	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
020122	27.7	150.2	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
020182	28.2	149.8	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
029002	28.9	149.2	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
029062	29.0	149.0	30	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
029122	30.1	149.1	30	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
029182	30.6	149.4	35	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
030002	31.4	149.8	40	31.3	150.3	40.	26.	0.	34.1	150.8	45.	8.	-5.	37.2	150.3	45.	30.	5.
030062	32.2	150.2	45	32.4	150.4	40.	19.	-5.	35.6	151.3	45.	23.	0.	0.0	0.0	0.	-0.	0.
030122	33.0	150.7	45	33.0	150.8	45.	5.	0.	35.7	153.2	40.	15.	-5.	0.0	0.0	0.	-0.	0.
030182	33.8	151.4	50	33.6	151.2	45.	16.	-5.	36.0	153.5	45.	31.	5.	0.0	0.0	0.	-0.	0.
031002	34.6	152.1	50	34.4	152.3	45.	15.	-5.	37.1	155.5	40.	40.	0.	0.0	0.0	0.	-0.	0.
031062	35.8	153.7	45	35.7	152.4	45.	39.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
031122	37.1	156.0	45	36.6	156.0	45.	30.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
031182	38.7	159.2	40	38.0	158.1	45.	66.	5.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
900002	40.8	162.4	40	39.7	161.6	40.	85.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.

ALL FORECASTS

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

TYPHOON IRMA

(September)

	BEST TRACK			WARNING			24 HOUR FORECAST				48 HOUR FORECAST				72 HOUR FORECAST			
	POSIT	WIND		POSIT	WIND		POSIT	WIND	ERRORS	POSIT	WIND	ERRORS	POSIT	WIND	ERRORS			
909122	21.0	123.8	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
909182	21.4	123.3	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
910002	21.4	122.8	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
910062	21.4	122.5	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
910122	21.5	122.2	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
910182	21.6	121.9	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
911002	21.6	121.8	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
911062	22.5	121.8	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
911122	23.2	122.3	30	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
911182	24.1	122.7	30	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
912002	24.9	122.6	35	25.0	122.9	30	17.	-5.	28.4	124.7	40	9.2	-10.	32.1	127.9	45	20.9	-15.
912062	25.4	123.0	40	25.8	122.8	30	20.	-10.	28.1	125.4	35	8.2	0.	31.4	127.5	60	11.3	0.
912122	25.9	123.5	50	25.8	124.0	40	28.	-5.	28.7	125.7	55	9.2	0.	31.9	127.8	60	9.0	-5.
912182	26.0	123.4	50	26.4	123.9	45	29.	-5.	29.2	125.2	55	4.2	-5.	32.4	127.3	60	6.	-5.
913002	27.3	123.4	50	27.2	123.7	45	12.	-5.	30.0	124.1	55	3.1	-5.	33.0	127.2	55	8.0	5.
913062	27.7	123.9	55	27.6	124.0	50	8.	-5.	30.4	124.4	60	2.2	0.	33.2	128.0	55	15.0	15.
913122	28.3	124.0	55	28.4	124.7	50	12.	-5.	31.0	124.1	60	3.2	-5.	33.8	129.3	50	19.0	20.
913182	29.1	124.4	60	29.2	124.5	55	8.	-5.	32.2	124.6	60	3.2	-5.	34.3	130.3	45	23.4	25.
914002	30.0	124.7	60	29.9	124.7	55	6.	-5.	32.8	124.2	60	1.2	0.	35.0	130.0	40	27.0	20.
914062	30.0	125.4	60	30.0	125.2	50	10.	0.	33.8	127.9	65	15.2	25.	36.0	130.0	40	27.0	20.
914122	31.5	126.1	65	31.6	126.0	65	19.	0.	34.4	124.3	65	18.2	35.	36.0	130.0	40	27.0	20.
914182	32.3	127.3	65	32.2	127.0	65	16.	0.	35.2	130.9	60	20.1	40.	36.0	130.0	40	27.0	20.
915002	33.1	128.8	50	33.0	128.7	65	15.	0.	35.2	130.9	60	20.1	40.	36.0	130.0	40	27.0	20.
915062	34.2	130.9	40	34.2	130.7	50	10.	0.	35.2	130.9	60	20.1	40.	36.0	130.0	40	27.0	20.
915122	34.7	133.0	30	34.7	133.0	30	0.	0.	35.2	130.9	60	20.1	40.	36.0	130.0	40	27.0	20.
915182	34.9	135.0	20	0.0	0.0	0.	-0.	0.	35.2	130.9	60	20.1	40.	36.0	130.0	40	27.0	20.

	ALL FORECASTS				TYPHOONS WHILE OVER 35 KTS			
	WMNG	24-HR	48-HR	72-HR	WMNG	24-HR	48-HR	72-HR
AVG FORECAST POSIT ERROR	14.	92.	134.	154.	15.	71.	100.	160.
AVG RIGHT ANGLE ERROR	12.	44.	31.	47.	13.	42.	34.	66.
AVG INTENSITY MAGNITUDE ERROR	5.	12.	11.	18.	5.	7.	8.	13.
AVG INTENSITY BIAS	-2.	7.	5.	10.	0.	1.	-1.	-3.
NUMBER OF FORECASTS	15	12	8	4	14	10	6	2

TYPHOON JUDY

(September)

	BEST TRACK			WARNING			24 HOUR FORECAST				48 HOUR FORECAST				72 HOUR FORECAST			
	POSIT	WIND		POSIT	WIND		POSIT	WIND	ERRORS	POSIT	WIND	ERRORS	POSIT	WIND	ERRORS			
909062	19.5	164.7	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
909122	19.6	163.1	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
909182	19.7	161.5	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
910002	20.0	160.3	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
910062	20.6	159.3	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
910122	21.5	158.3	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
910182	22.2	157.4	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
911002	22.7	155.8	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
911062	23.1	154.3	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
911122	23.3	152.7	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
911182	23.2	151.2	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
912002	23.1	149.9	30	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
912062	23.3	148.9	30	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
912122	23.6	148.0	35	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
912182	24.0	147.4	40	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
913002	24.6	146.7	40	24.6	146.6	50	5.	10.	26.4	144.3	65	8.9	5.	27.6	141.7	70	18.6	-5.
913062	25.4	146.3	45	25.2	146.2	50	13.	5.	27.5	144.4	65	7.2	5.	24.6	143.3	70	7.9	-10.
913122	26.3	146.0	50	26.6	146.2	50	21.	0.	30.0	146.0	70	10.2	5.	32.2	147.6	65	16.0	-20.
913182	27.0	145.5	55	27.2	145.7	55	16.	0.	30.3	145.0	70	6.2	0.	32.0	147.2	65	10.1	-25.
914002	27.6	145.3	60	27.8	145.4	60	13.	0.	30.3	145.0	65	3.1	-10.	32.7	147.5	60	9.2	-30.
914062	28.3	145.0	60	28.6	145.1	60	19.	0.	30.5	144.2	65	8.2	-15.	32.7	145.9	55	15.6	-35.
914122	28.8	144.6	65	28.4	145.0	65	32.	0.	30.7	145.4	65	5.9	-20.	31.6	148.8	55	29.3	-35.
914182	29.4	144.3	70	29.3	144.3	65	6.	-5.	31.4	144.7	65	6.2	-25.	32.7	148.4	50	35.7	-20.
915002	29.8	144.2	75	29.8	144.2	70	0.	-5.	32.1	145.9	65	9.2	-25.	33.0	151.3	50	43.6	0.
915062	30.6	144.3	80	30.6	144.1	75	10.	-5.	32.3	147.0	60	16.2	-30.	33.2	152.4	45	56.2	5.
915122	31.4	144.6	85	31.1	144.8	75	21.	-10.	32.7	148.5	60	23.0	-30.	33.0	150.0	40	60.0	0.
915182	32.4	145.2	90	32.3	144.9	90	16.	0.	35.4	144.3	75	22.0	5.	34.0	150.0	40	60.0	0.
916002	33.7	146.1	90	33.4	145.6	90	31.	0.	36.2	149.2	85	30.2	15.	34.0	150.0	40	60.0	0.
916062	35.0	147.4	90	34.9	147.2	90	11.	0.	38.3	153.4	85	26.5	45.	34.0	150.0	40	60.0	0.
916122	36.5	149.2	90	36.6	149.5	90	16.	0.	40.0	150.0	80	20.2	0.	34.0	150.0	40	60.0	0.
916182	38.2	151.3	70	37.7	150.7	70	41.	0.	40.0	150.0	80	20.2	0.	34.0	150.0	40	60.0	0.
917002	40.1	153.4	50	40.0	154.0	50	28.	0.	40.0	150.0	80	20.2	0.	34.0	150.0	40	60.0	0.
917062	42.0	156.6	40	41.9	155.5	40	49.	0.	40.0	150.0	80	20.2	0.	34.0	150.0	40	60.0	0.

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

TROPICAL STORM KIT

(September)

BEST TRACK				WARNING				24 HOUR FORECAST				48 HOUR FORECAST				72 HOUR FORECAST							
POSIT		WIND		POSIT		WIND	DST	WIND		POSIT		WIND	DST	WIND		POSIT		WIND	DST	WIND			
920002	13.6	133.6	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
920062	13.5	132.5	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
920122	13.4	131.2	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
920182	13.4	130.0	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
921002	13.4	129.0	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
921062	13.6	128.0	20	13.5	128.6	20.	35.	0.	14.2	126.7	30.	187.	5.	15.0	124.3	40.	497.	10.	15.7	121.1	45.	478.	5.
921122	14.0	127.0	25	13.6	128.1	25.	68.	0.	14.7	126.1	35.	225.	10.	15.2	123.4	40.	461.	5.	15.8	120.3	40.	476.	0.
921182	14.4	125.9	25	13.8	127.6	25.	105.	0.	14.6	125.5	35.	438.	5.	15.4	122.6	40.	461.	5.	16.0	119.4	40.	462.	-10.
922002	14.7	124.9	25	14.8	125.1	25.	13.	0.	16.1	120.9	30.	272.	0.	16.9	117.3	40.	224.	5.	17.4	113.1	45.	136.	-5.
922062	15.1	123.6	25	14.8	123.6	25.	18.	0.	15.8	118.5	30.	177.	0.	15.5	113.8	40.	75.	0.	14.9	109.2	45.	213.	0.
922122	15.5	122.4	25	15.2	122.1	25.	25.	0.	15.8	117.1	40.	182.	5.	15.4	112.8	50.	109.	10.	15.1	108.2	40.	202.	0.
922182	16.5	118.1	30	16.5	119.0	30.	53.	0.	16.7	114.7	40.	84.	5.	16.4	110.1	50.	107.	0.	0.0	0.0	0.	-0.	0.
923002	15.6	116.2	30	17.0	117.3	30.	105.	0.	17.4	113.1	40.	105.	5.	17.4	109.4	50.	87.	0.	17.0	106.1	40.	100.	0.
923062	14.6	115.7	30	14.4	115.0	30.	42.	0.	14.0	110.0	40.	212.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
923122	15.3	115.4	35	15.2	115.3	35.	8.	0.	15.3	110.8	30.	131.	10.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
923182	15.3	114.6	35	15.3	114.7	35.	6.	0.	15.7	110.6	30.	125.	0.	16.0	106.7	30.	136.	-10.	0.0	0.0	0.	-0.	0.
924002	15.7	113.6	35	15.4	113.5	35.	19.	0.	16.3	109.1	30.	140.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
924062	16.3	112.9	40	16.2	112.8	40.	6.	0.	18.1	109.1	30.	492.	5.	19.4	104.7	30.	153.	-10.	0.0	0.0	0.	-0.	0.
924122	17.1	112.1	40	17.1	111.0	40.	11.	0.	19.8	108.7	35.	85.	-5.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
924182	17.6	111.5	50	17.8	111.5	50.	12.	0.	20.5	108.9	35.	136.	-5.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
925002	18.0	110.8	50	18.1	111.1	50.	18.	0.	20.7	109.3	35.	191.	-5.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
925062	18.4	109.9	45	18.4	110.2	45.	17.	0.	20.5	107.0	35.	162.	-5.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
925122	18.4	109.0	40	18.3	108.8	40.	13.	0.	19.9	104.8	30.	148.	-5.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
925182	18.3	108.3	40	18.8	107.8	40.	41.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
926002	18.0	107.5	40	18.3	107.4	40.	19.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
926062	17.8	106.8	40	18.3	106.6	40.	32.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
926122	17.7	106.0	35	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.

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

TYPHOON LOLA
(September-October)

	BEST TRACK		WARNING				24 HOUR FORECAST				48 HOUR FORECAST				72 HOUR FORECAST								
	POSIT	WIND	POSIT	WIND	DST WIND	ERRORS	POSIT	WIND	DST WIND	ERRORS	POSIT	WIND	DST WIND	ERRORS	POSIT	WIND	DST WIND	ERRORS					
920122	7.0	147.0	15	0.0	0.0	0.0	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
920182	8.5	146.9	15	0.0	0.0	0.0	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
921002	9.2	146.5	15	0.0	0.0	0.0	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
921062	9.8	146.0	15	0.0	0.0	0.0	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
921122	10.0	145.3	15	0.0	0.0	0.0	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
921182	10.1	144.6	15	0.0	0.0	0.0	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
922002	10.3	143.7	15	0.0	0.0	0.0	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
922062	10.4	142.9	15	0.0	0.0	0.0	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
922122	10.5	142.0	15	0.0	0.0	0.0	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
922182	10.7	140.9	15	0.0	0.0	0.0	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
923002	11.0	139.9	20	0.0	0.0	0.0	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
923062	11.4	138.9	20	0.0	0.0	0.0	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
923122	11.7	137.8	20	0.0	0.0	0.0	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
923182	11.9	136.7	20	0.0	0.0	0.0	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
924002	12.1	135.6	20	0.0	0.0	0.0	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
924062	12.2	134.6	25	0.0	0.0	0.0	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
924122	12.3	133.7	25	12.3	133.7	25	0.0	13.4	129.9	35	115	5	14.2	125.6	40	153	-5	16.5	120.9	45	175	-5	
924182	12.4	132.3	30	12.6	132.6	30	21	0.0	13.4	124.9	40	120	10	15.4	121.7	45	140	0	16.5	120.0	50	115	0
925002	12.3	131.0	30	12.8	131.3	30	35	0.0	14.0	126.0	40	100	5	15.0	121.0	50	136	0	16.0	116.7	50	102	-5
925062	12.2	129.8	30	12.2	129.8	30	0	0.0	13.7	125.0	45	05	5	14.5	119.8	40	102	-10	14.7	114.8	50	145	-5
925122	12.2	128.8	30	12.2	128.8	30	6	0.0	13.0	125.0	40	21	-5	14.0	121.2	35	50	-15	14.6	117.2	45	48	-15
925182	12.1	127.7	30	12.2	127.7	30	6	0.0	12.7	124.7	35	30	-10	13.5	119.7	40	75	-10	14.9	116.0	50	84	-15
926002	12.2	126.8	35	12.2	126.7	35	0	0.0	13.1	122.0	40	25	-10	14.3	118.3	50	48	-5	16.4	114.5	60	24	-5
926062	12.5	125.9	40	12.4	125.8	40	6	0.0	13.5	121.0	45	20	-5	14.0	117.5	60	51	5	16.7	113.8	70	18	5
926122	12.8	124.7	45	12.7	124.6	45	8	0.0	13.7	120.3	45	30	-5	15.3	116.2	60	40	0	17.6	112.8	70	54	0
926182	13.2	123.0	45	13.4	123.4	45	17	0.0	14.7	119.3	50	0	0	16.5	115.3	65	31	0	19.1	112.1	70	130	0
927002	13.0	122.5	50	13.6	122.4	50	13	0.0	15.1	118.3	65	0	10	17.1	114.4	75	40	10	20.1	111.7	80	173	10
927062	13.0	121.4	50	13.6	121.4	50	13	0.0	14.9	117.6	65	30	10	17.2	114.3	75	26	10	20.1	111.7	80	152	5
927122	13.3	120.4	50	14.1	120.4	55	12	5	15.4	116.5	70	0	10	17.7	113.5	75	42	5	20.3	111.6	80	131	5
927182	14.7	119.3	50	14.5	119.0	55	21	5	16.4	114.9	70	05	5	19.2	112.1	75	135	5	22.2	111.2	80	225	-15
928002	15.1	118.2	55	15.0	117.4	55	18	0.0	16.4	114.8	70	25	5	19.0	112.2	75	101	5	21.9	111.0	80	143	-10
928062	15.4	117.2	55	15.6	117.1	55	13	0.0	17.4	114.0	70	30	5	19.7	111.7	75	130	0	22.7	110.8	80	198	-30
928122	15.9	116.5	60	15.9	116.4	60	6	0.0	18.2	113.8	75	7	5	20.8	111.9	80	157	5	0.0	0.0	0	0	0
928182	16.3	115.8	65	16.4	115.8	65	6	0.0	18.7	113.2	75	9	5	21.6	111.9	75	185	0	0.0	0.0	0	0	0
929002	16.0	114.9	65	16.6	114.8	65	8	0.0	18.3	111.1	75	11	5	19.0	107.0	65	266	-5	0.0	0.0	0	0	0
929062	16.8	114.1	65	16.7	114.4	70	18	5	17.7	111.7	80	5	5	18.7	107.8	65	191	-5	18.8	103.7	30	323	-20
929122	17.0	113.5	70	17.2	113.7	75	17	5	18.7	111.0	85	7	10	19.6	107.3	65	180	5	0.0	0.0	0	0	0
929182	17.2	113.2	70	17.2	112.6	75	34	5	18.1	109.0	75	17	0	18.6	105.4	65	280	5	0.0	0.0	0	0	0
930002	17.4	112.8	70	17.2	112.6	75	17	5	17.8	110.7	70	8	0	18.4	108.0	65	150	5	0.0	0.0	0	0	0
930062	17.7	112.6	75	17.6	112.4	75	13	0	18.5	110.4	65	0	-5	19.0	107.5	65	141	5	0.0	0.0	0	0	0
930122	18.2	112.3	75	18.3	112.2	75	8	0	19.5	110.4	65	13	5	21.6	107.9	65	24	20	0.0	0.0	0	0	0
930182	18.5	112.0	75	18.6	112.0	75	6	0	20.2	110.8	65	4	5	21.7	108.0	65	30	15	0.0	0.0	0	0	0
1001002	18.9	111.7	70	18.9	111.6	70	6	0	20.5	110.4	65	4	5	0.0	0.0	0	-0	0	0.0	0.0	0	0	0
1001062	19.4	111.1	70	19.2	111.2	70	13	0	21.0	109.4	60	2	0	0.0	0.0	0	-0	0	0.0	0.0	0	0	0
1001122	19.7	110.5	60	19.7	110.4	65	6	5	21.4	108.3	60	0	5	0.0	0.0	0	-0	0	0.0	0.0	0	0	0
1001182	20.1	110.1	60	20.0	110.0	65	8	5	21.8	107.7	45	2	5	0.0	0.0	0	-0	0	0.0	0.0	0	0	0
1002002	20.4	109.6	60	20.2	109.6	60	12	0	0.0	0.0	0	-0	0	0.0	0.0	0	-0	0	0.0	0.0	0	0	0
1002062	20.9	109.0	50	20.7	109.7	55	16	5	0.0	0.0	0	-0	0	0.0	0.0	0	-0	0	0.0	0.0	0	0	0
1002122	21.3	108.3	45	21.6	108.4	50	19	5	0.0	0.0	0	-0	0	0.0	0.0	0	-0	0	0.0	0.0	0	0	0
1002182	21.5	107.5	40	21.7	107.7	40	21	5	0.0	0.0	0	-0	0	0.0	0.0	0	-0	0	0.0	0.0	0	0	0

ALL FORECASTS
 AVG FORECAST POSIT ERROR
 AVG HIGH ANGLE ERROR
 AVG INTENSITY MAGNITUDE ERROR
 AVG INTENSITY BIAS
 NUMBER OF FORECASTS

WIND	ALL FORECASTS				TYPHOONS WHILE OVER 35 KTS				
	24-HR	48-HR	72-HR	ERRORS	WIND	24-HR	48-HR	72-HR	ERRORS
13	54	112	134	13	49	116	134	13	49
9	40	79	88	9	36	79	88	9	36
1	6	6	9	1	5	6	9	1	5
1	3	2	-6	1	3	2	-6	1	3
34	30	26	17	34	28	26	17	34	28

25 24 16

TYPHOON MAMIE
(September-October)

	BEST TRACK			WARNING			24 HOUR FORECAST			48 HOUR FORECAST			72 HOUR FORECAST		
	POSIT	WIND		POSIT	WIND	DST WIND	POSIT	WIND	DST WIND	POSIT	WIND	DST WIND	POSIT	WIND	DST WIND
929002	19.1	154.2	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
929062	19.6	153.0	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
929122	19.9	153.3	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
929182	19.8	152.8	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
930002	19.4	152.6	30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
930062	19.2	153.3	35	19.3	152.4	30	51	-5	19.6	150.9	45	185	0	20.6	147.7
930122	20.2	153.2	35	19.5	153.0	35	43	0	19.6	152.1	50	229	0	20.0	149.6
930182	20.9	152.9	35	19.6	152.8	35	74	0	19.7	151.9	50	271	0	20.1	149.5
1001002	21.0	152.8	40	21.1	153.1	35	34	-5	23.7	151.9	50	117	0	26.3	150.5
1001062	22.4	152.3	45	22.4	152.3	35	0	-10	26.0	150.7	50	38	-5	29.3	149.4
1001122	23.4	151.5	50	23.5	151.9	40	23	-10	26.9	150.2	50	5	-10	30.0	149.2
1001182	24.1	150.7	50	24.3	150.7	45	12	-5	27.5	149.1	60	120	-5	30.5	148.6
1002002	24.9	150.2	50	24.7	150.0	50	16	0	27.4	147.8	60	188	-10	30.9	148.4
1002062	25.9	150.0	55	25.8	149.8	50	17	-5	29.2	148.8	60	189	-10	32.5	151.1
1002122	26.9	150.1	60	26.8	150.3	50	12	-10	30.8	151.8	60	108	-10	34.9	155.4
1002182	28.0	150.3	65	27.8	150.7	50	24	-15	31.7	152.8	60	213	-5	0.0	0.0
1003002	29.0	150.8	70	28.7	150.8	60	18	-10	32.4	153.4	60	328	0	0.0	0.0
1003062	30.5	151.7	70	30.1	151.4	60	24	0	34.5	150.0	60	328	5	0.0	0.0
1003122	32.3	152.9	74	31.7	153.0	65	34	-5	36.9	161.0	65	254	0	0.0	0.0
1003182	34.7	155.1	65	34.7	155.0	65	5	0	0.0	0.0	0	-0	0	0.0	0.0
1004002	36.6	157.7	60	36.4	157.8	60	13	0	0.0	0.0	0	-0	0	0.0	0.0
1004062	38.7	160.4	55	38.6	160.2	55	11	0	0.0	0.0	0	-0	0	0.0	0.0
1004122	40.8	163.2	45	40.2	163.1	40	36	-5	0.0	0.0	0	-0	0	0.0	0.0

	ALL FORECASTS				TYPHOONS WHILE OVER 35 KTS			
	WARNING	24-HR	48-HR	72-HR	WARNING	24-HR	48-HR	72-HR
AVG FORECAST POSIT ERROR	25.	182.	386.	722.	25.	182.	386.	722.
AVG HIGH ANGLE ERROR	14.	68.	143.	371.	14.	68.	143.	327.
AVG INTENSITY MAGNITUDE ERROR	5.	4.	8.	8.	5.	4.	8.	8.
AVG INTENSITY BIAS	-5.	-4.	-3.	1.	0.	-4.	-3.	1.
NUMBER OF FORECASTS	18	14	10	6	18	14	10	6
		2	2	0				

TROPICAL STORM NINA

(October)

	OBS TRACK		WARNING		24 HOUR FORECAST				48 HOUR FORECAST				72 HOUR FORECAST			
	POSIT	WIND	POSIT	WIND	POSIT	WIND	ERRORS	POSIT	WIND	ERRORS	POSIT	WIND	ERRORS	POSIT	WIND	ERRORS
100600Z	14.0	141.0	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
100600Z	15.4	139.4	20	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
100612Z	15.7	137.8	20	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
100618Z	16.0	135.9	20	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
100700Z	16.0	134.0	20	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
100706Z	15.9	132.8	20	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
100712Z	15.7	131.6	20	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
100718Z	15.4	130.4	20	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
100800Z	15.2	129.1	30	0.0	0.0	0.0	15.6	123.7	45	75	0.0	16.2	118.4	50	153	5
100806Z	15.1	128.0	35	0.0	0.0	0.0	15.4	123.1	45	80	0.0	16.2	119.0	40	108	-5
100812Z	14.9	126.9	40	0.0	0.0	0.0	15.5	122.8	55	85	0.0	17.2	118.7	50	159	0
100818Z	14.5	125.7	45	0.0	0.0	0.0	15.6	121.4	55	80	0.0	17.5	118.3	50	188	-5
100900Z	14.3	124.7	45	0.0	0.0	0.0	16.7	120.4	50	100	0.0	14.0	117.7	50	233	-5
100906Z	13.2	123.8	45	0.0	0.0	0.0	17.1	120.0	45	140	0.0	19.6	116.9	50	252	-10
100912Z	13.1	122.7	50	0.0	0.0	0.0	17.1	119.2	50	140	0.0	19.5	116.7	50	250	5
100918Z	13.0	121.5	50	0.0	0.0	0.0	17.8	118.7	60	180	0.0	19.8	116.1	70	288	10
101000Z	14.7	120.7	45	0.0	0.0	0.0	14.5	118.2	60	100	0.0	14.8	112.4	60	216	5
101006Z	14.7	120.0	40	0.0	0.0	0.0	14.5	116.7	60	80	0.0	14.8	112.4	60	205	10
101012Z	14.0	119.3	50	0.0	0.0	0.0	14.4	115.4	60	140	0.0	15.1	111.3	60	294	10
101018Z	14.7	118.6	55	0.0	0.0	0.0	14.8	115.1	65	110	0.0	15.1	111.1	70	300	15
101100Z	13.1	117.9	55	0.0	0.0	0.0	15.8	113.1	65	200	0.0	16.5	109.0	70	430	15
101106Z	13.4	117.4	60	0.0	0.0	0.0	16.3	114.0	70	140	15	17.3	109.4	75	389	20
101112Z	13.4	117.6	60	0.0	0.0	0.0	16.2	115.8	70	50	15	17.2	112.7	75	238	20
101118Z	13.4	117.0	60	0.0	0.0	0.0	16.1	114.0	65	140	10	16.8	110.6	70	270	20
101200Z	13.4	116.0	60	0.0	0.0	0.0	15.7	113.5	65	160	10	15.8	109.4	60	312	15
101206Z	13.4	116.4	55	0.0	0.0	0.0	15.3	112.5	65	220	10	15.3	108.8	60	381	15
101212Z	13.4	116.4	55	0.0	0.0	0.0	15.7	114.5	65	110	10	15.9	110.8	60	261	15
101218Z	13.4	116.4	55	0.0	0.0	0.0	15.7	114.2	60	70	15	16.0	110.5	60	238	15
101300Z	13.4	116.4	55	0.0	0.0	0.0	15.6	114.7	50	50	0	16.0	111.0	45	190	-5
101306Z	13.4	116.4	55	0.0	0.0	0.0	15.6	114.7	45	80	-5	16.0	111.0	40	188	-10
101312Z	13.4	116.4	55	0.0	0.0	0.0	15.6	114.4	40	120	-10	16.0	111.1	35	201	-10
101318Z	13.0	115.5	50	0.0	0.0	0.0	15.7	114.7	35	140	-15	16.0	110.9	35	180	-10
101400Z	16.4	115.3	50	0.0	0.0	0.0	16.7	113.5	40	90	-10	17.5	111.5	35	178	-5
101406Z	17.0	115.2	50	0.0	0.0	0.0	19.1	111.5	45	50	-5	21.7	108.2	35	247	0
101412Z	17.0	115.0	50	0.0	0.0	0.0	20.1	113.8	45	100	0	22.8	110.7	30	140	0
101418Z	18.0	114.1	50	0.0	0.0	0.0	20.1	112.7	45	40	0	0.0	0.0	0	0	0
101500Z	18.3	113.3	50	0.0	0.0	0.0	19.3	109.6	40	160	0	0.0	0.0	0	0	0
101506Z	18.8	112.5	50	0.0	0.0	0.0	19.4	108.1	35	280	0	0.0	0.0	0	0	0
101512Z	19.2	112.2	45	0.0	0.0	0.0	20.4	108.8	35	240	5	0.0	0.0	0	0	0
101518Z	19.5	112.1	45	0.0	0.0	0.0	0.0	0.0	0	0	0	0.0	0.0	0	0	0
101600Z	20.4	112.2	40	0.0	0.0	0.0	0.0	0.0	0	0	0	0.0	0.0	0	0	0
101606Z	21.1	112.6	35	0.0	0.0	0.0	0.0	0.0	0	0	0	0.0	0.0	0	0	0
101612Z	21.0	113.0	30	0.0	0.0	0.0	0.0	0.0	0	0	0	0.0	0.0	0	0	0

ALL FORECASTS

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

TYPHOON ORA

(October)

BEST TRACK				WARNING				24 HOUR FORECAST				48 HOUR FORECAST				72 HOUR FORECAST							
POSIT		WIND		POSIT		ERRORS		POSIT		ERRORS		POSIT		ERRORS		POSIT		ERRORS					
POSIT	WIND		POSIT	WIND	DST	WIND	POSIT	WIND	DST	WIND	POSIT	WIND	DST	WIND	POSIT	WIND	DST	WIND					
100000Z	11.3	128.0	29	0.0	0.0	0.	0.0	0.0	0.0	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
100000Z	12.1	138.4	29	0.0	0.0	0.	0.0	0.0	0.0	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
100012Z	12.9	138.7	29	0.0	0.0	0.	0.0	0.0	0.0	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
100018Z	13.0	138.6	29	0.0	0.0	0.	0.0	0.0	0.0	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
100024Z	14.4	137.9	25	0.0	0.0	0.	0.0	0.0	0.0	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
100030Z	14.4	136.6	25	0.0	0.0	0.	0.0	0.0	0.0	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
100036Z	14.5	135.4	30	0.0	0.0	0.	0.0	0.0	0.0	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
100042Z	15.9	134.7	30	0.0	0.0	0.	0.0	0.0	0.0	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
101000Z	17.2	133.9	35	0.0	0.0	0.	20.7	131.2	30.	115.	0.	24.5	130.1	05.	347.	0.	27.9	132.3	75.	491.	-5.		
101006Z	17.0	132.9	40	17.7	133.0	40.	4.	0.	21.0	130.2	30.	100.	0.	24.9	129.4	05.	369.	-5.	28.3	131.9	75.	449.	-10.
101012Z	17.7	131.5	45	18.9	132.1	40.	7.4	0.	22.4	129.0	30.	120.	0.	24.9	128.0	05.	394.	-5.	28.9	131.5	75.	417.	-5.
101018Z	18.0	130.5	45	18.5	130.3	40.	21.	-5.	21.4	128.4	00.	35.	0.	24.3	127.1	05.	423.	-10.	28.6	117.6	30.	376.	-35.
101024Z	19.5	129.6	50	19.3	129.3	40.	21.	-10.	22.0	127.4	00.	31.	-4.	24.9	126.9	00.	446.	-30.	28.8	116.5	25.	343.	-30.
101030Z	20.1	128.7	50	20.1	128.4	30.	6.	0.	22.5	126.0	05.	42.	-4.	24.8	121.3	45.	402.	-40.	28.0	117.0	25.	414.	-20.
101036Z	20.9	127.4	55	21.0	127.4	30.	4.	-5.	23.4	125.7	05.	40.	-10.	24.2	120.7	45.	431.	-35.	0.0	0.0	0.	-0.	0.
101042Z	21.5	125.8	60	21.3	125.4	35.	12.	-5.	22.4	124.7	00.	40.	-15.	23.4	119.9	45.	416.	-20.	0.0	0.0	0.	-0.	0.
101200Z	21.0	124.5	65	22.0	124.7	00.	20.	-5.	23.7	114.6	30.	225.	-30.	23.5	113.6	25.	513.	-30.	0.0	0.0	0.	-0.	0.
101206Z	22.1	123.4	70	22.3	123.3	05.	13.	-5.	23.4	113.0	30.	209.	-35.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
101212Z	22.1	122.7	70	22.5	122.4	0.	24.	0.	23.3	111.0	30.	294.	-30.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
101218Z	22.3	122.6	75	22.1	122.0	0.	35.	-5.	22.7	111.0	35.	244.	-10.	23.5	110.7	25.	767.	-10.	0.0	0.0	0.	-0.	0.
101300Z	23.1	122.7	80	23.0	123.0	0.	14.	-10.	26.0	120.0	0.	0.	0.	24.4	120.4	05.	84.	20.	0.0	0.0	0.	-0.	0.
101306Z	23.9	122.9	85	23.8	122.7	00.	12.	-5.	27.7	120.3	05.	42.	30.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
101312Z	24.9	123.1	80	24.0	123.1	00.	18.	0.	27.7	120.9	05.	24.	37.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
101318Z	25.5	123.2	65	25.5	123.2	00.	0.	0.	28.7	120.0	00.	53.	37.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
101400Z	26.0	123.0	55	26.2	123.7	00.	13.	5.	28.4	127.4	00.	130.	7.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
101406Z	26.0	124.7	45	26.5	124.4	45.	17.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
101412Z	27.3	126.0	40	27.1	126.0	40.	12.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
101418Z	28.2	128.0	35	28.4	127.4	40.	24.	5.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
101500Z	29.5	130.3	35	29.3	129.4	35.	29.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.

	ALL FORECASTS				TYPHOONS WHILE OVER JS RIS			
	MMNG	24-HR	48-HR	72-HR	MMNG	24-HR	48-HR	72-HR
AVG FORECAST POSIT ERROR	19.	124.	314.	440.	19.	124.	314.	400.
AVG RIGHT ANGLE ERROR	14.	99.	239.	391.	14.	99.	239.	391.
AVG INTENSITY MAGNITUDE ERROR	4.	15.	19.	18.	4.	15.	17.	18.
AVG INTENSITY BIAS	-1.	-1.	-15.	-18.	0.	-1.	-15.	-18.
NUMBER OF FORECASTS	21	17	11	6	21	17	11	6
		9	5	0				

TROPICAL DEPRESSION, 26

(October)

BEST TRACK				WARNING				24 HOUR FORECAST				48 HOUR FORECAST				72 HOUR FORECAST							
POSIT		WIND		POSIT		ERRORS		POSIT		ERRORS		POSIT		ERRORS		POSIT		ERRORS					
POSIT	WIND		POSIT	WIND	DST	WIND	POSIT	WIND	DST	WIND	POSIT	WIND	DST	WIND	POSIT	WIND	DST	WIND					
100018Z	19.3	163.7	20	0.0	0.0	0.	0.0	0.0	0.0	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
100900Z	19.9	163.0	20	0.0	0.0	0.	0.0	0.0	0.0	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
100906Z	20.5	162.6	20	0.0	0.0	0.	0.0	0.0	0.0	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
100912Z	21.1	162.3	20	0.0	0.0	0.	0.0	0.0	0.0	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
100918Z	21.5	162.0	25	0.0	0.0	0.	0.0	0.0	0.0	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
101000Z	21.9	161.6	25	0.0	0.0	0.	0.0	0.0	0.0	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
101006Z	22.1	161.2	25	0.0	0.0	0.	0.0	0.0	0.0	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
101012Z	22.1	160.7	25	0.0	0.0	0.	0.0	0.0	0.0	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
101018Z	22.1	159.0	25	0.0	0.0	0.	0.0	0.0	0.0	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
101100Z	22.0	158.8	25	22.2	158.4	25.	25.	0.	22.9	158.6	35.	114.	5.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
101106Z	22.0	157.6	25	22.0	159.0	25.	78.	0.	22.4	156.5	35.	300.	4.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
101112Z	22.1	156.1	25	22.0	157.4	25.	94.	0.	22.4	154.9	35.	298.	10.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
101118Z	22.0	154.4	25	22.2	155.1	25.	45.	0.	23.4	151.2	35.	154.	15.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
101200Z	23.4	152.6	30	23.5	152.5	30.	8.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
101206Z	23.7	151.1	30	24.1	151.0	30.	25.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
101212Z	24.2	149.8	25	24.1	149.4	25.	6.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
101218Z	24.8	148.7	20	0.0	0.0	0.	0.0	0.0	0.0	0.	0.0	0.0	0.	0.0	0.0	0.	0.0	0.0	0.0	0.0	0.	-0.	0.

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

TROPICAL DEPRESSION 27

(October)

	BEST TRACK			WARNING				24 HOUR FORECAST ERRORS				48 HOUR FORECAST ERRORS				72 HOUR FORECAST							
	POSIT	WIND		POSIT	WIND	DST	WIND	POSIT	WIND	DST	WIND	POSIT	WIND	DST	WIND	POSIT	WIND	DST	WIND				
101000Z	5.0	153.4	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
101006Z	5.0	152.7	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
101012Z	5.4	151.4	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
101018Z	6.8	150.9	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
101002Z	7.3	149.9	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
101008Z	7.8	149.0	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
101014Z	8.2	147.9	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
101020Z	8.5	146.8	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
101004Z	8.7	145.7	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
101010Z	9.0	144.6	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
101016Z	9.0	142.4	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
101022Z	9.7	140.7	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
101300Z	10.0	139.1	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
101306Z	10.4	137.7	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
101312Z	11.0	136.4	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
101318Z	11.5	135.3	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
101400Z	12.1	134.5	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
101406Z	12.6	133.5	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
101412Z	13.2	132.6	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
101418Z	13.7	131.8	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
101500Z	14.1	131.1	20	14.3	131.0	20.	13.	0.	16.5	127.8	30.	13.	10.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
101506Z	14.6	130.4	20	14.8	130.2	20.	17.	0.	17.1	127.0	30.	18.	15.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
101512Z	15.0	130.2	20	15.3	129.3	20.	55.	0.	17.5	126.5	30.	20.	15.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
101518Z	15.5	130.1	20	15.9	128.7	20.	84.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
101600Z	15.9	130.1	20	16.3	129.4	20.	47.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
101606Z	16.3	130.1	15	16.5	130.0	15.	13.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.
101612Z	16.7	130.0	15	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.

ALL FORECASTS			
WNG	24-HR	48-HR	72-HR
38.	175.	0.	0.
30.	168.	0.	0.
0.	13.	0.	0.
0.	13.	0.	0.
6	3	0	0
	0		

AVG FORECAST POSIT ERROR
 AVG NIGHT ANGLE ERROR
 AVG INTENSITY MAGNITUDE ERROR
 AVG INTENSITY BIAS
 NUMBER OF FORECASTS

TYPHOON PHYLLIS

(October) LINE FOR 33 % REDUCTION

	BEST TRACK			WARNING			24 HOUR FORECAST ERRORS				48 HOUR FORECAST ERRORS				72 HOUR FORECAST					
	POSIT	WIND	PCST	WIND	PCST	WIND	POSIT	WIND	PCST	WIND	POSIT	WIND	PCST	WIND	POSIT	WIND	PCST	WIND		
101312Z	7.0	165.5	15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
101318Z	8.6	165.0	15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
101400Z	9.5	164.5	15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
101406Z	10.5	164.1	15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
101412Z	11.0	163.7	15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
101418Z	12.6	163.2	15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
101500Z	13.6	162.6	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
101506Z	14.0	162.2	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
101512Z	14.5	161.6	25	14.7	161.5	25	13.0	0.0	17.2	158.4	30	9.0	-10.0	18.8	154.5	40	15.7	-15.0	19.8	150.5
101518Z	15.0	161.2	25	14.9	161.1	25	8.0	0.0	17.1	158.3	30	6.2	-15.0	18.8	154.9	40	8.7	-25.0	19.8	150.5
101600Z	15.0	160.7	30	15.6	160.6	30	6.0	0.0	17.5	158.2	35	4.0	-15.0	19.4	154.8	40	4.7	-30.0	20.2	150.7
101606Z	16.0	160.2	40	16.2	160.2	40	12.0	0.0	18.3	157.9	40	4.8	-5.0	20.1	154.6	50	4.1	-30.0	20.6	150.3
101612Z	16.2	159.7	40	15.7	159.5	40	32.0	0.0	17.8	156.5	40	4.0	-5.0	19.0	153.0	55	17.2	-35.0	19.1	148.7
101618Z	16.4	159.1	45	16.4	159.2	45	6.0	0.0	17.5	156.5	40	9.0	-5.0	18.7	153.5	55	19.5	-25.0	19.1	149.3
101700Z	16.9	158.5	50	16.8	158.4	50	6.0	0.0	17.9	156.0	40	10.0	-10.0	19.0	152.8	55	23.5	-30.0	19.6	148.6
101706Z	17.5	157.9	55	17.3	157.9	55	12.0	0.0	18.8	155.5	45	9.0	-20.0	20.1	152.0	55	24.5	-30.0	20.7	147.8
101712Z	18.2	157.2	55	18.0	156.8	55	26.0	0.0	19.7	153.0	45	11.0	-25.0	20.8	149.5	55	36.5	-30.0	20.7	145.2
101718Z	19.1	156.4	65	18.8	156.3	65	19.0	0.0	20.5	152.4	40	17.2	-10.0	20.6	148.2	60	43.2	-15.0	20.6	143.9
101800Z	19.6	155.6	70	19.7	155.6	70	6.0	0.0	21.5	152.2	40	18.1	-15.0	21.9	147.8	65	41.2	-5.0	22.0	143.2
101806Z	20.3	155.3	85	20.3	155.3	85	0.0	0.0	23.4	154.9	45	0.0	0.0	26.6	156.9	95	17.6	10.0	29.3	161.2
101812Z	20.9	155.3	90	21.1	155.3	90	12.0	0.0	24.7	155.9	45	9.8	0.0	28.0	159.6	85	32.7	5.0	30.4	165.5
101818Z	21.5	155.3	90	21.6	155.3	90	6.0	0.0	25.0	156.0	40	9.2	-5.0	28.2	159.9	80	34.3	0.0	30.5	166.0
101900Z	22.1	155.4	95	22.1	155.4	95	0.0	0.0	25.1	156.7	45	11.5	-5.0	27.8	160.5	70	37.3	-10.0	29.4	166.6
101906Z	22.6	155.5	95	22.7	155.5	95	6.0	0.0	25.5	157.0	45	14.6	0.0	28.0	160.9	70	38.5	0.0	0.0	0.0
101912Z	23.1	155.5	95	23.1	155.7	95	11.0	0.0	25.7	157.3	45	16.0	5.0	28.2	161.2	70	39.5	0.0	0.0	0.0
101918Z	23.6	155.3	95	23.7	155.9	95	33.0	0.0	26.4	158.1	45	22.0	5.0	28.7	163.0	65	32.4	0.0	0.0	0.0
102000Z	24.1	154.9	90	24.3	155.5	90	35.0	0.0	27.6	156.4	45	15.7	-5.0	29.8	161.2	50	18.9	-10.0	0.0	0.0
102006Z	24.6	154.5	85	24.6	154.4	85	5.0	0.0	27.6	152.9	45	4.4	0.0	31.0	157.4	50	42.2	0.0	0.0	0.0
102012Z	25.4	154.2	80	25.5	154.2	80	6.0	0.0	29.3	154.4	40	2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
102018Z	26.1	153.9	80	26.0	154.0	80	8.0	0.0	29.8	154.4	45	15.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
102100Z	27.1	153.5	80	27.0	153.5	80	6.0	0.0	31.0	154.0	40	34.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
102106Z	28.0	153.6	75	28.4	152.6	75	5.0	0.0	33.9	154.8	35	46.1	5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
102112Z	29.2	154.9	70	28.8	153.8	70	6.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
102118Z	30.7	157.2	65	29.6	155.8	65	9.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
102200Z	32.9	160.5	60	31.4	158.8	60	12.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
102206Z	35.4	164.0	50	35.5	164.1	50	8.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

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

SUPER TYPHOON RITA

(October)

	BEST TRACK		WARNING		24 HOUR FORECAST				48 HOUR FORECAST				72 HOUR FORECAST			
	POSIT	WIND	POSIT	WIND	POSIT	WIND	POSIT	WIND	POSIT	WIND	POSIT	WIND	POSIT	WIND	POSIT	WIND
101500Z	10.0	185.4	15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
101506Z	9.7	184.4	15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
101512Z	9.5	183.4	15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
101518Z	9.3	182.5	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
101524Z	9.1	181.6	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
101530Z	8.9	180.6	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
101536Z	8.7	179.7	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
101542Z	8.5	178.1	30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
101548Z	8.3	176.5	30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
101554Z	8.1	177.5	30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
101600Z	8.0	176.5	30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
101606Z	8.0	175.4	30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
101612Z	8.0	174.3	30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
101618Z	8.0	173.3	35	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
101624Z	8.0	172.2	35	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
101630Z	8.0	171.1	35	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
101636Z	8.0	170.0	40	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
101642Z	8.0	168.7	40	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
101648Z	8.0	167.3	45	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
101654Z	8.0	165.9	60	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
102000Z	11.0	164.5	75	11.7	164.3	70	13.0	164.5	85	7.0	164.2	153.3	75	18.0	164.7	100
102006Z	11.0	162.8	75	11.7	162.8	75	6.0	0.0	12.4	157.3	85	7.0	162.8	151.5	95	13.0
102012Z	11.0	161.2	80	11.8	161.3	75	8.0	-5.0	12.8	155.2	85	9.0	161.2	149.0	95	17.0
102018Z	11.0	159.5	80	11.6	159.4	80	8.0	-10.0	12.7	153.2	85	12.0	159.5	147.2	95	21.0
102024Z	11.0	158.1	105	11.4	158.2	95	6.0	-10.0	11.7	152.5	115.0	8.0	158.1	147.0	125	14.0
102030Z	11.0	156.7	105	11.4	156.8	100	8.0	-5.0	12.0	151.2	140.0	7.0	156.7	145.7	125	14.0
102036Z	11.0	155.5	105	11.2	155.4	105	6.0	0.0	12.3	149.4	140.0	8.0	155.5	144.5	125	11.0
102042Z	11.0	154.5	110	11.1	154.5	105	0.0	-5.0	12.4	147.9	115.0	5.0	154.5	144.4	120	11.0
102048Z	11.0	153.5	115	11.1	153.3	110	13.0	-5.0	11.4	146.9	115.0	25.0	153.5	144.0	120	17.0
102054Z	11.0	152.3	125	11.3	152.3	120	6.0	-5.0	12.1	147.9	135.0	15.0	152.3	143.5	140	21.0
102100Z	11.0	151.2	130	11.5	151.0	125	13.0	-5.0	12.4	146.2	135.0	5.0	151.2	141.5	140	22.0
102106Z	11.0	150.0	140	11.7	150.3	130	19.0	-10.0	12.4	144.1	135.0	10.0	150.0	141.2	140	33.0
102112Z	11.0	148.6	145	11.6	148.5	135	6.0	-10.0	12.2	143.3	145.0	9.0	148.6	138.1	150	28.0
102118Z	11.0	147.1	150	11.9	147.1	140	12.0	-10.0	12.5	142.1	150.0	12.0	147.1	137.0	150	34.0
102124Z	12.0	145.4	150	12.0	145.7	145	19.0	-5.0	12.8	140.0	150.0	13.0	145.4	136.0	160	29.0
102130Z	12.0	143.6	145	12.3	143.7	140	19.0	-5.0	13.1	138.8	135.0	11.0	143.6	135.3	150	19.0
102136Z	12.0	141.7	140	11.8	141.9	140	17.0	0.0	11.5	136.9	135.0	11.0	141.7	128.4	135	24.0
102142Z	12.0	139.9	145	12.1	140.1	140	21.0	-5.0	12.0	135.2	135.0	13.0	139.9	126.7	135	21.0
102148Z	12.0	137.7	145	12.4	137.6	140	13.0	-5.0	12.5	129.5	135.0	9.0	137.7	121.8	120	10.0
102154Z	12.0	135.4	145	12.5	135.1	140	0.0	-5.0	13.0	126.8	135.0	7.0	135.4	119.3	120	15.0
102200Z	12.0	133.3	150	13.0	133.0	145	25.0	-5.0	13.8	124.3	145.0	5.0	133.3	117.1	100	17.0
102206Z	12.0	131.1	155	12.9	131.0	145	6.0	-10.0	13.9	122.0	100.0	7.0	131.1	115.7	100	19.0
102212Z	12.0	129.0	150	13.1	129.1	145	19.0	-5.0	13.4	120.7	100.0	12.0	129.0	114.0	100	22.0
102218Z	12.0	126.9	145	13.6	126.7	140	13.0	-5.0	14.1	118.4	100.0	15.0	126.9	111.5	100	30.0
102224Z	12.0	125.1	140	13.8	125.1	140	18.0	0.0	14.3	116.0	90.0	16.0	125.1	111.9	100	22.0
102230Z	12.0	123.6	135	14.7	123.3	135	18.0	0.0	16.1	110.3	110.0	12.0	123.6	110.2	100	29.0
102236Z	12.0	122.4	125	14.7	122.2	135	13.0	10.0	15.4	116.3	110.0	9.0	122.4	110.3	110	25.0
102242Z	12.0	121.3	115	15.3	121.4	120	13.0	5.0	15.4	117.5	110.0	10.0	121.3	112.0	110	10.0
102248Z	10.5	119.7	75	16.4	119.8	95	8.0	20.0	17.0	112.9	100.0	15.0	119.7	108.0	100	13.0
102254Z	10.7	118.4	65	16.8	118.0	90	24.0	25.0	17.0	111.3	100.0	22.0	118.4	106.9	100	35.0
102300Z	17.0	117.4	55	16.9	117.0	75	24.0	20.0	17.0	111.0	100.0	18.0	117.4	106.7	85	34.0
102306Z	17.2	116.4	55	17.1	116.5	85	8.0	10.0	18.0	112.0	85.0	19.0	116.4	107.0	85	36.0
102312Z	16.7	115.5	50	17.2	115.2	85	34.0	15.0	17.4	111.5	85.0	15.0	115.5	107.0	85	34.0
102318Z	16.8	115.3	50	16.8	115.4	80	29.0	0.0	16.3	114.5	85.0	18.0	115.3	106.0	85	34.0
102324Z	16.4	114.8	50	16.4	114.9	80	6.0	0.0	15.6	112.0	85.0	15.0	114.8	106.0	85	34.0
102330Z	15.7	114.3	45	16.1	114.3	85	24.0	0.0	15.1	111.1	80.0	14.0	114.3	106.0	85	34.0
102336Z	14.7	113.2	40	15.3	114.0	80	58.0	0.0	0.0	0.0	0.0	0.0	113.2	106.0	85	34.0
102342Z	14.2	112.1	35	14.5	112.7	85	39.0	0.0	0.0	0.0	0.0	0.0	112.1	106.0	85	34.0
102348Z	13.7	110.8	30	13.8	111.2	80	24.0	0.0	0.0	0.0	0.0	0.0	110.8	106.0	85	34.0
102354Z	12.5	109.4	25	12.8	109.4	85	18.0	0.0	0.0	0.0	0.0	0.0	109.4	106.0	85	34.0

AVG FORECAST POSIT ERROR	15.	107.	214.	301.
AVG RIGHT ANGLE ERROR	10.	60.	114.	157.
AVG INTENSITY MAGNITUDE ERROR	5.	19.	26.	32.
AVG INTENSITY BIAS	-1.	0.	0.	-5.
NUMBER OF FORECASTS	51	47	43	39

ALL FORECASTS				TYPHOONS WHILE OVER 35 KTS			
WIND	24-HR	48-HR	72-HR	WIND	24-HR	48-HR	72-HR
15.	107.	214.	301.	15.	107.	214.	301.
10.	60.	114.	157.	10.	60.	114.	157.
5.	19.	26.	32.	5.	19.	26.	32.
-1.	0.	0.	-5.	-1.	0.	0.	-5.
51	47	43	39	45	45	41	37

TROPICAL STORM TESS

(November)

	BEST TRACK				WARNING ERRORS				24 HOUR FORECAST ERRORS				48 HOUR FORECAST ERRORS				72 HOUR FORECAST			
	POSIT	WIND	POSIT	WIND	DST	WIND	POSIT	WIND	DST	WIND	POSIT	WIND	DST	WIND	POSIT	WIND	DST	WIND		
1031002	13.8	147.5	15	0.0	0.0	0.	-0.0	0.	0.0	0.0	0.	-0.0	0.	0.0	0.0	0.	-0.0	0.		
1031062	13.9	146.8	15	0.0	0.0	0.	-0.0	0.	0.0	0.0	0.	-0.0	0.	0.0	0.0	0.	-0.0	0.		
1031122	14.0	146.4	15	0.0	0.0	0.	-0.0	0.	0.0	0.0	0.	-0.0	0.	0.0	0.0	0.	-0.0	0.		
1031182	14.1	146.0	20	0.0	0.0	0.	-0.0	0.	0.0	0.0	0.	-0.0	0.	0.0	0.0	0.	-0.0	0.		
1101002	14.4	145.6	20	0.0	0.0	0.	-0.0	0.	0.0	0.0	0.	-0.0	0.	0.0	0.0	0.	-0.0	0.		
1101062	14.0	145.2	20	0.0	0.0	0.	-0.0	0.	0.0	0.0	0.	-0.0	0.	0.0	0.0	0.	-0.0	0.		
1101122	14.0	144.9	25	0.0	0.0	0.	-0.0	0.	0.0	0.0	0.	-0.0	0.	0.0	0.0	0.	-0.0	0.		
1101182	15.2	144.5	25	15.4	142.7	25.	104.	0.	15.9	140.7	40.	207.	5.	17.3	138.2	50.	497.	0.		
1102002	15.9	144.2	30	15.5	144.2	30.	24.	0.	16.0	143.3	40.	191.	0.	17.3	140.8	50.	397.	-5.		
1102062	16.0	144.4	30	16.4	144.0	30.	33.	0.	18.4	143.7	40.	132.	-5.	21.1	143.4	50.	203.	-5.		
1102122	17.0	144.6	30	17.4	144.1	30.	31.	0.	19.4	144.1	40.	122.	-5.	22.5	144.2	50.	174.	-10.		
1102182	18.4	145.0	35	18.6	145.0	30.	12.	-5.	21.3	145.8	40.	68.	-10.	24.5	148.0	50.	24.	-10.		
1103002	18.4	145.5	40	18.4	145.1	35.	33.	-5.	21.0	146.2	45.	21.	-10.	24.0	148.1	50.	84.	-10.		
1103062	18.0	146.0	45	19.0	145.4	45.	16.	0.	21.3	147.5	55.	52.	0.	24.2	148.3	55.	158.	5.		
1103122	19.5	146.3	45	19.6	146.3	45.	6.	0.	22.3	148.2	55.	09.	-5.	25.3	150.9	55.	176.	5.		
1103182	20.3	146.4	50	19.9	146.4	50.	33.	0.	21.7	148.5	55.	150.	5.	24.3	150.5	70.	306.	10.		
1104002	21.2	146.5	55	21.3	146.4	55.	18.	0.	25.5	148.4	55.	38.	5.	30.0	152.6	70.	47.	10.		
1104062	22.1	146.9	55	22.0	147.9	55.	56.	0.	26.1	148.4	55.	42.	5.	30.4	153.2	70.	96.	10.		
1104122	23.1	147.3	50	23.0	147.0	55.	18.	-5.	27.1	149.0	55.	62.	5.	31.4	154.3	70.	166.	15.		
1104182	24.2	147.7	50	24.2	147.7	50.	0.	0.	28.4	150.4	50.	61.	0.	0.0	0.0	0.	-0.0	0.		
1105002	25.4	148.1	50	25.4	148.4	50.	16.	0.	29.3	151.7	50.	82.	0.	0.0	0.0	0.	-0.0	0.		
1105062	26.4	148.8	50	26.7	148.7	50.	8.	0.	31.0	151.8	55.	122.	-5.	0.0	0.0	0.	-0.0	0.		
1105122	28.1	149.9	50	27.9	149.2	50.	39.	0.	31.7	153.0	55.	214.	0.	0.0	0.0	0.	-0.0	0.		
1105182	29.4	151.1	50	28.8	150.7	50.	41.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.0	0.		
1106002	30.7	152.2	50	30.3	152.5	55.	28.	-5.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.0	0.		
1106062	31.9	153.9	50	32.3	154.4	55.	35.	-5.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.0	0.		
1106122	33.1	156.9	55	33.5	157.1	50.	26.	-5.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.0	0.		

ALL FORECASTS

WMNG	24-HR	48-HR	72-HR
29.	108.	194.	367.
21.	53.	127.	237.
2.	4.	6.	4.
-2.	-1.	1.	3.
20	16	12	8
	9	8	3

AVG FORECAST POSIT ERROR
 AVG HIGH ANGLE ERROR
 AVG INTENSITY MAGNITUDE ERROR
 AVG INTENSITY BIAS
 NUMBER OF FORECASTS

TROPICAL DEPRESSION 32

(November)

	BEST TRACK				WARNING ERRORS				24 HOUR FORECAST ERRORS				48 HOUR FORECAST ERRORS				72 HOUR FORECAST			
	POSIT	WIND	POSIT	WIND	DST	WIND	POSIT	WIND	DST	WIND	POSIT	WIND	DST	WIND	POSIT	WIND	DST	WIND		
1115182	15.3	130.1	15	0.0	0.0	0.	-0.0	0.	0.0	0.0	0.	-0.0	0.	0.0	0.0	0.	-0.0	0.		
1116002	15.3	129.8	15	0.0	0.0	0.	-0.0	0.	0.0	0.0	0.	-0.0	0.	0.0	0.0	0.	-0.0	0.		
1116062	15.3	129.5	20	0.0	0.0	0.	-0.0	0.	0.0	0.0	0.	-0.0	0.	0.0	0.0	0.	-0.0	0.		
1116122	15.3	129.2	20	0.0	0.0	0.	-0.0	0.	0.0	0.0	0.	-0.0	0.	0.0	0.0	0.	-0.0	0.		
1116182	15.3	128.9	20	0.0	0.0	0.	-0.0	0.	0.0	0.0	0.	-0.0	0.	0.0	0.0	0.	-0.0	0.		
1117002	15.3	128.5	25	16.0	130.0	25.	96.	0.	17.3	130.2	30.	210.	5.	19.5	132.9	35.	530.	10.		
1117062	15.3	128.2	25	16.3	130.0	25.	119.	0.	17.3	130.2	30.	249.	5.	19.5	132.8	35.	556.	15.		
1117122	15.2	128.0	25	17.0	128.9	25.	119.	0.	18.5	127.2	30.	240.	5.	20.0	125.2	35.	390.	15.		
1117182	15.1	127.6	25	17.4	128.6	25.	149.	0.	19.1	126.9	30.	290.	5.	21.1	126.9	35.	491.	15.		
1118002	15.0	127.3	25	14.6	126.4	25.	37.	0.	14.5	125.5	20.	38.	-5.	14.0	123.5	15.	38.	0.		
1118062	14.7	126.8	25	14.6	126.8	25.	6.	0.	14.4	125.2	20.	42.	0.	0.0	0.0	0.	-0.0	0.		
1118122	14.4	126.5	25	14.6	126.8	25.	21.	0.	14.3	124.6	20.	48.	0.	0.0	0.0	0.	-0.0	0.		
1118182	14.2	126.1	25	14.4	126.4	25.	21.	0.	14.0	124.2	20.	45.	0.	0.0	0.0	0.	-0.0	0.		
1119002	13.9	125.7	25	14.3	125.4	25.	25.	0.	13.4	123.4	20.	25.	5.	0.0	0.0	0.	-0.0	0.		
1119062	13.7	125.2	20	13.8	125.2	25.	6.	5.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.0	0.		
1119122	13.5	124.6	20	13.5	124.6	25.	0.	5.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.0	0.		
1119182	13.4	123.9	20	13.5	123.9	20.	6.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.0	0.		
1120002	13.4	123.3	15	0.0	0.0	0.	-0.0	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.0	0.		

ALL FORECASTS

WMNG	24-HR	48-HR	72-HR
50.	133.	401.	973.
33.	108.	349.	871.
1.	3.	11.	70.
1.	2.	11.	70.
12	9	5	1
	5	1	0

AVG FORECAST POSIT ERROR
 AVG HIGH ANGLE ERROR
 AVG INTENSITY MAGNITUDE ERROR
 AVG INTENSITY BIAS
 NUMBER OF FORECASTS

TYPHOON VIOLA

(November)

	BEST TRACK				WARNING				24 HOUR FORECAST				48 HOUR FORECAST				72 HOUR FORECAST						
	POSIT	WIND	POSIT	WIND	WIND	DST	WIND	WIND	DST	WIND	WIND	DST	WIND	WIND	DST	WIND	WIND	DST	WIND				
111000	3.0	155.0	15	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
111006	4.4	154.3	20	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
111012	5.0	153.3	20	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
111018	6.0	152.0	20	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
111000	6.0	151.8	25	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
111006	8.0	149.9	30	8.1	149.9	30	6.0	10.7	147.4	40	0.0	-5.0	12.3	140.3	30	8.0	17.8	135.1	60	10.4	-15.0		
111012	8.7	148.5	35	8.5	148.4	30	2.1	-5.0	10.4	144.5	45	8.0	0.0	12.1	139.9	30	12.1	-5.0	17.5	135.1	00	15.0	-75.0
111018	9.1	147.1	40	9.1	147.1	35	0.0	-5.0	11.5	141.9	45	13.0	-4.0	12.5	137.2	35	8.0	-5.0	14.3	133.7	65	7.4	-35.0
111000	9.4	145.0	40	9.5	145.7	40	8.0	0.0	11.7	140.2	45	12.0	-5.0	13.2	135.2	35	8.4	-10.0	16.6	131.8	65	10.1	-50.0
111006	10.0	144.5	45	9.5	144.0	45	4.0	0.0	11.7	138.2	50	7.0	10.0	13.0	132.5	35	19.0	-10.0	13.9	126.4	70	3.5	-50.0
111012	10.9	143.1	45	10.7	143.0	45	13.0	0.0	12.6	137.4	50	39.0	5.0	14.2	131.7	35	18.7	-20.0	15.1	126.0	70	3.3	-55.0
111018	11.3	141.8	50	11.5	141.4	50	26.0	0.0	13.1	135.6	50	102.0	0.0	14.5	129.7	35	25.5	-35.0	15.4	123.7	70	4.4	-55.0
111000	11.7	140.4	50	11.7	140.4	50	0.0	0.0	13.3	135.0	50	92.0	-5.0	14.7	129.0	40	25.3	-45.0	15.6	122.8	75	4.3	-65.0
111006	12.2	138.9	50	12.2	139.0	50	6.0	0.0	13.4	133.1	50	145.0	-15.0	15.0	127.2	40	32.0	-50.0	16.1	121.2	80	4.2	-55.0
111012	12.9	138.0	55	12.5	137.9	50	25.0	-5.0	14.4	132.3	50	150.0	-25.0	15.3	126.1	40	33.4	-55.0	16.2	120.5	80	5.0	-50.0
111018	13.5	137.3	60	13.7	136.8	50	31.0	0.0	16.0	131.4	50	124.0	-25.0	16.3	126.5	50	29.4	-45.0	16.3	120.0	80	5.7	-40.0
112000	13.8	136.5	65	14.5	135.9	50	54.0	-5.0	16.7	131.2	50	135.0	-40.0	17.1	125.4	50	26.6	-40.0	17.0	119.3	80	6.3	-35.0
112006	14.5	135.5	75	14.6	135.6	70	8.0	-5.0	16.1	132.7	50	13.0	-30.0	16.9	124.5	100	12.7	-15.0	17.2	125.4	100	4.8	20.0
112012	15.1	134.8	85	15.2	134.6	70	13.0	-15.0	16.4	131.5	50	11.0	-35.0	17.3	128.4	100	15.5	-10.0	17.6	124.2	100	5.6	30.0
112018	15.5	134.0	100	15.5	134.0	85	0.0	-15.0	17.1	130.7	50	19.0	-30.0	17.5	127.4	100	21.8	5.0	17.5	123.3	105	6.0	45.0
112000	15.9	133.4	115	16.1	133.1	100	21.0	-15.0	17.4	129.9	100	30.0	0.0	18.4	126.6	120	24.2	30.0	18.7	122.4	130	7.1	80.0
112006	16.3	132.6	120	16.4	132.4	115	13.0	-5.0	18.0	129.1	130	60.0	15.0	18.5	125.8	130	34.4	55.0	18.8	121.6	135	8.3	95.0
112012	16.8	131.7	125	16.8	131.6	120	13.0	-5.0	17.9	127.8	130	134.0	20.0	18.6	123.9	135	49.9	65.0	0.0	0.0	0.0	0.0	0.0
112018	17.4	130.8	125	17.2	130.7	120	13.0	-5.0	18.3	126.7	130	170.0	30.0	18.8	122.8	135	61.2	75.0	0.0	0.0	0.0	0.0	0.0
112000	18.3	129.9	120	18.3	129.9	125	11.0	5.0	19.5	125.8	130	227.0	35.0	19.7	122.5	135	70.5	85.0	0.0	0.0	0.0	0.0	0.0
112006	19.0	129.1	115	19.1	129.3	115	13.0	0.0	21.4	127.8	95	144.0	15.0	23.3	130.4	75	32.4	35.0	0.0	0.0	0.0	0.0	0.0
112012	20.1	128.3	110	19.9	128.2	110	13.0	0.0	22.4	126.2	90	167.0	20.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
112018	21.0	128.5	100	21.2	128.4	105	13.0	5.0	23.4	131.3	90	55.0	30.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
112000	21.7	129.1	95	21.7	128.9	100	11.0	5.0	24.7	131.5	90	130.0	40.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
112006	22.7	130.0	80	22.3	129.7	95	29.0	15.0	24.8	132.5	80	182.0	40.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
112012	23.7	131.0	70	23.9	131.3	90	20.0	20.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
112018	24.6	131.9	60	24.7	132.7	75	44.0	15.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
112000	25.2	133.8	50	25.5	133.5	50	24.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
112006	25.4	135.9	40	25.4	135.0	40	44.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

	ALL FORECASTS				TYPHOONS WHILE OVER JS KIS			
	MMNG	24-HR	48-HR	72-HR	MMNG	24-HR	48-HR	72-HR
AVG FORECAST POSIT ERROR	19.	96.	269.	434.	14.	46.	269.	434.
AVG RIGHT ANGLE ENRR	10.	51.	172.	338.	10.	51.	172.	338.
AVG INTENSITY MAGNITUDE FRMR	5.	19.	33.	46.	5.	14.	33.	46.
AVG INTENSITY BIAS	-1.	2.	0.	-14.	0.	2.	0.	-14.
NUMBER OF FORECASTS	29	25	21	17	28	25	21	17
		13	8	4				

TROPICAL STORM WINNIE

(November)

	BEST TRACK				WARNING				24 HOUR FORECAST				48 HOUR FORECAST				72 HOUR FORECAST					
	POSIT	WIND	POSIT	WIND	WIND	DST	WIND	WIND	DST	WIND	WIND	DST	WIND	WIND	DST	WIND	WIND	DST	WIND			
112512	9.4	147.7	20	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
112518	9.7	147.7	20	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
112600	10.0	147.8	20	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
112606	10.4	147.9	20	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
112612	10.6	148.3	20	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
112618	10.8	148.7	20	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
112700	10.9	149.2	25	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
112706	11.0	149.5	30	11.7	149.5	30	6.0	0.0	12.5	147.2	45	21.0	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
112712	12.6	149.0	30	12.0	149.1	30	36.0	0.0	12.9	146.9	45	28.0	5.0	13.6	144.5	35	88.0	0.0	0.0	0.0	0.0	0.0
112718	13.7	148.4	30	12.6	148.7	30	68.0	0.0	13.4	146.4	45	38.0	0.0	14.1	144.0	35	85.1	5.0	0.0	0.0	0.0	0.0
112800	14.7	147.8	35	14.9	147.7	35	13.0	0.0	20.2	147.3	50	60.0	-5.0	24.8	150.5	50	35.5	20.0	0.0	0.0	0.0	0.0
112806	16.0	147.5	35	15.7	147.4	35	19.0	0.0	19.4	147.1	50	180.0	-5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
112812	17.7	146.8	40	16.8	147.3	40	61.0	0.0	20.5	147.4	50	240.0	-5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
112818	19.5	146.4	45	19.1	145.9	45	37.0	0.0	24.7	147.5	50	240.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
112900	20.7	146.2	55	21.2	146.3	55	30.0	0.0	27.6	150.3	45	290.0	5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
112906	22.5	147.4	55	22.4	146.6	55	45.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
112912	24.3	149.0	55	24.0	148.2	50	47.0	-5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
112918	26.4	151.7	50	26.5	151.6	50	12.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
113000	28.4	155.8	40	28.2	155.3	45	29.0	5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

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

2. NORTH INDIAN OCEAN CYCLONE TRACK DATA

TC18-78

(MAY)

BEST TRACK				WARNING				24 HOUR FORECAST				48 HOUR FORECAST				72 HOUR FORECAST			
POSIT	WIND	POSIT	WIND	ERRORS		POSIT	WIND	ERRORS		POSIT	WIND	ERRORS		POSIT	WIND	ERRORS			
				DST	WIND			DST	WIND			DST	WIND			DST	WIND		
513022	10.5	88.9	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	
513082	10.8	89.1	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	
513142	11.1	89.2	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	
513202	11.4	89.4	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	
514022	11.0	89.5	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	
514082	12.0	89.6	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	
514142	12.3	89.6	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	
514202	12.5	89.7	30	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	
515022	12.7	89.8	30	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	
515082	13.2	90.1	30	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	
515142	14.1	90.1	35	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	
515202	14.9	90.0	35	15.7	92.6	35.	157.	0.	17.7	93.4	40.	120.	-5.	19.2	94.4	25.	78.	5.	
516022	16.9	89.8	35	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	
516082	16.8	90.2	40	16.5	90.0	35.	21.	-5.	18.7	91.1	40.	108.	-20.	0.0	0.0	0.	-0.	0.	
516142	17.7	90.6	40	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	
516202	18.4	91.3	45	18.4	91.4	35.	6.	-10.	21.0	94.4	50.	30.	10.	0.0	0.0	0.	-0.	0.	
517022	18.5	92.1	50	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	
517082	18.9	93.0	60	19.5	92.0	35.	38.	-25.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	
517142	19.7	93.8	45	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	
517202	20.5	94.5	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	

ALL FORECASTS

	MMNG	24-HR	48-HR	72-HR
AVG FORECAST POSIT ERROR	55.	88.	76.	0.
AVG RIGHT ANGLE ERROR	41.	41.	45.	0.
AVG INTENSITY MAGNITUDE ERROR	10.	12.	5.	0.
AVG INTENSITY BIAS	-10.	-5.	5.	0.
NUMBER OF FORECASTS	4	3	1	0

TC19-78

(OCTOBER)

BEST TRACK				WARNING				24 HOUR FORECAST				48 HOUR FORECAST				72 HOUR FORECAST			
POSIT	WIND	POSIT	WIND	ERRORS		POSIT	WIND	ERRORS		POSIT	WIND	ERRORS		POSIT	WIND	ERRORS			
				DST	WIND			DST	WIND			DST	WIND			DST	WIND		
1024022	8.5	96.9	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	
1024082	9.6	95.4	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	
1024142	10.7	93.8	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	
1024202	11.8	92.2	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	
1025022	12.8	91.0	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	
1025082	13.5	90.0	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	
1025142	14.2	89.1	30	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	
1025202	15.0	88.5	30	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	
1026022	15.6	87.9	35	15.7	87.3	35.	35.	0.	18.4	86.0	35.	193.	0.	0.0	0.0	0.	-0.	0.	
1026082	16.5	87.4	35	16.7	87.7	35.	17.	0.	19.7	83.9	20.	237.	-15.	0.0	0.0	0.	-0.	0.	
1026142	17.2	87.1	35	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	
1026202	17.9	87.0	35	17.8	86.0	35.	57.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	
1027022	18.6	87.4	35	18.5	86.9	35.	29.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	
1027082	19.4	88.1	35	19.4	88.7	35.	34.	0.	21.1	93.4	20.	170.	-5.	0.0	0.0	0.	-0.	0.	
1027142	20.0	89.0	40	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	
1027202	20.8	89.8	40	21.0	90.6	40.	46.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	
1028022	21.8	90.3	35	22.2	90.4	25.	25.	-10.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	
1028082	22.7	90.7	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	

ALL FORECASTS

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

TC20-78
(NOVEMBER)

	BEST TRACK				WARNING				24 HOUR FORECAST				48 HOUR FORECAST				72 HOUR FORECAST			
	POSIT	WIND	POSIT	WIND	ERRORS DST WIND	POSIT	WIND	ERRORS DST WIND	POSIT	WIND	ERRORS DST WIND	POSIT	WIND	ERRORS DST WIND	POSIT	WIND	ERRORS DST WIND			
110308Z	9.5	80.8	15	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
110314Z	9.8	79.9	20	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
110320Z	10.1	78.8	20	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
110402Z	10.2	77.9	20	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
110408Z	10.4	76.9	20	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
110414Z	10.5	76.0	20	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
110420Z	10.6	75.0	20	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
110502Z	10.6	74.3	20	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
110508Z	10.6	73.5	20	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
110514Z	10.7	72.9	25	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
110520Z	10.9	72.3	30	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
110522Z	11.3	71.9	30	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
110608Z	11.9	71.3	35	11.0	72.0	35	68.0	0.0	11.4	69.6	45	213.0	-5.0	17.4	67.2	55.0	33.4			
110614Z	12.5	70.3	35	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
110620Z	13.0	69.3	40	12.1	70.3	40	79.0	0.0	13.4	67.4	50	183.0	-10.0	14.2	64.8	60.0	24.9			
110702Z	13.0	68.3	45	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
110708Z	14.2	67.1	50	13.5	67.3	50	43.0	0.0	15.3	64.2	60	93.0	-5.0	16.0	62.1	70.0	22.1			
110714Z	14.7	66.1	55	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
110720Z	15.4	65.0	60	15.2	65.5	60	31.0	0.0	18.2	62.8	70	13.0	-10.0	20.9	60.9	70.0	18.0			
110802Z	16.0	64.2	70	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
110808Z	16.7	63.5	75	16.9	62.8	75	42.0	0.0	19.0	57.7	80	263.0	-10.0	0.0	0.0	0.0	0.0			
110814Z	17.4	62.9	75	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
110820Z	18.1	62.6	80	17.5	61.5	80	72.0	10.0	19.0	57.5	90	313.0	-5.0	0.0	0.0	0.0	0.0			
110902Z	18.9	62.4	80	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
110908Z	19.7	62.3	80	19.2	62.0	80	34.0	10.0	21.8	62.4	80	67.0	20.0	23.9	65.6	75.0	120.0			
110914Z	20.3	62.4	75	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
110920Z	20.9	62.7	75	21.7	63.2	85	55.0	10.0	24.2	67.7	60	17.0	10.0	0.0	0.0	0.0	0.0			
111002Z	21.5	63.1	65	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
111008Z	21.9	63.6	60	22.3	64.1	75	37.0	15.0	24.9	69.5	30	16.0	-10.0	0.0	0.0	0.0	0.0			
111014Z	22.3	64.4	55	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
111020Z	22.5	65.1	50	23.5	66.8	65	78.0	15.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
111102Z	22.7	66.3	45	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
111108Z	22.9	67.5	40	22.6	66.5	40	58.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
111114Z	23.0	68.4	35	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
111120Z	23.0	69.3	20	23.1	70.2	25	50.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			

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

BEST TRACK				WARNING ERRORS				24 HOUR FORECAST ERRORS				48 HOUR FORECAST ERRORS				72 HOUR FORECAST			
POSIT	WIND	POSIT	WIND	DST	WIND	POSIT	WIND	DST	WIND	POSIT	WIND	DST	WIND	POSIT	WIND	DST	WIND		
1119204	8.0	80.9	30	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	
1120024	7.9	80.3	35	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	
1120084	7.8	89.8	40	8.0	90.4	40.	43.	0.	8.2	88.5	00.	67.	10.	8.9	85.3	70.	120.	0.	
1120142	7.8	89.4	40	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	
1120204	7.5	88.9	40	8.5	88.8	40.	60.	0.	9.3	85.5	00.	150.	5.	4.8	81.5	75.	232.	-5.	
1120224	7.5	88.4	45	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	
1120384	7.4	87.7	50	7.7	88.0	50.	25.	0.	7.6	84.7	00.	51.	-10.	7.2	79.9	50.	160.	-40.	
1121142	7.2	87.1	50	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	
1121204	7.0	86.5	55	7.3	86.7	55.	21.	0.	7.0	83.5	05.	30.	-15.	6.7	78.7	50.	158.	-20.	
1122024	7.0	85.9	60	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	
1122084	6.9	85.2	70	6.7	85.0	60.	17.	-10.	6.2	81.8	00.	70.	-20.	5.5	77.1	65.	251.	15.	
1122142	6.8	84.7	75	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	
1122204	6.9	84.1	80	6.7	84.1	65.	12.	-15.	6.4	81.4	00.	112.	0.	6.0	76.6	65.	253.	35.	
1123024	7.0	83.5	85	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	
1123084	7.2	82.6	90	7.6	83.0	75.	27.	-15.	6.3	80.4	05.	179.	15.	6.0	76.6	80.	344.	50.	
1123142	7.5	81.8	90	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	
1123204	8.2	80.9	70	7.4	81.1	70.	38.	0.	7.9	78.3	00.	150.	30.	8.6	75.5	60.	283.	25.	
1124024	8.0	80.2	55	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	
1124084	9.1	79.3	50	8.5	79.0	65.	50.	15.	8.8	77.1	00.	222.	30.	9.0	74.0	70.	400.	35.	
1124142	9.4	78.3	40	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	
1124204	10.2	77.2	30	9.4	77.8	35.	59.	5.	10.7	74.4	25.	147.	-10.	13.0	71.3	35.	105.	10.	
1125024	10.8	75.6	30	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	
1125084	11.3	74.3	30	11.7	74.5	40.	27.	10.	14.2	71.4	50.	61.	15.	16.5	69.9	60.	133.	40.	
1125142	11.8	73.4	30	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	
1125204	12.3	72.5	35	11.7	72.3	45.	38.	10.	13.4	69.2	60.	58.	35.	0.0	0.0	0.	-0.	0.	
1126024	12.7	71.8	35	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	
1126084	13.2	71.2	35	13.0	70.7	55.	31.	20.	15.5	68.1	60.	40.	40.	0.0	0.0	0.	-0.	0.	
1126142	13.6	70.5	30	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	
1126204	14.1	69.9	25	14.1	70.2	55.	17.	30.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	
1127024	14.5	69.1	25	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	
1127084	14.8	68.4	20	14.6	68.6	35.	17.	15.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	
1127142	15.0	67.8	20	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	0.0	0.0	0.	-0.	0.	

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

ANNEX B - TROPICAL CYCLONE FIX DATA

I. WESTERN NORTH PACIFIC CYCLONE FIX DATA

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

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

TROPICAL STORM NADINE

SATELLITE FIXES

FIX NO.	TIME (Z)	FIX POSITION	ACCR	UNDAK CODE	SAT	COMMENTS	SITE
* 1	052013	5.0N 170.0E		T1.0	G0FS2	INITIAL OBS	PHNL
2	061239	7.7N 164.9E	PCN 6		DMS234		PGTW
3	062043	4.5N 165.4E	PCN 6	T2.0/2.0-	DMS234	INITIAL OBS	PGTW
4	062133	4.6N 165.3E	PCN 5		N0AA5		PGTW
5	071009	4.5N 162.9E	PCN 6		N0AA5	POORLY DEFINED	PGTW
6	071221	9.5N 163.2E	PCN 6		DMS234		PGTW
7	071221	9.3N 163.5E	PCN 6		DMS234		KGWC
8	072026	10.2N 160.0E	PCN 6	T1.0/1.0 /w1.0/24HRS	DMS234		PGTW
9	072245	9.9N 160.5E	PCN 5		N0AA5		PGTW
10	080103	10.1N 168.4E	PCN 6		DMS234		PGTW
11	080908	9.0N 161.7E	PCN 6		DMS234	CI SAME	PGTW
12	080925	9.0N 161.6E	PCN 6		N0AA5		PGTW
13	081204	9.5N 161.3E	PCN 6		DMS234		KGWC
14	082008	9.9N 163.1E	PCN 6	T1.0/1.0 /50.0/24HRS	DMS234		PGTW
15	092157	10.1N 162.9E	CONF 1	T1.5/1.5 /01.5/24HRS	N0AA5	INITIAL OBS	FWFS
16	082201	10.1N 163.0E	PCN 5		N0AA5		PGTW
17	090046	11.1N 162.7E	PCN 5		DMS234		PGTW
18	090345	10.4N 161.1E	CONF 2		N0AA5		FWFS
19	090550	10.1N 161.5E	PCN 6		DMS234		KGWC
20	090851	10.4N 161.7E	PCN 6		DMS234	CI SAME	PGTW
21	091038	10.3N 161.5E	PCN 5		N0AA5		PGTW
22	091328	10.4N 161.5E	PCN 6		DMS234		PGTW
23	091951	11.0N 161.3E	PCN 6	T1.0/1.0	DMS234	INITIAL OBS	KGWC
24	091951	10.6N 161.9E	PCN 6		DMS234	EDGE OF DATA	PGTW
25	092117	10.9N 161.0E	PCN 5	T1.0/1.0 /50.0/25HRS	N0AA5	INITIAL OBS	PGTW
26	092309	11.1N 161.8E	CONF 1	T2.5/2.5 /01.0/23HRS	N0AA5		FWFS
27	100028	11.2N 161.6E	PCN 6		DMS234		PGTW
28	100933	12.6N 160.7E	PCN 6		DMS234		KGWC
29	100834	12.2N 160.8E	PCN 6		DMS234	CI UP	PGTW
30	100954	12.5N 160.9E	PCN 5		N0AA5		PGTW
31	101310	13.2N 160.5E	PCN 4		DMS234		PGTW
32	102115	13.8N 160.1E	PCN 6	T1.0/1.0	DMS234	INITIAL OBS	KGWC
33	102116	13.8N 160.2E	PCN 5		DMS234		PGTW
34	102225	14.0N 160.4E	CONF 1	T3.5/3.5 /01.0/24HRS	N0AA5		FWFS
35	102230	14.0N 160.2E	PCN 5	T2.0/2.0 /01.0/25HRS	N0AA5		PGTW
36	110010	14.4N 160.4E	PCN 5		DMS234		PGTW
37	110816	15.5N 160.8E	PCN 6		DMS234		KGWC
38	110817	15.4N 160.9E	PCN 6		DMS234	CI UP	PGTW
39	110910	15.9N 161.7E	PCN 4		N0AA5		PHIK
40	110910	15.4N 161.0E	PCN 6		N0AA5		PGTW
41	110915	15.0N 161.0E	CONF 1	T4.0/4.0 /01.0/24HRS	N0AA5		FWFS
42	111252	15.9N 160.9E	PCN 6		DMS234		PGTW
43	112145	16.4N 163.8E	PCN 4	T4.0/4.0	N0AA5	INITIAL OBS	PHIK
44	112146	17.1N 163.7E	PCN 2	T3.5/3.5-/01.5/23HRS	N0AA5		PGTW
45	112336	16.9N 164.9E	CONF 3	T4.5/4.5 /01.0/24HRS	N0AA5		FWFS
46	112393	17.0N 164.2E	PCN 2		DMS234		PGTW
47	120754	18.1N 167.0E	PCN 4	T3.5/3.5	DMS234		KGWC
48	120759	17.9N 166.8E	PCN 6		DMS234		PHIK
49	120826	17.9N 167.1E	PCN 6		N0AA5		PGTW
50	120826	17.9N 167.3E	PCN 4		N0AA5	POORLY DEFINED	PHIK
51	121416	18.9N 168.9E	PCN 6		DMS234		PGTW
52	122054	20.0N 170.9E	CONF 1	T3.0/3.0 /50.0/12HRS	N0AA5		FWFS
53	122102	20.9N 171.8E	PCN 4	T2.0/3.0-/w1.5/24HRS	N0AA5		PGTW
54	122102	20.8N 171.3E	PCN 6	T3.0/4.0-/w1.0/24HRS	N0AA5		PHIK
55	122249	21.3N 171.8E		T3.0	G0FS2	INITIAL OBS	PHNL
56	130349	22.5N 173.5E			G0FS2		PHNL

AIRCRAFT FIXES

FIX NO.	TIME (Z)	FIX POSITION	FLT LVL	MIN HGT	DBS MSLP	MAX-SFC-WIND VEL/3RG/RWG	MAX-FLT-LVL-WIND DTR/VEL/DRG/4NG	ACCR	EYE SHAPE	EYE ORIEN- DIAM/TATION	EYE TEMP (C) UHT/ IN/ DP/ SST	MSW NO.
1	080248	9.1N 161.9E	-1500FT	0381	996	035 290 070	330 033 290 140	10 15			+24 +24 +24 29	03
2	090615	10.2N 161.9E	700MB	3056	996	030 180 042	260 036 180 042	04 07			+11 +12 +10	04
3	091534	10.0N 161.1E	700MB	3026	995		180 030 270 060	15 45			+12 +12 +12	05
4	100315	11.2N 161.3E	700MB	3031		030 230 100		04 08			+11 +10 +10	05
5	101504	13.2N 160.2E	700MB	2955	985		310 038 220 015	10 05			+11 +13 +12	07
6	110325	14.9N 160.7E	700MB	2941	981	040 290 050	350 060 290 050	05 05			+12 +14 +11	09
7	111447	16.1N 162.1E	700MB	2882	976		340 063 270 021	10 10	ELLIPTICAL	70 50 150	+13 +15 +11 25	09
8	120304	17.4N 165.3E	700MB	2870	973	050 160 012	320 070 270 040	04 10			+11 +20 +08	10
9	121613	19.9N 170.1E	700MB	2852	972		070 058 260 020	10 03	CIRCULAR	20	+13 +14 +11	11

TYPHOON OLIVE

STATE I I T F FIXES

FIX NO.	TIME (Z)	FIX POSITION	ACCR	UNIQUE CODE	SAT	COMMENTS	SITE
1	142325	3.4N 149.3E	PCN 5	T0.0/0.0	N0AA5		PGTW
2	151005	4.1N 147.0E	PCN 5		N0AA5		PGTW
3	152241	4.1N 143.8E	PCN 5	T1.0/1.0 /01.0/24HRS	N0AA5		PGTW
4	160951	4.5N 141.4E	PCN 5		DMSP36	CI SAME	PGTW
5	161117	4.6N 141.1E	PCN 5		N0AA5		PGTW
6	161340	4.7N 140.8E	PCN 5		DMSP35		PGTW
7	162234	7.3N 139.6E	PCN 5	T1.0/1.0 /50.0/24HRS	DMSP36		PGTW
8	162353	7.3N 139.4E	PCN 5		N0AA5		PGTW
9	170222	4.3N 139.6E	PCN 5		DMSP35		PGTW
10	171033	7.2N 137.1E	PCN 5		N0AA5	CI SAME	PGTW
11	171115	7.3N 137.3E	PCN 5		DMSP36		PGTW
12	172215	4.3N 135.0E	PCN 5	T0.0/0.0	DMSP36		RPMK
13	172217	4.6N 134.7E	PCN 5	T1.0/1.0 /50.0/24HRS	DMSP36		PGTW
14	172309	4.6N 134.4E	PCN 5		N0AA5		PGTW
15	180204	4.9N 134.8E	PCN 5		DMSP35		PGTW
16	180204	4.9N 134.8E	PCN 5		DMSP35		RPMK
17	181355	4.1N 133.1E	PCN 5		DMSP36	CI UP	PGTW
18	181355	4.7N 133.1E	PCN 5		DMSP36		RPMK
19	181446	9.0N 132.9E	PCN 5		N0AA5		PGTW
20	181546	9.0N 132.5E	PCN 5		DMSP35		PGTW
21	182159	4.6N 130.2E	PCN 5		DMSP36		PGTW
22	182159	4.9N 130.0E	PCN 5	T2.0/2.0 /02.0/24HRS	DMSP36		RPMK
23	182159	4.7N 130.0E	PCN 5		DMSP36		RPMK
24	190022	9.4N 129.3E	PCN 5	T3.0/3.0-702.0/24HRS	N0AA5		RODN
25	190304	9.4N 129.6E	CONF 2	T3.5/3.5 /00.5/24HRS	DMSP		PGTW
26	191329	4.6N 128.8E	PCN 5		DMSP35	6000 JUTFLOW	FWFS
27	191041	10.3N 127.7E	PCN 3		DMSP36	CI UP	RPMK
28	191041	10.3N 127.6E	PCN 1		DMSP36	CI UP	RPMK
29	191102	10.3N 127.7E	PCN 4		N0AA5		PGTW
30	191428	10.7N 126.4E	PCN 4		DMSP36		PGTW
31	192324	11.5N 124.6E	PCN 5	T4.0/4.0-701.0/23HRS	DMSP36		PGTW
32	192324	11.3N 124.7E	PCN 5	T4.0/4.0-	DMSP36		RODN
33	192338	11.5N 124.6E	PCN 5		N0AA5		PGTW
34	200134	11.5N 124.4E	PCN 5		N0AA5		PGTW
35	200315	11.6N 124.0E	CONF 1	T4.5/4.5 /01.0/24HRS	DMSP		FWFS
36	201205	12.4N 122.1E	PCN 1		DMSP36		RPMK
37	201214	12.5N 122.0E	PCN 1		N0AA5	CI UP	PGTW
38	202305	13.0N 119.6E	PCN 3	T3.5/3.5+700.5/24HRS	DMSP36		PGTW
39	202305	13.0N 119.5E	PCN 3	T3.5/3.5	DMSP36		RKSO
40	210050	13.2N 119.5E	PCN 4		N0AA5		PGTW
41	210252	13.1N 119.2E	PCN 3		DMSP35		PGTW
42	210252	13.0N 119.3E	PCN 3		DMSP35		RKSO
43	211148	13.3N 117.4E	PCN 1		DMSP36	CI UDDN	PGTW
44	212249	13.2N 116.6E	PCN 5		DMSP36		PGTW
45	212249	13.2N 116.6E	PCN 5	T4.0/4.0	DMSP36		RODN
46	220006	13.2N 116.4E	PCN 5		N0AA5		PGTW
47	220031	14.0N 116.4E	PCN 3		DMSP36		RPMK
48	220235	14.0N 116.0E	PCN 3		DMSP35		RPMK
49	220235	13.9N 116.0E	PCN 5		DMSP35		PGTW
50	221131	14.6N 115.3E	PCN 3		DMSP36		RPMK
51	221131	14.4N 114.8E	PCN 1		DMSP36		PGTW
52	221242	14.7N 114.8E	PCN 1		N0AA5		PGTW
53	221517	15.4N 114.6E	PCN 1		DMSP35		PGTW
54	230013	15.2N 113.7E	PCN 2	T5.0/5.0	DMSP36		KGWC
55	230014	14.0N 113.5E	PCN 1	T5.0/5.0	DMSP36		RPMK
56	230119	16.0N 113.4E	PCN 1	T5.0/5.0	N0AA5		PGTW
57	230359	16.3N 113.4E	PCN 1		DMSP35		RODN
58	230359	16.4N 113.2E	PCN 1		DMSP35		RPMK
59	231158	16.4N 112.8E	PCN 3		N0AA5	CI UP WEIL DEFINED EYE	PGTW
60	231255	17.3N 112.9E	PCN 4		DMSP36		RODN
61	231540	17.3N 112.9E	PCN 4		DMSP35		RODN
62	231540	17.3N 113.3E	PCN 1		DMSP35		RPMK
63	232355	18.4N 113.9E	PCN 1	T5.0/5.0	DMSP36		RODN
64	232355	18.5N 113.9E	PCN 1	T5.0/5.0-750.0/24HRS	DMSP36		RPMK
65	240035	18.5N 113.5E	PCN 1	T5.0/5.0-750.0/23HRS	N0AA5		PGTW
66	240304	18.2N 114.2E	PCN 1		DMSP35		RODN
67	240341	19.0N 114.1E	PCN 1		DMSP35		RPMK
68	240345	18.2N 114.5E	CONF 1		DMSP		FWFS
69	241238	19.6N 115.9E	PCN 1		DMSP36		RODN
70	241523	19.2N 117.6E	PCN 5		DMSP35		RODN
71	241523	20.0N 117.2E	PCN 5		DMSP35	CI UDDN	RPMK
72	242339	21.0N 118.7E	PCN 3	T4.0/4.0	DMSP36		RKSO
73	242339	20.9N 118.4E	PCN 3	T3.0/4.0 /W2.0/24HRS	DMSP36		RPMK
74	250323	21.0N 119.7E	PCN 3		DMSP35		RPMK
75	250329	21.0N 119.4E	CONF 2		DMSP		FWFS
76	251221	21.5N 124.5E	PCN 5		DMSP36		RKSO
77	251221	21.5N 123.4E	PCN 5		DMSP36		RPMK
78	251227	21.5N 124.0E	PCN 5		N0AA5		PGTW
79	251505	22.3N 126.0E	PCN 5		DMSP36		RKSO
80	252322	22.1N 127.2E	PCN 3	T3.0/3.0-750.0/24HRS	DMSP36		RPMK
81	252322	22.4N 129.3E	PCN 5		DMSP36		RODN
82	260103	22.1N 127.5E	PCN 3	T3.0/4.0 /W2.0/25HRS	N0AA5		PGTW
83	260305	22.6N 128.3E	PCN 3	T3.0/4.0 /W1.0/27HRS	DMSP35		RKSO
84	261022	22.7N 131.5E	PCN 5		DMSP36		RKSO
85	261022	22.9N 131.0E	PCN 5		DMSP36		PGTW
86	261143	22.9N 131.3E	PCN 5		N0AA5		PGTW
87	261406	22.9N 132.2E	PCN 5		DMSP35		PGTW
88	262305	23.4N 135.0E	PCN 4		DMSP36		PGTW
89	270019	23.3N 135.0E	PCN 4		N0AA5		PGTW

ATCRAFT FIXES

FLA NO.	TIME (Z)	FIX POSITION	FLT LVL	MIN HGT	DBS MSLP	MAX-SFC-WND VEL/ARG/RNG	MAX-FLT-LVL-WND DTR/VEL/BRG/WNG	ACCR NAV/MET	EYE SHAPE	EYE ORIEN- DIAM/TATION	EYE TEMPI (°) IN/ DB/SST	MSW NO.
1	170023	6.4N 141.1E	1500F1		1005	025 030 050	090 021 020 050	05 10			+22 +22 25	01
2	180212	8.5N 134.4E	1500F1		1003	035 030 030	060 038 030 030	04 02			+27 +23	02
3	180252	8.5N 134.6E	700MB	3093	1003			06 05			+11 +11	02
4	181553	9.2N 131.8E	700MB	3057	997		110 038 060 126	05 05	ELLIPTICAL	20 10 110	+12 +11	03
5	190114	10.0N 129.9E	700MB									04
6	190322	4.3N 129.1E	700MB	3009	992	030 020 010	150 060 030 020	05 05	CIRCULAR	12	+12 +15 +10	04
7	191435	14.7N 127.4E	700MB	2985	989		030 055 030 040	15 20			+18 +14 +11	05
8	192030	11.1N 125.5E	700MB	2881			160 077 060 040	03 10	CIRCULAR	25	+14 +14 +11	05
9	200315	12.1N 122.8E	619MB		982		210 065 120 025	05 05	CIRCULAR	25	+04 +07	06
10	202104	13.0N 120.0E	700MB	3013	995		260 049 240 012	05 05	CIRCULAR	06	+10 +13 +12	07
11	202315	13.0N 119.7E	700MB									07
12	210233	13.0N 119.3E	700MB	3013	995		300 065 050 050	05 05	ELLIPTICAL	30 10 090	+12 +13 +11	07
13	210945	13.3N 118.4E	700MB	2945	985	030 290 020	030 040 290 030	05 08			+13 +16 +10	08
14	220155	13.9N 116.2E	700MB									09
15	220442	14.1N 115.8E	700MB	2834		050 230 012	240 077 240 025	04 03	ELLIPTICAL	35 30 160	+10 +18 +12	09
16	221235	14.9N 115.0E	700MB									10
17	221530	15.2N 114.4E	700MB	2740	958			05 05	CIRCULAR	30	+13 +18	10
18	240350	18.9N 114.2E	700MB	2692	956	090 150 018	240 090 170 043	04 08	CIRCULAR	20	+13 +20	12
19	240437	19.3N 115.1E	700MB	2682		090 200 019	200 090 120 022	04 04	CIRCULAR	30	+11 +16	12
20	242103	20.4N 118.0E	700MB	2823	970		230 110 150 035	05 05	ELLIPTICAL	60 20 200	+12 +17 +12	13
21	250233	21.2N 119.4E	700MB	2849	974		210 110 120 030	05 05			+12 +15 +13	13
22	250330	21.2N 119.4E	700MB									13
23	251530	21.5N 124.6E	700MB	2920	983		300 065 210 040	03 08			+13 +15 +14	14
24	251749	21.7N 125.1E	700MB									14
25	260350	21.9N 128.3E	700MB	2926	979	090 260 012	260 085 090 040	15 03			+15 +17	15

RAJAR FIXES:

FLA NO.	TIME (Z)	FIX POSITION	RADAR	ACCR	EYE SHAPE	EYE DIAM	RADAR-CODE ASWAM TDDFF	COMMENTS	RADAR POSITION	SITE WND NO.
1	192220	11.2N 124.3E	LAND						11.0N 125.7E	98558
2	192300	11.2N 124.2E	LAND	6900		011			11.0N 125.7E	98558
3	200000	11.0N 123.8E	LAND	6900		017			11.0N 125.7E	98558
4	200100	11.2N 123.8E	LAND	6900		012			11.0N 125.7E	98558
5	200200	11.2N 123.5E	LAND	6900		012			11.0N 125.7E	98558
6	240400	19.9N 114.0E	LAND				20902 ////		22.3N 114.2E	45005
7	240500	19.0N 114.4E	LAND				20912 ////		22.3N 114.2E	45005
8	240700	19.2N 114.8E	LAND				20912 ////		22.3N 114.2E	45005
9	241200	19.4N 115.4E	LAND				30912 ////		22.3N 114.2E	45005
10	241500	19.9N 116.3E	LAND				35 /// 70719		22.3N 114.2E	45005
11	250000	20.7N 118.9E	LAND				75 /// 5052J		22.6N 120.3E	46744
12	250100	20.7N 119.0E	LAND				75 /// 50907		22.6N 120.3E	46744
13	250200	20.7N 119.2E	LAND				75 /// 50808		22.6N 120.3E	46744
14	250300	20.9N 119.4E	LAND				75 /// 08016		22.6N 120.3E	46744
15	250400	20.9N 119.6E	LAND				75 /// /0809		22.6N 120.3E	46744
16	250500	20.9N 120.1E	LAND				75 /// /0926		22.6N 120.3E	46744
17	250500	21.1N 120.6E	LAND				75 /// /0626		22.6N 120.3E	46744

TROPICAL STORM POLLY

SATELLITE FIXES

FIX NO.	TIME (Z)	FIX POSITION	ACCR	ORIGIN CODE	SAT	COMMENTS	SITE
* 1	131305	21.4N 134.1E	CONF 2		DWSP		FWFS
2	132245	21.4N 134.0E	PCN 3	T1.7/1.0	DWSP34	INIT JMS	PGTW
3	140005	22.4N 134.4E	PCN 4		N0A45		PGTW
4	140205	22.4N 134.0E	PCN 3		DWSP34	SECONDARY AT 19.2N 136.9E	PGTW
* 5	141214	23.4N 134.1E	CONF 2	T1.5/1.5 /100.5/12HRS	DWSP		FWFS
6	141042	23.4N 134.0E	PCN 4		N0A45	CI SAME EXPOSED LOW LVL CIRC	PGTW
7	141130	24.7N 134.0E	PCN 3		DWSP34		RKSO
8	141130	24.4N 134.0E	PCN 4		DWSP34	CI SAME EXPOSED LOW LVL CIRC	PGTW
* 9	141444	17.0N 134.0E	CONF 2	T1.5/1.5 /100.5/24HRS	DWSP		FWFS
10	141450	24.1N 134.4E	PCN 3		DWSP34	CI SAME	PGTW
11	142231	24.4N 133.3E	PCN 3	T1.0/1.0	DWSP34	INIT JMS	RKSO
12	142231	24.4N 133.3E	PCN 3	T1.0/1.0 /50.0/24HRS	DWSP34		PGTW
13	142319	24.7N 133.4E	PCN 4		N0A45		PGTW
14	150151	24.4N 133.0E	PCN 3		DWSP34		RKSO
* 15	150157	20.0N 134.0E	CONF 2	T1.5/1.5 /50.0/24HRS	DWSP		FWFS
16	150300	14.0N 134.0E			DWSP		FWFS
17	152214	22.4N 132.2E	PCN 3	T1.5/1.5 /100.5/24HRS	DWSP34		PGTW
18	160031	22.4N 132.0E	PCN 3		N0A45		PGTW
19	160135	22.4N 132.1E	PCN 3		DWSP34		PGTW
* 20	160344	20.2N 132.0E	CONF 3		DWSP		FWFS
* 21	161007	24.7N 132.2E	PCN 4		DWSP37		RODN
22	161055	23.1N 132.1E	PCN 6		DWSP34		PGTW
23	161111	24.0N 132.0E	PCN 6		N0A45		PGTW
24	161144	23.7N 131.4E	PCN 6		DWSP34		PGTW
25	162335	24.1N 129.0E	CONF 2		DWSP		FWFS
26	162125	24.1N 129.0E	PCN 3	T2.0/2.0 /100.5/24HRS	DWSP37		PGTW
27	162347	24.1N 129.2E	PCN 3		N0A45		PGTW
28	170115	25.4N 127.0E	CONF 2	T2.0/2.0 /50.0/24HRS	DWSP37		FWFS
29	171007	25.7N 127.1E	PCN 4		DWSP	CI DD44	PGTW
30	171223	25.4N 127.2E	PCN 3		N0A45		PGTW
31	171335	25.4N 127.1E	PCN 3		DWSP34		PGTW
32	172105	25.4N 126.1E	PCN 3	T2.0/2.0	DWSP37	INIT JMS	RPMK
33	172105	24.2N 126.1E	PCN 3	T2.0/2.0 /50.0/24HRS	DWSP37		PGTW
34	172321	24.0N 126.1E	PCN 3	T2.0/2.0	DWSP34	INIT JMS	RKSO
35	172321	24.1N 126.1E	PCN 3		DWSP34		PGTW
36	180100	24.0N 126.4E	PCN 3		N0A45		PGTW
* 37	180239	24.1N 126.3E	CONF 4		DWSP34		PGTW
38	181139	24.5N 126.1E	PCN 4		N0A45		PGTW
39	181203	24.4N 126.0E	PCN 3		DWSP34	CI UP	PGTW
40	181203	24.4N 126.0E	PCN 3		DWSP34		RKSO
* 41	181435	24.5N 126.0E	CONF 2		DWSP		FWFS
42	181521	25.4N 126.2E	PCN 4		DWSP34		PGTW
43	182229	27.2N 126.0E	PCN 3		DWSP37		RODN
44	182229	27.1N 126.0E	PCN 3		DWSP37		RPMK
45	182303	27.5N 126.7E	PCN 3	T3.0/3.0 /101.0/24HRS	DWSP34		RKSO
46	182304	27.4N 126.1E	PCN 3	T3.0/3.0 /101.0/24HRS	DWSP34		RPMK
47	182304	27.4N 126.1E	PCN 3	T2.0/2.0	DWSP34	INIT JMS	RODN
48	182304	27.4N 126.0E	PCN 3	T3.0/3.0 /101.0/24HRS	DWSP34		PGTW
49	190016	27.4N 126.0E	PCN 3		N0A45		PGTW
50	190221	27.7N 126.0E	PCN 1		DWSP34		RODN
51	190221	27.4N 126.0E	PCN 1		DWSP34		RKSO
52	190221	27.7N 126.0E	PCN 3		DWSP34		RPMK
53	190221	27.4N 126.0E	PCN 1		DWSP34		PGTW
54	190239	27.4N 126.1E	CONF 1		DWSP		FWFS
55	191035	24.4N 126.3E	PCN 2		N0A45		PGTW
56	191109	24.4N 126.6E	PCN 2		DWSP37		RODN
57	191145	24.4N 126.3E	PCN 2		DWSP34		RODN
58	191145	24.4N 126.4E	PCN 1		DWSP34	CI SAME	PGTW
59	191145	24.4N 126.4E	PCN 3		DWSP34		RKSO
60	191503	24.4N 126.5E	PCN 3		DWSP34		PGTW
61	191523	27.7N 126.0E	CONF 1	T4.0/4.5 /101.0/12HRS	DWSP		FWFS
62	192209	31.7N 127.0E	PCN 3	T3.0/3.0 /50.0/24HRS	DWSP37		RPMK
63	192246	31.1N 126.5E	PCN 3	T3.0/3.0 /50.0/24HRS	DWSP34	APPXNT LOW LVL CIRC	RKSO
64	192246	31.5N 127.1E	PCN 3		DWSP34		PGTW
65	200128	31.7N 127.3E	PCN 3		N0A45		PGTW
66	200203	32.2N 128.0E	PCN 3		DWSP34		RKSO
67	200203	32.2N 127.0E	PCN 3		DWSP34		PGTW
68	201129	32.4N 129.8E	PCN 3		DWSP34		RKSO
69	201129	33.1N 129.7E	PCN 3		DWSP34		PGTW
70	201445	33.4N 132.3E	PCN 6		DWSP34		PGTW

AIRCRAFT FIXES

FIX NO.	TIME (Z)	FIX POSITION	FLT LVL	MIN HGT	OBS MSLP	MAX-SFC-WIND VEL/DRG/RNG	MAX-FLT-LVL-WIND DIR/VEL/DRG/RNG	ACCRY NAV/MET	EYE SHAPE	EYE ORIEN-DI&N/TATIDN	EYE TEMPI (C) OUT/ IN/ DR/ SST	MSW NO.
1	160516	23.1N 132.4E	1500FT		999	035 130 075	160 045 130 075	05 05			+26 +25	04
2	161559	23.7N 129.4E	700MB	3085	1000		190 040 120 140	04 10			+09 +11 +10	05
3	161720	23.7N 129.4E	700MB									05
4	161935	23.9N 129.5E	700MB									05
5	170235	24.4N 128.9E	700MB	3073	997	030 110 120	260 020 180 020	03 10			+12 +13 +10	06
6	170334	24.7N 128.0E	700MB	3063	997	020 350 025	100 032 350 020	02 04			+13 +13 +12	07
7	171047	24.7N 127.0E	700MB	3064	997		040 025 270 030	02 04			+12 +13 +13	07
8	180322	25.4N 125.7E	700MB	3025	993	035 070 050	130 034 060 140	04 07			+13 +12	09
9	181457	26.7N 126.1E	700MB	3005	988		300 035 230 070	02 10			+12 +14 +11	09
10	190241	27.4N 126.1E	700MB	2955	984	040 170 030	270 050 170 030	05 01	CIRCULAR	30	+10 +13	10
11	190305	29.0N 126.3E	700MB									11
12	191305	29.4N 126.5E	700MB	2974	987		210 062 120 090	04 05			+14 +16 +11	11
13	191535	29.4N 126.5E	700MB									11
* 14	200330	32.4N 128.4E	700MB	3007	992		250 030 190 030	02 10			+18 +13 +13	12
15	200434	32.2N 128.5E	1500FT		989		000 000 0	02 10			+23 +23	12

RAJAR FIXES

FIX NO.	TIME (Z)	FIX POSITION	H0004	ACFT	EYE SHAPE	EYF DIA	RANOM-CODE ASWAN IDUFF	COMMENTS	HADR POSITTON	SITF. WMO NO.
1	170500	24.5N 127.8E	LAND	G000	CIRCULAR	010			26.4N 127.8E	47991
2	170930	24.5N 127.8E	LAND	G000	CIRCULAR	009			26.4N 127.8E	47991
3	171000	24.5N 124.6E	LAND	P00R	CIRCULAR	008		MAX TOP 200	26.4N 127.8E	47991
4	171030	27.5N 127.6E	LAND	P00R	CIRCULAR	018			26.4N 127.8E	47991
5	171100	24.5N 127.4E	LAND	G000	CIRCULAR	027		MAX TOP 320	26.4N 127.8E	47991
6	171200	25.0N 127.3E	LAND	P00R	ELLIPTICAL	004			26.4N 127.8E	47991
7	171535	24.5N 127.4E	LAND	P00R	CIRCULAR	015		MAX TOP 150	26.4N 127.8E	47991
8	171500	24.5N 127.4E	LAND	P00R	CIRCULAR	015			26.4N 127.8E	47991
9	171500	25.2N 124.7E	LAND				6//// 1111		26.2N 127.8E	47997
10	171530	25.1N 127.3E	LAND	P00R	CIRCULAR	012		MAX TOP 200	26.4N 127.8E	47991
11	171700	25.2N 127.6E	LAND	P00R	CIRCULAR	007			26.4N 127.8E	47991
12	171700	25.2N 127.3E	LAND				35//// 53216		26.2N 127.8E	47997
13	171730	25.3N 127.1E	LAND	P00R	CIRCULAR	007		MAX TOP 200	26.4N 127.8E	47991
14	171910	25.3N 127.9E	LAND	P00R	CIRCULAR	030			26.4N 127.8E	47991
15	171935	25.4N 127.1E	LAND	P00R	CIRCULAR	015		MAX TOP 200	26.4N 127.8E	47991
16	171900	25.5N 127.1E	LAND				6//// 73212		26.2N 127.8E	47997
17	171930	25.5N 126.8E	LAND	P00R	CIRCULAR	015		MAX TOP 280	26.4N 127.8E	47991
18	172000	25.5N 126.9E	LAND				6//// 73211		26.2N 127.8E	47997
19	172010	25.7N 126.8E	LAND	P00R	CIRCULAR	015			26.4N 127.8E	47991
20	172030	25.7N 126.9E	LAND	P00R	CIRCULAR	015		MAX TOP 340	26.4N 127.8E	47991
21	172100	25.3N 126.7E	LAND				6//// 73111		26.2N 127.8E	47997
22	172110	25.3N 126.8E	LAND	F AIR	CIRCULAR	010			26.4N 127.8E	47991
23	172200	25.3N 126.5E	LAND				6//// 73113		26.2N 127.8E	47997
24	172210	25.3N 126.4E	LAND	P00R	CIRCULAR	018			26.4N 127.8E	47991
25	172235	25.3N 126.7E	LAND	P00R	CIRCULAR	010			26.4N 127.8E	47991
26	172300	25.4N 126.2E	LAND				35///3 5111		24.8N 125.3E	47997
27	172300	24.0N 124.3E	LAND				6//// 73012		26.2N 127.8E	47997
28	172310	25.3N 126.1E	LAND	P00R	CIRCULAR	012			26.4N 127.8E	47991
29	172330	25.3N 126.1E	LAND	P00R	CIRCULAR	015		MAX TOP 300	26.4N 127.8E	47991
30	180005	25.3N 126.0E	LAND	P00R				-SYSTEM APPEARS LESS ORGANIZED	26.4N 127.8E	47991
31	180035	26.1N 126.8E	LAND	P00R	CIRCULAR	015		SYSTEM APPEARS LESS ORGANIZED	26.4N 127.8E	47991
32	180100	25.5N 125.9E	LAND				65///3 52608		24.8N 125.3E	47997
33	180110	26.2N 126.8E	LAND	P00R	CIRCULAR	019			26.4N 127.8E	47991
34	180200	25.7N 125.8E	LAND				22573 52308		24.8N 125.3E	47997
35	180200	25.5N 125.9E	LAND				6//// 72212		26.2N 127.8E	47997
36	180300	25.5N 125.8E	LAND				22413 51904		24.8N 125.3E	47997
37	180300	25.5N 125.9E	LAND				6//// 72008		26.2N 127.8E	47997
38	180400	25.7N 125.9E	LAND				65/42 50708		24.8N 125.3E	47997
39	180400	25.4N 125.8E	LAND				//// 72405		26.2N 127.8E	47997
40	180500	25.7N 126.1E	LAND				6///3 50812		24.8N 125.3E	47997
41	180500	25.5N 126.0E	LAND				//// 70000		26.2N 127.8E	47997
42	180545	25.3N 125.6E	LAND	FAIR	CIRCULAR	017			26.4N 127.8E	47991
43	180700	26.0N 126.2E	LAND				6///2 53619		24.8N 125.3E	47997
44	180700	25.8N 126.3E	LAND				35/1 70511		26.2N 127.8E	47997
45	180900	26.1N 126.2E	LAND				65/2 70107		24.8N 125.3E	47997
46	180900	26.0N 126.2E	LAND				//// 70208		26.2N 127.8E	47997
47	180930	25.3N 125.6E	LAND	G000	CIRCULAR	012			26.4N 127.8E	47991
48	180900	26.2N 126.1E	LAND				65/2 53211		24.8N 125.3E	47997
49	180900	26.0N 125.7E	LAND	G000	CIRCULAR	012			26.4N 127.8E	47991
50	180930	26.0N 125.8E	LAND	G000	CIRCULAR	018			26.4N 127.8E	47991
51	181000	26.3N 126.1E	LAND				65/2 50211		24.8N 125.3E	47997
52	181000	26.2N 125.5E	LAND	FAIR	CIRCULAR	014			26.4N 127.8E	47991
53	181000	26.3N 126.2E	LAND				6//// 73507		26.4N 127.8E	47991
54	181030	26.1N 125.5E	LAND	G000	CIRCULAR	020			26.4N 127.8E	47991
55	181100	26.1N 125.5E	LAND	FAIR	CIRCULAR	020			26.2N 127.8E	47997
56	181100	26.4N 126.0E	LAND				35/2 73422		26.4N 127.8E	47991
57	181100	26.3N 126.1E	LAND				6//// 73605		24.8N 125.3E	47997
58	181133	26.2N 125.8E	LAND	P00R	CIRCULAR	024		MAX TOP 400	26.4N 127.8E	47991
59	181200	26.5N 126.0E	LAND				35/2 73236		24.8N 125.3E	47997
60	181200	26.5N 125.2E	LAND	P00R	CIRCULAR	008			26.4N 127.8E	47991
61	181200	26.4N 126.1E	LAND				6//// 70000		26.2N 127.8E	47997
62	181300	26.5N 125.9E	LAND				35/2 73322		24.8N 125.3E	47997
63	181300	26.5N 126.1E	LAND				//// 73503		26.2N 127.8E	47997
64	181400	26.5N 125.9E	LAND				6//// 73307		26.2N 127.8E	47997
65	181535	26.4N 125.8E	LAND	P00R	CIRCULAR	015		MAX TOP 410	26.4N 127.8E	47991
66	181500	26.7N 125.8E	LAND				65/3 73316		24.8N 125.3E	47997
67	181500	26.7N 125.9E	LAND				6//// 73307		26.2N 127.8E	47997
68	181505	26.7N 125.9E	LAND	P00R	CIRCULAR	020			26.4N 127.8E	47991
69	181530	26.7N 125.9E	LAND	G000	CIRCULAR	015		MAX TOP 340	26.4N 127.8E	47991
70	181500	26.9N 125.9E	LAND				65/2 73412		24.8N 125.3E	47997
71	181500	26.9N 125.8E	LAND				6//// 73208		26.2N 127.8E	47997
72	181505	26.9N 125.8E	LAND	G000	CIRCULAR	015			26.4N 127.8E	47991
73	181530	27.0N 125.9E	LAND	FAIR		070		MOV 3620	26.2N 127.8E	47997
74	181532	26.9N 126.0E	LAND	G000	CIRCULAR	015		MAX TOP 330	26.4N 127.8E	47991
75	191700	27.1N 125.8E	LAND				65/3 63624		24.8N 125.3E	47997
76	191700	26.9N 125.8E	LAND				6//// 73611		26.2N 127.8E	47997
77	181705	27.1N 125.9E	LAND	FAIR	CIRCULAR	020			26.4N 127.8E	47991
78	181730	27.2N 125.8E	LAND	FAIR	CIRCULAR	025		MAX TOP 400	26.4N 127.8E	47991
79	181800	27.3N 125.8E	LAND				35/3 73532		24.8N 125.3E	47997
80	181900	27.1N 125.8E	LAND	FAIR		070		MOV 3620	26.2N 127.8E	47997
81	181900	27.2N 125.9E	LAND				6//// 73611		26.2N 127.8E	47997
82	181910	27.2N 125.8E	LAND	FAIR	CIRCULAR	020			26.4N 127.8E	47991
83	181930	27.2N 125.6E	LAND	FAIR	CIRCULAR	020		MAX TOP 310	26.4N 127.8E	47991
84	181900	27.3N 125.8E	LAND				55/3 50000		24.8N 125.3E	47997
85	181900	27.3N 125.8E	LAND				6//// 73506		26.2N 127.8E	47997
86	181910	27.2N 125.7E	LAND	FAIR	CIRCULAR	020			26.4N 127.8E	47991
87	181930	27.2N 125.6E	LAND	FAIR	CIRCULAR	015		MAX TO 300	26.4N 127.8E	47991
88	182000	27.2N 125.7E	LAND				55/4 52208		24.8N 125.3E	47997
89	182000	27.1N 125.7E	LAND				6//// 73504		26.2N 127.8E	47997
90	182010	27.2N 125.8E	LAND	G000	CIRCULAR	015			26.4N 127.8E	47991
91	182030	27.2N 125.8E	LAND	G000	CIRCULAR	020		MAX TOP 310	26.4N 127.8E	47991
92	182100	27.1N 125.9E	LAND				25/4 71504		24.8N 125.3E	47997
93	182100	27.1N 125.9E	LAND				6//// 70000		26.2N 127.8E	47997
94	182110	27.1N 126.0E	LAND	FAIR	CIRCULAR	020			26.4N 127.8E	47991
95	182130	27.2N 126.0E	LAND	FAIR	CIRCULAR	020		MAX TOP 270	26.4N 127.8E	47991
96	182200	27.1N 125.9E	LAND				6//// 70000		26.2N 127.8E	47997
97	182210	27.2N 126.0E	LAND	P00R	CIRCULAR	020			26.4N 127.8E	47991

98	182230	27.2N	126.0E	LAND	PQJH	CIRCULAR	020					26.4N	127.8E	47931
99	182230	27.2N	126.0E	LAND	PQJH					MAX TOP 280		26.4N	127.8E	47931
100	182300	27.2N	126.2E	LAND				6777	70612			26.2N	127.8E	47937
101	182330	27.2N	126.2E	LAND	PQJH	CIRCULAR	019			EYE VERY DIFFUS APPEARS TO BE FILING		26.4N	127.8E	47931
102	180000	27.5N	126.3E	LAND				6777	70512			26.2N	127.8E	47937
103	180010	27.4N	126.1E	LAND	PQJH					SPRL FEATURES BEING ILL DEFINED		26.4N	127.8E	47931
104	180030	27.4N	126.2E	LAND	PQJH					MAX TOP 280		26.4N	127.8E	47931
105	180100	27.5N	126.2E	LAND				6777	73508			26.2N	127.8E	47937
106	180130	27.5N	126.0E	LAND	PQJH					MAX TOP 360		26.4N	127.8E	47931
107	180200	27.7N	126.3E	LAND				6777	70119			26.2N	127.8E	47937
108	180210	27.7N	126.0E	LAND	PQJH					MAX TOP 270		26.4N	127.8E	47931
109	180230	27.7N	126.1E	LAND				6777	70114			26.2N	127.8E	47937
110	180300	27.7N	126.2E	LAND				6777	73509			26.2N	127.8E	47937
111	180400	27.2N	126.1E	LAND				6777	73409			28.4N	129.5E	47909
112	180500	28.1N	126.1E	LAND				65773	50211			26.2N	127.8E	47937
113	180500	28.1N	126.1E	LAND				6777	73511			28.4N	129.5E	47909
114	180500	28.2N	126.2E	LAND				65773	50310			26.2N	127.8E	47937
115	180500	28.4N	126.1E	LAND				65773	53519			28.4N	129.5E	47909
116	180700	28.3N	126.4E	LAND				65773	53610			28.4N	129.5E	47909
117	180800	28.7N	126.4E	LAND				65773	53605			28.4N	129.5E	47909
118	180900	28.9N	126.4E	LAND				65773	53610			28.4N	129.5E	47909
119	181000	28.3N	126.4E	LAND				65773	53605			28.4N	129.5E	47909
120	181300	29.0N	126.5E	LAND				67773	53605			28.4N	129.5E	47909
121	181400	29.2N	126.5E	LAND				67773	53511			28.4N	129.5E	47909
122	181500	29.4N	126.4E	LAND				67773	53311			28.4N	129.5E	47909
123	181700	29.6N	126.4E	LAND				67773	50108			28.4N	129.5E	47909
124	182000	30.1N	126.4E	LAND	PQJH					MOV 0230	SHIMONOSHIMI			47762

TROPICAL STORM ROSE

SATELITE FIXES

FIX NO.	TIME (Z)	FIX POSITION	ACCRV	DVRK CODE	SAT	COMMENTS	SITE
1	201445	17.8N 132.0E	PCN 6		DMSP35		PGTW
2	202229	16.6N 130.7E	PCN 5	T1.0/1.0	DMSP3A	INIT OBS	RPMK
3	210044	16.3N 130.2E	PCN 5	T1.0/1.0	NDAAS	INIT OBS	PGTW
4	210145	16.3N 129.8E	PCN 6		DMSP35		PGTW
5	210146	16.4N 129.8E	PCN 5		DMSP35		RPMK
6	211124	17.1N 129.2E	PCN 6		NDAAS	CI 0000	PGTW
7	220000	18.7N 128.2E	PCN 5	T1.0/1.0 /50.0/23HRS	NDAAS		PGTW
8	220309	19.6N 126.8E	PCN 3		DMSP35	DUAL LOW LVL CIRCULATION EXPOSED	PGTW
9	220309	17.9N 128.1E	PCN 5	T1.0/1.0 /50.0/29HRS	DMSP35	NO LOW LVL CIRCULATION	RPMK
10	221236	19.5N 126.9E	PCN 6		NDAAS		PGTW
11	221551	16.9N 125.1E	PCN 5		DMSP35		RDDN
12	222335	18.6N 124.8E	PCN 5	T2.0/2.0 /01.0/21HRS	DMSP3A		RPMK
13	222336	18.8N 124.8E	PCN 5	T2.0/2.0 /01.0/24HRS	DMSP3A	SECUNJARY 20.5N 125.3E	PGTW
14	230112	18.7N 124.6E	PCN 5		NDAAS		PGTW
15	230252	18.7N 124.5E	PCN 5		DMSP35		PGTW
16	230252	18.6N 123.9E	PCN 5	T2.0/2.0	DMSP35	INIT OBS	RDDN
17	230252	18.5N 124.7E	PCN 5		DMSP35		RPMK
18	231133	18.5N 124.1E	PCN 6		DMSP37		RDDN
19	231133	19.0N 124.5E	PCN 5		DMSP37		RPMK
20	231152	18.5N 123.7E	PCN 6		NDAAS		PGTW
21	231218	18.5N 124.3E	PCN 6		DMSP36		RDDN
22	231218	18.8N 124.2E	PCN 5		DMSP36		RPMK
23	231533	18.7N 123.1E	PCN 5		DMSP35		PGTW
24	232233	21.0N 122.6E	PCN 3		DMSP37		RPMK
25	232319	21.3N 122.6E	PCN 3	T2.5/2.5 /00.5/24HRS	DMSP36		PGTW
26	232319	21.2N 122.5E	PCN 3	T2.0/2.0	DMSP36	INIT OBS	RKSD
27	232319	21.2N 122.5E	PCN 3	T2.0/2.0 /50.0/24HRS	DMSP36		RPMK
28	240028	21.4N 122.5E	PCN 3		NDAAS		PGTW
29	241114	22.7N 122.0E	PCN 5		DMSP37	NO LOW LVL CIRCULATION	RDDN
30	241201	22.7N 121.5E	PCN 6		DMSP36		PGTW
31	241515	24.6N 121.8E	PCN 5		DMSP35	NO APPRNT LOW LVL CIRCULATION	PGTW
32	241516	24.6N 121.9E	PCN 5		DMSP35	NO APPRNT LOW LVL CIRCULATION	RKSD

AIRCRAFT FIXES

FIX NO.	TIME (Z)	FIX POSITION	FLT LVL	MIN HGT	OBS MSLP	MAX=SFC-WND VEL/DRG/RNG	MAX=FLI-LVL-WND DIR/VEL/DRG/RNG	ACCRV NAV/MET	EYE SHAPE	EYE ORIEN-DIAM/TATION	EYE TEMP (C) OUT/ IN/ DP/ST	WSV NO.
1	220154	18.6N 127.2E	1500FT		1003	30 070 070	140 032 080 080	04 02			+25 +26 +24	01
2	230112	18.7N 124.6E	1500FT		989	65 070 50	150 55 070 30				+26	02
3	230305	18.8N 124.5E	700MB	3039	993	030 090 010	080 045 350 020	05 05	CIRCULAR	10	+18 +15	02
4	231600	18.7N 123.5E	700MB	3096	1004		250 035 120 040	20 20			+10 +10	03
5	232142	20.9N 122.6E	700MB	3068	995	035 310 015	230 030 170 110	02 03			+14 +16	29 04
6	240959	22.6N 121.8E	700MB	3082	1002	030 160 040	210 040 210 040	02 10			+14 +14 +13	05
7	241140	22.5N 121.8E	700MB	3082			260 31 150 31				+13 +13	05

TROPICAL STORM SHIRLEY

SATELLITE FIXES

FIX NO.	TIME (Z)	FIX POSITION	ACCR	DVORAK CODE	SAT	COMMENTS	SITE
1	271249	11.3N 122.6E	PCN 5		NDAAS	UPPER LVL	PGTW
2	272256	11.2N 117.8E	PCN 5		DMSP37		RPMK
3	272351	10.8N 118.0E	PCN 5	T1.0/1.0	DMSP36	INIT OBS	RPMK
4	280125	9.4N 119.5E	PCN 5	T1.0/1.0	NDAAS	INIT OBS	PGTW
5	280304	10.1N 119.3E	PCN 5		DMSP35		RPMK
6	281137	10.4N 116.8E	PCN 6		DMSP37	CI DOWN	RPMK
7	281205	10.4N 117.1E	PCN 6		NDAAS	CI DOWN UPPER LVL	PGTW
8	281546	10.4N 116.0E	PCN 6		DMSP35		RPMK
9	282237	10.3N 118.4E	PCN 5	T1.0/1.0	DMSP37	INIT OBS SECONDARY 12.2N 115.0E	RODN
10	282333	10.9N 117.7E	PCN 5	T1.0/1.0 /50.0/22HRS	DMSP36		PGTW
11	282334	10.2N 117.4E	PCN 5		DMSP36		RODN
12	290041	10.9N 117.6E	PCN 5		NDAAS		PGTW
13	291118	11.3N 115.3E	PCN 6		DMSP37		RODN
14	291216	11.2N 115.4E	PCN 5		DMSP35	CI SAME	RPMK
15	291528	12.1N 113.4E	PCN 5		DMSP35		PGTW
16	292217	13.2N 111.8E	PCN 3	T2.0/2.0	DMSP37	INIT OBS	RPMK
17	292218	13.2N 112.5E	PCN 5	T2.0/2.0 /01.0/23HRS	DMSP37		PGTW
18	300410	13.2N 111.6E	PCN 3		DMSP35	BANDING TYPE EYE EST T3.0	RPMK
19	301058	13.6N 109.6E	PCN 3		DMSP37	CI UP	RPMK
20	301059	13.7N 109.4E	PCN 6		DMSP37		RODN
21	301158	13.7N 109.6E	PCN 3		DMSP36		RPMK
22	301159	13.4N 109.5E	PCN 3		DMSP36	CI UP	PGTW
23	301233	13.4N 109.2E	PCN 4		NDAAS		PGTW
24	301652	13.7N 108.4E	PCN 5		DMSP35		RPMK
25	302340	14.4N 107.0E	PCN 5	T1.0/2.0-/W1.0/25HRS	DMSP37		RPMK
26	010110	14.6N 106.4E	PCN 5	T1.0/2.0-/W1.0/26HRS	NDAAS		PGTW
27	010353	14.6N 106.2E	PCN 5		DMSP35	EST T1.0/2.0 LOST IN DROP-OUT	RODN

RAJAR FIXES

FIX NO.	TIME (Z)	FIX POSITION	RADAR	ACCR	EYE SHAPE	EYE DIAM	RADAR-CODE ASWAV TDOFF	COMMENTS	RADAR POSITION	SITE WVD NO.
1	300050	12.3N 112.2E	ACFT					54 WRS		

TYPHOON TRIX

SATELLITE FIXES

FIX NO.	TIME (Z)	FIX POSITION	ACCRV	SV32AK CODE	SAT	COMMENTS	SITE
1	110055	19.0N 147.6E	PCV 6	TU.0/0.0	DMS235	INIT OBS	PGTW
2	111018	17.8N 146.3E	PCV 6		NDAAS		PGTW
3	112130	19.4N 147.7E	PCV 5	T1.0/1.0 /01.0/21HRC	DMS236		PGTW
4	112255	19.5N 147.3E	PCV 6		NDAAS		PGTW
5	120934	20.8N 149.5E	PCV 6		NDAAS		PGTW
6	121012	21.4N 149.7E	PCV 5		DMS236		PGTW
7	121318	22.3N 149.8E	PCV 6		DMS235		PGTW
8	122113	23.6N 148.2E	PCV 5	T1.0/1.0 /50.0/24HRC	DMS236		PGTW
9	130008	23.3N 147.8E	PCV 5		NDAAS		PGTW
10	130201	23.6N 147.8E	PCV 6		DMS235		PGTW
11	130955	22.4N 150.4E	PCV 6		DMS236		PGTW
12	131047	21.4N 150.0E	PCV 6		NDAAS	SECONDARY 23.0N 146.4E	PGTW
13	131442	24.0N 145.4E	PCV 6		DMS235	NU APPANT CC PSHL SECONDARY CC	PGTW
14	132109	24.2N 143.9E	PCV 5		DMS237		PGTW
15	132109	23.8N 146.5E	PCV 5		DMS237		PGTW
16	132237	24.2N 143.9E	PCV 5	T2.0/2.0 /01.0/25HRC	DMS236		RKSO
17	132237	24.0N 143.5E	PCV 5	T2.0/2.0	DMS236		PGTW
18	132324	23.9N 143.4E	PCV 5		NDAAS		RKSO
19	140143	24.0N 143.2E	PCV 5		DMS235		PGTW
20	140143	24.5N 143.2E	PCV 5		DMS235		RKSO
21	140950	24.6N 142.2E	PCV 6		DMS237		RODN
22	140950	23.7N 142.3E	PCV 6		DMS237	CI UP	PGTW
23	141003	23.9N 142.2E	PCV 6		NDAAS		PGTW
24	141119	23.9N 142.2E	PCV 5		DMS236		PGTW
25	141119	24.0N 142.2E	PCV 5		DMS236		RKSO
26	141425	23.8N 141.2E	PCV 5		DMS235		PGTW
27	142049	24.1N 140.5E	PCV 3	T3.0/3.0 /01.0/23HRC	DMS237		PGTW
28	142049	24.1N 140.4E	PCV 3	T3.0/3.0 /01.0/23HRC	DMS237		RKSO
29	142220	24.0N 139.8E	PCV 3		DMS236		RKSO
30	142222	24.1N 140.0E	PCV 3		DMS236		PGTW
31	150125	24.0N 139.0E	PCV 3		DMS235		PGTW
32	150930	23.6N 138.3E	PCV 6		DMS237	CI UP	PGTW
33	150930	23.6N 138.2E	PCV 4		DMS237		RKSO
34	151102	23.5N 138.2E	PCV 3		DMS236		PGTW
35	151407	23.4N 138.0E	PCV 5		DMS235		PGTW
36	152030	22.7N 137.2E	PCV 3		DMS237		RODN
37	152030	22.9N 137.3E	PCV 1	T4.0/4.0 /01.0/24HRC	DMS237		PGTW
38	152203	22.5N 137.2E	PCV 3	T4.0/4.0	DMS236	INIT OBS	RODN
39	160107	22.9N 137.7E	PCV 3	T4.0/4.0 /01.0/24HRC	DMS237		RKSO
40	161044	22.4N 137.8E	PCV 4		DMS236		RODN
41	162145	22.2N 138.7E	PCV 3		DMS236		PGTW
42	162152	22.2N 138.4E	PCV 1	T4.0/4.0	DMS237	INIT OBS	PGTW
43	162152	22.0N 138.5E	PCV 3	T4.0/4.0 /50.0/25HRC	DMS237		PGTW
44	162307	22.0N 138.8E	PCV 4		NDAAS		PGTW
45	171027	22.7N 139.9E	PCV 6		DMS237		RODN
46	171027	23.2N 140.2E	PCV 6		DMS236		PGTW
47	171144	23.2N 140.7E	PCV 6		NDAAS		PGTW
48	172128	23.5N 142.2E	PCV 3	T4.5/4.5 /00.5/24HRC	DMS236		PGTW
49	172128	23.2N 142.0E	PCV 5	T4.0/4.0	DMS236	INIT OBS	RODN
50	172132	23.4N 142.2E	PCV 1	T5.0/5.0	DMS237	INIT OBS RAGGED EYE	RKSO
51	180213	24.6N 143.3E	PCV 3		DMS235		RKSO
52	180213	24.5N 143.5E	PCV 3		DMS235	CI DOWN	RKSO
53	180213	24.5N 143.4E	PCV 5		DMS235		RODN
54	181010	25.6N 143.9E	PCV 6		DMS236		RODN
55	181013	25.3N 144.6E	PCV 5		DMS237		PGTW
56	181013	25.3N 144.8E	PCV 5		DMS237	CI DOWN	PGTW
57	181100	25.7N 141.5E	PCV 5		NDAAS		PGTW
58	181314	25.6N 145.2E	PCV 5		DMS235		PGTW
59	181455	25.5N 145.7E	PCV 5		DMS235		PGTW
60	182110	25.2N 145.5E	PCV 3	T5.0/5.0 /00.5/24HRC	DMS236		PGTW
61	182111	25.7N 145.9E	PCV 6	T5.0/5.0 /01.0/24HRC	DMS236		RODN
62	182112	25.4N 145.7E	PCV 3	T5.0/5.0 /50.0/24HRC	DMS236		RKSO
63	182336	25.6N 146.2E	PCV 3		NDAAS		PGTW
64	190156	26.0N 145.0E	PCV 3		DMS235		RKSO
65	190158	26.5N 146.1E	PCV 3		DMS235		PGTW
66	190954	27.5N 144.8E	PCV 6		DMS237		RODN
67	190954	27.0N 145.0E	PCV 3		DMS237		RKSO
68	191016	27.0N 145.5E	PCV 5		NDAAS		PGTW
69	191437	27.7N 145.2E	PCV 3		DMS235	CI UP	PGTW
70	192053	28.9N 144.0E	PCV 3	T3.5/4.5 /01.5/24HRC	DMS237		PGTW
71	192053	29.0N 143.8E	PCV 3	T4.0/4.0 /01.0/24HRC	DMS237		RKSO
72	192235	29.0N 143.8E	PCV 3		DMS236	UPR LVL 29.5N 143.3E	RKSO
73	192252	29.2N 143.6E	PCV 6		NDAAS		PGTW
74	200138	29.2N 143.2E	PCV 3		DMS235		PGTW
75	200934	29.9N 141.0E	PCV 6		DMS237		PGTW
76	200934	30.6N 140.9E	PCV 6		DMS237	LOW LVL CIRC ON CU LINE	RODN
77	201117	30.1N 139.8E	PCV 5		DMS236		PGTW
78	201128	29.5N 140.0E	PCV 6		NDAAS		PGTW
79	201419	29.5N 139.2E	PCV 6		DMS235		PGTW
80	202034	29.7N 138.0E	PCV 5		DMS237		PGTW
81	202218	28.9N 136.7E	PCV 5	T2.5/2.5	DMS236	INIT OBS	RODN
82	202218	30.2N 137.9E	PCV 5	T3.0/4.0 /01.0/24HRC	DMS236		RKSO
83	202218	30.1N 137.9E	PCV 5	T2.0/3.0 /01.5/24HRC	DMS236		PGTW
84	210005	30.5N 137.6E	PCV 3		NDAAS		PGTW
85	210120	30.8N 137.2E	PCV 5		DMS235	EXPUSED LOW LVL CIRC	RKSO

86	211059	30.2N	174.1E	PCN 5		DMS934		PGTW
87	211100	30.4N	175.7E	PCN 5		DMS936		RKSO
88	211401	29.7N	172.9E	PCN 5		DMS935		PGTW
89	211534	29.4N	173.2E	PCN 5		DMS934		RODN
90	212156	29.1N	179.5E	PCN 5	T2.0/2.0 /50.0/24HRS	DMS937		PGTW
91	212201	29.2N	170.8E	PCN 5	T2.0/1.0 /41.0/24HRS	DMS936		RKSO
92	220117	28.8N	178.4E	PCN 5		NDAAS		PGTW
93	220244	28.5N	178.5E	PCN 5	T2.0/2.5 /40.5/24HRS	DMS935		RODN
94	220244	28.5N	177.2E	PCN 5		DMS935		RKSO
95	221035	29.5N	175.6E	PCN 5		DMS937		PGTW
96	221037	29.9N	175.0E	PCN 5		DMS937		RKSO
97	221156	28.1N	174.7E	PCN 5		NDAAS		PGTW
98	221224	27.4N	174.8E	PCN 5		DMS936	BASED ON CI RANGING	RODN
99	221525	28.4N	174.1E	PCN 5		DMS935		PGTW
100	222137	29.2N	171.8E	PCN 3	T1.0/2.0-/41.0/24HRS	DMS937		PGTW
101	222137	28.5N	171.6E	PCN 5	T1.0/2.0 /41.0/19HRS	DMS937		RODN
102	230033	29.2N	171.3E	PCN 5		NDAAS		PGTW

AIRCRAFT FIXES

FIX NO.	TIME (Z)	FIX POSITION	FLT LVL	HT	DBS MSLP	MAX-SFC-WND VEL/HRG/RNG	MAX-FLT-LVL-WND DIR/VEL/DRG/ANG	ACCRY NAV/MET	EYE SHAPE	EYE ORIEN- DIAM/TATION	EYE TEMP (F) ONT/ IN/ DP/SST	MSV NO.
1	131549	23.9N 144.8E	700MB	3089	1003		090 029 360 090	04 05			+10 +10	2
2	140105	23.6N 143.1E	700MB			35 330 50	070 27 330 90					3
3	140338	23.9N 142.8E	700MB	3041	995	035 340 045	070 027 340 045	04 02			+14 +15	3
4	141443	23.9N 141.2E	700MB	3009	992		200 038 160 010	02 05			+11 +13 +17	4
5	150309	23.8N 139.6E	700MB	2946		100 050 10	230 65 050 30				+17	5
6	150345	23.9N 139.3E	700MB	2927	980	090 140 010	090 064 360 040	10 05	CIRCULAR	15	+10 +17	5
7	150540	23.8N 139.3E	700MB	2927		90 140 10	230 57 140 15				+17	5
8	151159	23.4N 138.1E	700MB	2936			060 58 340 30				+20	6
9	151506	23.2N 138.0E	700MB	2966	980		040 045 290 075	05 05			+13 +20	6
10	160030	22.9N 137.8E	700MB	2867	973	090 120 010	230 071 140 018	01 03	CIRCULAR	15	+12 +17	08 7
11	160326	22.7N 137.7E	700MB	2852	970	090 120 020	040 065 360 025	03 03	CIRCULAR	18	+10 +16	09 7
12	161221	22.1N 138.1E	700MB	2881			200 75 100 10				+18	8
13	161505	22.0N 138.1E	700MB	2876	974		200 070 110 020	05 07	CIRCULAR	20	+12 +18	8
14	170132	22.0N 139.3E	700MB	2838		70 180 25	270 75 180 25				+17 +17	9
15	170435	22.4N 139.6E	700MB	2828	967	065 170 025	270 072 170 025	03 00	CIRCULAR	25	+15 +21 +13	9
16	171410	22.6N 140.8E	700MB	2942			200 50 040 30				+20	10
17	171530	22.9N 141.3E	700MB	2939	980		200 050 120 025	04 04			+11 +17 +17	10
18	180317	24.1N 143.7E	700MB	2913							+16 +17	11
19	180636	24.2N 143.9E	700MB	2905	980	045 180 030	250 050 180 030	02 10			+14 +16 +10	11
20	190330	24.4N 146.1E	700MB	3001	988	050 270 030	240 040 160 045	03 05			+11 +17	12
21	190506	25.6N 146.4E	700MB	3084	984	055 250 010	180 060 080 030	02 01			+21 +25	27 12
22	191305	27.4N 145.3E	700MB	3012			140 53 090 50				+14 +13	13
23	191542	28.0N 144.8E	700MB	2974			110 050 020 040	03 04			+16 +17 +15	13
24	200254	29.1N 143.0E	700MB	3049	996	035 070 040	160 040 070 035	03 05			+14 +14	26 14
25	201520	29.5N 139.3E	700MB	3070	1000		050 039 290 047	10 05			+16 +16 +11	15
26	210305	29.8N 136.5E	700MB		1000	025 360 025	100 025 360 025	03 10			+24 +25 +24	29 16
27	211529	27.1N 131.4E	700MB	3108	1003		360 025 200 010	02 15				17
28	220000	28.0N 129.1E	1500F1		1000							18
29	220350	28.7N 127.7E	1500F1		997	055 100 015	140 035 080 080	05 05	CIRCULAR	08	+26 +26	27 18

TYPHOON VIRGINIA

SATELLITE FIXES

FIX NO.	TIME (Z)	PTX POSITION	ACCY	DVORAK CODE	SAT	COMMENTS	SITE
1	222237	14.3N 151.0E	PCN 5	T0.0/0.0	NDAAS	INIT OBS	PGTW
2	230044	16.2N 151.3E	PCN 5		DMSP35		PGTW
3	231025	16.1N 150.7E	PCN 5		DMSP36	CI UP	PGTW
4	231025	14.4N 149.5E	PCN 4		DMSP36		RODN
5	231325	16.1N 151.1E	PCN 6		DMSP35		PGTW
6	231326	13.9N 150.2E	PCN 6		DMSP35	SECONDARY 15.4N 152.1E	RODN
7	232125	16.3N 151.9E	PCN 5	T2.0/2.0 /02.0/23HRS	DMSP36		PGTW
8	240027	16.9N 151.5E	PCN 5		DMSP35		PGTW
9	241008	17.3N 151.2E	PCN 6		DMSP36	CI SAME	PGTW
10	241308	18.1N 151.2E	PCN 6		DMSP36		PGTW
11	242109	18.5N 150.5E	PCN 5	T3.0/3.0 /01.0/24HRS	DMSP36		PGTW
12	242305	18.7N 150.4E	PCN 5		NDAAS		PGTW
13	250150	18.3N 150.3E	PCN 5		DMSP35		PGTW
14	250940	20.0N 149.6E	PCN 5		DMSP37		PGTW
15	250940	19.5N 150.7E	PCN 5		DMSP37		RODN
16	251251	20.4N 149.5E	PCN 6		DMSP35		PGTW
17	252038	20.4N 149.2E	PCN 5	T4.0/4.0 /01.0/24HRS	DMSP37		PGTW
18	252038	20.3N 149.4E	PCN 5	T4.0/4.0	DMSP37	INIT OBS	RODN
19	260132	21.2N 148.9E	PCN 6		DMSP35		PGTW
20	260319	21.4N 147.9E	PCN 5		DMSP37		RODN
21	260319	21.3N 148.9E	PCN 6		DMSP37	UPR LVL COD	RODN
22	261614	21.4N 147.8E	PCN 5		DMSP35	CI DOWN	PGTW
23	262018	21.5N 148.1E	PCN 5		DMSP37		PGTW
24	262215	21.3N 148.0E	PCN 3		DMSP36		RPMK
25	270114	21.5N 147.0E	PCN 5		DMSP35		PGTW
26	270115	21.5N 147.8E	PCN 5	T3.0/4.0	DMSP35		RODN
27	270900	21.4N 147.4E	PCN 4		DMSP35		RODN
28	270900	21.5N 147.4E	PCN 4		DMSP37		PGTW
29	271057	21.4N 146.9E	PCN 4		DMSP36		PGTW
30	271357	21.7N 147.2E	PCN 5		DMSP35		PGTW
31	271959	21.2N 147.2E	PCN 5	T5.0/5.0 /01.0/24HRS	DMSP37		PGTW
32	272158	21.7N 147.4E	PCN 5	T3.5/3.5	DMSP36	INIT OBS	RKSO
33	272158	21.3N 147.5E	PCN 5		DMSP36		PGTW
34	280056	21.6N 147.7E	PCN 5		DMSP35		PGTW
35	280840	22.2N 147.4E	PCN 6		DMSP37	CI DOWN	PGTW
36	281040	22.2N 147.2E	PCN 4		DMSP36		RODN
37	281040	22.1N 147.2E	PCN 5		DMSP36	UPR LVL	PGTW
38	281329	22.0N 146.6E	PCN 6		DMSP35		PGTW
39	281357	21.7N 147.9E	PCN 5		DMSP35		RODN
40	282121	22.3N 144.9E	PCN 3		DMSP37		RPMK
41	282121	22.7N 147.0E	PCN 3		DMSP37		RKSO
42	282141	22.2N 146.7E	PCN 3	T4.0/4.0	DMSP36	INIT OBS	RODN
43	282141	22.2N 147.2E	PCN 3	T4.5/5.0- /W0.5/26HRS	DMSP36		PGTW
44	290033	22.3N 147.3E	PCN 4		DMSP35		PGTW
45	291002	24.0N 147.3E	PCN 4		DMSP37		RKSO
46	291002	23.4N 146.8E	PCN 4		DMSP37		PGTW
47	291022	23.3N 146.6E	PCN 4		DMSP36		PGTW
48	291023	24.1N 146.6E	PCN 6		DMSP36		RODN
49	291320	24.0N 146.5E	PCN 4		DMSP35		PGTW
50	292102	25.0N 145.0E	PCN 3		DMSP37		RKSO
51	292102	25.3N 145.6E	PCN 5	T4.0/4.0 /S0.0/24HRS	DMSP37		RODN
52	292124	25.0N 145.1E	PCN 3	T4.5/4.5 /S0.0/24HRS	DMSP36		PGTW
53	300203	25.4N 145.0E	PCN 3		DMSP35		RPMK
54	300203	25.3N 144.7E	PCN 3	T4.0/4.0	DMSP35		RKSO
55	300203	25.4N 144.9E	PCN 4		DMSP35		PGTW
56	300943	27.3N 143.9E	PCN 6		DMSP37		RODN
57	300943	27.3N 143.9E	PCN 4		DMSP37		PGTW
58	301005	27.3N 143.7E	PCN 4		DMSP36		PGTW
59	301444	27.4N 143.6E	PCN 4		DMSP35		PGTW
60	301445	27.5N 143.6E	PCN 5		DMSP35		RKSO
61	302043	28.7N 143.0E	PCN 3	T3.0/4.0 /W1.0/24HRS	DMSP37		RODN
62	302043	28.4N 142.8E	PCN 1	T3.5/4.5 /W1.0/24HRS	DMSP37		PGTW
63	302106	28.4N 142.9E	PCN 3		DMSP36		PGTW
64	310145	30.2N 142.8E	PCN 3	T3.5/4.0 /W0.5/24HRS	DMSP35		RKSO
65	310145	30.3N 142.8E	PCN 3		DMSP35		PGTW
66	310923	31.3N 141.9E	PCN 6		DMSP37		RODN
67	310923	31.5N 141.8E	PCN 4		DMSP37		PGTW
68	311129	31.3N 141.8E	PCN 4		DMSP36		PGTW
69	311426	32.3N 141.6E	PCN 3		DMSP35		PGTW
70	311427	32.5N 141.7E	PCN 3		DMSP35		RPMK
71	311427	32.4N 142.0E	PCN 3		DMSP35		RKSO
72	312023	33.3N 141.5E	PCN 1	T3.0/4.0- /W0.5/24HRS	DMSP37		PGTW
73	312231	33.3N 141.5E	PCN 3		DMSP36		PGTW
74	312346	33.4N 141.1E	PCN 3		NDAAS		PGTW
75	010127	34.1N 141.6E	PCN 3	T3.0/3.5- /W0.5/24HRS	DMSP35		RKSO
76	010127	34.1N 141.6E	PCN 3		DMSP35		PGTW
77	010904	35.4N 142.0E	PCN 6		DMSP37		RODN
78	010904	35.2N 141.8E	PCN 3		DMSP37	CI SAME	PGTW
79	011045	30.5N 142.3E	PCN 4		DMSP37		RKSO
80	011112	35.4N 142.5E	PCN 3		DMSP36		PGTW
81	011140	36.4N 143.0E	PCN 3		DMSP35		PGTW
82	012004	38.6N 144.0E	PCN 5		DMSP37		RODN
83	012004	37.7N 143.9E	PCN 5	T2.0/2.0	DMSP37		PGTW
84	012213	38.7N 144.1E	PCN 5	T3.0/4.0- /S0.0/24HRS	DMSP36		PGTW
85	012213	38.4N 144.3E	PCN 5	T2.0/3.0- /W1.0/24HRS	DMSP36		RKSO
86	012302	38.3N 144.3E	PCN 5		NDAAS		PGTW
87	020942	40.1N 147.9E	PCN 6		NDAAS	CI DOWN	PGTW
88	021026	40.5N 148.2E	PCN 5		DMSP37		RKSO
89	021026	40.6N 148.6E	PCN 6		DMSP37		RODN
90	021055	40.4N 148.6E	PCN 5		DMSP36		RKSO
91	030015	43.5N 150.4E	PCN 5		NDAAS		PGTW

AIRCRAFT FIXES

FIX NO.	TIME (Z)	FIX POSITION	FLT LVL	MIN HGT	CRS MSLP	MAX-SFC-WIND VEL/DRG/RNG	MAX-FLT-LVL-WIND DTN/VEL/DRG/RNG	ACCRV NAV/MET	EYE SHAPE	EYE ORIEN- DIAM/TATION	EVE TEMP. (C) IN/ DP/SST	MSV NO.
1	230015	15.3N 151.0E	1500F1		984	55 290 45	350 45 290 45	3 5	CIRCULAR	40	+26 +26 +26 25	1
2	232208	16.5N 151.1E	700MM	7027	993	75 240 5	310 65 340 20	4 5			+13 +21 +11	2
3	240135	16.7N 151.0E	700MM	7056		100 050 20	150 50 050 20				+18 + 9	2
4	240355	16.3N 151.0E	700MM	7026	987	55 260 10	140 70 120 15	4 6			+15 +15 + 9	2
5	241553	16.7N 151.0E	700MM									3
6	250130	18.3N 150.2E	700MM	2964	982		140 50 050 30	7 2			+ 9 +19	3
7	250425	19.0N 150.2E	700MM	2935		30 700 30	140 63 700 60				+18 +11	4
8	250425	19.4N 150.2E	700MM	2888	974	70 130 10	220 60 130 10	5 5	CIRCULAR	40	+15 +21 +12	4
9	251345	20.1N 149.2E	700MM	2892			120 65 400 30				+19	5
10	251500	20.4N 149.2E	700MM	2894	977		200 90 180 24	4 4	ELLIPTICAL	40 25 140	+12 +16	5
11	260307	21.1N 148.6E	700MM	2919	981	35 210 22	300 55 250 40	7 5			+10 +17 +13	5
12	260545	21.4N 148.4E	700MM	2921		30 340 45	060 75 340 50				+17 +13	6
13	261250	21.3N 147.7E	700MM	2962			090 45 050 30				+19 +10	7
14	261512	21.7N 147.6E	700MM	2942	982		340 70 270 30	3 5			+15 +18 +11	7
15	270040	21.5N 147.1E	700MM	2997		30 020 70	110 45 020 30				+16 +12	8
16	270235	21.3N 147.3E	700MM	2996	987	100 340 30	060 55 340 30	4 4			+13 +17 +13	8
17	280221	21.3N 147.6E	700MM	2913		40 030 120	040 30 030 120				+16 +13	9
18	280439	21.4N 147.9E	700MM	2911	979	30 280 120	010 40 260 40	3 5			+15 +17 +11	9
19	281550	21.4N 147.1E	700MM	2905	980		270 66 210 36	5 3			+12 +15 +13	10
20	281902	22.2N 147.1E	700MM	2884	977		020 52 110 95	5 3			+13 +14 +13	10
21	290215	22.7N 147.1E	700MM	2929		50 320 40	060 50 320 70				+15 +13	11
22	290411	22.4N 146.9E	700MM	2915	982	40 090 50	350 45 090 60	4 10			+13 +15 +12 21	11
23	291413	24.2N 145.8E	700MM	2934			130 55 030 80				+14 +12	12
24	291550	24.3N 145.9E	700MM	2930	983		090 50 360 100	3 5			+13 +14 +12	12
25	300113	25.5N 144.8E	700MM	2944		50 140 58	200 55 140 68	6 4			+13 +12 +12	13
26	300342	25.4N 144.7E	700MM	2932	985	45 100 58	340 40 100 68	5 5			+12 +13 +12	13
27	301715	24.4N 143.3E	700MM	2954	984		240 48 180 60	25 5			+12 +12	14
28	310230	30.0N 142.2E	700MM	2930	978	55 210 40	320 40 220 72	3 1			+13 +14 +13	15
29	310523	30.4N 142.0E	700MM	2925		55 060 120	180 63 060 77				+13 +12	15
30	311514	32.4N 141.2E	700MM	2944	983		140 75 100 64	5 5			+13 +13 +12	16
31	311923	32.3N 141.0E	700MM	2932			140 55 090 80				+12 +12	15
32	312342	32.1N 141.2E	700MM	2934	982	45 170 35	260 47 170 65	5 5			+12 +13 +11	15
33	010030	33.4N 141.2E	700MM	2900	978	50 200 25	280 50 190 70	5 2			+14 +15 +12	17
34	010235	34.0N 141.9E	700MM	2906	978		160 55 060 60	5 3			+13 +15 +11	17
35	011515	36.2N 142.9E	700MM	2930	981		320 60 240 40	2 5	ELLIPTICAL	45 20 030	+13 +14	18
36	011731	37.3N 143.3E	700MM	2924			280 55 200 120				+14	18

RAJAR FIXES

FIX NO.	TIME (Z)	FIX POSITION	RADAR	ACCRV	EYE SHAPE	EYE DIAM	RADAR-CODE ASWAN IDOFF	COMMENTS	RADAR POSITION	SITE W40 NO.
1	312130	33.4N 141.3E	LAND	G700		25		MNV 3620 MINEOKA	35.2N 140.1E	
2	312230	33.5N 141.4E	LAND	G700		25		MNV 3620 MINEOKA	35.2N 140.1E	
3	312300	33.4N 141.5E	LAND	G700		25		MNV 3615 MINEOKA	35.2N 140.1E	
4	010000	33.4N 141.6E	LAND	G700		25		MNV 3620 MINEOKA	35.2N 140.1E	
5	010100	33.3N 141.7E	LAND	G700		25		MNV 3615 MINEOKA	35.2N 140.1E	
6	010230	34.0N 141.5E	LAND	G700		30		MNV 3615 MINEOKA	35.2N 140.1E	
7	010300	34.2N 141.4E	LAND	G700		25		MNV 0310 MINEOKA	35.2N 140.1E	
8	010300	34.1N 141.6E	LAND				21901 ////			47542
9	010335	34.1N 141.4E	LAND	P70R					35.8N 139.8E	47542
10	010400	34.3N 141.4E	LAND	G700		25		MNV 3615 MINEOKA	35.2N 140.1E	
11	010410	34.1N 141.4E	LAND	P70R					35.7N 139.3E	47542
12	010445	34.2N 141.5E	LAND	P70R		25			35.7N 139.3E	47542
13	010500	34.5N 141.4E	LAND	G700				MNV 0430 MINEOKA	35.2N 140.1E	
14	010510	34.2N 141.5E	LAND	P70R					35.7N 139.3E	47542
15	010535	34.3N 141.6E	LAND	P70R					35.2N 140.1E	47542
16	010500	34.8N 141.9E	LAND	G700		30		MNV 0440 MINEOKA	35.2N 140.1E	
17	010510	34.5N 141.6E	LAND	P70R					35.7N 139.3E	47542
18	010535	34.4N 141.0E	LAND	P70R					35.7N 139.3E	47542
19	010700	34.9N 141.9E	LAND	G700		45			35.2N 140.1E	
20	010700	35.0N 141.8E	LAND				21942 70120		35.8N 139.8E	47542
21	010710	34.7N 141.8E	LAND	P70R					35.7N 139.3E	47542
22	010735	34.4N 141.4E	LAND	P70R					35.7N 139.3E	47542
23	010835	35.2N 142.1E	LAND	P70R					35.7N 139.3E	47542
24	010900	35.5N 142.2E	LAND				21922 70319		35.8N 139.8E	47542
25	010910	35.4N 142.3E	LAND	P70R					35.7N 139.3E	47542
26	010935	35.3N 142.4E	LAND	P70R					35.7N 139.3E	47542
27	011000	35.4N 142.3E	LAND				21922 70314		35.8N 139.8E	47542
28	011010	35.4N 142.6E	LAND	P70R					35.7N 139.3E	47542
29	011030	34.0N 142.6E	LAND	P70R					35.7N 139.3E	47542
30	011100	35.3N 142.4E	LAND				21912 70216		35.8N 139.8E	47542
31	011110	34.4N 142.3E	LAND	P70R					35.7N 139.3E	47542
32	011200	34.1N 142.4E	LAND				21912 70214		35.8N 139.8E	47542
33	011210	36.5N 142.5E	LAND	P70R					35.7N 139.3E	47542
34	011230	36.4N 142.5E	LAND	P70R					35.7N 139.3E	47542
35	011300	36.3N 142.6E	LAND				22912 70315		35.8N 139.8E	47542
36	011500	34.4N 142.6E	LAND				65741 70110		35.8N 139.8E	47542
37	011500	36.7N 142.5E	LAND				65771 50111		38.3N 140.9E	47590
38	011500	37.0N 142.7E	LAND				65771 50216		38.3N 140.9E	47590
39	011700	37.4N 143.2E	LAND				65771 50432		38.3N 140.9E	47590
40	011900	37.7N 143.3E	LAND				65771 50322		38.3N 140.9E	47590
41	011900	38.1N 143.7E	LAND				67771 50327		38.3N 140.9E	47590
42	012000	38.4N 144.1E	LAND				67771 50327		38.3N 140.9E	47590

TYPHOON WENDY

SATELLITE FIXES

FIX NO.	TIME (Z)	FTX POSITION	ACCR	UVZRAK CODE	SAT	COMMENTS	SITE
1	222137	21.1N 137.4E	PCN 3	T1.0/1.0	DMSP37		PGTW
2	231018	21.6N 137.1E	PCN 5		DMSP37	CI UP	PGTW
3	231508	22.0N 137.0E	PCN 6		DMSP35		PGTW
4	241508	21.4N 136.6E	PCN 3		DMSP35		RODN
5	242117	21.4N 134.1E	PCN 5	T3.0/3.0 /02.0/24HRS	DMSP37		PGTW
6	232308	21.4N 134.5E	PCN 5		DMSP36		PGTW
7	232349	21.3N 134.1E	PCN 5		NDAAS		PGTW
8	240209	21.1N 134.0E	PCN 3		DMSP35		PGTW
9	240358	21.1N 133.9E	PCN 5		DMSP37	CI UP	PGTW
10	240358	20.5N 134.0E	PCN 5		DMSP37		RKSO
11	241149	20.9N 133.6E	PCN 5		DMSP36		PGTW
12	241149	20.5N 134.6E	PCN 5		DMSP36		RKSO
13	241450	20.7N 134.0E	PCN 5		DMSP35		PGTW
14	241450	20.0N 134.5E	PCN 5		DMSP35		RKSO
15	242056	21.7N 134.8E	PCN 1	T5.0/5.0	DMSP37	INIT OBS	RODN
16	242058	21.7N 133.8E	PCN 1	T4.5/4.5 /01.5/24HRS	DMSP37		PGTW
17	242250	20.9N 133.9E	PCN 3	T4.0/4.0	DMSP36	INIT OBS	RPMK
18	242250	21.9N 134.4E	PCN 5	T4.5/4.5	DMSP36	INIT OBS	RKSO
19	242305	20.8N 133.8E	PCN 3		NDAAS		PGTW
20	250150	20.8N 133.7E	PCN 5		DMSP35		PGTW
21	250150	20.4N 134.2E	PCN 5		DMSP35		RKSO
22	250338	21.1N 133.3E	PCN 5		DMSP37		RKSO
23	250339	21.3N 133.3E	PCN 3		DMSP37	CI SAME	RKSO
24	250339	21.1N 133.3E	PCN 5		DMSP37	CI SAME	RODN
25	251132	21.0N 133.4E	PCN 4		DMSP36		PGTW
26	251132	21.1N 134.0E	PCN 3		DMSP36		PGTW
27	251432	21.0N 133.4E	PCN 5		DMSP35		RKSO
28	252232	21.5N 134.0E	PCN 5	T5.0/5.0 /00.5/26HRS	DMSP36		PGTW
29	252232	21.5N 134.0E	PCN 5	T5.0/5.0 /00.5/26HRS	DMSP36		PGTW
30	252233	21.6N 134.1E	PCN 3	T5.0/5.0 /00.5/24HRS	DMSP36		PGTW
31	252233	21.0N 134.2E	PCN 3	T4.0/4.0 /50.0/24HRS	DMSP36		RKSO
32	260017	21.4N 133.8E	PCN 5		NDAAS	BASED ON EXTRAP CB BAND	PGTW
33	260132	21.7N 133.3E	PCN 5		DMSP35	BANDING TYPE EYE	RKSO
34	260132	21.5N 133.4E	PCN 5		DMSP35		PGTW
35	260919	22.2N 133.0E	PCN 6		DMSP37		RODN
36	260919	22.3N 132.9E	PCN 4		DMSP37		PGTW
37	261101	22.3N 132.9E	PCN 4		DMSP37		PGTW
38	261101	22.4N 133.2E	PCN 2		DMSP37		RKSO
39	261115	22.4N 132.9E	PCN 2		DMSP36		RODN
40	261115	22.3N 132.8E	PCN 4		DMSP36		PGTW
41	261414	22.4N 132.6E	PCN 3		DMSP35		PGTW
42	262200	23.1N 132.9E	PCN 1	T5.0/5.0+/50.0/24HRS	DMSP37		RKSO
43	262200	23.2N 132.5E	PCN 1	T5.0/5.0+/50.0/24HRS	DMSP37		PGTW
44	262215	23.3N 132.4E	PCN 1		DMSP36		PGTW
45	262215	23.2N 132.4E	PCN 1	T4.0/4.0+/50.0/24HRS	DMSP36		RPMK
46	270115	23.2N 132.6E	PCN 5		DMSP35		RKSO
47	270115	23.0N 132.4E	PCN 5		DMSP35		RODN
48	271041	24.3N 131.8E	PCN 2		DMSP37		PGTW
49	271041	24.4N 131.9E	PCN 1		DMSP37		RPMK
50	271057	24.4N 131.8E	PCN 4		DMSP36		RODN
51	271057	24.3N 131.6E	PCN 2		DMSP36		PGTW
52	271530	24.6N 131.1E	PCN 4		DMSP35		PGTW
53	271538	24.7N 131.1E	PCN 4		DMSP35		RPMK
54	272140	25.7N 130.3E	PCN 3	T5.0/5.0 /50.0/24HRS	DMSP37		PGTW
55	272158	25.7N 130.6E	PCN 3	T5.0/5.0+/50.0/24HRS	DMSP36		RKSO
56	272340	26.2N 129.9E	PCN 3		DMSP36		RKSO
57	280045	26.7N 129.8E	PCN 3		NDAAS		PGTW
58	280238	26.8N 129.4E	PCN 4		DMSP35		PGTW
59	280239	26.9N 129.4E	PCN 1		DMSP35		RKSO
60	280239	26.8N 129.3E	PCN 3	T5.5/5.5	DMSP35	INIT OBS	RODN
61	280239	26.9N 129.1E	PCN 3	T3.0/4.0 /W1.0/26HRS	DMSP35		RPMK
62	281022	27.3N 127.6E	PCN 4		DMSP37	CI SAME	PGTW
63	281022	27.8N 127.7E	PCN 2		DMSP36	CI SAME	RKSO
64	281222	27.7N 127.3E	PCN 4		DMSP36		RODN
65	281222	28.0N 127.2E	PCN 2		DMSP36		RKSO
66	281222	27.8N 127.8E	PCN 4		DMSP36		RPMK
67	281520	27.8N 126.7E	PCN 4		DMSP35		PGTW
68	282121	28.2N 126.2E	PCN 1	T4.0/5.0-/W1.0/24HRS	DMSP37		PGTW
69	282121	28.1N 126.2E	PCN 1	T4.0/5.0-/W1.0/24HRS	DMSP37		RKSO
70	282121	28.1N 126.2E	PCN 1	T3.5/3.5 /00.5/19HRS	DMSP37		RPMK
71	282323	28.3N 126.1E	PCN 1		DMSP36		PGTW
72	282323	28.1N 126.0E	PCN 1		DMSP36		RPMK
73	291002	24.7N 126.0E	PCN 4		DMSP37		PGTW
74	291002	29.1N 125.8E	PCN 3		DMSP37		RKSO
75	291144	29.3N 125.5E	PCN 6		DMSP37		RPMK
76	291204	29.2N 125.6E	PCN 2		DMSP36		RKSO
77	291204	29.2N 125.7E	PCN 4		DMSP36		PGTW
78	291502	29.5N 125.4E	PCN 4		DMSP35		PGTW
79	292102	29.9N 125.0E	PCN 5		DMSP37		PGTW
80	292102	29.9N 125.3E	PCN 2	T4.0/4.0-/50.0/24HRS	DMSP37		RKSO
81	292102	29.9N 125.1E	PCN 3		DMSP37		RODN
82	292243	29.8N 125.3E	PCN 3		DMSP37		RKSO
83	292243	29.8N 125.2E	PCN 3		DMSP37		RPMK
84	292305	29.9N 125.3E	PCN 3	T4.5/4.5-/D0.5/26HRS	DMSP36		PGTW
85	292305	29.9N 125.1E	PCN 3	T4.5/4.5-/D1.0/26HRS	DMSP36		RPMK
86	300202	29.9N 125.1E	PCN 3		DMSP35		RPMK
87	300203	30.0N 125.3E	PCN 1		DMSP35		RKSO
88	300203	30.1N 125.0E	PCN 2		DMSP35		PGTW
89	301124	30.9N 125.5E	PCN 4		DMSP37		RODN
90	301147	30.5N 124.8E	PCN 4		DMSP36		PGTW
91	301147	30.6N 125.0E	PCN 3		DMSP36		RKSO
92	301444	30.4N 124.7E	PCN 3		DMSP35		PGTW
93	301445	30.3N 124.5E	PCN 3		DMSP35		RKSO
94	301626	30.3N 124.9E	PCN 3		DMSP35		RKSO

TROPICAL STORM AGNES

SATELLITE FIXES

FIX NO.	TIME (Z)	FIX POSITION	ACCRV	UVZ&K CODE	SAT	COMMENTS	SITE
1	240049	19.4N 114.0E	PCN 5	T1.0/1.0	DMSPT6	INIT J35	RPMK
2	240349	19.4N 115.0E	PCN 5		DMSPT5		RPMK
3	241149	19.5N 115.8E	PCN 5		DMSPT7	CI UP	RPMK
4	241149	17.9N 115.4E	PCN 5		DMSPT6		PGTW
5	241149	18.4N 115.5E	PCN 5		DMSPT6		RKSO
6	241225	14.1N 115.7E	PCN 5		NDA44		PGTW
7	241631	19.0N 115.2E	PCN 4		DMSPT5		RPMK
8	242239	19.4N 114.1E	PCN 5	T2.0/2.0	DMSPT7	INIT J35	RODN
9	250031	19.2N 115.8E	PCN 5	T3.0/3.0 /D2.0/24HRC	DMSPT6		RPMK
10	250102	19.7N 115.9E	PCN 5	T3.0/3.0	NDA44	INIT J35	PGTW
11	250332	20.0N 115.8E	PCN 3		DMSPT5	EXPOSED LOW LVI	RODN
12	250332	20.1N 115.8E	PCN 3		DMSPT5	EXPOSED LOW LVI	RPMK
13	250332	20.2N 116.0E	PCN 3	T2.5/2.5	DMSPT5	INIT J35	RKSO
14	251120	20.3N 115.5E	PCN 4		DMSPT7		RODN
15	251141	21.0N 115.6E	PCN 5		NDA44		PGTW
16	251313	20.5N 115.7E	PCN 4		DMSPT6		RODN
17	251613	21.1N 115.4E	PCN 3		DMSPT5		RODN
18	251614	21.0N 115.9E	PCN 4		DMSPT5		RPMK
19	252219	21.5N 115.0E	PCN 5	T4.0/4.0 /D1.0/27HRC	DMSPT7		PGTW
20	252220	20.4N 115.1E	PCN 5	T3.0/3.0 /D1.0/24HRC	DMSPT7	BASED JN U/L GRAVITY WAVES	RODN
21	260014	21.9N 115.1E	PCN 5	T3.0/3.0 /S0.0/24HRC	DMSPT6		RPMK
22	260015	21.2N 115.6E	PCN 5	T3.0/3.0 /D1.0/24HRC	DMSPT6		RODN
23	260314	21.4N 115.0E	PCN 3		DMSPT5		RODN
24	260314	21.5N 114.6E	PCN 3		DMSPT5		RPMK
25	261101	21.5N 114.1E	PCN 2		DMSPT7		RKSO
26	261101	21.3N 114.0E	PCN 2		DMSPT7		PGTW
27	261254	20.9N 114.0E	PCN 4		NDA44		PGTW
28	261256	21.1N 114.0E	PCN 3		DMSPT6		RPMK
29	261555	21.1N 113.3E	PCN 6		DMSPT5		RPMK
30	261556	21.1N 113.9E	PCN 3		DMSPT5		RODN
31	262200	21.2N 113.5E	PCN 1	T4.0/4.0	DMSPT7	INIT J35	RKSO
32	262200	21.3N 113.3E	PCN 1	T4.5/4.5 /D0.5/24HRC	DMSPT7		PGTW
33	262357	21.4N 112.9E	PCN 1	T4.0/4.0 /D0.5/24HRC	DMSPT6		RPMK
34	262357	21.3N 113.0E	PCN 1	T3.5/3.5 /D0.5/25HRC	DMSPT6		RODN
35	271041	21.2N 112.6E	PCN 1		DMSPT7		RPMK
36	271041	21.0N 112.4E	PCN 2		DMSPT7		PGTW
37	271239	21.1N 112.3E	PCN 1		DMSPT5		RKSO
38	271538	20.4N 112.1E	PCN 4	T4.0/4.0 /S0.0/24HRC	DMSPT5		RPMK
39	271538	21.1N 111.9E	PCN 1		DMSPT5	BANDING FYE	PGTW
40	272322	20.9N 111.6E	PCN 2		DMSPT7		RODN
41	272339	20.9N 112.0E	PCN 1	T3.0/3.5 /W0.5/24HRC	DMSPT6		RODN
42	272340	20.3N 111.7E	PCN 1	T3.0/4.0 /W1.0/24HRC	DMSPT6		RKSO
43	272340	20.6N 111.8E	PCN 1	T4.0/4.0 /S0.0/24HRC	DMSPT6		RPMK
44	280239	21.0N 111.8E	PCN 5		DMSPT5	CI SAME	RODN
45	280420	20.6N 112.0E	PCN 1		DMSPT5		RPMK
46	281203	20.4N 111.8E	PCN 4		DMSPT7		RODN
47	281203	20.3N 112.2E	PCN 6		DMSPT7		RPMK
48	281222	20.4N 111.6E	PCN 4		DMSPT6	CI UD4V	RODN
49	281222	20.4N 111.8E	PCN 4		DMSPT6	CI UD4V	RKSO
50	281222	20.5N 112.3E	PCN 4		DMSPT6		RPMK
51	281520	20.3N 112.2E	PCN 6		DMSPT6		PGTW
52	282323	20.5N 112.5E	PCN 3		DMSPT6		PGTW
53	282323	20.6N 112.7E	PCN 3	T2.5/3.5 /W1.5/24HRC	DMSPT6		RPMK
54	290402	20.4N 113.7E	PCN 1	T3.0/3.0 /S0.0/24HRC	DMSPT5		RODN
55	290402	20.6N 113.4E	PCN 1		DMSPT5		RPMK
56	291144	21.3N 114.7E	PCN 2		DMSPT7		RODN
57	291144	21.5N 114.4E	PCN 6		DMSPT7		RPMK
58	291204	21.4N 114.4E	PCN 4		DMSPT6		PGTW
59	291204	21.5N 114.3E	PCN 6		DMSPT6		RKSO
60	291644	21.6N 114.7E	PCN 6		DMSPT5	APPEARS WEAKFR	RODN
61	291644	22.0N 114.6E	PCN 4		DMSPT5	CI UD4V	RPMK
62	292243	22.4N 115.0E	PCN 3	T3.0/3.0	DMSPT7	INIT J35	RKSO
63	292243	22.7N 114.5E	PCN 3	T2.5/2.5 /S0.0/23HRC	DMSPT7		RPMK
64	300114	22.5N 114.9E	PCN 5	T2.5/2.5	NDA44	INIT J35	PGTW
65	300344	22.9N 115.2E	PCN 3		DMSPT5	CENTRAL CLOUD MASS 23.2N 114.4E	RPMK
66	300345	22.7N 115.3E	PCN 3		DMSPT5		RKSO
67	300345	23.0N 114.4E	PCN 5	T2.0/2.0	DMSPT5	INIT J35	RODN
68	301124	23.9N 114.6E	PCN 6		DMSPT7		RODN
69	310030	24.3N 114.1E	PCN 3	T1.0/2.0 /W1.5/23HRC	NDA44		PGTW

RAJAR FIXES

FIX NO.	TIME (Z)	FIX POSITION	RADAR	ACCRV	EYE SHAPE	EYE DIAM	RADAR-CODE ASWAN TDDFF	COMMENTS	RADAR POSITION	SITE WMO NO.
1	250010	19.7N 115.8E	LAND				55411 50107		22.3N 114.2E	45005
2	250400	20.1N 115.7E	LAND				55711.5/111		22.3N 114.2E	45005
3	250700	20.3N 115.7E	LAND				5564/11111		22.3N 114.2E	45005
4	250900	20.4N 115.7E	LAND				3547/11111		22.3N 114.2E	45005
5	251200	21.2N 115.7E	LAND				3544/11111		22.3N 114.2E	45005
6	251500	21.3N 115.5E	LAND				3544 11111		22.3N 114.2E	45005
7	251758	21.4N 115.5E	LAND				2134/ 73403		22.3N 114.2E	45005
8	252100	21.4N 115.2E	LAND				3576/11111		22.3N 114.2E	45005
9	260000	21.5N 114.8E	LAND				3576/ 72806		22.3N 114.2E	45005

10	260300	21.5N	114.6E	LAND	2197/ 72900	22.3N	114.2E	45005
11	260500	21.5N	114.4E	LAND	2197/ 52705	22.3N	114.2E	45005
12	260900	21.4N	114.1E	LAND	2194/ 52205	22.3N	114.2E	45005
13	261200	21.3N	114.0E	LAND	10R11 52704	22.3N	114.2E	45005
14	261400	21.3N	113.9E	LAND	10R11 52704	22.3N	114.2E	45005
15	261500	21.3N	113.8E	LAND	10R11 52704	22.3N	114.2E	45005
16	261500	21.3N	113.8E	LAND	10R11 52703	22.3N	114.2E	45005
17	261700	21.3N	113.8E	LAND	10R11 52703	22.3N	114.2E	45005
18	261900	21.3N	113.7E	LAND	10R11 52804	22.3N	114.2E	45005
19	261900	21.3N	113.6E	LAND	10R11 52805	22.3N	114.2E	45005
20	262130	21.3N	113.5E	LAND	10912 52704	22.3N	114.2E	45005
21	270000	21.3N	113.3E	LAND	10912 52705	22.3N	114.2E	45005
22	270300	21.3N	113.0E	LAND	10942 52704	22.3N	114.2E	45005
23	270500	21.3N	112.7E	LAND	10912 82705	22.3N	114.2E	45005
24	270900	21.3N	112.5E	LAND	10A13 92705	22.3N	114.2E	45005
25	271200	21.2N	112.3E	LAND	21643 52405	22.3N	114.2E	45005
26	271300	21.1N	112.2E	LAND	10R43 52306	22.3N	114.2E	45005
27	271400	21.1N	112.1E	LAND	10143 52700	22.3N	114.2E	45005
28	271500	21.1N	112.0E	LAND	10R13 52506	22.3N	114.2E	45005
29	271500	21.0N	111.9E	LAND	20R43 52405	22.3N	114.2E	45005
30	271900	20.9N	111.8E	LAND	21111 52204	22.3N	114.2E	45005
31	272100	20.9N	112.0E	LAND	35111 11111	22.3N	114.2E	45005
32	272200	20.9N	112.0E	LAND	20973 53602	22.3N	114.2E	45005
33	272300	20.9N	112.0E	LAND	25743 50000	22.3N	114.2E	45005
34	280000	20.9N	111.9E	LAND	25743 51111	22.3N	114.2E	45005
35	280200	20.9N	111.9E	LAND	25942 72103	22.3N	114.2E	45005
36	280500	20.9N	111.8E	LAND	25913 73002	22.3N	114.2E	45005
37	281200	20.4N	112.0E	LAND	25943 61205	22.3N	114.2E	45005
38	281500	20.3N	112.2E	LAND	28547 71306	22.3N	114.2E	45005
39	281900	20.4N	112.4E	LAND	25857 70404	22.3N	114.2E	45005
40	282100	20.5N	112.6E	LAND	10R57 50704	22.3N	114.2E	45005
41	282200	20.5N	112.7E	LAND	20R43 51107	22.3N	114.2E	45005
42	290000	20.5N	112.9E	LAND	25943 50810	22.3N	114.2E	45005
43	290200	20.5N	113.1E	LAND	10773 50907	22.3N	114.2E	45005
44	290300	20.6N	113.3E	LAND	10R13 50415	22.3N	114.2E	45004
45	290400	20.7N	113.4E	LAND	10343 50705	22.3N	114.2E	45005
46	290500	20.9N	113.7E	LAND	10534 50708	22.3N	114.2E	45005
47	290900	21.2N	114.2E	LAND	10322 60710	22.3N	114.2E	45005
48	291200	21.5N	114.4E	LAND	25112 50611	22.3N	114.2E	45005
49	292140	22.6N	114.8E	LAND	50577 11111	22.3N	114.2E	45005
50	300000	22.9N	114.7E	LAND	65111 11111	22.3N	114.2E	45005

TROPICAL STORM BONNIE

SATELLITE FIXES

FIX NO.	TIME (Z)	FIX POSITION	ACCR	UVORAK CODE	SAT	COMMENTS	SITE
1	090140	18.9N 114.5E	PCN 5	T0.0/0.0	N0AA5	INIT OBS	PGTW
2	091219	20.0N 114.5E	PCN 6		N0AA5		PGTW
3	092318	18.5N 114.3E	PCN 3	T1.0/1.0	DMSP36	INIT OBS	RPMK
4	100056	19.0N 113.9E	PCN 3	T1.0/1.0 /D1.0/24HRS	N0AA5		PGTW
5	100352	18.3N 113.8E	PCN 5		DMSP35		RPMK
6	101113	18.3N 112.2E	PCN 6		DMSP37		RPMK
7	101113	16.9N 110.7E	PCN 5		DMSP37		RODN
8	101200	18.4N 112.4E	PCN 5		DMSP36	CI SAME	PGTW
9	101534	18.1N 111.6E	PCN 6		DMSP35		RPMK
10	102213	17.4N 110.4E	PCN 5		DMSP37		PGTW
11	102213	17.5N 110.7E	PCN 5		DMSP37		RPMK
12	110042	17.5N 110.4E	PCN 3	T2.5/2.5 /D1.5/25HRS	DMSP36		RPMK
13	110334	17.9N 109.4E	PCN 5		DMSP35	MID ANG LOW LVL	RPMK
14	111054	17.9N 107.9E	PCN 6		DMSP37		PGTW
15	111324	16.2N 106.2E	PCN 6		DMSP36	UPR LVL	RPMK
16	111516	16.4N 106.5E	PCN 6		DMSP35	UPR LVL	RPMK
17	120021	17.4N 105.0E	PCN 3	T2.5/2.5-/50.0/24HRS	DMSP36		RPMK
18	120125	17.5N 104.7E	PCN 6		N0AA5		PGTW
19	120316	17.7N 104.6E	PCN 5		DMSP35		RPMK

CATELITE FIXES

FIX NO.	TIME (Z)	FIX POSITION	ACCY	UNIQUE CODE	SAT	COMMENTS	SITE
1	080104	16.3N 165.8E	PCV 6	T4.0/0.0	DMSP35	INIT J35	PGTW
2	091023	16.5N 165.7E	PCV 6		N08A4		PGTW
3	092300	16.8N 165.5E	PCV 5	T4.0/1.0	N08A4	INIT J35	PGTW
4	100210	17.1N 163.9E	PCV 5		DMSP35		PGTW
5	100332	16.0N 165.0E	PCV 6		DMSP37	CI UP	PGTW
6	101019	15.2N 165.7E	PCV 6		DMSP35		PGTW
7	101311	16.5N 165.0E	PCV 6		DMSP35		PGTW
8	102032	15.2N 164.6E	PCV 5	T2.0/7.0 /01.0/22HRS	DMSP37		PGTW
9	102119	15.2N 164.5E	PCV 5		N08A4		PGTW
10	110012	16.1N 164.8E	PCV 5		DMSP37		RODN
11	110912	16.0N 164.0E			DMSP37		PGTW
12	110913	15.7N 164.2E	PCV 6		DMSP35	CI SAME	PGTW
13	111434	15.7N 164.3E	PCV 4		DMSP37		PGTW
14	112012	15.7N 164.4E	PCV 3	T2.5/2.5 /00.5/24HRS	DMSP36	INIT J35	RPMK
15	112243	15.9N 164.4E	PCV 3	T4.0/4.0	DMSP36		PGTW
16	112243	15.9N 164.4E	PCV 3		DMSP35		PGTW
17	120135	16.1N 164.5E	PCV 3		DMSP37	CI SAME	PGTW
18	120953	17.9N 164.2E	PCV 6		DMSP37	UPR LVL	RODN
19	120953	19.9N 165.4E	PCV 6		DMSP37		PGTW
20	121125	18.0N 163.9E	PCV 5		DMSP36		PGTW
21	121417	18.1N 163.3E	PCV 6		DMSP35		PGTW
22	122134	19.5N 161.6E	PCV 6	T3.5/3.5 /01.0/25HRS	DMSP37		PGTW
23	122134	19.9N 161.6E	PCV 4		DMSP37		RODN
24	122225	19.6N 161.6E	PCV 5		DMSP36		PGTW
25	122226	19.5N 161.4E	PCV 3	T3.0/3.0	DMSP36	INIT J35	RODN
26	130116	20.3N 160.8E	PCV 1		DMSP35		PGTW
27	131015	21.3N 134.2E	PCV 2		DMSP37		RODN
28	131015	21.9N 134.5E	PCV 1		DMSP37	INIT J35	RKSO
29	131015	21.5N 134.7E	PCV 2		DMSP37	CI UP	PGTW
30	131108	21.5N 134.5E	PCV 2		DMSP36		PGTW
31	131359	21.7N 137.2E	PCV 2		DMSP35		PGTW
32	132114	22.9N 135.4E	PCV 3	T3.5/3.5 /50.0/24HRS	DMSP35		PGTW
33	132115	23.0N 135.5E	PCV 3	T4.5/4.5	DMSP37	INIT J35	RKSO
34	132208	23.1N 135.4E	PCV 1		DMSP36		PGTW
35	142355	23.2N 134.9E	PCV 3		N08A4		PGTW
36	140240	23.9N 136.0E	PCV 1		DMSP35		PGTW
37	141241	24.0N 136.3E	PCV 1	T4.0/4.0	DMSP35	INIT J35	RPMK
38	141241	23.9N 136.4E	PCV 1	T4.5/4.5	DMSP35		RODN
39	140241	24.0N 136.5E	PCV 1	T4.5/4.5 24HRS	DMSP35		RKSO
40	140355	25.3N 130.8E	PCV 2		DMSP37		RPMK
41	141036	24.7N 132.2E	PCV 1		N08A4		PGTW
42	141523	25.0N 130.0E	PCV 2		DMSP35		PGTW
43	142055	26.2N 129.4E	PCV 2	T4.5/4.5 /01.0/24HRS	DMSP37		PGTW
44	142237	26.1N 129.4E	PCV 3		DMSP37	EDGE OF DATA	RPMK
45	142323	26.4N 128.7E	PCV 1	T5.0/5.0 /00.5/24HRS	DMSP36		RKSO
46	142332	26.4N 128.9E	PCV 2		DMSP36		PGTW
47	142333	26.3N 128.8E	PCV 1	T5.0/5.0 /00.5/21HRS	DMSP36		RODN
48	150108	26.6N 128.5E	PCV 1		N08A4		PGTW
49	150222	26.7N 128.1E	PCV 1		DMSP35		RPMK
50	150223	26.7N 127.9E	PCV 1	T4.5/4.5 /00.5/24HRS	DMSP35		RKSO
51	150223	26.7N 127.9E	PCV 1		DMSP35		RODN
52	150223	26.7N 128.0E	PCV 1		DMSP37		RPMK
53	151117	27.2N 125.9E	PCV 2		DMSP37		RKSO
54	151118	27.4N 126.6E	PCV 2		DMSP37		PGTW
55	151149	27.5N 125.9E	PCV 1		N08A4		PGTW
56	151215	27.4N 125.8E	PCV 2		DMSP36		PGTW
57	151505	27.9N 124.1E	PCV 1		DMSP35		PGTW
58	152217	27.9N 124.0E	PCV 3	T5.0/5.0 /50.0/23HRS	DMSP37		RODN
59	152217	28.0N 124.1E	PCV 1	T4.0/5.0- /W1.0/24HRS	DMSP37		RKSO
60	152315	28.1N 124.1E	PCV 1	T5.0/5.0- /00.5/21HRS	DMSP36		RPMK
61	152315	28.3N 123.8E	PCV 1	T5.0/5.0- /00.5/25HRS	DMSP36		PGTW
62	160205	28.1N 123.8E	PCV 1		DMSP35		RKSO
63	160205	28.3N 123.5E	PCV 1		DMSP35		PGTW
64	160205	28.3N 123.6E	PCV 5		DMSP35		RODN
65	161058	27.9N 123.0E	PCV 2		DMSP37		RPMK
66	161058	28.4N 123.2E	PCV 1		DMSP37	CTR IN EYE	RKSO
67	161157	28.6N 123.3E	PCV 3		DMSP36		PGTW
68	161446	28.8N 123.0E	PCV 3		DMSP35		PGTW
69	161528	28.2N 122.4E	PCV 3		DMSP35		RPMK
70	161529	28.7N 122.9E	PCV 6		DMSP35		RODN
71	162159	28.3N 122.7E	PCV 5	T3.5/4.0- /W0.5/24HRS	DMSP37		RKSO
72	162159	28.5N 122.2E	PCV 5	T3.5/4.5 /W1.5/23HRS	DMSP37		PGTW
73	162159	28.4N 122.4E	PCV 5	T3.5/4.5 /W1.5/22HRS	DMSP37		RPMK
74	162258	28.4N 122.4E	PCV 5		DMSP36		PGTW
75	170147	29.1N 122.7E	PCV 5		DMSP35		PGTW
76	170329	28.3N 122.4E	PCV 5		DMSP35		RKSO
77	170329	28.5N 122.0E	PCV 6	T3.5/4.5- /W1.5/29HRS	DMSP35		RODN
78	171038	28.5N 123.0E	PCV 6		DMSP37		PGTW
79	171039	28.3N 122.6E	PCV 6		DMSP37	UPR LVL CTR	RODN
80	171139	28.7N 123.1E	PCV 5		DMSP35		PGTW
81	171511	28.2N 123.1E	PCV 5		DMSP35		RKSO
82	171511	28.4N 123.1E	PCV 3		DMSP35		RPMK
83	172138	28.7N 123.1E	PCV 6	T2.0/3.0 /W1.5/18HRS	DMSP37		RODN
84	172138	28.6N 123.4E	PCV 5	T2.0/3.0 /W1.5/24HRS	DMSP37		PGTW
85	172241	28.9N 123.5E	PCV 5		DMSP36		RODN
86	172241	28.5N 123.3E	PCV 5		DMSP36		PGTW
87	172241	29.1N 123.4E	PCV 5		DMSP36		RKSO
88	180053	28.4N 123.3E	PCV 3		N08A4		PGTW
89	180311	28.4N 123.6E	PCV 3	T3.0/3.5- /W0.5/29HRS	DMSP35		RPMK
90	180311	28.6N 123.9E	PCV 5		DMSP35		RODN
91	180311	28.5N 123.6E	PCV 5	T2.0/3.0- /W1.5/24HRS	DMSP35		RKSO
92	181019	28.3N 124.0E	PCV 5		DMSP37		RKSO
93	181019	27.9N 124.1E	PCV 4		DMSP37		PGTW

94	181122	27.4N	124.0E	PCN 4		DMSP34		PGTW
95	181133	27.4N	124.1E	PCN 6		N0844		PSTW
96	181304	24.4N	124.1E	PCN 6		DMSP36	UPR LVL	RODN
97	181553	24.3N	124.0E	PCN 3		DMSP35		RKSO
98	181553	24.5N	123.4E	PCN 3		DMSP35		RPMK
99	192119	24.1N	123.5E	PCN 6		DMSP37		RODN
100	182119	23.0N	124.0E	PCN 5		DMSP37		PGTW
101	182223	23.2N	124.2E	PCN 4		DMSP36		PGTW
102	190004	24.4N	124.0E	PCN 5	T2.0/3.0 /w1.0/21HRS	DMSP36		RPMK
103	190004	24.2N	124.5E	PCN 5	T2.0/2.0 /50.0/27HRS	N0844		PGTW
104	191000	30.6N	125.2E	PCN 5		DMSP37		RKSO
105	191000	30.6N	125.2E	PCN 5		DMSP37	CI SAME	PGTW
106	191049	30.7N	124.5E	PCN 5		N0844		PGTW
107	191247	31.1N	124.7E	PCN 5		DMSP36		RODN
108	191535	31.5N	124.6E	PCN 3		DMSP35		RPMK
109	191535	31.5N	125.7E	PCN 5		DMSP35		RODN
110	192059	33.5N	124.3E	PCN 5		DMSP37		RODN
111	192059	34.0N	124.0E	PCN 3		DMSP37		PGTW
112	192059	33.9N	124.3E	PCN 5		DMSP37		RKSO
113	192205	34.2N	124.2E	PCN 5		DMSP36		PGTW
114	200122	35.0N	124.2E	PCN 5	T1.0/2.0 /w1.0/25HRS	N0844		PGTW
115	200235	35.3N	127.4E	PCN 5		DMSP35		RKSO
116	200235	35.4N	127.7E	PCN 5	T0.0/1.0 /w2.0/22HRS	DMSP35		RPMK

ATCRAFT FIXES

FIX NO.	TIME (Z)	FIX POSITION	FLT LVL	MIN HGT	ORBS MSLP	MAX-SFC-WND VEL/DRG/RNG	MAX-FLT-LVL-WND DIR/VEL/DRG/4NR	ACCRV NAV/MET	EYE SHAPE	EYE DIMEN- DIAM/TATION	EYE TEMP (C) IN/ DP/SS	WSN NO.
1	100128	17.3N 144.0E	1500FT		1004	15 010 10		4 20			+24 29	1
2	100705	17.0N 143.0E	1500FT		1007	25 170 130	240 15 170 75 15 5			+26 +26 +26	29	2
3	101020	16.7N 144.7E	700MB				310 20 270 240 5 15			+12 +11		3
4	110030	16.1N 144.8E	700MB	3085		40 010 30	120 40 010 30			+10 + 9		2
5	110309	15.6N 144.5E	700MB	3014	992	70 220 15	040 40 300 60 4 5			+12 +12 +11		3
6	111100	15.6N 144.5E	700MB	3005			200 45 070 17			+14 + 8		4
7	111433	15.9N 144.3E	700MB	2989	989		320 58 190 22 4 2	ELLIPTICAL	35 22 120	+10 +14 +07		4
8	112228	15.9N 144.3E	700MB	2952	983	30 170 15	230 80 170 8 1 5	CIRCULAR	25	+13 +15 +11		5
9	120100	16.2N 144.3E	700MB	2942		100 310 10	070 65 310 14			+16		5
10	120315	16.3N 144.1E	700MB	2924	980	30 240 10	260 65 240 10 2 5	CIRCULAR	20	+12 +19		5
11	121235	17.5N 143.3E	700MB	2972			150 61 050 40			+17 + 9		5
12	121531	18.3N 142.9E	700MB	2949	983		150 61 110 40 10 10			+13 +16 +11		5
13	130338	20.6N 140.2E	700MB	2898	976	90 090 15	150 80 090 15 5 5	CIRCULAR	25	+10 +19 +11		7
14	131510	22.3N 137.1E	700MB	2864	974		180 70 120 45 5 5	ELLIPTICAL	35 20 50	+09 +16 +10		9
15	131735	22.6N 136.3E	700MB	2851			230 52 350 25			+15 +11		9
16	140150	23.5N 134.4E	700MB	2813	969	90 140 15	240 65 140 15 3 1	CIRCULAR	28	+15 +19 +12		9
17	140413	23.9N 133.8E	700MB	2814	969	90 180 20	260 70 180 20 3 3	CIRCULAR	25	+12 +18 +12		9
18	141549	25.7N 130.8E	700MB	2783	965		300 58 190 30 5 3	ELLIPTICAL	25 20 30	+11 +16 +13		10
19	141915	25.3N 129.9E	700MB	2752			110 118 300 15			+14 +14		10
20	142037	26.1N 129.5E	700MB	2765	963		030 68 320 20 5 3	CIRCULAR	28	+12 +16 +11		10
21	151231	27.5N 125.8E	700MB	2752			080 89 300 24			+18 +13		11
22	151434	27.9N 125.1E	700MB	2744			080 85 350 24 5 2	CIRCULAR	15	+16 +18 +10		11

RAJAN FIXES

FIX NO.	TIME (Z)	FIX POSITION	KADAR	ACCRV	EYE SHAPE	EYE DIA	RAJAN-CODE ASWAK IDUFF	COMMENTS	KADAR POSITION	SIF WND NO.
1	110645	15.9N 144.7E	LAND		ELLIPTICAL	12		OPEN SW	13.0N 144.9E	91218
2	110745	16.0N 144.6E	LAND	FAIR	ELLIPTICAL	14		OPEN W THRU S	13.0N 144.9E	91218
3	110845	15.9N 144.8E	LAND	GOOD	CIRCULAR	25		OPEN NW AND SE	13.0N 144.9E	91218
4	110945	15.9N 144.2E	LAND	FAIR	ELLIPTICAL	23		OPEN NW AND E THRU S	13.0N 144.9E	91218
5	111045	15.7N 144.3E	LAND	GOOD	CIRCULAR	25		OPEN E	13.0N 144.9E	91218
6	111145	15.7N 144.4E	LAND	GOOD	CIRCULAR	23		OPEN NW AND E	13.0N 144.9E	91218
7	111245	15.7N 144.5E	LAND	POOR				OPEN W THRU E	13.0N 144.9E	91218
8	111345	15.9N 144.5E	LAND	GOOD	CIRCULAR	25		OPEN NE THRU S	13.0N 144.9E	91218
9	111445	15.9N 144.4E	LAND	GOOD	CIRCULAR	40		OPEN NE	13.0N 144.9E	91218
10	111545	15.9N 144.3E	LAND	GOOD	CIRCULAR	45		OPEN NW	13.0N 144.9E	91218
11	111645	15.9N 144.4E	LAND	GOOD	CIRCULAR	30		OPEN SW	13.0N 144.9E	91218
12	111745	15.9N 144.5E	LAND	GOOD	CIRCULAR	40		OPEN NW	13.0N 144.9E	91218
13	111845	16.0N 144.1E	LAND	POOR	ELLIPTICAL	40		OPEN W THRU N THRU E	13.0N 144.9E	91218
14	111945	15.9N 144.3E	LAND	GOOD	CIRCULAR	32		OPEN NW AND SE	13.0N 144.9E	91218
15	112045	16.0N 144.3E	LAND	GOOD	CIRCULAR	30		OPEN N	13.0N 144.9E	91218
16	141400	25.1N 131.4E	LAND				6111 1111		26.1N 127.8E	47937
17	141500	25.2N 131.2E	LAND				6111 53014		26.1N 127.8E	47937
18	141500	25.2N 131.2E	LAND				6111 52812		28.4N 129.5E	47909
19	141600	25.5N 131.0E	LAND	GOOD		20		MWV 3125	26.1N 127.7E	47937
20	141600	25.5N 130.9E	LAND				6111 53122		28.4N 129.5E	47909
21	141600	25.4N 130.8E	LAND				21001 63019		26.1N 127.8E	47937
22	141700	25.6N 130.7E	LAND	GOOD		20		MWV 2930	26.1N 127.7E	47937
23	141700	25.7N 130.6E	LAND				26702 53123		28.4N 129.5E	47909
24	141700	25.6N 130.6E	LAND				1171 73019		26.1N 127.8E	47937
25	141800	25.7N 130.5E	LAND	GOOD		20		MWV 3130	26.1N 127.7E	47937
26	141800	25.8N 130.4E	LAND				10712 53010		28.4N 129.5E	47909
27	141800	25.9N 130.2E	LAND				10611 73020		26.1N 127.8E	47937
28	141900	26.0N 130.1E	LAND	GOOD		20		MWV 3130	26.1N 127.7E	47937
29	141900	26.0N 130.0E	LAND				10642 53019		28.4N 129.5E	47909
30	141900	25.9N 130.0E	LAND				10611 73018		26.1N 127.8E	47937
31	141930	25.6N 129.6E	LAND	POOR					26.3N 127.8E	47931
32	142000	26.1N 129.9E	LAND	GOOD		20		MWV 3130	26.1N 127.7E	47937
33	142000	26.0N 129.8E	LAND				10811 73010		26.1N 127.8E	47937
34	142000	26.1N 129.8E	LAND				10612 53013		28.4N 129.5E	47909
35	142005	25.7N 129.5E	LAND	POOR					26.3N 127.8E	47931
36	142030	26.0N 129.6E	LAND	GOOD		20		MWV 3130	26.3N 127.8E	47931
37	142100	26.2N 129.6E	LAND	GOOD		20			26.1N 127.7E	47937
38	142100	26.2N 129.5E	LAND				10612 52919		28.4N 129.5E	47909
39	142100	26.1N 129.4E	LAND				10711 72624		26.1N 127.8E	47937

40	142105	26.1M	129.4E	LAND	GOOD					26.3M	127.8E	47931
41	142130	26.1M	129.4E	LAND	GOOD					26.3M	127.8E	47931
42	142200	26.1M	129.2E	LAND	GOOD	CIRCULAR	25			26.3M	127.8E	47931
43	142200	26.2M	129.2E	LAND				10611	72915	26.1M	127.8E	47937
44	142200	26.3M	129.3E	LAND				10612	53115	28.4M	129.5E	47909
45	142200	26.3M	129.3E	LAND	GOOD					26.1M	127.7E	47937
46	142230	26.2M	129.1E	LAND	GOOD	CIRCULAR	25			26.3M	127.8E	47931
47	142300	26.3M	128.9E	LAND				10611	72917	26.1M	127.8E	47937
48	142300	26.3M	128.9E	LAND	GOOD	ELLIPTICAL	20			26.3M	127.8E	47931
49	142300	26.4M	129.0E	LAND	GOOD					26.1M	127.7E	47937
50	142300	26.6M	129.8E	LAND	POUR					26.2M	127.6E	47930
51	142300	26.4M	128.9E	LAND				10612	52920	28.4M	129.5E	47909
52	142330	26.3M	128.3E	LAND	GOOD	ELLIPTICAL	17			26.3M	127.8E	47931
53	150000	26.5M	128.7E	LAND	GOOD					26.1M	127.7E	47937
54	150000	26.4M	128.6E	LAND	GOOD	ELLIPTICAL	17			26.3M	127.8E	47931
55	150000	26.4M	128.7E	LAND				10612	52913	28.4M	129.5E	47909
56	150000	26.5M	129.4E	LAND	GOOD					26.2M	127.6E	47930
57	150030	26.6M	128.5E	LAND	GOOD	ELLIPTICAL	22			26.3M	127.8E	47931
58	150100	26.5M	128.4E	LAND				14711	72916	26.1M	129.5E	47937
59	150100	26.6M	128.4E	LAND	GOOD					26.2M	127.6E	47930
60	150100	26.5M	128.4E	LAND	GOOD	ELLIPTICAL	19			26.3M	127.8E	47931
61	150100	26.6M	128.5E	LAND	GOOD					26.1M	127.7E	47937
62	150100	26.5M	128.5E	LAND				57742	52915	28.4M	129.5M	47909
63	150135	26.6M	128.3E	LAND	GOOD	ELLIPTICAL	14			26.3M	127.8E	47931
64	150200	26.7M	128.2E	LAND	GOOD					26.2M	127.6E	47930
65	150200	26.6M	128.2E	LAND	GOOD	ELLIPTICAL	17			26.3M	127.8E	47931
66	150200	26.7M	128.3E	LAND	GOOD					26.1M	127.7E	47937
67	150200	26.6M	128.2E	LAND				57742	52919	28.4M	129.5E	47909
68	150200	26.5M	128.2E	LAND				11711	72915	26.1M	127.8E	47937
69	150300	26.8M	127.9E	LAND	GOOD	ELLIPTICAL	20			26.1M	127.8E	47931
70	150300	26.8M	127.9E	LAND				11741	73016	28.4M	129.5E	47909
71	150300	26.7M	128.0E	LAND				47712	53113	26.1M	127.8E	47937
72	150300	26.9M	128.0E	LAND	GOOD					26.1M	127.8E	47937
73	150300	26.8M	127.9E	LAND	POUR					28.4M	129.5E	47909
74	150330	26.8M	127.8E	LAND	GOOD	ELLIPTICAL	20			26.1M	127.8E	47937
75	150400	27.0M	127.6E	LAND	POUR					26.2M	127.6E	47930
76	150400	26.8M	127.6E	LAND				11811	72916	26.1M	127.8E	47931
77	150400	26.9M	127.8E	LAND				57742	53215	28.4M	129.5E	47909
78	150400	26.9M	127.7E	LAND	GOOD	ELLIPTICAL	21			26.1M	127.8E	47931
79	150400	26.9M	127.7E	LAND	GOOD					26.1M	127.7E	47937
80	150500	27.0M	127.6E	LAND				57742	53013	28.4M	129.5E	47909
81	150500	27.1M	127.5E	LAND	GOOD					26.1M	127.7E	47937
82	150500	27.0M	127.5E	LAND	GOOD	CIRCULAR	23			26.1M	127.8E	47931
83	150500	27.0M	127.4E	LAND				10711	72915	26.1M	127.8E	47937
84	150600	27.1M	127.2E	LAND				10811	73014	26.1M	127.8E	47937
85	150600	27.2M	127.6E	LAND				67741	53019	28.4M	129.5E	47909
86	150600	27.1M	127.3E	LAND	GOOD					26.1M	127.7E	47937
87	150700	27.1M	127.0E	LAND				37713	53011	24.8M	125.3E	47927
88	150700	27.2M	127.0E	LAND				10812	73012	26.1M	127.8E	47937
89	150700	27.3M	127.0E	LAND	GOOD					26.1M	127.7E	47937
90	150700	27.2M	127.2E	LAND				17741	53015	28.4M	129.5E	47909
91	150800	27.3M	126.8E	LAND	GOOD	CIRCULAR	16			26.1M	127.8E	47931
92	150800	27.3M	126.8E	LAND				10712	72912	26.1M	127.8E	47937
93	150800	27.2M	126.9E	LAND				67741	52716	28.4M	129.5E	47909
94	150800	27.3M	126.8E	LAND				37712	53116	24.8M	125.3E	47927
95	150800	27.3M	126.8E	LAND	GOOD					26.1M	127.7E	47937
96	150900	27.3M	126.5E	LAND				10731	72912	26.1M	127.8E	47937
97	150900	27.4M	126.6E	LAND				37712	53011	24.8M	125.3E	47927
98	150900	27.3M	126.5E	LAND	GOOD					26.1M	127.7E	47937
99	150900	27.2M	126.5E	LAND				67741	52820	28.4M	129.5E	47909
100	151000	27.5M	126.3E	LAND				37712	52916	24.8M	125.3E	47927
101	151000	27.3M	126.3E	LAND	GOOD					26.3M	126.8E	47929
102	151000	27.4M	126.4E	LAND	FAIR	CIRCULAR	17			26.1M	127.8E	47931
103	151000	27.4M	126.3E	LAND				20842	72914	26.1M	127.8E	47937
104	151030	27.5M	126.2E	LAND	FAIR	CIRCULAR	16			26.1M	127.8E	47931
105	151100	27.5M	126.0E	LAND				20711	72914	26.1M	127.8E	47937
106	151100	27.5M	126.1E	LAND	POUR	CIRCULAR	16			26.1M	127.8E	47937
107	151100	27.5M	126.1E	LAND	GOOD					26.3M	126.8E	47929
108	151100	27.5M	126.0E	LAND				37712	52714	24.8M	125.3E	47927
109	151200	27.6M	125.9E	LAND				57742	52908	24.8M	125.3E	47927
110	151200	27.5M	125.8E	LAND				67741	72912	26.1M	127.8E	47937
111	151200	27.6M	125.9E	LAND	GOOD					26.1M	127.8E	47937
112	151300	27.6M	125.7E	LAND				67741	72916	26.1M	127.8E	47937
113	151300	27.7M	125.6E	LAND				57742	53012	24.8M	125.3E	47927
114	151300	27.6M	125.7E	LAND	GOOD					26.3M	126.8E	47929
115	151400	27.6M	125.4E	LAND				67741	72811	26.1M	127.8E	47937
116	151400	27.9M	125.3E	LAND				37742	52915	24.8M	125.3E	47927
117	151400	27.7M	125.6E	LAND	FAIR					26.3M	126.8E	47929
118	151500	27.8M	125.2E	LAND				37742	52911	24.8M	125.3E	47927
119	151500	27.7M	125.2E	LAND				67741	73012	26.1M	127.8E	47937
120	151500	27.9M	125.0E	LAND	FAIR					26.3M	126.8E	47929
121	151600	27.9M	124.9E	LAND				57742	52715	24.8M	125.3E	47927
122	151700	27.9M	124.8E	LAND				57741	53108	24.8M	125.3E	47927
123	151800	28.0M	124.6E	LAND				57742	53013	24.8M	125.3E	47927
124	151900	28.0M	124.4E	LAND				57742	52711	24.8M	125.3E	47927
125	152000	28.1M	124.3E	LAND				57742	53308	24.8M	125.3E	47927

TROPICAL STORM DELIA

SATELLITE FIXES

FIX NO.	TIME (Z)	FIX POSITION	ACCR	JOYPAK CODE	SAT	COMMENTS	SITE
1	100210	12.5N 128.7E	PCN 5	TU.0/0.0	DMSP35	IN11 JHS	PGTW
2	101200	14.8N 129.5E	PCN 5		DMSP35	CI UP	PGTW
3	102213	15.5N 129.9E	PCN 5	TU.0/0.0 /SU.0/20HRS	DMSP37		PGTW
4	111054	18.4N 126.9E	PCN 5		DMSP37	CI UP	PGTW
5	111142	18.4N 127.0E	PCN 5		DMSP36		PGTW
6	111434	18.8N 126.6E	PCN 5		DMSP35		PGTW
7	111434	18.3N 127.0E	PCN 5		DMSP35		RODN
8	112154	20.0N 124.0E	PCN 5	T1.0/1.0 /01.0/24HRS	DMSP37		PGTW
9	112243	20.7N 124.7E	PCN 5		DMSP36		PGTW
10	112243	20.1N 125.8E	PCN 5	T1.0/1.0	DMSP36	IN11 JHS	RPMK
11	120125	20.9N 124.6E	PCN 5		NOAA5		PGTW
12	120316	22.1N 125.2E	PCN 5	T1.0/1.0	DMSP35	IN11 JHS	RODN
13	120316	21.5N 125.0E	PCN 5		DMSP35		RPMK
14	121035	23.2N 124.7E	PCN 5		DMSP37	CI UP	PGTW
15	121125	23.6N 123.9E	PCN 5		DMSP36		PGTW
16	121558	24.2N 123.4E	PCN 5		DMSP35		RPMK
17	122134	23.9N 122.0E	PCN 5	T2.5/2.5+/01.5/24HRS	DMSP37		PGTW
18	130007	24.6N 121.6E	PCN 5	T3.5/3.5	DMSP36	IN11 JHS	RKSO
19	130258	25.0N 121.1E	PCN 5	T3.0/3.0-/02.0/24HRS	DMSP35		RPMK
20	130258	24.8N 120.8E	PCN 5		DMSP35		PGTW
21	130259	25.2N 121.0E	PCN 5	T2.5/2.5-/01.5/24HRS	DMSP35		RODN
22	131120	26.5N 120.3E	PCN 5		NOAA5		PGTW
23	131249	26.5N 120.1E	PCN 5		DMSP36		RODN
24	141540	26.7N 119.5E	PCN 5		DMSP35		PGTW

AIRCRAFT FIXES

FIX NO.	TIME (Z)	FIX POSITION	FLT LVL	HT	OBS MSLP	MAX-SFC-WIND VEL/DIR/RVB	MAX-FLT-LVL-WIND DIR/VEL/DIR/ANG	ACCR	NAV/MEI	EYE SHAPE	EYE ORIENTATION	EYE TEMP. (C) HGT IN/ DP/SST	WSN NO.
1	110429	16.9N 128.1E	1500F1		999	60 090 15	260 40 150 10	2 2					U1
2	120403	21.5N 124.9E	700MH	3031									U2
3	120424	21.5N 124.9E	700MH	3031		50 050 25	160 58 050 25	5 H			+12 +16 +11		U2
4	120651	21.9N 124.9E	700MH	3035							+14 +10		U2
5	121505	22.6N 122.9E	700MH	3004	987		250 40 180 15	2 2			+18 +18 +0R		03
6	121920	23.1N 122.1E	700MH	2990	984		210 35 110 20	5 S			+18 +20 +0K		03

RAJAH FIXES

FIX NO.	TIME (Z)	FIX POSITION	RADAR	ACCR	EYE SHAPE	EYE DIAM	RADAR-COUE ASWAM TDOFF	COMMENTS	RADAR POSITION	SITE WVD NO.
1	121700	22.9N 122.8E	LAND				25/// 51314		24.0N 121.6E	46699
2	121800	23.1N 122.6E	LAND				25/// 53114		24.0N 121.6E	46699
3	121900	23.2N 122.4E	LAND				25/// 53312		24.0N 121.6E	46699
4	122000	23.5N 122.4E	LAND				24/// 53415		24.0N 121.6E	46699
5	122100	23.4N 122.2E	LAND				25/// 52312		24.0N 121.6E	46699
6	122200	23.4N 122.4E	LAND				24/// 53415		24.0N 121.6E	46699
7	122300	23.5N 122.1E	LAND				25/// 53313		24.0N 121.6E	46699
8	130000	23.9N 122.2E	LAND				//// 50217		24.0N 121.6E	46699
9	130100	24.1N 122.1E	LAND				10572 50515		24.0N 121.6E	46699

TROPICAL DEPRESSION 14

SATELLITE FIXES

FLA NO.	TIME (Z)	FIX POSITION	ACCRY	UNUSAK CODE	SAT	COMMENTS	SITE
1	132200	16.4N 142.4E	PCN 6	TU.0/0.0	NDAAS	INIT OBS	PGTW
2	141341	11.4N 150.0E	PCN 6		DMSP35	CI DOWN	PGTW
3	150041	12.4N 154.9E	PCN 5	TU.0/0.0 /50.0/27HRS	DMSP35		PGTW
4	150952	13.4N 156.4E	PCN 5		NDAAS	CI UP	PGTW
5	151323	13.4N 156.4E	PCN 6		DMSP35		PGTW
6	160923	16.4N 154.4E	PCN 5	TU.0/0.0 /50.0/24HRS	DMSP35		PGTW
7	170147	19.4N 150.4E	PCN 3	T1.0/1.0 /01.0/24HRS	DMSP35		PGTW
8	170955	20.4N 148.9E	PCN 6		DMSP36		PGTW
9	172059	21.4N 149.4E	PCN 5	T1.0/1.0 /50.0/19HRS	DMSP36		PGTW
10	180129	22.4N 148.4E	PCN 6		DMSP35		PGTW
11	181122	24.4N 144.7E	PCN 6		DMSP36		PGTW
12	181153	24.4N 144.5E	PCN 6		NDAAS		PGTW
13	181411	24.4N 144.4E	PCN 4		DMSP35	PARTIALLY EXPOSED LLCG	PGTW
14	182119	25.7N 141.4E	PCN 5	T2.0/2.0+01.0/24HRS	DMSP37		PGTW
15	182223	25.7N 141.4E	PCN 3		DMSP36		PGTW
16	190009	26.0N 141.0E	PCN 3		NDAAS		PGTW
17	191300	27.4N 138.2E	PCN 3		DMSP37	CI DOWN	PGTW
18	191000	27.4N 138.1E	PCN 3		DMSP37		RKSO
19	191949	27.4N 137.4E	PCN 4		NDAAS		PGTW
20	191334	24.4N 137.4E	PCN 3		DMSP35		PGTW
21	192059	30.1N 135.4E	PCN 3	T2.5/2.5+00.5/24HRS	DMSP37		PGTW
22	192959	30.4N 135.4E	PCN 3	T2.0/2.0	DMSP37	INIT OBS	RKSO
23	192959	30.1N 135.5E	PCN 3	T1.0/1.0	DMSP37	INIT OBS	RODN
24	192205	30.4N 135.4E	PCN 3		DMSP36		PGTW
25	192323	30.4N 135.2E			NDAAS		PGTW
26	200054	31.2N 134.1E	PCN 3		DMSP35		PGTW
27	200235	31.7N 134.4E	PCN 3		DMSP35		PGTW
28	200245	31.7N 134.4E	PCN 3		DMSP35		RKSO
29	200940	33.4N 134.4E	PCN 5		DMSP37		PGTW
30	200940	33.4N 133.6E	PCN 6		DMSP37		RODN

AIRCRAFT FIXES

FLA NO.	TIME (Z)	FIX POSITION	FLT LVL	MIN HGT	OBS MSLP	MAX-SFC-WND VEL/HRG/RWG	MAX-FLT-LVL-WND DIR/VEL/HRG/RWG	ACCRY NAV/MET	EYE SHAPE	EYE ORIEN- DIAM/TATION	EYE TEMP (C) UUT/ IN/ DP/SSI	MSV NO.
1	141330	24.1N 144.3E	700MB	3103	1002		100 48 080 95	5 3			+11 +10 + 8	2
2	190130	27.4N 140.5E	700MB									3
3	191324	26.3N 139.9E	700MB	3004	998	50 360 15	080 50 360 15	2 3			+24 +26 +26 29	3
4	191522	27.4N 135.5E	700MB	3116			090 38 040 40	13 4			+10 +10 +10	4
5	200248	31.3N 134.5E	1500FT		1006	20 130 60	250 35 130 40	5 20			+26 +17	5

RAJAR FIXES

FLA NO.	TIME (Z)	FIX POSITION	RADAR	ACCRY	EYE SHAPE	EYE DIAM	RADOB-CODE ASWAF TODFF	COMMENTS	RADAR POSITION	SITE WMO NO.
1	200700	33.2N 134.4E	LAND				57627 /999/		33.3N 134.2E	47899
2	200900	33.4N 134.5E	LAND				57777 50127		33.3N 134.2E	47899

TYPHOON ELAINE

SATELLITE FIXES

FIA NO.	TIME (Z)	FIX POSITION	ACCRY	ORBITAL CODE	SAT	COMMENTS	SITE
1	177325	17.2N 133.2E	PCN 5	T0.0/0.0	N0A45	INIT J45	PGTW
2	210034	17.2N 130.3E	PCN 5	T0.0/0.0 /50.0/25HRS	N0A45		PGTW
3	211115	16.8N 129.3E	PCN 6		N0A45	CI UP	PGTW
4	212324	17.3N 126.2E	PCN 5	T0.0/0.0 /50.0/24HRS	N0A45		PGTW
5	221235	17.2N 124.2E	PCN 6		N0A45		PGTW
6	222225	17.3N 124.0E	PCN 4	T2.0/2.0	04SP36	INIT J45 PENETRATING CBS	RPMK
7	230105	17.4N 124.8E	PCN 5	T1.0/1.0 /01.0/26HRS	N0A45		PGTW
8	230323	17.1N 123.7E	PCN 4		04SP36	PENETRATING CBS AT 18.2N 123.8E	RPMK
9	231024	17.4N 122.8E	PCN 5		04SP37	CI UP	PGTW
10	231024	17.4N 122.8E	PCN 5		04SP37		RODN
11	231145	17.4N 122.3E	PCN 5		N0A45		PGTW
12	231505	17.7N 121.8E	PCN 5		04SP35		RPMK
13	231505	17.2N 120.8E	PCN 5		04SP35		RODN
14	232305	16.5N 120.7E	PCN 5	T2.0/2.0	04SP37	INIT J45 SECONDARY 17.3N 121.4E	RODN
15	240020	17.7N 120.4E	PCN 3		04SP36	PSBL SECONDARY CC 17.4N 120.7E	RPMK
16	240020	17.5N 120.8E	PCN 5		04SP33		RODN
17	240022	17.5N 121.4E	PCN 5	T2.0/2.0 /01.0/25HRS	N0A45		PGTW
18	240305	17.3N 120.4E	PCN 4		04SP35		PGTW
19	241145	17.1N 120.2E	PCN 6		04SP37		RODN
20	241145	17.1N 119.5E	PCN 4		04SP37		RPMK
21	241205	17.1N 119.4E	PCN 5		N0A45		PGTW
22	241302	17.0N 119.5E	PCN 3		04SP36	SECUNJARY CC 17.8N 119.1E	RPMK
23	241547	17.4N 119.4E	PCN 5		04SP35	SECUNJARY CC 16.9N 118.9E	RODN
24	242245	17.6N 118.4E	PCN 4	T3.0/3.0 /01.0/23HRS	04SP37		RODN
25	250002	17.4N 118.5E	PCN 5	T3.0/3.0	04SP36	INIT J45	RPMK
26	250003	17.4N 114.8E			04SP36		RODN
27	250134	17.3N 118.5E	PCN 5	T2.5/2.5 /00.5/25HRS	N0A45		PGTW
28	251125	17.1N 117.4E	PCN 5		04SP37		RPMK
29	251214	16.3N 117.4E	PCN 6		N0A45		PGTW
30	251244	17.0N 117.6E	PCN 3		04SP36	LOW LVL CIRCULATION	RPMK
31	251529	17.4N 117.3E	PCN 3		04SP35		PGTW
32	252225	17.3N 117.2E	PCN 1	T3.5/3.5 /01.0/21HRS	04SP37		PGTW
* 33	252225	17.3N 117.4E	PCN 5	T3.0/3.0 /50.0/22HRS	04SP37		RPMK
* 34	252345	17.4N 117.4E	PCN 5	T3.0/3.0 /50.0/25HRS	04SP36		RODN
35	252345	17.3N 117.2E	PCN 5		04SP36		PGTW
36	260051	17.5N 117.0E	PCN 4		N0A45		PGTW
37	260230	17.5N 116.3E	PCN 3		04SP35		PGTW
38	260230	17.7N 116.3E	PCN 3		04SP35		RPMK
39	261107	17.4N 115.6E	PCN 4		04SP37		RODN
40	261130	19.2N 115.3E	PCN 6		N0A45		PGTW
41	261227	19.4N 114.4E	PCN 5		04SP36		RPMK
42	261512	20.0N 114.6E	PCN 3		04SP35		PGTW
43	261512	19.3N 114.6E	PCN 3		04SP35		RPMK
44	261504	20.0N 114.6E	PCN 4		04SP35	BASED ON CONTINUITY	RPMK
45	262205	20.1N 113.3E	PCN 5		04SP37		PGTW
46	262325	20.2N 113.0E	PCN 3	T4.0/4.0 /00.5/25HRS	04SP36		PGTW
47	270354	20.4N 112.3E	PCN 1	T5.0/5.0 /02.0/29HRS	04SP35		RPMK
48	271047	21.4N 110.8E	PCN 4		04SP37		PGTW
49	271047	21.4N 110.6E	PCN 4		04SP37		RPMK
50	271205	21.4N 110.4E	PCN 4		04SP36		PGTW
51	271535	21.4N 108.7E	PCN 5		04SP37	EYE GONE	RPMK
52	280119	21.7N 106.6E	PCN 5		N0A45		PGTW

AIRCRAFT FIXES

FIA NO.	TIME (Z)	FIX POSITION	FLT LVL	MLV HGT	γBS MSLP	MAX-SFC-WND VEL/DRG/RNG	MAX-FLT-LVL-WND DIR/VEL/DRG/RNG	ACCRV NAV/MET	EYE SHAPE	EYE ORIEN- DIAM/TATION	EYE TEMP (C) DIT/ IN/ DP/ SST	MSW NO.
1	240034	17.4N 120.3E	700MB	2999		50 010 50	080 61 010 120				+12 +12	1
2	240230	17.0N 120.2E	700MB	2995		40 330 50	060 50 320 130	? 5			+12 +12 +12	1
3	241255	16.8N 119.1E	700MB									2
4	241545	16.4N 119.1E	700MB	2976			020 42 300 155	? 7			+11 +13 +11	2
5	250355	17.4N 118.1E	700MB	2961	981	30 160 120	240 48 160 120	5 10			+26 +25	3
6	250532	17.3N 117.9E	700MB									3
7	250835	17.0N 117.8E	700MB	2924	981	40 200 35	270 45 200 45	5 10			+14 +14 +11	3
8	251504	17.2N 118.1E	700MB	2897	977		220 43 150 75	20 H			+12 +14 +10	4
9	251938	17.4N 117.8E	700MB	2885	977		310 40 240 120	25 5			+12 +14 +10	4
10	252225	18.2N 117.0E	700MB	2882	975		360 40 230 60	15 3			+12 +14 +12	4
11	261028	19.2N 116.5E	700MB	2867	970	45 120 125	180 55 110 60	? 5			+12 +15 +14	27 5
12	261330	19.5N 114.8E	700MB	2867			170 68 270 105				+13 +13	5

RAJAH FIRLS

FIA NO.	TIME (Z)	FIX POSITION	MADR	ACCMY	EYE SHAPE	EYE DIAM	RADUS-COUE ASWAN DUUFF	COMMENTS	MADR POSITION	SITE WHO NO.
* 1	231200	19.6N 121.5E	LAND				2221/ 427//		16.3N 120.6E	98321
* 2	231300	19.4N 121.3E	LAND				2212/ 427//		16.3N 120.6E	98321
* 3	231740	19.4N 120.6E	LAND				25/// /////		16.3N 120.6E	98321
4	240001	17.6N 120.3E	LAND				1060/ /////		16.3N 120.6E	98321
5	240200	17.3N 120.2E	LAND				1152/ 62115		16.3N 120.6E	98321
6	240605	17.3N 119.7E	LAND					PSBL CNTN	16.6N 120.3E	
7	240630	17.3N 120.0E	LAND				10123 73908		16.3N 120.6E	98321
8	240800	17.5N 119.7E	LAND				11197 10413		16.3N 120.6E	98321
9	241700	17.2N 118.7E	LAND				45/// 91///		16.3N 120.6E	98321
10	250015	16.5N 119.4E	LAND		CIRCULAR	PI		EYE	16.6N 120.3E	
11	250230	17.5N 118.2E	LAND				4/// /////		16.3N 120.6E	98321
12	250355	16.3N 119.5E	LAND						16.6N 120.3E	
13	250740	17.2N 117.6E	LAND				4/// 61///		16.3N 120.6E	98321
14	250930	17.2N 117.6E	LAND				4/// 61///		16.3N 120.6E	98321
15	251330	17.1N 117.4E	LAND				4/// 61///	10DEG SPHL OVERLAY	16.3N 120.6E	98321
16	262240	19.9N 113.1E	LAND				30902 52710		22.3N 114.2E	45005
17	262350	20.0N 112.9E	LAND				30912 53110		22.3N 114.2E	45005
18	270003	20.1N 112.7E	LAND				20917 52914		22.3N 114.2E	45005
19	270130	20.1N 112.6E	LAND				20912 52907		22.3N 114.2E	45005
20	270300	20.3N 112.4E	LAND				20912 53210		22.3N 114.2E	45005
21	270400	20.6N 112.0E	LAND				20912 63117		22.3N 114.2E	45005
22	270500	20.9N 111.8E	LAND				20912 63211		22.3N 114.2E	45005
23	270800	21.3N 111.5E	LAND				20912 63215		22.3N 114.2E	45005
24	270900	21.4N 111.3E	LAND				20912 63213		22.3N 114.2E	45005

TYPHOON FAYE

SATELLITE FIXES

FIX NO.	TIME (Z)	FIX POSITION	ACCRV	ORBIT CODE	SAT	COMMENTS	SITE
1	242142	6.4N 140.8E	PCN 6	T0.0/0.0	N0AAS	INIT OBS	PGTW
2	251017	7.4N 157.8E	PCN 6		N1AAS		PGTW
3	252254	6.5N 155.8E	PCN 6	T0.0/0.0 /S0.0/25HRC	N0AAS		PGTW
4	260934	7.3N 152.9E	PCN 6		N1AAS		PGTW
5	271028	10.5N 148.9E	PCN 6		DMS076		PGTW
6	272129	12.7N 146.4E	PCN 3	T1.0/1.0	DMS076	INIT OBS	PGTW
7	274323	17.7N 145.8E	PCN 3		N1AAS		PGTW
8	280155	13.6N 146.0E	PCN 5		DMS077		PGTW
9	280946	14.6N 145.0E	PCN 5		DMS077	CI UP	PGTW
10	281011	14.9N 145.0E	PCN 5		DMS076		PGTW
11	281437	15.1N 144.7E	PCN 6		DMS075		PGTW
12	282127	16.3N 145.9E	PCN 5	T3.5/3.5 /N2.5/24HRC	DMS077		PGTW
13	282253	16.6N 145.8E	PCN 5		DMS076		PGTW
14	290137	17.0N 145.2E	PCN 5		DMS075		PGTW
15	290927	17.9N 145.4E	PCN 6		DMS077	CI SAME	PGTW
16	290953	14.0N 145.2E	PCN 6		DMS076		PGTW
17	291419	18.4N 145.7E	PCN 6		DMS075		PGTW
18	292109	19.3N 146.3E	PCN 5	T3.5/3.5 /S0.0/24HRC	DMS077		PGTW
19	292108	19.3N 146.5E	PCN 3	T3.5/3.5	DMS077	INIT OBS	PGTW
20	292236	19.4N 146.6E	PCN 5		DMS076		PGTW
21	300948	14.6N 147.6E	PCN 6		DMS077		PGTW
22	300949	19.4N 147.6E	PCN 5		DMS077	CI SAME	PGTW
23	301118	19.3N 148.1E	PCN 5		DMS076		PGTW
24	301401	19.0N 148.3E	PCN 6		DMS075		PGTW
25	302048	17.4N 148.5E	PCN 5	T3.5/3.5 /S0.0/24HRC	DMS077		PGTW
26	302048	18.2N 149.1E	PCN 3	T3.0/3.0	DMS077	INIT OBS	RODN
27	302218	17.9N 148.9E	PCN 4		DMS076		PGTW
28	310929	17.4N 149.0E	PCN 5		DMS077		PGTW
29	310929	17.9N 148.6E	PCN 6		DMS077		PGTW
30	310929	17.5N 148.6E	PCN 6		DMS077		RODN
31	311100	17.9N 148.9E	PCN 5		DMS076		PGTW
32	311343	17.1N 147.9E	PCN 3		DMS075	EXPOSED LOW LVL	PGTW
33	312028	16.9N 147.5E	PCN 3	T4.0/4.0 /D0.5/24HRC	DMS077		PGTW
34	312201	17.4N 147.5E	PCN 3		DMS076		PGTW
35	010043	16.7N 147.2E	PCN 3		DMS075		PGTW
36	010910	17.4N 146.4E	PCN 5		DMS077	CI UP	PGTW
37	010910	17.3N 146.0E	PCN 6		DMS077		RODN
38	011043	17.5N 146.1E	PCN 5		DMS076		PGTW
39	011325	17.9N 145.6E	PCN 5		DMS075		PGTW
40	012009	19.5N 145.0E	PCN 2	T4.5/4.5 /D0.5/24HRC	DMS077		PGTW
41	012143	18.9N 144.9E	PCN 1		DMS076		PGTW
42	020207	19.3N 144.6E	PCN 1		DMS075		PGTW
43	020850	20.7N 143.7E	PCN 2		DMS077	CI UP	PGTW
44	020850	19.8N 143.2E	PCN 6		DMS077		RODN
45	021026	20.4N 143.6E	PCN 1		DMS076		PGTW
46	021449	20.8N 143.6E	PCN 5		DMS075		PGTW
47	022126	21.9N 141.0E	PCN 2		DMS076		PGTW
48	022308	22.0N 141.4E	PCN 4		DMS076		PGTW
49	030149	22.4N 140.7E	PCN 4	T5.0/5.0 /D0.5/30HRC	DMS075		PGTW
50	031012	23.5N 139.4E	PCN 6		DMS077		PGTW
51	031012	23.4N 139.2E	PCN 6		DMS077		RKSO
52	031150	24.0N 138.9E	PCN 6		DMS076		PGTW
53	031150	24.0N 139.2E	PCN 5		DMS076		RODN
54	031431	24.4N 138.2E	PCN 5		DMS075		PGTW
55	032112	25.2N 137.3E	PCN 5	T3.5/4.5 /W1.5/19HRC	DMS077		PGTW
56	032251	25.6N 137.7E	PCN 5	T4.0/4.0	DMS076	INIT OBS	RKSO
57	032251	25.6N 137.0E	PCN 5		DMS076		PGTW
58	040131	26.2N 136.4E	PCN 3		DMS075		RKSO
59	040131	26.1N 136.6E	PCN 3		DMS075		RKSO
60	040953	27.6N 135.4E	PCN 4		DMS077		PGTW
61	040953	27.5N 135.5E	PCN 4		DMS077	CENTER OF CDD	PGTW
62	041133	27.9N 135.4E	PCN 5		DMS076		PGTW
63	041413	28.2N 134.8E	PCN 5		DMS075		PGTW
64	042053	28.7N 134.8E	PCN 5	T3.0/3.5 /W0.5/24HRC	DMS077		RKSO
65	042233	28.9N 134.8E	PCN 3	T3.5/4.0 /W0.5/24HRC	DMS076		PGTW
66	042233	28.9N 134.7E	PCN 5		DMS076		PGTW
67	050934	30.4N 135.4E	PCN 6		DMS077		RKSO
68	050934	29.8N 135.5E	PCN 6		DMS077		PGTW
69	051115	30.2N 136.0E	PCN 5		DMS076		PGTW
70	051356	30.0N 136.5E	PCN 5		DMS075	CI UP	PGTW
71	051356	29.9N 136.5E	PCN 5		DMS075		RODN
72	052033	30.1N 137.4E	PCN 4	T3.0/3.0 /S0.0/24HRC	DMS077		PGTW
73	052033	33.0N 137.9E	PCN 3	T3.5/3.5 /S0.0/22HRC	DMS077		RKSO
74	052216	30.1N 138.4E	PCN 5		DMS076		PGTW
75	060056	30.2N 138.3E	PCN 5		DMS075		RKSO
76	060056	30.0N 138.0E	PCN 3		DMS075		PGTW
77	060914	30.1N 139.4E	PCN 5		DMS077	CI DOWN	PGTW
78	060914	30.0N 139.3E	PCN 6		DMS077		RODN
79	061058	30.0N 139.5E	PCN 5		DMS076		PGTW
80	061338	29.9N 139.9E	PCN 5		DMS075		PGTW
81	061519	29.3N 141.3E	PCN 6		DMS075		RODN
82	062014	30.6N 140.1E	PCN 3	T2.5/3.0 /W0.5/24HRC	DMS077		PGTW
83	062014	30.6N 140.3E	PCN 3	T2.5/3.5 /W1.0/24HRC	DMS077		RKSO
84	062158	30.7N 140.3E	PCN 3		DMS076		PGTW
85	070038	30.7N 140.8E	PCN 3		DMS075		PGTW
86	070219	30.6N 140.6E	PCN 4		DMS077		PGTW
87	070219	30.6N 140.6E	PCN 4		DMS077		KGWC
88	071028	30.5N 141.2E	PCN 4		DMS077		KGWC
89	071036	30.2N 140.9E	PCN 6		N0AAS	CI DOWN	PGTW
90	071502	30.5N 141.8E	PCN 4		DMS077		RODN
91	071502	30.1N 141.6E	PCN 5		DMS075		PGTW
92	072136	30.3N 142.5E	PCN 3		DMS077		RODN
93	072141	30.4N 142.4E	PCN 3		DMS076		PGTW

ATCRAFT FIXES

FIX NO.	TIME (Z)	FIX POSITION	FLT LVL	WIND MGT	DBS MSLP	MAX=SFC-WND VEL/ARG/RNG	MAX=FLT-LVL-WND DIR/VEL/ARG/HNG	ACCRV NAV/MET	EYE SHAPE	EYE ORIEN- DIAM/TATION	EYE TEMP. (C) OUT/ IN/ DP/SS/T	MSW NO.
1	272253	12.5N 146.3E	1500FT		1000	45 110 55	150 48 110 55	5 3			+23 +26 30	1
2	280158	13.2N 146.0E	1500FT		997	25 180 45	260 30 180 45	5 3			+24 +26 30	1
3	281535	15.9N 144.9E	700MB	3095	1001		290 30 250 30	3 5			+11 +15 + 7	2
4	281927	16.1N 145.0E	700MB	3091			090 38 360 38				+ 13+ 6	2
5	282102	16.2N 145.1E	700MB	3098	1001	50 180 15	030 29 300 40	3 5			+14 +15 + 7	2
6	290100	16.9N 145.0E	700MB	3125		50 050 40	140 43 050 40				+ 15+ 12	3
7	290324	17.3N 145.1E	700MB	3100	1002	35 310 45	030 20 310 37	4 2			+14 +20 +11	3
8	291503	17.2N 145.8E	700MB	3053	996		350 35 270 30	5 2			+13 +20 + 9	6
9	300034	19.2N 146.9E	700MB			50 360 20	170 65 030 15					5
10	300332	19.2N 147.0E	700MB	3055	984	60 020 15	140 65 020 15	2 2	CIRCULAR	15	+14 +16 + 9	28
11	301205	19.0N 147.9E	700MB	3053			330 49 210 30				+16 + 6	5
12	301452	14.8N 148.3E	700MB	3100	1002		010 38 270 40	10 10	ELLIPTICAL	50 20 090	+12 +12 +11	6
13	302340	18.0N 148.6E	700MB	3069	997	35 120 35	320 45 120 35				+16 + 7	7
14	310340	17.8N 148.8E	700MB	2974	987	50 240 20	350 50 270 15	3 1			+11 +19 + 7	7
15	311202	17.4N 148.7E	700MB	2994			100 45 280 20				+19 + 8	8
16	311442	17.3N 148.3E	700MB	2974	986		350 45 280 20	3 5	CIRCULAR	30	+11 +17 +13	8
17	312052	17.0N 147.7E	700MB	2994	987	60 090 10	240 38 180 15	3 5			+10 +15 +11	9
18	010035	16.9N 147.3E	700MB	2982		90 010 10	110 52 010 20				+ 15+ 11	9
19	010333	17.0N 147.0E	700MB	2919	981	95 300 10	240 62 290 10	3 5	CIRCULAR	30	+12 +15 +11	9
20	011521	18.0N 145.6E	700MB	2921	969		230 77 170 15	5 2	CIRCULAR	15	+12 +14 +13	10
21	011930	18.5N 145.3E	700MB	2779			170 95 140 12				+ 15+ 13	10
22	012031	18.7N 145.1E	700MB	2949	961	40 180 50	010 75 280 10	5 2	CIRCULAR	12	+13 +17 +12	11
23	020054	19.1N 144.8E	700MB	2866	949	40 230 50	310 80 230 15	3 2	ELLIPTICAL	15 12 040	+12 +19 +14	11
24	020339	19.5N 144.5E	700MB	2957	939	130 270 7	310 100 270 10	2 1	CIRCULAR	15	+12 +19 +14	11
25	021503	21.3N 143.1E	700MB	2929	936		270 94 180 15	20 2	CIRCULAR	12	+12 +19 +15	12
26	021833	21.6N 142.4E	700MB	2928			090 103 350 5				+ 18+ 15	12
27	022042	21.8N 141.8E	700MB	2942	937		290 93 210 6	5 2	CIRCULAR	15	+12 +19 +15	12
28	030053	22.2N 141.1E	700MB	2953	950							13
29	030340	22.6N 140.6E	700MB	2746	961	100 360 10	110 122 360 10	5 5	CIRCULAR	15	+13 +15 +15	13
30	031513	22.7N 139.2E	700MB	3000	990		190 61 110 55	5 5	ELLIPTICAL	30 20 150	+12 +20 + 8	14
31	032118	25.5N 137.3E	700MB	3008	991	60 090 20	120 58 090 20	5 10			+15 +11 +11	14
32	040108	26.1N 136.5E	700MB	2954		60 050 20	190 55 120 60				+16	15
33	040339	26.7N 136.1E	700MB	2974	987	55 310 45	070 35 310 45	3 3			+15 +19	15
34	041455	28.2N 134.7E	700MB	3014	989		200 53 140 30	2 5			+12 +18 +13	16
35	041901	28.2N 134.6E	700MB	2978			160 45 040 40				+ 18+ 9	18
36	042057	28.9N 134.7E	700MB	2977	985	35 360 15	010 35 300 25	4 2			+15 +18 +11	16
37	050030	29.2N 134.5E	700MB	2922		40 090 20	180 54 090 30				+16	17
38	050315	29.5N 135.1E	700MB	2903	979	30 330 30	030 49 330 20	4 3	CIRCULAR	25	+12 +16	17
39	051236	30.0N 136.6E	700MB	2898			180 70 120 25				+17 +11	18
40	051541	30.2N 136.9E	700MB	2877	972		010 80 280 15	3 3	CIRCULAR	17	+19 +20 +10	18
41	060040	30.3N 138.3E	700MB	2866	975	90 270 5	74				+25 + 9	19
42	060330	30.2N 138.6E	700MB	2870	975	100 040 25	140 65 040 30	2 2			+16 +21 + 8	19
43	062356	30.7N 140.6E	700MB			30 0	31					20
44	070036	30.8N 140.5E	700MB	3104	1002	25 240 50	320 41 240 90	4 2			+17 +18 + 9	20
45	070302	30.7N 140.7E	700MB	3084	1000	35 010 120	090 20 010 40	5 3			+17 +18 + 8	20

RAJAR FIXES

FIX NO.	TIME (Z)	FIX POSITION	RADAR	ACCRV	EYE SHAPE	EYE DIAM	RAJAR-CODE ASWAR TDDFF	COMMENTS	RAJAR POSITION	SITF WMO NO.
1	272330	12.7N 146.1E	LAND					1 BAND 50NM	13.6N 144.9E	91218
2	280125	13.2N 146.7E	LAND					POORLY DEFINED SPIRAL BAND	13.6N 144.9E	91218
3	280235	13.3N 145.5E	LAND					FEWER BANDS APPEAR WEAKER	13.6N 144.9E	91218
4	280310	13.6N 145.7E	LAND	POOR				PSBL CNTR	13.6N 144.9E	91218
5	280335	13.6N 145.7E	LAND	GOOD	CIRCULAR	20		PSBL CNTR WALL CLD OPEN S-W	13.6N 144.9E	91218
6	280410	13.7N 145.6E	LAND	POOR	CIRCULAR	15		PSBL CNTR WALL CLD OPEN SE-W	13.6N 144.9E	91218
7	280435	13.9N 145.5E	LAND	GOOD	ELLIPTICAL			PSBL CNTR WALL CLD OPEN SW-NE	13.6N 144.9E	91218
8	280510	13.9N 145.5E	LAND	POOR				PSBL CNTR	13.6N 144.9E	91218
9	281310	14.9N 145.2E	LAND	FAIR	CIRCULAR	25		PSBL EYE	13.6N 144.9E	91218

TROPICAL STORM GLORIA

CATEGORY FIXES

FIX NO.	TIME (Z)	FIX POSITION	ACCR	WIND CODE	SAT	COMMENTS	SITE
1	261512	20.2N 132.4E	PCN 5		DMS434		PGTW
2	272310	17.5N 129.4E	PCN 5	T1.0/1.0	DMS434	INIT J35	ROUN
3	280155	21.1N 130.4E	PCN 3	T1.0/1.0	DMS434	INIT J35	PGTW
4	281028	19.4N 128.4E	PCN 5		DMS437	CI JP	PGTW
5	281152	19.6N 128.7E	PCN 5		DMS434	SECONDARY 22.3N 128.0E	PGTW
6	281437	14.6N 128.6E	PCN 5		DMS434		PGTW
7	282127	20.1N 126.6E	PCN 3		DMS437	SECONDARY 22.2N 129.7E	PGTW
8	282253	22.2N 129.0E	PCN 3	T1.0/1.0	DMS434	INIT J35	RKSO
9	282253	22.2N 129.1E	PCN 3	T1.0/1.0	DMS434	INIT J35	RPMK
10	282253	22.2N 129.0E	PCN 3	T2.0/2.0 /01.0/21HRC	DMS434	SECONDARY 20.0N 126.0E	PGTW
11	290035	22.0N 128.9E	PCN 3		NDA85	SECONDARY 22.3N 130.0E	PGTW
12	290137	21.8N 128.5E	PCN 3		DMS434	SECONDARY 22.5N 130.1E	RPMK
13	290137	21.9N 128.3E	PCN 3		DMS434	SECONDARY 22.6N 129.9E	PGTW
14	291008	22.3N 128.0E	PCN 6		DMS437		RKSO
15	291008	20.9N 126.5E	PCN 6		DMS437		RPMK
16	291008	22.1N 127.9E	PCN 5		DMS437	CI SAME	PGTW
17	291135	22.0N 127.9E	PCN 5		DMS434		PGTW
18	291419	22.0N 127.8E	PCN 5		DMS434		PGTW
19	291500	23.0N 130.0E	PCN 5		DMS434		RPMK
20	292108	23.3N 129.0E	PCN 3	T2.0/2.0 /01.0/22HRC	DMS437		RKSO
21	292109	23.9N 128.7E	PCN 3	T2.5/2.5 /01.5/23HRC	DMS437		RPMK
22	292108	24.0N 128.7E	PCN 3	T2.5/2.5 /00.5/22HRC	DMS437		PGTW
23	292236	24.1N 128.7E	PCN 3		DMS434		PGTW
24	300949	24.0N 127.4E	PCN 4		DMS437		RKSO
25	300949	25.0N 128.9E	PCN 5		DMS437	CI SAME	PGTW
26	301118	25.1N 129.1E	PCN 5		DMS434		PGTW
27	301542	25.3N 128.9E	PCN 4		DMS434		RPMK
28	302218	27.5N 130.3E	PCN 3		DMS434		PGTW
29	302230	27.4N 130.5E	PCN 3	T2.0/2.5 /00.5/25HRC	DMS437		RPMK
30	302230	27.4N 130.3E	PCN 3		DMS437		RKSO
31	310242	27.6N 130.0E	PCN 3		DMS434	SECONDARY 31.3N 134.7E	RPMK
32	310242	27.7N 129.9E	PCN 3		DMS434		PGTW
33	310243	27.5N 130.0E	PCN 5		DMS434		RKSO
34	311100	28.4N 130.7E	PCN 5		DMS434		PGTW
35	311242	28.0N 130.4E	PCN 6		DMS434		RPMK
36	312201	27.4N 131.9E	PCN 5		DMS434		PGTW
37	312210	27.2N 131.9E	PCN 5		DMS437		RKSO

AIRCRAFT FIXES

FIX NO.	TIME (Z)	FIX POSITION	FLT LVL	MIN HGT	OBS MSLP	MAX-SFC-WND VEL/DRG/RNG	MAX-FLT-LVL-WND H/M/VEL/DRG/RNG	ACCR	EYE SHAPE	EYE ORIENT- DIAM/TATION	EYE TEMP (C) UHT/ IN/ DP/SST	MSN NO.
1	290117	21.1N 129.2E	1500F1		998	25 360 70	040 24 300 7n	5 20			+24 +24 +24	1
2	290231	21.3N 128.9E	700MB	3057	996	25 020 50	040 24 020 5n	5 10			+11 +10	1
3	291437	22.5N 127.9E	700MB	3036	994		030 20 300 4n	4 10			+11 +13 +10	2
4	300640	24.7N 128.5E	700MB	3000	990	25 180 35	240 29 210 6n	4 2			+13 +14 +9	3
5	301400	25.6N 128.4E	700MB	3013			210 27 120 9n				+14 +9	4
6	301630	26.2N 128.4E	700MB	3045	995		230 36 120 15n	5 15			+15 +14 +5	4
7	310408	27.7N 130.1E	700MB	3039	993	15 270 95	240 15 110 3n	1 4			+13 +13 +12	5

TROPICAL STORM HESTER

SATELLITE FIXES

FIX NO.	TIME (Z)	FIX POSITION	ACCR	DVORAK CODE	SAT	COMMENTS	SITE
1	281011	27.2N 150.4E	PCN 5		DMSP36	UPPER LVL POSITION	PGTW
2	281437	28.0N 150.3E	PCN 6		DMSP36	UPPER LVL POSITION	PGTW
3	290137	29.4N 149.3E	PCN 6	T1.0/1.0	DMSP35	INIT J35	PGTW
4	290827	29.6N 148.5E	PCN 6		DMSP37	CI UP	PGTW
5	290953	29.9N 148.4E	PCN 6		DMSP36		PGTW
6	291419	30.3N 149.0E	PCN 6		DMSP35	UPPER LVL	PGTW
7	291925	30.9N 149.6E	PCN 6		DMSP37		PGTW
8	292054	31.3N 150.1E	PCN 5	T2.0/2.0 /01.0/19HRS	DMSP36		PGTW
9	292108	31.3N 150.1E	PCN 6		DMSP37		PGTW
10	300948	32.6N 150.3E	PCN 4		DMSP37		RKSO
11	300949	32.9N 150.5E	PCN 3		DMSP37	CI UP	PGTW
12	301118	33.1N 150.5E	PCN 2		DMSP36		RODN
13	301118	32.9N 150.7E	PCN 1		DMSP36		PGTW
14	301401	33.2N 150.8E	PCN 2		DMSP35		PGTW
15	301402	32.9N 150.8E	PCN 4		DMSP35		RKSO
16	301906	33.6N 151.1E	PCN 4		DMSP37		KGWC
17	302048	34.2N 151.9E	PCN 1	T3.0/3.0	DMSP37	INIT J35	RODN
18	302048	34.0N 151.8E	PCN 2	T3.5/3.5--/01.5/24HRS	DMSP37		PGTW
19	310101	35.2N 152.5E	PCN 1		DMSP35		RKSO
20	310101	34.7N 152.4E	PCN 2		DMSP36		RODN
21	310101	35.0N 152.2E	PCN 1		DMSP36		PGTW
22	310929	36.1N 155.0E	PCN 2		DMSP37		RKSO
23	311100	36.6N 155.7E	PCN 2		DMSP36		PGTW
24	311343	37.2N 156.6E	PCN 2		DMSP35		PGTW
25	311343	37.7N 156.6E	PCN 2		DMSP36		KGWC
26	311947	38.3N 159.6E	PCN 4	T3.0/3.0	DMSP37	INIT J35	KGWC
27	312029	39.7N 156.8E	PCN 5		DMSP37	LOW/MID LVL FEATURE	RKSO
28	312301	41.1N 161.5E	PCN 4		DMSP35		KGWC
29	010043	40.5N 164.1E	PCN 6		DMSP35		PGTW
30	010910	53.5N 174.5E			DMSP37		KGWC
31	010910	43.0N 168.0E			DMSP		KGWC

AIRCRAFT FIXES

FIX NO.	TIME (Z)	FIX POSITION	FLT LVL	MIN HGT	OBS MSLP	MAX-SFC-WIND VEL/HRG/RNG	MAX-FLT-LVL-WIND DTW/VEL/BRG/RNG	ACCR NAV/MET	EYE SHAPE	EYE ORIEN-DI&M/TATION	EYE TEMP (C) OUT/ IN/ DP/SST	WSR NO.
1	291909	30.9N 149.6E	700MB	7080	999		060 36 320 23	5 5			+14 * R	1

TYPHOON IRMA

SATELLITE FIXES

FIX NO.	TIME (Z)	FIX POSITION	ACCRY	WVDRK CODE	SAT	COMMENTS	SITE
1	091147	10.5N 124.7E	PCN 5		DMSR34		PGTW
2	092248	21.4N 123.0E	PCN 5	T1.0/1.0	DMSR34	INII J95	PGTW
3	101130	21.2N 121.2E	PCN 5		DMSR34		PGTW
4	102219	21.7N 121.8E	PCN 5	T1.5/1.5	DMSR37	INII J95	RPMK
5	110012	22.0N 121.8E	PCN 5		DMSR34		RPMK
6	110250	22.3N 121.5E	PCN 5		DMSR34		PGTW
7	111059	23.0N 122.3E	PCN 5	T2.5/2.5	DMSR37	INII J95	PGTW
8	112159	23.6N 122.7E	PCN 5	T2.5/2.5	DMSR37	INII J95	RODN
9	112159	24.4N 122.9E	PCN 5		DMSR37		PGTW
10	121040	25.5N 123.8E	PCN 5		DMSR34		RPMK
11	121237	25.9N 123.6E	PCN 5		DMSR34		RKSO
12	121514	26.2N 123.5E	PCN 2		DMSR35	PSBL EYE FORMING	PGTW
13	121514	26.1N 123.6E	PCN 4		DMSR35		RPMK
14	122139	27.3N 123.7E	PCN 3	T3.0/3.0	DMSR37	INII J95	PGTW
15	122140	27.0N 123.2E	PCN 3	T3.0/3.0 /00.5/24HRS	DMSR37		RODN
16	122338	27.4N 123.1E	PCN 3	T3.0/3.0 /00.5/24HRS	DMSR34		PGTW
17	130214	27.5N 123.2E	PCN 4		DMSR35		PGTW
18	131020	28.2N 123.9E	PCN 4		DMSR37		RKSO
19	131021	28.3N 124.3E	PCN 4		DMSR37		RODN
20	131220	28.5N 124.7E	PCN 5		DMSR34		RODN
21	131455	28.7N 124.3E	PCN 3		DMSR35		PGTW
22	132120	29.4N 124.5E	PCN 6		DMSR37		RPMK
23	132120	29.6N 124.6E	PCN 4	T3.0/3.0-/50.0/24HRS	DMSR37		PGTW
24	132220	29.8N 124.9E	PCN 3	T3.5/3.5-/00.5/25HRS	DMSR34		PGTW
25	141001	31.5N 125.8E	PCN 4		DMSR34		RKSO
26	141001	31.4N 125.8E	PCN 4		DMSR37		RODN
27	141001	31.3N 125.8E	PCN 6		DMSR37		RKSO
28	141202	31.7N 126.2E	PCN 2		DMSR34		PGTW
29	141202	31.7N 126.0E	PCN 1		DMSR34		RKSO
30	141438	32.0N 126.5E	PCN 4		DMSR34		PGTW
31	141438	31.9N 126.4E	PCN 3		DMSR35		RKSO
32	142101	32.6N 128.1E	PCN 1		DMSR37		PGTW
33	142101	32.8N 128.0E	PCN 2		DMSR37		RODN
34	142303	32.9N 128.8E	PCN 1		DMSR34		PGTW
35	150139	33.2N 129.2E	PCN 3	T3.0/3.5-/00.5/24HRS	DMSR35		PGTW
36	150942	34.6N 132.5E	PCN 6		DMSR37	CI U0W	RKSO
37	151123	34.3N 133.1E	PCN 5		DMSR34		PGTW
38	151145	34.6N 133.2E	PCN 5		DMSR35		PGTW
39	151421	35.2N 134.5E	PCN 6		DMSR35		RKSO
40	151421	35.1N 134.5E	PCN 5		DMSR35		RODN
41	151421	35.5N 134.0E	PCN 6		DMSR35		

AIRCRAFT FIXES

FIX NO.	TIME (Z)	FIX POSITION	FLT LVL	WIN HGT	DBS MSLP	MAX-SFC-WIND VEL/DRG/RNG	MAX-FLT-LVL-WIND DTW/VEL/DRG/RNG	ACCRY NAV/MET	EYE SHAPE	EYE ORIEN-DIAM/TATION	EYE TEMP (C) UNIT/ IN/ DP/ SST	MSW NO.
1	120727	25.5N 123.1E	700MB	2957	985	30 030 30	140 40 080 60				+15 +12	1
2	120935	25.7N 123.6E	700MB	2987	988	50 220 10	170 57 090 20	1 2	CIRCULAR	15	+12 +15 +12	1
3	131225	28.4N 124.1E	700MB			180 58 010 30					+14 +12	4
4	140100	30.3N 124.7E	700MB	2909	979	55 110 75	180 70 110 20	5 5	CIRCULAR	30	+11 +13 +12	4
5	140333	30.5N 125.1E	700MB	2906	978		130 74 080 25				+15 +12	5
6	141248	31.6N 126.2E	700MB	2882	976		170 53 050 20				+13 +14 +12	5
7	141546	32.0N 126.8E	700MB	2875	972		240 80 150 50	2 3	CIRCULAR	25		

RAJAR FIXES

FIX NO.	TIME (Z)	FIX POSITION	RADAR	ACCRY	EYE SHAPE	EYE DIAM	RADAR-CODE ASWAV TDRFF	COMMENTS	RADAR POSITION	SITE WNO NO.
1	111938	24.3N 122.8E	LAND				215/1 //		24.3N 124.2E	47918
2	112000	24.4N 122.9E	LAND				65/11 40217		24.3N 124.2E	47918
3	112100	24.7N 122.8E	LAND				6/111 53514		24.3N 124.2E	47918
4	112100	24.5N 122.7E	LAND				65/14 51111		24.8N 125.3E	47927
5	112200	24.7N 122.8E	LAND				6/111 53305		24.3N 124.2E	47918
6	112200	24.7N 122.6E	LAND				65/14 53314		24.8N 125.3E	47927
7	112300	25.0N 122.7E	LAND				6/112 53514		24.3N 124.2E	47918
8	112300	24.9N 122.6E	LAND				6/113 50208		24.8N 125.3E	47927
9	120000	25.1N 122.6E	LAND				65/13 50119		24.3N 124.2E	47918
10	120000	25.2N 122.6E	LAND				6/113 50119		24.8N 125.3E	47927
11	120100	25.3N 122.6E	LAND				6/113 53506		24.3N 124.2E	47918
12	120100	25.2N 122.5E	LAND				6/113 52705		24.8N 125.3E	47927
13	120200	25.3N 122.6E	LAND				6/113 50108		24.3N 124.2E	47918
14	120200	25.2N 122.6E	LAND				6/114 50000		24.8N 125.3E	47927
15	120300	25.2N 122.7E	LAND				6/114 50701		24.3N 124.2E	47918
16	120400	25.3N 122.9E	LAND				6/113 50515		24.8N 125.3E	47927
17	120400	25.5N 122.8E	LAND				6/112 50608		24.3N 124.2E	47918
18	120500	25.3N 122.9E	LAND				6/114 50000		24.8N 125.3E	47927
19	120700	25.4N 123.1E	LAND				40504 50500		24.3N 124.2E	47918
20	120700	25.4N 123.2E	LAND				45/104 71007		24.8N 125.3E	47927
21	122000	27.0N 123.3E	LAND				3/114 53406		24.3N 124.2E	47918
22	130100	27.4N 123.5E	LAND				6/115 50214		24.8N 125.3E	47927
23	130200	27.4N 123.3E	LAND				6/116 53011		24.3N 124.2E	47918
24	130237	27.4N 123.8E	ACFT	GOOD	CIRCULAR	35		EYE 10MM THICK 54 WRS	26.5N 123.9E	
25	131319	28.4N 124.1E	ACFT	GOOD				54 WRS	29.4N 125.6E	

26	141800	32.5N	127.3E	LAND			55//0	60416			33.4N	130.3E	47806
27	141900	32.5N	127.3E	LAND			55//0	60605			33.4N	130.3E	47806
28	142100	32.6N	127.9E	LAND			55//1	50716			33.4N	130.3E	47806
29	142200	32.7N	128.3E	LAND			55//1	50719			33.4N	130.3E	47806
30	142300	33.0N	128.5E	LAND			55//1	50319			33.4N	130.3E	47806
31	142300	33.0N	128.5E	LAND	FAIR	40			EYE MOV 0625	SEBURI			
32	150000	33.2N	128.8E	LAND			20911	50616			33.4N	130.3E	47806
33	150000	33.2N	128.7E	LAND	FAIR	40			EYE MOV 0625	SEBURI			
34	150100	33.3N	128.9E	LAND			10841	50311			33.4N	130.3E	47806
35	150100	33.3N	128.9E	LAND	GOOD	45			EYE MOV 0625	SEBURI			
36	150200	33.5N	129.1E	LAND			10811	50516			33.4N	130.3E	47806
37	150200	33.4N	129.2E	LAND	FAIR	45			EYE MOV 0625	SEBURI			
38	150230	32.5N	129.4E	LAND			20901	47777			34.3N	132.6E	47792
39	150300	33.7N	129.5E	LAND			19931	50622			33.4N	130.3E	47806
40	150300	33.5N	129.7E	LAND			20911	40914			34.3N	132.6E	47792
41	150300	33.5N	129.7E	LAND	POOR	40			EYE MOV 0620	SEBURI			
42	150400	33.9N	130.8E	LAND			30951	50522			34.3N	132.6E	47792
43	150400	33.9N	129.7E	LAND			14851	50616			33.4N	130.3E	47806
44	150400	33.9N	129.9E	LAND	POOR	20			EYE MOV 0520	NISHIMA			
45	150500	34.0N	130.4E	LAND			35851	50516			34.3N	132.6E	47792
46	150500	34.1N	130.7E	LAND			65777	50622			35.5N	133.1E	47791
47	150500	34.1N	130.2E	LAND			25841	50625			33.4N	130.3E	47806
48	150500	33.9N	130.2E	LAND	POOR	10			EYE MOV 0630	NISHIMA			
49	150600	34.3N	130.6E	LAND	POOR	25			EYE MOV 0625	TAKAO			
50	150600	34.2N	130.8E	LAND			65772	57777			35.6N	133.2E	47791
51	150600	34.1N	130.6E	LAND			25841	50722			33.4N	130.3E	47806
52	150700	34.3N	130.9E	LAND	POOR	20			EYE MOV 0720	TAKAO			
53	150700	34.2N	131.0E	LAND			21971	60816			33.4N	130.3E	47806
54	150700	34.2N	131.1E	LAND			30771	50816			35.5N	133.1E	47791
55	150800	34.4N	131.4E	LAND			30621	50722			34.3N	132.6E	47792
56	150900	34.3N	131.3E	LAND			21961	50616			33.4N	130.3E	47806
57	150900	34.3N	131.5E	LAND			35771	50716			35.5N	133.1E	47791
58	150900	34.4N	131.6E	LAND			20611	50814			34.3N	132.6E	47792
59	150900	34.5N	131.9E	LAND	POOR	30			EYE MOV 0920	TAKAO			
60	150900	34.4N	131.9E	LAND			35771	50722			35.5N	133.1E	47791
61	150900	34.4N	131.8E	LAND			21911	60719			33.4N	130.3E	47806
62	151000	34.7N	132.0E	LAND			31941	60622			33.4N	130.3E	47806
63	151000	34.5N	132.2E	LAND			75771	50716			35.5N	133.1E	47791
64	151000	34.3N	132.1E	LAND			75771	50922			34.3N	132.6E	47792
65	151100	34.6N	132.7E	LAND			75771	50716			35.5N	133.1E	47791
66	151100	34.7N	132.4E	LAND			34770	60519			33.4N	130.3E	47806
67	151100	34.6N	132.6E	LAND			37771	50722			34.3N	132.6E	47792
68	151200	34.9N	133.0E	LAND			25770	50532			33.4N	130.3E	47806
69	151200	34.6N	132.8E	LAND			77771	50916			35.5N	133.1E	47791
70	151200	34.7N	133.1E	LAND			77771	50827			34.3N	132.6E	47792
71	151300	34.7N	133.4E	LAND			77771	50819			35.5N	133.1E	47791
72	151300	34.9N	133.4E	LAND			77771	50819			34.3N	132.6E	47792
73	151400	34.6N	133.8E	LAND			77771	51024			35.5N	133.1E	47791
74	151400	34.9N	133.9E	LAND			37771	50824			34.3N	132.6E	47792

TYPHOON JUDY

SATELLITE FIXES

FIX NO.	TIME (Z)	FIX POSITION	ACCRY	DVORAK CODE	SAT	COMMENTS	SITE
1	091006	19.3N 145.3E	PCN 6		DMS36	APPARENT LOW LVL	PGTW
2	092106	19.9N 146.5E	PCN 6	T0.0/0.0	DMS36	INIT JDS	PGTW
3	100948	20.9N 148.8E	PCN 4		DMS36	EXPOSED LLCC	PGTW
4	102049	22.3N 157.0E	PCN 4	T1.0/1.0 /01.0/24HRC	DMS36		PGTW
5	110931	23.3N 153.3E	PCN 6		DMS36	EXTRAP TO ILL DEFINED LLCC	PGTW
6	112019	22.9N 148.2E	PCN 5	T2.0/2.0 /01.0/24HRC	DMS37		PGTW
7	121055	23.5N 148.0E	PCN 3		DMS37		PGTW
8	121332	23.4N 147.9E	PCN 3		DMS37		PGTW
9	121958	24.7N 147.2E	PCN 3		DMS37		PGTW
10	122156	24.5N 147.0E	PCN 5	T3.5/3.5 /01.5/24HRC	DMS36		PGTW
11	130033	24.4N 146.7E			DMS36		PGTW
12	130839	25.3N 146.5E	PCN 6		DMS37		PGTW
13	131038	26.4N 144.1E	PCN 4		DMS36		PGTW
14	131038	26.5N 144.3E	PCN 6		DMS36		RODN
15	131314	26.9N 144.1E	PCN 5		DMS36		PGTW
16	132120	27.5N 145.4E	PCN 6		DMS37		PGTW
17	132139	27.4N 145.5E	PCN 5	T4.0/4.0 /00.5/24HRC	DMS36		PGTW
18	132139	27.5N 146.1E	PCN 6		DMS36		RODN
19	141001	28.3N 145.0E	PCN 3		DMS37		PGTW
20	141001	28.5N 144.9E	PCN 6		DMS37		RODN
21	141001	28.5N 145.0E	PCN 6		DMS37		PGTW
22	141020	28.4N 145.0E	PCN 3		DMS36		PGTW
23	141438	28.6N 144.8E	PCN 6		DMS35		RODN
24	141438	28.9N 144.6E	PCN 6		DMS36		PGTW
25	142101	29.3N 144.2E	PCN 1	T4.0/4.0 /50.0/23HRC	DMS37		RODN
26	142101	29.5N 144.0E	PCN 2	T5.0/5.0	DMS37	INIT JDS	RODN
27	142101	29.7N 144.4E	PCN 2	T5.0/5.0	DMS37	INIT JDS	RODN
28	142121	29.4N 144.1E	PCN 3		DMS36		PGTW
29	150139	29.9N 144.1E	PCN 1		DMS35		PGTW
30	150942	31.0N 144.6E	PCN 2		DMS37	RAGGED EYE	RODN
31	150942	30.9N 144.6E	PCN 2		DMS37	CI SAME	PGTW
32	151003	30.9N 144.5E	PCN 2		DMS36		PGTW
33	151145	31.1N 144.8E	PCN 1		DMS36		PGTW
34	151421	31.6N 144.8E	PCN 2		DMS35		RODN
35	151421	31.6N 145.0E	PCN 2		DMS35		RODN
36	151421	31.6N 144.7E	PCN 1		DMS35		RODN
37	152041	33.0N 145.5E	PCN 2	T5.0/5.0 /50.0/24HRC	DMS37		RODN
38	152041	32.8N 145.5E	PCN 1	T4.5/4.5 /00.5/24HRC	DMS37		PGTW
39	152104	32.9N 145.6E	PCN 1		DMS36		PGTW
40	152245	33.2N 146.0E	PCN 1		DMS36		PGTW
41	160121	34.0N 146.1E	PCN 1		DMS35		PGTW
42	160922	36.0N 148.5E	PCN 2		DMS37		RODN
43	160922	35.9N 148.4E	PCN 1		DMS37	CI SAME	PGTW
44	161128	34.4N 149.2E	PCN 1		DMS36		PGTW
45	161403	37.0N 149.7E	PCN 3		DMS35		PGTW
46	162022	39.2N 152.5E	PCN 5		DMS37		RODN
47	162022	39.1N 152.3E	PCN 3	T3.0/4.0 /01.5/24HRC	DMS37		PGTW
48	170103	40.5N 154.1E	PCN 5	T3.5/3.5	DMS35	INIT JDS	KGWC
49	170902	43.0N 158.9E	PCN 6		DMS37		KGWC
50	171345	44.1N 160.8E	PCN 6		DMS37		KGWC

AIRCRAFT FIXES

FIX NO.	TIME (Z)	FIX POSITION	FLT LVL	4IN HGT	OBS MSLP	MAX-SFC-WND VEL/HRG/RNG	MAX-FLT-LVL-WND DIR/VEL/DRG/3RG	ACCRY NAV/MET	EYE SHAPE	EYE ORIEN- DIAM/TATION	EYE TEMP (C) UUT/ IN/ DP/SSST	MSW NO.
1	130000	24.6N 146.4E	700MB	3016	991	90 070 75	150 56 080 75	4 2				
2	130340	25.0N 146.4E	700MB	3007	990	40 270 50	360 30 270 60	4 10			+14 +10	1
3	131410	26.4N 145.8E	700MB	2936			140 51 100 51				+13 +9	1
4	131652	26.9N 145.8E	700MB	2917	980		110 55 360 90	5 5	CIRCULAR	35	+18 +10	2
5	140330	27.9N 145.2E	700MB	2917	979	55 270 30	350 45 270 35	2 2			+11 +11	2
6	140545	28.1N 145.1E	700MB	2899	977	40 140 90	210 50 140 30				+12 +12	3
7	141335	28.8N 144.5E	700MB	2888	977		160 80 080 25				+16 +12	3
8	141618	29.1N 144.4E	700MB	2867	972		200 50 250 25				+15 +11	4
9	150030	29.9N 144.1E	700MB	2774	964	90 010 15	070 78 010 23	4 2	ELLIPTICAL	30 20 090	+14 +11	4
10	150317	30.2N 144.2E	700MB	2754	962	70 250 20	330 72 250 20	5 5	ELLIPTICAL	35 38 020	+15 +11	5
11	151330	31.5N 144.7E	700MB	2713	957		270 105 210 20				+16 +10	5
12	151540	31.9N 144.8E	700MB	2680	953		270 120 180 14	2 3	CIRCULAR	25	+17 +14	6
13	160032	33.9N 146.1E	700MB	2656	950	30 250 15	040 92 020 14				+16 +13	7
14	160318	34.5N 146.7E	700MB	2661	950	30 260 16	360 106 270 12	4 2	CIRCULAR	38	+19 +13	7
											+13 +15	7

TROPICAL STORM KIT

SATELLITE FIXES

FIX NO.	TIME (Z)	FIX POSITION	ACCR	DVORAK CODE	SAT	COMMENTS	SITE
1	192318	13.6N 133.6E	PCN 5	T0.0/0.0	DMS336	INIT OBS	PGTW
2	200946	16.3N 128.2E	PCN 6		DMS337		PGTW
3	202227	13.7N 127.2E	PCN 5	T1.0/1.0 /D1.0/23HRS	DMS337		PGTW
4	202227	13.2N 128.0E	PCN 5	T1.5/1.5	DMS337	INIT OBS	RPNK
5	210315	13.6N 128.0E	PCN 5		DMS335		RPNK
6	211048	12.6N 125.4E	PCN 5		DMS337		RODN
7	211108	13.4N 126.5E	PCN 5		DMS337		RPNK
8	211142	13.5N 127.2E	PCN 6		DMS336		PGTW
9	211415	13.0N 128.4E	PCN 6		DMS335		RODN
10	211556	14.0N 125.7E	PCN 5		DMS335	BASED ON CB W EDGE	RODN
11	212208	13.7N 123.8E	PCN 5	T2.0/2.0 /D0.5/24HRS	DMS337		RPNK
12	212208	14.9N 123.2E	PCN 5	T1.5/1.5-/D0.5/24HRS	DMS337		PGTW
13	220257	14.0N 120.7E	PCN 5		DMS335	2ND 13.0N 120.7E	RPNK
14	220257	15.0N 123.3E	PCN 5		DMS335	15.0N 122.7E	PGTW
15	221048	15.2N 120.8E	PCN 5		DMS337		RPNK
16	221048	15.5N 121.0E	PCN 5		DMS337		PGTW
17	221539	16.4N 118.1E	PCN 5		DMS335		RPNK
18	221539	16.4N 118.6E	PCN 5		DMS335		PGTW
19	222148	17.8N 117.8E	PCN 5		DMS337	CI UP	PGTW
20	222148	18.1N 117.7E	PCN 5		DMS337		RPNK
21	222330	15.5N 115.7E	PCN 5		DMS337		RPNK
22	230239	15.5N 115.8E	PCN 5	T2.0/2.0 /D0.5/28HRS	DMS335	APPARENT LOW LVL CIRCULATION	PGTW
23	230239	15.5N 115.4E	PCN 5	T2.0/2.0-/S0.0/28HRS	DMS335		RPNK
24	230421	15.5N 115.0E	PCN 5		DMS335		RPNK
25	231029	14.8N 114.0E	PCN 6		DMS337		RPNK
26	231029	15.2N 115.4E	PCN 6		DMS337		PGTW
27	231210	15.0N 112.7E	PCN 6		DMS337		RPNK
28	231249	14.5N 114.3E	PCN 6		DMS336		RODN
29	232310	15.7N 113.4E	PCN 5	T2.5/2.5 /D0.5/21HRS	DMS337		RPNK
30	232350	16.3N 112.9E	PCN 6	T2.5/2.5-/D0.5/21HRS	DMS336	2ND 17.6N 123.7E	PGTW
31	232350	16.3N 113.0E	PCN 6	T3.0/3.0	DMS336	INIT OBS	RODN
32	240403	16.0N 113.3E	PCN 5		DMS335	BETTER ORGANIZED	RPNK
33	241151	16.9N 112.2E	PCN 5		DMS337	CI DOWN	RPNK
34	241151	17.1N 112.4E	PCN 6		DMS337		RODN
35	241645	17.6N 111.7E	PCN 5		DMS335		RPNK
36	242251	17.9N 111.2E	PCN 3	T3.0/3.0-/D0.5/24HRS	DMS337		RPNK
37	242251	17.9N 111.2E	PCN 6		DMS337	SECONDARY AT 16.8N 110.1E	RODN
38	242332	18.2N 111.0E	PCN 6		DMS336		PGTW
39	250345	17.9N 110.4E	PCN 5		DMS335		RPNK
40	250345	18.5N 109.5E	PCN 5		DMS335		RODN
41	251132	18.9N 109.0E	PCN 5		DMS337		RPNK
42	251132	17.8N 108.7E	PCN 6		DMS337	CI UP	RODN
43	251215	18.3N 109.1E	PCN 5		DMS336		PGTW
44	251527	18.8N 108.3E	PCN 5		DMS335		RPNK
45	252231	18.2N 107.6E	PCN 5	T2.0/2.5-/D0.5/23HRS	DMS337		PGTW
46	260058	17.9N 107.2E	PCN 1	T3.5/3.5-/D0.5/26HRS	DMS336	RAGGED EYE	RPNK
47	260327	17.8N 107.0E	PCN 3		DMS335		RPNK
48	261112	17.5N 106.4E	PCN 5		DMS337		RPNK
49	261112	17.6N 105.3E	PCN 5		DMS337		RODN
50	261609	17.7N 104.4E	PCN 6		DMS335		RODN

AIRCRAFT FIXES

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

TYPHOON LOLA

SATELLITE FIXES

FIX NO.	TIME (Z)	FIX POSITION	ACCR	UVZRAK CODE	SAT	COMMENTS	SITE
1	202045	9.1N 144.6E	PCN 5	T0.0/0.0	DMS437	INIT JSS	PGTW
2	210926	10.2N 146.1E	PCN 6		DMS437	BASCU JN POS 5 I LCC	PGTW
3	211415	9.4N 146.1E	PCN 6		DMS436		PGTW
4	212243	11.3N 147.4E	PCN 6	T0.0/0.0 /50.0/24HRS	DMS436		PGTW
5	221357	9.4N 147.4E	PCN 5		DMS436		PGTW
6	231107	11.0N 139.3E	PCN 5		DMS436		PGTW
7	242208	12.7N 137.6E	PCN 5	T1.0/1.0	DMS436	INIT JSS SECONDARY 11.4N 136.5E	PGTW
8	240222	12.1N 135.3E	PCN 5		DMS436		PGTW
9	241010	12.2N 134.2E	PCN 6		DMS437	CI UP	PGTW
10	241010	12.4N 134.6E	PCN 5		DMS437		RPMK
11	241050	12.4N 133.9E	PCN 5		DMS436		PGTW
12	241503	12.5N 133.1E	PCN 5		DMS436		PGTW
13	241503	12.4N 134.1E	PCN 5		DMS436		RPMK
14	242109	11.7N 131.7E	PCN 5	T2.5/2.5 /01.5/23HRS	DMS437		PGTW
15	242332	13.1N 131.7E	PCN 5		DMS436	BASCU JN CH HANUS	PGTW
16	250204	13.0N 130.9E	PCN 5		DMS436		PGTW
17	250204	12.4N 130.8E	PCN 3	T2.0/2.0	DMS436	INIT JSS	RPMK
18	250950	12.0N 129.6E	PCN 5		DMS437	CI UP	PGTW
19	250950	11.7N 129.5E	PCN 6		DMS437	MULTI CB LINES	RPMK
20	251215	12.1N 129.6E	PCN 5		DMS436		PGTW
21	251215	11.9N 129.8E	PCN 5		DMS436		RPMK
22	251446	12.2N 129.0E	PCN 5		DMS436		PGTW
23	252231	12.2N 124.9E	PCN 5	T2.5/2.5+/50.0/25HRS	DMS437		PGTW
24	252231	12.7N 124.9E	PCN 5	T2.5/2.5 /00.5/20HRS	DMS437		RPMK
25	252315	12.3N 124.6E	PCN 5		DMS436		PGTW
26	260327	12.4N 124.9E	PCN 5		DMS436		RPMK
27	261112	13.0N 124.7E	PCN 5		DMS437		RPMK
28	261112	12.1N 124.7E	PCN 5		DMS437		RODN
29	261157	12.9N 124.5E	PCN 5		DMS436	CI UP	PGTW
30	261428	13.0N 124.5E	PCN 6		DMS436		RPMK
31	261428	13.3N 124.0E	PCN 5		DMS436		PGTW
32	262211	13.5N 122.1E	PCN 3	T3.0/3.0	DMS437	INIT JSS	RKSO
33	262212	13.3N 122.4E	PCN 3	T3.5/3.5 /01.0/24HRS	DMS437		RPMK
34	262212	13.4N 122.5E	PCN 5	T3.5/3.5 /01.0/24HRS	DMS437		PGTW
35	262258	13.4N 122.4E	PCN 6		DMS436		PGTW
36	270310	13.8N 121.7E	PCN 3	T4.0/4.0+/01.0/24HRS	DMS436		RPMK
37	270310	13.7N 121.7E	PCN 3		DMS436		PGTW
38	270310	13.9N 121.7E	PCN 5	T2.0/2.0	DMS436	INIT JSS	RODN
39	271053	14.3N 120.2E	PCN 3		DMS437		PGTW
40	271053	14.1N 120.4E	PCN 3		DMS437		RPMK
41	271140	14.4N 119.9E	PCN 4		DMS436		PGTW
42	271140	14.5N 120.2E	PCN 5		DMS436		RPMK
43	271551	14.9N 119.2E	PCN 5		DMS436	CI UP	RPMK
44	272152	14.6N 117.9E	PCN 5		DMS437		PGTW
45	272152	15.0N 118.9E	PCN 6		DMS437		RPMK
46	272152	14.5N 118.8E	PCN 5		DMS436		RODN
47	280022	16.1N 118.2E	PCN 6		DMS436		RPMK
48	280252	15.4N 117.1E	PCN 3	T3.5/3.5+/50.0/24HRS	DMS436		RPMK
49	280252	15.5N 117.3E	PCN 3	T3.5/3.5 /50.0/24HRS	DMS436		PGTW
50	281033	15.7N 116.6E	PCN 3		DMS437	INDISTINCT EYE	PGTW
51	281033	15.4N 116.5E	PCN 3		DMS437		RODN
52	281304	16.2N 116.6E	PCN 5		DMS436		RPMK
53	281534	16.2N 116.0E	PCN 3		DMS436		PGTW
54	282314	16.7N 115.0E	PCN 1	T4.5/4.5 /01.0/20HRS	DMS437		RODN
55	290004	16.7N 114.9E	PCN 1		DMS436	INIT JSS	RPMK
56	290004	16.5N 114.7E	PCN 1	T4.5/4.5	DMS436		RODN
57	292234	16.3N 114.6E	PCN 3		DMS436		PGTW
58	290416	16.5N 114.6E	PCN 1		DMS436	EYE EXPANDING 3/4 DEG CIRCULAR	RPMK
59	291246	17.0N 113.5E	PCN 1		DMS436		RPMK
60	291516	17.1N 113.1E	PCN 1		DMS436		PGTW
61	291516	16.9N 113.0E	PCN 1		DMS436		RODN
62	292255	17.1N 113.2E	PCN 1	T5.5/5.5 /01.0/24HRS	DMS437		RPMK
63	292255	17.2N 113.0E	PCN 1	T5.0/5.0 /00.5/22HRS	DMS437		RODN
64	292347	17.1N 113.1E	PCN 1	T4.5/4.5	DMS436	INIT JSS	PGTW
65	300358	17.6N 112.7E	PCN 1		DMS436		RPMK
66	301136	18.1N 112.4E	PCN 1		DMS437		RPMK
67	301136	18.0N 112.6E	PCN 4		DMS437		RODN
68	301640	18.4N 112.2E	PCN 1		DMS436		RPMK
69	302235	18.7N 111.7E	PCN 1	T4.5/4.5	DMS437	INIT JSS	RKSO
70	302235	18.8N 111.7E	PCN 3	T4.0/5.0-/01.0/24HRS	DMS437		RODN
71	302329	18.5N 112.0E	PCN 3		DMS436	EDGE OF DATA	PGTW
72	010110	18.7N 112.0E	PCN 1	T5.5/5.5-/50.0/26HRS	DMS436		RPMK
73	010340	19.1N 111.4E	PCN 1		DMS436	RAGGED EYE	RKSO
74	010340	19.0N 111.3E	PCN 6		DMS436		RODN
75	011116	19.4N 110.5E	PCN 5		DMS437		RODN
76	011116	19.6N 110.5E	PCN 1		DMS437		RPMK
77	011212	19.5N 110.7E	PCN 1		DMS436	EXTREME EDGE OF DATA	PGTW
78	011622	19.9N 110.6E	PCN 6		DMS436		RODN
79	011522	20.0N 110.3E	PCN 1		DMS436		RPMK
80	012216	20.0N 110.0E	PCN 2		DMS437		PGTW
81	012216	20.1N 109.9E	PCN 1		DMS437		RKSO
82	020322	20.1N 109.6E	PCN 1		DMS436		RODN
83	020322	20.7N 109.5E	PCN 1		DMS436		RPMK
84	021057	20.6N 109.6E	PCN 1	T5.0/5.0-/00.5/22HRS	DMS437		RKSO
85	021057	21.4N 108.5E	PCN 1		DMS437		PGTW
86	021336	21.2N 108.0E	PCN 2		DMS436		RPMK
87	021504	21.3N 107.7E	PCN 1		DMS436		RKSO
88	021504	21.5N 107.6E	PCN 1		DMS436		RPMK
89	022338	21.4N 106.9E	PCN 1	T3.0/4.0-/02.0/20HRS	DMS437	EYE ALMOST GONE	RPMK
90	030034	21.6N 106.4E	PCN 6	T1.0/1.0	DMS436	INIT JSS	RODN

AIRCRAFT FIXES

FIX NO.	TIME (Z)	FIX POSITION	FLT LVL	MIN HGT	OBS MSLP	MAX-SFC-WND VEL/ARG/RNG	MAX-FLT-LVL-WND DIR/VEL/DRG/ANG	ACCRV NAV/MET	EYE SHAPE	EYE ORIEN- DIAM/TATION	EYE TEMP. (C) OUT/ IN/ DP/ST	MSX NO.
1	242200	12.1N 131.3E	700MB	3104	1005	25 340 50	050 30 340 60	5 10			+12 +12 + R	1
2	250135	12.2N 130.5E	700MB	3105		25 340 50	040 37 340 60				+11 +11	1
3	250315	12.2N 130.3E	700MB	3097	1002	10 130 35	210 20 130 15	3 5			+11 +13 + 9	1
4	251551	12.4N 128.1E	700MB	3070			130 50 060 180	5 10			+12 + 7	2
5	251850	12.3N 127.7E	700MB	3045			330 33 230 60				+12 + 7	2
6	252110	12.0N 127.3E	700MB	3044		35 290 30	070 38 290 120	5 10			+12 + R	2
7	260200	12.2N 126.6E	700MB	3041		30 120 30	210 40 130 60				+12 +11	3
8	260356	12.3N 126.2E	700MB	3013	992	45 100 90	180 45 090 40	2 3			+10 +13 +10	3
9	271100	14.2N 120.4E	700MB	2965			080 72 310 60				+14 +12	4
10	271510	14.5N 119.5E	700MB	2964	985		300 62 190 10	5 5			+13 +15 +11	4
11	280306	15.2N 117.7E	700MB			50 0						5
12	280415	15.3N 117.4E	700MB	2935	983	50 120 40	190 57 120 60	3 2			+12 +15 + 9	5
13	281855	16.3N 115.7E	700MB	2825	969		130 74 020 45	10 5	ELLIPTICAL	50 20 360	+14 +15 +12	6
14	282120	16.4N 115.1E	700MB	2815	969		140 62 160 50	7 5	ELLIPTICAL	50 20 360	+14 +15 +11	6
15	290351	16.6N 114.6E	700MB	2812	968	55 090 30	170 74 090 30	3 4	CIRCULAR	50	+12 +15 + 9	7
16	290635	16.8N 114.3E	700MB	2773		70 350 50	080 82 350 60	5 4			+16 + 9	7
17	290948	17.0N 114.0E	700MB	2764	963		180 87 090 30	15 3	ELLIPTICAL	50 40 340	+12 +17 + R	7

RAJAR FIXES

FIX NO.	TIME (Z)	FIX POSITION	RAJAR	ACCRV	EYE SHAPE	EYE DIAM	RAJAH-COUE ASWAM TUFF	COMMENTS	RAJAH POSITION	SITE WMO NO.
1	261900	13.4N 123.4E	LAND					PROBABLE EYE NOT WELL DEFINED	14.1N 123.0E	98440
2	262330	13.4N 122.5E	LAND					PSBL CFNIER	15.2N 120.6E	98327
3	270055	13.5N 122.4E	LAND				258// 53212		14.1N 123.0E	98440
4	270130	13.6N 122.4E	LAND	POOH				PSBL CFNIER	15.2N 120.6E	98327
5	270210	13.6N 122.2E	LAND	POOK				PSBL CFNIER	15.2N 120.6E	98327
6	270230	13.6N 122.1E	LAND	POOH				PSBL CFNIER	15.2N 120.6E	98327
7	270310	13.6N 122.0E	LAND	POUR				PSBL CFNIER	15.2N 120.6E	98327
8	270330	13.4N 121.9E	LAND	POUR				PSBL CFNIER	15.2N 120.6E	98327
9	270430	13.4N 121.7E	LAND	POOK				PSBL CFNIER	15.2N 120.6E	98327
10	270510	13.4N 121.8E	LAND	POOH				PSBL CFNIER	15.2N 120.6E	98327
11	270535	13.7N 121.6E	LAND	POOR				PSBL CFNIER	15.2N 120.6E	98327
12	270630	14.1N 121.3E	LAND	POOH				PSBL CENTER	15.2N 120.6E	98327
13	270710	14.0N 121.1E	LAND					EYE NEG WALL CLO	15.2N 120.6E	98327
14	270730	14.0N 121.0E	LAND	FAIR	CIRCULAR	33		EYE NEG WALL CLO	15.2N 120.6E	98327
15	270810	14.0N 121.1E	LAND	FAIR	CIRCULAR	24		EYE APRNF WALL CLU FRMG E QUAD	15.2N 120.6E	98327
16	270830	14.0N 121.1E	LAND	FAIR	CIRCULAR	29		EYE NEG WALL CLO	15.2N 120.6E	98327
17	270910	13.9N 121.1E	LAND	FAIR	CIRCULAR	23		EYE NEG WALL CLO	15.2N 120.6E	98327
18	271010	14.0N 120.8E	LAND	FAIR	CIRCULAR	29		EYE NEG WALL CLO	15.2N 120.6E	98327
19	271030	13.9N 120.7E	LAND	FAIR	CIRCULAR	30		EYE NEG WALL CLO	15.2N 120.6E	98327
20	271100	14.7N 119.8E	LAND				1020/ ////		16.3N 120.6E	98321
21	271210	14.3N 120.3E	LAND	POOR	CIRCULAR	12		EYE APPEARS TO BE REORGANIZING	15.2N 120.6E	98327
22	271235	14.3N 120.4E	LAND	POOR	CIRCULAR	36		EYE APPEARS TO BE REORGANIZING	15.2N 120.6E	98327
23	271310	14.3N 120.3E	LAND	POOR	CIRCULAR	38		EYE BCMG INDISTINCT DUE TO MTNS	15.2N 120.6E	98327
24	271410	14.3N 120.1E	LAND	POOH	CIRCULAR	36		PSBL EYE NEG WALL CLO	15.2N 120.6E	98327
25	271500	15.0N 119.5E	LAND				45/// ////		16.3N 120.6E	98321
26	271800	14.9N 119.7E	LAND				41/// ////	10 DEG SPRL OVERLAY	16.3N 120.6E	98321
27	272100	15.0N 118.8E	LAND				41/// ////		16.3N 120.6E	98321
28	272300	15.0N 118.3E	LAND				45/// 62712	10 DEG SPRL OVERLAY	16.3N 120.6E	98321
29	280300	15.3N 117.4E	LAND				45/// 52709	15 DEG SPRL OVERLAY	16.3N 120.6E	98321

TYPHOON MAMIE

SATELLITE FIXES

FIX NO.	TIME (Z)	FIX POSITION	ACCR	DVORAK CODE	SAT	COMMENTS	SITE
1	282223	19.9N 154.0E	PCN 5	T0.0/0.0	DMSP96	INIT OBS	PGTW
2	290924	19.7N 153.3E	PCN 6		DMSP96	CI UP	PGTW
3	291105	20.0N 153.3E	PCN 5		DMSP96	CI UP	PGTW
4	292205	19.6N 153.2E	PCN 5	T1.5/1.5 /01.5/24HRC	DMSP96		PGTW
5	300035	19.4N 152.9E	PCN 5		DMSP96		PGTW
6	300813	19.5N 153.2E	PCN 6		DMSP97		PGTW
7	301048	19.8N 152.9E	PCN 5		DMSP96		PGTW
8	301316	20.1N 153.0E	PCN 5		DMSP95		PGTW
9	302053	21.5N 153.3E	PCN 6		DMSP97		PGTW
10	302054	21.5N 153.3E	PCN 6		DMSP97	BASED ON CENTER COO	RDDN
11	302148	21.3N 153.6E	PCN 6	T2.5/2.5 /01.0/23HRC	DMSP96		PGTW
12	010016	21.8N 152.3E	PCN 4		DMSP95	BASED ON EXTRAP CU/TCU LINES	PGTW
13	010935	23.2N 152.0E	PCN 5		DMSP97	CI UP	PGTW
14	011030	23.5N 151.9E	PCN 5		DMSP96		PGTW
15	011259	23.9N 151.8E	PCN 5		DMSP95		PGTW
16	012034	24.0N 150.3E	PCN 4	T3.5/3.5 /01.0/26HRC	DMSP97		PGTW
17	012034	24.9N 150.4E	PCN 6	T1.0/1.0	DMSP97	INIT OBS	RDDN
18	012130	24.3N 150.7E	PCN 4		DMSP96		PGTW
19	020140	25.2N 149.8E	PCN 5		DMSP95		PGTW
20	020915	26.3N 150.1E	PCN 5		DMSP97	CI SAME	PGTW
21	020915	26.5N 150.4E	PCN 6		DMSP97		RDDN
22	021013	26.6N 150.2E	PCN 5		DMSP96		PGTW
23	021422	27.4N 150.5E	PCN 5		DMSP95		PGTW
24	022014	28.1N 150.4E	PCN 4	T3.0/3.0+/02.0/24HRC	DMSP97		RDDN
25	022015	28.2N 150.4E	PCN 4	T3.0/3.5 /00.5/24HRC	DMSP97		PGTW
26	022113	28.2N 150.6E	PCN 4		DMSP96		PGTW
27	030122	29.5N 151.1E	PCN 4		DMSP95		PGTW
28	030856	31.2N 152.7E	PCN 5		DMSP97	CI DOWN	PGTW
29	030956	31.5N 152.6E	PCN 6		DMSP96		PGTW
30	031404	32.4N 153.4E	PCN 6		DMSP95		PGTW
31	031955	35.0N 155.9E	PCN 3	T2.0/3.0 /01.0/24HRC	DMSP97		PGTW
32	031955	34.9N 155.9E	PCN 4	T2.5/2.5	DMSP97	INIT OBS	KGWC
33	032056	35.6N 156.8E	PCN 3		DMSP96		PGTW
34	040105	36.9N 158.2E	PCN 3		DMSP95		PGTW
35	040936	39.9N 161.6E	PCN 4		DHSP	NO CONVECTION	KGWC
36	041346	41.5N 164.3E	PCN 6		DMSP95	CONVECTION NORTH OF STORM	KGWC
37	041935	42.1N 168.5E	PCN 4		DMSP97	WELL DEFINED SC BANDING	KGWC
38	042305	42.2N 170.5E	PCN 4		DMSP95	WELL DEFINED SC BANDING	KGWC

AIRCRAFT FIXES

FIX NO.	TIME (Z)	FIX POSITION	FLT LVL	MIN HGT	OBS MSLP	MAX-SFC-WND VEL/DRG/RWG	MAX-FLT-LVL-WND DIR/VEL/DRG/RWG	ACCR NAV/MET	EYE SHAPE	EYE ORIEN-DIAM/TATION	EYE TEMPI (C) OUT/ IN/ DP/SSST	MSW NO.
1	300213	19.3N 152.5E	1500FT		996	30 150	40 240	27 160	35	3 1	+23 +25 +25	23 1
2	300358	19.3N 152.6E	700MB	3056	996	35 150	40 220	22 150	20	5 2	+10 +13 +10	1
3	010156	21.6N 152.5E	700MB	3030		35 050	30 190	43 050	30		+15 + 7	2
4	010350	22.1N 152.5E	700MB	3003	990	35 260	30 330	30 260	30	4 2	+13 +16 + 9	2
5	011455	23.9N 150.9E	700MB	2967	986		240	38 160	25	5 2	+12 +18 +12	3
6	020357	25.5N 150.0E	700MB	2983	985	45 060	15 040	54 330	25	3 7	+14 +15 +12	4
7	021928	28.1N 150.3E	700MB	2858	973		260	50 160	25	4 3	+13 +15 +15	5
8	030050	29.1N 150.9E	700MB	2797		65 130	45 220	70 130	20		+20 +10	6
9	030317	29.6N 151.3E	700MB	2774	965	50 060	55 160	65 060	30	3 3	+12 +18 +11	6
10	031243	32.5N 153.1E	700MB	2813	969		200	87 090	62		+18 +12	7
11	031405	33.3N 153.5E	700MB	2824	969		170	75 080	120		+15 +12	7
12	041503	33.6N 154.0E	700MB	2795	963		360	58 310	8	4 4	ELLIPTICAL 40 30 150	+13 +17 +12 7

TROPICAL STORM NINA

SATELLITE FIXES

FIX NO.	TIME (Z)	FTX POSITION	ACCR	ORBIT CODE	SAT	COMMENTS	SITE
1	052203	15.4N 144.6E	PCN 5	T0.0/0.0	DMS436	INIT J45	PGTW
2	061045	17.7N 137.3E	PCN 6		DMS436		PGTW
3	062327	16.0N 134.2E	PCN 5	T1.5/1.5 /01.5/24HRC	DMS436		PGTW
4	071209	16.5N 131.1E	PCN 5		DMS436		PGTW
5	071435	15.4N 130.0E	PCN 5		DMS436		PGTW
6	072200	15.7N 128.3E	PCN 5	T2.5/2.5 /01.0/23HRC	DMS437		PGTW
7	072310	15.4N 128.2E	PCN 5		DMS436		PGTW
8	081041	14.8N 126.8E	PCN 5		DMS437	CI JP	PGTW
9	041041	13.4N 126.8E	PCN 5		DMS437		RPMK
10	081152	15.1N 127.1E	PCN 3		DMS436		PGTW
11	081558	15.6N 126.1E	PCN 5		DMS436		RODN
12	082141	14.5N 124.8E	PCN 6		DMS437		PGTW
13	082252	14.5N 124.6E	PCN 6		DMS436		PGTW
14	090259	15.1N 123.5E	PCN 5	T2.0/2.0	DMS435	INIT J45	RPMK
15	090259	15.0N 124.3E	PCN 5	T3.0/3.0 /00.5/29HRC	DMS435		PGTW
16	091022	15.5N 124.0E	PCN 3		DMS437		PGTW
17	091130	15.3N 123.1E	PCN 5		DMS436		PGTW
18	091541	15.0N 122.0E	PCN 5		DMS436		RPMK
19	091541	15.7N 122.6E	PCN 5		DMS436		RODN
20	092303	14.3N 121.0E	PCN 5	T2.0/2.0 /50.0/20HRC	DMS437		RPMK
21	092303	16.5N 120.9E	PCN 6		DMS437	SE QUAD CDO	RODN
22	100016	14.4N 120.0E	PCN 3	T2.5/2.5 /00.5/22HRC	DMS436		RPMK
23	100049	14.5N 120.3E	PCN 5	T3.5/3.5 /00.5/22HRC	N0445		PGTW
24	101522	15.3N 118.0E	PCN 5		DMS435		RPMK
25	101523	14.5N 119.0E	PCN 5		DMS435		PGTW
26	102243	14.9N 117.3E	PCN 5	T3.0/3.0 /00.5/23HRC	DMS437		RPMK
27	102243	12.7N 117.5E	PCN 6		DMS437	POSSIBLE ZND 16.7N 114.3E	RODN
28	102359	14.4N 117.8E	PCN 3	T4.0/4.0 /00.5/24HRC	DMS436		PGTW
29	102359	15.0N 117.3E	PCN 3		DMS436		RPMK
30	110223	15.1N 117.6E	PCN 3		DMS436	PARTIALLY EXPOSED LLCC	PGTW
31	110223	15.0N 118.2E	PCN 5		DMS435	BASED ON EXPOSED LLCC	RPMK
32	110405	15.2N 118.3E	PCN 3		DMS435	BASED ON EXPOSED LLCC	RPMK
33	111124	15.4N 117.9E	PCN 3		DMS437		RPMK
34	111241	15.4N 117.8E	PCN 3		DMS436		RPMK
35	111505	15.5N 117.1E	PCN 3		DMS435	PARTIALLY EXPOSED LLCC	PGTW
36	111505	15.5N 117.5E	PCN 3		DMS435		RPMK
37	112223	15.4N 116.6E	PCN 3		DMS437	PARTIALLY EXPOSED LLCC	PGTW
38	112223	15.4N 116.1E	PCN 5	T3.0/3.0 /50.0/24HRC	DMS437	POSS 2ND EXPOSED 16.2N 117.0E	RPMK
39	112223	15.2N 115.8E	PCN 5		DMS437		RKSD
40	120347	15.2N 115.7E	PCN 1		DMS435		RPMK
41	121105	15.5N 115.8E	PCN 5		DMS437		RODN
42	121105	15.5N 116.3E	PCN 1		DMS437		RPMK
43	121529	15.4N 116.1E	PCN 3		DMS435		RPMK
44	122204	15.6N 115.6E	PCN 4		DMS437		PGTW
45	122324	15.5N 116.0E	PCN 3		DMS436		PGTW
46	122324	15.2N 116.5E	PCN 3		DMS436		RPMK
47	130329	15.2N 116.2E	PCN 3	T4.0/4.0	DMS435	INIT J45	RODN
48	130329	15.2N 115.8E	PCN 3	T3.0/3.0 /50.0/29HRC	DMS435	LLCC	RPMK
49	131045	15.5N 115.2E	PCN 6		DMS437		RPMK
50	131045	15.3N 114.4E	PCN 5		DMS437	CI D044	PGTW
51	131207	15.7N 116.4E	PCN 3		DMS437		PGTW
52	131611	15.6N 115.2E	PCN 5		DMS435	PARTIALLY EXPOSED LLCC NW	RPMK
53	132326	17.1N 115.7E	PCN 5	T1.5/2.5 /01.5/20HRC	DMS437	BASED ON CENTER OF FEATURES	RPMK
54	140311	16.7N 114.9E	PCN 5	T3.5/4.0 /00.5/24HRC	DMS435		RODN
55	140311	15.7N 115.2E	PCN 3	T2.5/2.5	DMS435	INIT J45 PARTIALLY EXPOSED LLCC	PGTW
56	140311	16.2N 115.1E	PCN 3	T3.0/3.0	DMS435	INIT J45	RKSD
57	141207	17.7N 115.3E	PCN 3		DMS437	EXPOSED LLCC	RPMK
58	141553	17.9N 114.9E	PCN 3		DMS435		RPMK
59	141553	17.9N 114.8E	PCN 3		DMS435	NE OF CDO	RODN
60	141553	18.1N 114.7E	PCN 5		DMS435		RKSD
61	142307	18.4N 113.6E	PCN 4		DMS437		RODN
62	151148	18.9N 111.9E	PCN 3		DMS437		RPMK
63	151314	19.2N 111.9E	PCN 3		DMS435		RPMK
64	151535	19.0N 112.2E	PCN 3		DMS435		RODN
65	151535	20.0N 111.7E	PCN 5		DMS435		PGTW
66	160014	20.9N 112.1E	PCN 5	T2.0/2.0	DMS436	INIT J45	PGTW
67	160417	21.3N 112.0E	PCN 5		DMS436		RPMK
68	161128	21.6N 113.1E	PCN 3		DMS437		RODN
69	161128	21.6N 114.2E	PCN 5		DMS437		RPMK
70	161256	22.7N 112.6E	PCN 5		DMS436		RODN
71	161517	21.6N 114.4E	PCN 5		DMS435		RPMK
72	161517	22.6N 114.2E	PCN 5		DMS435	CI D044	PGTW
73	162356	21.9N 114.2E	PCN 5		DMS436	ZNU 21.7N 110.9E	RODN
74	162359	21.6N 111.3E	PCN 3		DMS436		RPMK

AIRCRAFT FIXES

FIX NO.	TIME (Z)	FTX POSITION	FLT LVL	MIN HGT	OBS MSLP	MAX-SFC-WND VEL/DIR/AVG	MAX-FLT-LVL-WND DIR/VEL/DIR/AVG	ACCR	EYE SHAPE	EYE ORIEN-DIAM/TATION	EYE TEMP (C) DIRT/ IN/ CP/ SST	MS4 NO.
1	072334	15.2N 129.3E	1500FT		993	30 080	55 110 36 050 16R	3 2			+26 +26 +27 29	3
2	080230	15.2N 128.7E	1500FT		992	30 060	30 120 33 060 90	4 2			+26 +27 +27 27	3
3	081555	14.5N 126.1E	700MB	2973	986		100 53 010 40	4 4			+14 +14 +11	4
4	081900	14.6N 125.6E	700MB	2974			090 53 320 120				+13 +13	4
5	082040	14.7N 125.3E	700MB	2964	986		240 39 120 120	4 8			+14 +14 +12	4

TYPHOON ORA

SATELLITE FIXES

FIX NO.	TIME (Z)	FIX POSITION	ACCRV	UVZRAK CODE	SAT	COMMENTS	SITE
1	072310	11.2N 137.4E	PCN 5	T0.0/0.0	DMS244	INIT J3S	PGTW
2	081417	11.2N 138.4E	PCN 6		DMS245	SECONDARY 11.0N 142.4E	PGTW
3	082141	14.5N 138.5E	PCN 6	T1.0/1.0 /01.0/23HRS	DMS247		PGTW
4	042252	14.6N 138.8E	PCN 6		DMS248		PGTW
5	040117	14.3N 138.2E	PCN 5		DMS249		PGTW
6	091022	14.6N 138.7E	PCN 5		DMS247		PGTW
7	091135	14.6N 138.5E	PCN 5		DMS248		PGTW
8	091359	14.5N 138.9E	PCN 5		DMS249		PGTW
9	092121	17.0N 133.3E	PCN 6	T1.0/1.0 /50.0/24HRS	DMS247		PGTW
10	092234	17.1N 133.2E	PCN 6		DMS248		PGTW
11	101002	14.7N 132.2E	PCN 6		DMS249	CI UP PARTIALLY EXPOSED LLCC	PGTW
12	101002	14.6N 133.1E	PCN 5		DMS247		RPMK
13	101117	19.9N 132.1E	PCN 5		DMS248		PGTW
14	101523	13.0N 131.1E	PCN 6		DMS249		PGTW
15	102101	14.0N 128.4E	PCN 6		DMS247		PGTW
16	102102	14.0N 130.4E	PCN 6		DMS247		RODN
17	102359	13.3N 129.3E	PCN 6		DMS248		PGTW
18	110223	20.1N 129.5E	PCN 5	T3.0/3.0	DMS249	INIT J3S EXPOSED LLCC	RODN
19	110223	20.0N 129.5E	PCN 3	T2.5/2.5	DMS249	INIT J3S	RPMK
20	110223	11.9N 129.3E	PCN 3	T2.0/2.0-/01.0/27HRS	DMS249		PGTW
21	110943	20.9N 128.2E	PCN 5		DMS247	CI UP	PGTW
22	111241	21.3N 127.3E	PCN 3		DMS248	CI UP	RPMK
23	111241	20.5N 126.1E	PCN 3		DMS248		RKSO
24	111505	21.0N 126.3E	PCN 5		DMS249		PGTW
25	111505	21.3N 126.5E	PCN 5		DMS249		RPMK
26	112223	21.4N 125.1E	PCN 3	T3.5/3.5-/01.0/20HRS	DMS247		RPMK
27	112223	21.4N 126.7E	PCN 6	T3.0/3.0 /01.0/20HRS	DMS247		PGTW
28	112223	21.4N 124.8E	PCN 3	T3.0/3.0	DMS247	INIT J3S	RKSO
29	120205	22.0N 127.9E	PCN 3		DMS249	BEGINNING OF HANDING TYPE EYE	PGTW
30	120205	22.0N 124.1E	PCN 3	T3.0/3.0 /50.0/24HRS	DMS249		RODN
31	121105	22.3N 122.8E	PCN 1		DMS247		RODN
32	121105	22.0N 123.1E	PCN 1		DMS247		RPMK
33	121447	22.0N 123.1E	PCN 1		DMS249		RODN
34	121447	22.1N 122.5E	PCN 2		DMS248	CI UP	PGTW
35	122204	22.4N 122.7E	PCN 2	T4.0/4.0 /01.0/24HRS	DMS247		PGTW
36	122204	22.9N 122.9E	PCN 1	T4.0/4.0-/01.0/24HRS	DMS247		RKSO
37	122324	23.1N 122.4E	PCN 1	T4.5/4.5-/01.0/25HRS	DMS248		RPMK
38	122324	23.0N 122.9E	PCN 1		DMS246		PGTW
39	130329	23.7N 122.9E	PCN 1		DMS248		RPMK
40	130329	23.7N 122.9E	PCN 1	T4.0/4.0 /01.0/25HRS	DMS249		RODN
41	131045	24.4N 123.3E	PCN 3		DMS247		PGTW
42	131045	24.7N 123.2E	PCN 3		DMS247		RKSO
43	131049	24.2N 123.3E	PCN 3		DMS247		RPMK
44	131207	24.7N 123.2E	PCN 3		DMS248		PGTW
45	131511	24.0N 123.7E	PCN 1		DMS249		RODN
46	132144	25.5N 123.5E	PCN 4	T3.0/4.0 /01.0/23HRS	DMS247		PGTW
47	132306	25.9N 123.4E	PCN 3		DMS248	EXPOSED LLCC	PGTW
48	140311	26.5N 123.9E	PCN 5	T3.0/4.0-/01.0/24HRS	DMS249		RODN
49	140311	26.6N 123.9E	PCN 3	T3.0/3.0 /01.0/20HRS	DMS249	PARTIALLY EXPOSED LLCC	RKSO
50	141026	27.2N 126.7E	PCN 5		DMS247		RODN
51	141026	27.3N 126.4E	PCN 5		DMS247	CI UP	PGTW
52	141149	27.2N 126.3E	PCN 5		DMS247		PGTW
53	141553	27.2N 127.2E	PCN 5		DMS249		RPMK
54	141553	29.0N 127.9E	PCN 5		DMS249		RODN
55	141553	27.2N 126.7E	PCN 3		DMS249		RKSO
56	142125	24.3N 128.8E	PCN 4		DMS247	PART EXP LLCC F EDGE MAJ CONV	PGTW
57	142125	27.4N 129.5E	PCN 5	T2.0/2.5-/01.9/05HRS	DMS247		RODN
58	142249	29.0N 129.1E	PCN 5	T2.0/3.0-/01.7/25HRS	DMS247		PGTW
59	151006	31.5N 134.3E	PCN 5		DMS247		PGTW

AIRCRAFT FIXES

FIX NO.	TIME (Z)	FIX POSITION	FLT LVL	MIN HGT	QBS MSLP	MAX-SFC-WIND VEL/DRG/RNG	MAX-FLT-LVL-WIND DIR/VEL/DRG/RNG	ACCRV NAV/MFT	EYE SHAPE	EYE ORIEN- DIRM/TATION	EYE TEMP (C) IIR/ IN/ DR/AST	MSN NO.
1	092254	17.1N 134.0E	700MB	3080	997	50 150 10	200 38 080 20	5 2			+23 +25 +20	1
2	104238	17.4N 133.5E	700MB	3073	998	50 150 10	270 40 210 30	5 2			+ 9 +13 + 7	1
3	101230	17.7N 131.3E	700MB	3057			140 35 050 60				+13 + 7	2
4	101456	13.3N 131.0E	700MB	3033	996		040 40 290 60	5 15			+12 +11 +11	2
5	110321	19.9N 129.2E	700MB			50 110 45	110 45 210 45	3 H			+12 +14 +10	3
6	110530	20.3N 124.5E	700MB			30 310 30	040 36 310 120				+13 +11	3
7	110939	20.7N 128.1E	700MB		987		240 33 190 75	4 H			+11 +14 +11	3
8	111326	21.9N 126.9E	700MB	2987	989		050 42 310 90				+15 +12	4
9	111530	21.2N 126.4E	700MB	2945	982		190 55 090 20	5 2			+12 +14 +14	4
10	120304	22.1N 123.9E	700MB	2923	970		130 65 040 5	3 7	CIRCULAR	15	+14 +16 +13	5
11	120710	22.4N 123.4E	700MB	2763	962	75 180	15 240 70 150	10 5 5	CIRCULAR	15	+14 +16 +12	5
12	130430	23.7N 122.7E	700MB	2600	944	100 060	5 210 80 120	10 2 2	CIRCULAR	7	+14 +15 +14	5
13	130559	24.0N 122.8E	700MB	2640	949	100 180	15 240 70 100	20			+15 +12	5
14	132122	25.9N 123.4E	700MB	2980	988		220 62 130 20	2 1			+17 +19 +11	7
15	140040	26.0N 123.4E	700MB	2967	986	40 160	10 240 54 100	10			+18 +10	7
16	140252	26.2N 124.0E	700MB	3025	991	35 180	75 230 48 180	10 2 4			+14 +19 + 8	7
17	141315	27.6N 126.6E	700MB	3040	995		240 47 180 90				+14 +13	9
18	141430	27.6N 126.6E	700MB	3034	998		240 45 200 30	2 3			+11 +12 +12	9

RAJAH FIXES

FIX NO.	TIME (Z)	FIX POSITION	MADAR	ACOMY	EYE SHAPE	EYE DIAM	RANOH-CODE ANWAR	TOUFF	COMMENTS	MADAR POSITION	51TF WAO NO.
1	112300	21.7N 124.4E	LAND				35773	////		24.3N 124.2E	47918
2	120000	21.4N 124.5E	LAND				21613	52918		24.3N 124.2E	47918
3	120100	21.9N 124.3E	LAND				10613	52919		24.3N 124.2E	47918
4	120100	22.0N 124.4E	LAND				21705	5777		24.8N 125.3E	47927
5	120200	21.9N 124.2E	LAND				10623	62710		24.8N 125.3E	47927
6	120200	22.0N 124.2E	LAND				25775	52711		24.8N 125.3E	47927
7	120300	22.0N 123.9E	LAND				10613	72809		24.3N 124.2E	47918
8	120300	22.04 124.1E	LAND				25775	52911		24.8N 125.3E	47927
9	120400	22.1N 123.8E	LAND				10732	72911		24.3N 124.2E	47918
10	120400	22.1N 123.9E	LAND				20675	53014		24.8N 125.3E	47927
11	120500	22.1N 123.7E	LAND				20675	73011		24.3N 124.2E	47918
12	120500	22.1N 121.7E	LAND				35745	52710		24.8N 125.3E	47927
13	120600	22.2N 121.5E	LAND				45742	72911		24.3N 124.2E	47918
14	120600	22.1N 123.4E	LAND				35775	52715		24.8N 125.3E	47927
15	120700	22.2N 123.4E	LAND				20452	72709		24.3N 124.2E	47918
16	120700	22.2N 123.3E	LAND				35774	53305		24.8N 125.3E	47927
17	120700	22.3N 123.3E	LAND	G00D		25			EYE	24.8N 125.3E	47927
18	120900	22.2N 123.1E	LAND				35776	52711		24.8N 125.3E	47927
19	120900	22.3N 123.2E	LAND				10644	53329		24.0N 121.6E	46599
20	120900	22.2N 123.2E	LAND				10612	72911		24.3N 124.2E	47918
21	120900	22.2N 123.1E	LAND				21633	72708		24.3N 124.2E	47918
22	120900	22.2N 123.1E	LAND				10594	52407		24.0N 121.6E	46599
23	120900	22.2N 123.1E	LAND				21633	72708		24.8N 125.3E	47927
24	121100	22.2N 122.8E	LAND				35776	52708		24.8N 125.3E	47927
25	121100	22.1N 122.9E	LAND				11323	52709		24.0N 121.6E	46599
26	121100	22.2N 122.8E	LAND				31542	72505		24.3N 124.2E	47918
27	121200	22.1N 122.7E	LAND				31447	72505		24.3N 124.2E	47918
28	121300	22.1N 122.6E	LAND				12424	52607		24.0N 121.6E	46599
29	121300	22.1N 122.6E	LAND				31547	72708		24.3N 124.2E	47918
30	121400	22.0N 122.5E	LAND				11324	52105		24.0N 121.6E	46599
31	121400	22.0N 122.5E	LAND				31511	72505		24.3N 124.2E	47918
32	121500	21.9N 122.5E	LAND				10314	50000		24.0N 121.6E	46599
33	121500	21.9N 122.5E	LAND				31541	50000		24.3N 124.2E	47918
34	121500	22.1N 122.6E	LAND				12424	52607		24.0N 121.6E	46599
35	121500	21.9N 122.5E	LAND				31511	50000		24.3N 124.2E	47918
36	121700	22.0N 122.7E	LAND				12513	50708		24.0N 121.6E	46599
37	121700	22.0N 122.5E	LAND				31417	50105		24.3N 124.2E	47918
38	121800	22.1N 122.7E	LAND				12424	50308		24.0N 121.6E	46599
39	121800	22.1N 122.7E	LAND				10392	50311		24.3N 124.2E	47918
40	121900	22.3N 122.7E	LAND				20312	53615		24.3N 124.2E	47918
41	122000	22.5N 122.8E	LAND				12322	53509		24.0N 121.6E	46599
42	122000	22.5N 122.8E	LAND				21322	50310		24.3N 124.2E	47918
43	122100	22.7N 122.6E	LAND				35776	43613		24.8N 125.3E	47927
44	122100	22.5N 122.8E	LAND				21312	73612		24.3N 124.2E	47918
45	122200	22.8N 122.6E	LAND				20476	53613		24.8N 125.3E	47927
46	122200	22.8N 122.8E	LAND				11312	73611		24.3N 124.2E	47918
47	122300	23.0N 122.7E	LAND				20416	50112		24.8N 125.3E	47927
48	122300	23.0N 122.8E	LAND				12243	53513		24.0N 121.6E	46599
49	122300	23.0N 122.7E	LAND				21313	73511		24.3N 124.2E	47918
50	130000	23.1N 122.7E	LAND				10313	73511		24.3N 124.2E	47918
51	130000	23.1N 122.7E	LAND				22416	53505		24.8N 125.3E	47927
52	130100	23.3N 122.7E	LAND				10224	73509		24.3N 124.2E	47918
53	130100	23.3N 122.7E	LAND				11213	53509		24.0N 121.6E	46599
54	130100	23.2N 122.8E	LAND				22326	53305		24.8N 125.3E	47927
55	130200	23.4N 122.7E	LAND				22375	50212		24.8N 125.3E	47927
56	130200	23.3N 122.6E	LAND				12213	53505		24.0N 121.6E	46599
57	130200	23.4N 122.7E	LAND				10214	53508		24.3N 124.2E	47918
58	130300	23.5N 122.7E	LAND				10122	73607		24.3N 124.2E	47918
59	130300	23.5N 122.6E	LAND				11212	53510		24.0N 121.6E	46599
60	130300	23.4N 122.7E	LAND				22285	53404		24.8N 125.3E	47927
61	130300	23.4N 122.8E	LAND	G00D		55			EYE MOV 0120	24.8N 125.3E	47927
62	130400	23.6N 122.7E	LAND				10212	50308		24.0N 121.6E	46599
63	130400	23.7N 122.7E	LAND				11212	73608		24.3N 124.2E	47918
64	130400	23.6N 122.7E	LAND				12245	50213		24.8N 125.3E	47927
65	130500	23.9N 122.8E	LAND				12212	50211		24.0N 121.6E	46599
66	130500	23.9N 122.8E	LAND				12335	50110		24.8N 125.3E	47927
67	130500	23.8N 122.7E	LAND				12313	70109		24.3N 124.2E	47918
68	130500	24.0N 122.0E	LAND				11213	53610		24.0N 121.6E	46599
69	130600	23.9N 122.7E	LAND				10212	70209		24.3N 124.2E	47918
70	130500	23.9N 122.9E	LAND				12314	54011		24.8N 125.3E	47927
71	130700	24.0N 122.9E	LAND				12415	53605		24.8N 125.3E	47927
72	130700	24.1N 122.9E	LAND				10213	70209		24.3N 124.2E	47918
73	130900	24.2N 123.0E	LAND				12463	50309		24.0N 121.6E	46599
74	130900	24.1N 123.0E	LAND				20375	50408		24.8N 125.3E	47927
75	130900	24.2N 123.0E	LAND				10213	70309		24.3N 124.2E	47918
76	130900	24.3N 123.1E	LAND				12423	50309		24.0N 121.6E	46599
77	130900	24.3N 123.1E	LAND				10212	70309		24.3N 124.2E	47918
78	130900	24.3N 123.1E	LAND				10474	52012		24.8N 125.3E	47927
79	130900	24.3N 123.1E	LAND	G00D		10			EYE MOV 0115	24.8N 125.3E	47927
80	131000	24.5N 123.1E	LAND				11312	70309		24.8N 125.3E	47927
81	131000	24.5N 123.1E	LAND				10314	53612		24.3N 124.2E	47918
82	131000	24.5N 123.1E	LAND	G00D		10			EYE MOV 3615	24.8N 125.3E	47927
83	131100	24.5N 123.1E	LAND				10314	51008		24.8N 125.3E	47927
84	131100	24.7N 123.1E	LAND				11311	70210		24.3N 124.2E	47918
85	131100	24.7N 123.1E	LAND	G00D		10			EYE MOV 3620	24.8N 125.3E	47927
86	131200	24.9N 123.1E	LAND				35777	50211		24.0N 121.6E	46599
87	131200	24.9N 123.1E	LAND				67771	73611		24.8N 125.3E	47927
88	131200	24.9N 123.1E	LAND				67771	73611		24.3N 124.2E	47918
89	131200	24.9N 123.1E	LAND	G00D		10			EYE MOV 3615	24.8N 125.3E	47927
90	131300	25.0N 123.1E	LAND				67771	73609		24.3N 124.2E	47918
91	131300	24.9N 123.1E	LAND				67776	50105		24.8N 125.3E	47927
92	131400	25.1N 123.1E	LAND				37774	53611		24.8N 125.3E	47927
93	131500	25.3N 123.1E	LAND				67774	53614		24.8N 125.3E	47927
94	131700	25.4N 123.0E	LAND				35777	53505		24.0N 121.6E	46599
95	140700	26.7N 124.9E	LAND	G00D		55			EYE	24.8N 125.3E	47927
96	140900	26.8N 125.3E	LAND	G00D					EYE MOV 0740	24.8N 125.3E	47927

TROPICAL DEPRESSION 26

SATELLITE FIXES

FIX NO.	TIME (Z)	FIX POSITION	ACCR	UVZRAK CODE	SAT	COMMENTS	SITE
1	042111	14.5N 143.3E	PCN 5	TU.0/0.0	DMS036	INIT OBS	PGTW
2	091939	21.4N 141.7E	PCN 6	TU.0/0.0 /SO.0/22HRS	DMS037		PGTW
3	092053	22.0N 142.0E	PCN 6		DMS036		PGTW
4	100935	22.2N 140.8E	PCN 6		DMS036	CI SA4E	PGTW
5	102045	22.1N 140.0E	PCN 6	T1.0/1.0 /01.0/25HRS	DMS036		PGTW
6	110041	22.0N 140.5E	PCN 6		DMS036	PSN 240 EXPOSED LLCC	PGTW
7	110301	22.0N 140.3E	PCN 5		DMS037		PGTW
8	110913	21.9N 139.1E	PCN 6		DMS036	CI SA4E	PGTW
9	111323	22.1N 140.0E	PCN 6		DMS036		PGTW
10	112042	23.0N 143.4E	PCN 4		DMS037	PSN BY EXPOSED LLCC NW QJAD	PGTW
11	112042	23.2N 143.3E	PCN 4		DMS037	BASED ON APPARENT LLCC	ROUN
12	112200	23.2N 143.0E	PCN 3	T1.0/1.0 /SO.0/25HRS	DMS036	EXPOSED LLCC	PGTW
13	120023	23.4N 142.5E	PCN 4		DMS036	CI DUWN EXPOSED LLCC	PGTW
14	120923	23.4N 140.5E	PCN 3		DMS037	CI DUWN EXPOSED LLCC	PGTW
15	120923	24.2N 140.6E	PCN 6		DMS037		ROUN
16	121042	24.0N 140.0E	PCN 4		DMS036		PGTW
17	122022	25.0N 140.4E	PCN 4	TU.0/1.0 /W1.0/22HRS	DMS037	EXPOSED LLCC	PGTW

TROPICAL DEPRESSION 27

SATELLITE FIXES

FIX NO.	TIME (Z)	FIX POSITION	ACCR	UVZRAK CODE	SAT	COMMENTS	SITE
1	082111	7.5N 153.6E	PCN 5	TU.0/0.0	DMS036	INIT OBS	PGTW
2	090340	5.2N 152.6E	PCN 6		DMS037		PGTW
3	100935	7.5N 152.3E	PCN 6		DMS036		PGTW
4	102101	6.7N 151.4E	PCN 6		DMS037		PGTW
5	102217	6.5N 151.2E	PCN 6	T1.0/1.0	DMS036	INIT OBS	PGTW
6	111323	8.5N 147.5E	PCN 6		DMS036		PGTW
7	112042	8.5N 145.8E	PCN 6	T1.5/1.5-/00.5/22HRS	DMS037		PGTW
8	112200	9.0N 145.4E	PCN 6		DMS036		PGTW
9	120205	10.4N 145.0E	PCN 6		DMS036		PGTW
10	120923	10.7N 143.1E	PCN 6		DMS037	CI SA4E	PGTW
11	121042	11.0N 142.9E	PCN 6		DMS036		PGTW
12	121447	11.1N 142.1E	PCN 6		DMS036		PGTW
13	122324	11.4N 130.0E	PCN 6	T1.0/1.5 /W0.5/27HRS	DMS036		PGTW
14	130147	11.5N 138.6E	PCN 3		DMS036	BASED ON APPARENT LLCC	PGTW
15	130904	12.7N 137.1E	PCN 6		DMS037		PGTW
16	131207	13.7N 135.2E	PCN 5		DMS036		PGTW
17	131429	13.7N 134.6E	PCN 5		DMS036		PGTW
18	132144	16.5N 133.2E	PCN 6	T2.0/2.0 /01.0/22HRS	DMS037		PGTW
19	132306	16.8N 133.1E	PCN 5		DMS036		PGTW
20	140129	17.5N 133.3E	PCN 5		DMS036		PGTW
21	141025	19.1N 132.0E	PCN 5		DMS037	CI DUWN 2ND 15.1N 132.0E	PGTW
22	141149	19.3N 131.6E	PCN 5		DMS036	2ND 15.1N 131.7E	PGTW
23	141411	20.0N 131.5E	PCN 6		DMS036	2ND 15.4N 130.7E	PGTW
24	142125	16.5N 131.4E	PCN 6		DMS037		ROUN
25	142249	14.5N 130.3E	PCN 6	T2.0/2.0 /SO.0/25HRS	DMS036		PGTW
26	151132	15.5N 129.2E	PCN 5		DMS036		PGTW
27	152106	16.2N 129.4E	PCN 5		DMS037		PGTW
28	152106	17.4N 130.3E	PCN 6		DMS037		ROUN

AIRCRAFT FIXES

FIX NO.	TIME (Z)	FIX POSITION	FLT LVL	MIN HGT	QBS MSLP	MAX-SFC-WND VEL/DRG/RWG	MAX-FLT-LVL-WND DIR/VEL/DRG/RWG	ACCR NAV/MET	EYE SHAPE	EYE ORIENTATION	EYE TEMP (C) UHT/ IN/ DP/ST	MSK NO.
1	120338	8.3N 144.7E	1500F1		1005	15 090 40	200 17 090 40	5 4			+25 +26 +23 29	3
2	130353	10.1N 138.6E	1500F1		1003	15 120 35	170 24 050 72	10 5			+26 25	4

TYPHOON PHYLLIS

SATELLITE FIXES

FIX NO.	TIME (Z)	FIX POSITION	ACCRY	SVZ&K CODE	SAT	COMMENTS	SITE
1	131248	4.0N 165.5E	PCN 6		DMSP35		PGTW
2	132003	4.0N 166.9E	PCN 6	TU.0/0.0	DMSP37		PGTW
3	132125	4.1N 166.7E	PCN 6		DMSP36		PGTW
4	132348	10.0N 163.3E	PCN 6	T1.5/1.5	DMSP35	INIT DJS	KGWC
5	141008	11.3N 166.2E	PCN 6		DMSP36		PGTW
6	141230	11.0N 163.9E	PCN 6		DMSP35	CI UP	PGTW
7	141943	13.6N 162.9E	PCN 4	TU.0/0.0 /50.0/24HRS	DMSP37		PGTW
8	142107	13.6N 163.1E	PCN 4		DMSP36		PGTW
9	150325	14.6N 162.0E	PCN 6		DMSP37		PGTW
10	150950	14.6N 161.6E	PCN 6		DMSP36	CI UP	PGTW
11	150951	14.7N 162.9E	PCN 6		DMSP36		NNUL
12	151212	14.6N 161.7E	PCN 6		DMSP35		PGTW
13	151212	14.6N 161.6E	PCN 6		DMSP35		NNUL
14	151324	15.2N 161.3E	PCN 5	T2.0/2.0 /02.0/24HRS	DMSP37		PGTW
15	151324	15.0N 161.5E	PCN 4		DMSP36		KGWC
16	152050	15.3N 161.2E	PCN 5		DMSP37		PGTW
17	160054	15.3N 161.0E	PCN 5		DMSP36		PGTW
18	160905	15.5N 160.3E	PCN 6		DMSP37		PGTW
19	160905	16.1N 160.7E	PCN 6		DMSP37		KGWC
20	160908	15.5N 160.5E	PCN 4		DMSP37		NNUL
21	160933	15.5N 160.8E	PCN 5		DMSP36	CI UP	PGTW
22	161336	15.7N 160.6E	PCN 5		DMSP35		PGTW
23	161336	15.6N 160.4E	PCN 4		DMSP36	MUT INFLW SW-S QUADS	NNUL
24	162033	16.6N 158.6E	PCN 6		DMSP36		PGTW
25	170036	16.8N 158.5E	PCN 1	T4.0/4.0+ /02.0/24HRS	DMSP35		PGTW
26	170038	16.0N 158.5E	PCN 1	T4.5/4.5	DMSP35	INIT DJS WELL OFND CC SML EYE	NNUL
27	170915	17.6N 157.0E	PCN 6		DMSP36		PGTW
28	171318	18.4N 157.2E	PCN 1		DMSP35		PGTW
29	171318	18.0N 157.0E	PCN 2		DMSP35	WELL OFND CC SML EYE VSRL	NNUL
30	172157	19.4N 155.9E	PCN 1	T4.5/4.5 /00.5/24HRS	DMSP36		PGTW
31	172157	19.4N 156.0E	PCN 1	T5.0/5.0 /00.5/21HRS	DMSP36	WELL OFND CC EYE VSBL	NNUL
32	181040	20.0N 155.3E	PCN 1		DMSP36		PGTW
33	181040	21.0N 155.6E	PCN 2		DMSP36	SML EYE VSBL	NNUL
34	181040	20.9N 155.5E	PCN 6		DMSP36		RODN
35	181300	20.9N 155.1E	PCN 3		DMSP35		PGTW
36	181300	20.9N 155.2E	PCN 2		DMSP35	SML EYE VSBL	NNUL
37	182139	21.0N 155.5E	PCN 2	T4.5/4.5 /50.0/24HRS	DMSP36		PGTW
38	182140	21.9N 155.5E	PCN 3	T5.5/5.5 /00.5/24HRS	DMSP36	1 DEG CDN STRNG LL INFLW ALQDS	NNUL
39	190000	22.1N 155.5E	PCN 1		DMSP35	RAGGED EYE	PGTW
40	190000	22.1N 155.6E	PCN 2		DMSP	MUT LL INFLW ALQDS	NNUL
41	191022	22.9N 155.6E	PCN 2		DMSP36		PGTW
42	191242	23.2N 155.7E	PCN 2		DMSP35		PGTW
43	192122	23.0N 155.1E	PCN 2	T5.0/5.0 /00.5/24HRS	DMSP36		PGTW
44	200124	24.1N 154.7E	PCN 3		DMSP35		PGTW
45	201005	25.2N 154.3E	PCN 2		DMSP36		PGTW
46	201406	25.5N 154.2E	PCN 2		DMSP35		PGTW
47	201406	25.4N 154.2E	PCN 2		DMSP35		RKSO
48	202105	26.5N 153.5E	PCN 3	T4.5/5.0- /W0.5/24HRS	DMSP36		PGTW
49	210106	27.2N 153.6E	PCN 4	T4.0/4.0	DMSP35	INIT DJS	KGWC
50	210106	27.3N 153.1E	PCN 4		DMSP35		PGTW
51	210106	27.6N 153.5E	PCN 4	T4.5/4.5	DMSP36	INIT DJS	RODN
52	210347	28.6N 153.8E	PCN 4		DMSP36	CI UP	PGTW
53	211348	29.2N 155.0E	PCN 1		DMSP35		RODN
54	211348	29.9N 154.9E	PCN 4		DMSP35		PGTW
55	212048	31.3N 154.5E	PCN 5		DMSP36		PGTW
56	220048	33.2N 160.8E	PCN 5	T3.0/4.0 /W1.5/27HRS	DMSP35		PGTW
57	220743	36.5N 165.6E	PCN 6		DMSP		KGWC
58	221329	40.3N 171.3E	PCN 6		DMSP35		KGWC

AIRCRAFT FIXES

FIX NO.	TIME (Z)	FIX POSITION	FLT LVL	MI4 MGT	OBS MSLP	MAX-SFC-WIND VEL/DRG/RNG	MAX-FLT-LVL-WIND DTR/VEL/DRG/RNG	ACCRY NAV/MET	EYE SHAPE	EYE ORIEN- DIAM/TATION	EYE TEMP (C) IN/ DP/SSI	MSW NO.		
1	160330	15.0N 160.6E	700MB	3015	992	55 030	20 130	60 030	15	10 5	CIRCULAR	20	+14 +17 + 9	1
2	161447	16.3N 159.5E	700MB	2964	986		040	52 360	20	5 5	CIRCULAR	15	+16 +16 +11	2
3	170355	17.3N 159.1E	700MB	2907	980	40 220	30 320	55 260	15	4 2	CIRCULAR	25	+ 9 +13 +13	3
4	171451	18.7N 156.8E	700MB	2820	968		360	80 270	10	3 5	ELLIPTICAL	20 12 350	+11 +16	4
5	171557	18.0N 156.7E	700MB				320	85 260	10				+17	4
6	180245	20.0N 155.3E	700MB	2707	953	90 140	10 230	83 140	10	4 2	CIRCULAR	20	+19 +19 + 8	5
7	180515	20.3N 155.3E	700MB	2709		50 060	70 120	105 060					+19 + 9	5
8	182321	22.0N 155.3E	700MB	2740	957	100 160	15 220	90 120	15	2 3	CIRCULAR	22	+12 +20 +12	6

RAJAH FIXES

FIX NO.	TIME (Z)	FIX POSITION	RADAR	ACCRY	EYE SHAPE	EYE DIAM	RADAR-CODE ASW&M TDFF	COMMENTS	RADAR POSITION	SITE WMO NO.
1	182042	21.9N 155.4E	ACFT					54 WRS		

SUPER TYPHOON RITA

SATELLITE FIXES

FIX NO.	TIME (Z)	FIX POSITION	ACCR	UNIQUE CODE	SAT	COMMENTS	SITE
1	162215	17.0N 174.5W			GNSS		PHNL
2	162215	17.0N 174.5W			GNSS		PHNL
3	162312	17.0N 174.1W		T1.5/1.5	DMSD36	UPR LVL ANTICYCLONE	KGWC
4	161154	17.0N 174.2E			DMSD36		KGWC
5	161156	17.0N 174.5E	PCN 6		DMSD36		NNUL
6	162033	17.0N 174.4E		T1.5/1.5	DMSD36	INIT J35	KGWC
7	162033	17.0N 174.2E	PCN 4	T1.5	DMSD36	WELL DEFINED IICC	NNUL
8	162315	17.0N 174.5E			GNSS	WELL DEFINED HOOKING BANDS	PHNL
9	170349	17.0N 174.7E			GNSS		PHNL
10	170315	17.0N 174.2E	PCN 6		DMSD36		PGTW
11	170315	17.0N 174.4E	PCN 6		DMSD36		KGWC
12	170315	17.0N 174.7E	PCN 4		DMSD36		NNUL
13	171126	17.0N 174.6E	PCN 4		DMSD36	MUI LVL LVL INFLOW ALQDS	NNUL
14	171136	17.0N 174.5E	PCN 6		DMSD36		PHIK
15	171945	17.0N 174.2E	PCN 4		DMSD36	MUI LVL LVL INFLOW ALQDS	NNUL
16	172015	17.0N 174.5E	PCN 6	T1.5/1.5 /S0.0/24HRC	DMSD36		KGWC
17	180349	17.0N 174.8E			GNSS	1.5 DEG COO	PHNL
18	180726	17.0N 173.5E	PCN 4		DMSD36		NNUL
19	180857	17.0N 172.9E	PCN 6	T1.5/1.5 / 5.0/24HRC	DMSD36		KGWC
20	180859	17.0N 173.3E	PCN 4		DMSD36	MUI LVL LVL INFLOW ALQDS	NNUL
21	181113	17.0N 172.8E	PCN 6		DMSD36		PHIK
22	181118	17.0N 171.9E	PCN 6	T2.5/2.5 /D1.0/16HRC	DMSD36		KGWC
23	190000	17.0N 170.0E	PCN 3	T3.0/3.0	DMSD36	INIT J35	PGTW
24	190000	17.0N 169.5E	PCN 2	T2.5	DMSD36	EYE BARELY DISCERNIBLE INIT ORS	NNUL
25	190846	17.0N 168.3E	PCN 6		GNSS		PHIK
26	191242	17.0N 167.3E	PCN 4		DMSD36		NNUL
27	191242	17.0N 167.4E	PCN 6		DMSD36		PGTW
28	191348	17.0N 167.2E	PCN 4	T3.0/3.0 /D0.5/20HRC	DMSD36	STRONG LOW LVL INFLOW ALQDS	NNUL
29	192122	17.0N 165.1E	PCN 2	T4.0/4.0 /D1.0/24HRC	DMSD36		PGTW
30	192122	17.0N 165.4E	PCN 2	T5.0/5.0	GNSS	INIT J35 NO GEOGRAPHY	PHIK
31	192342	17.0N 164.0E	PCN 2	T4.5/4.5	DMSD36	INIT J35	KGWC
32	201005	17.0N 161.7E	PCN 6		DMSD36		PGTW
33	201224	17.0N 161.0E	PCN 2		DMSD36		PGTW
34	201224	17.0N 161.2E			DMSD36	STRONG LOW LVL INFLOW ALQDS	NNUL
35	202105	17.0N 158.8E	PCN 1	T5.5/5.5 /D1.5/24HRC	DMSD36		PGTW
36	210106	17.0N 157.8E	PCN 2		DMSD36		PGTW
37	210106	17.0N 158.6E	PCN 1	T5.5/5.5 /D2.5/24HRC	DMSD36	EYE V33L STRONG LOW LVL INFLOW	NNUL
38	210947	17.0N 155.6E	PCN 6		DMSD36	UPR LVL ANTICYCLONE	PGTW
39	211348	17.0N 155.4E	PCN 6		DMSD36	UPR LVL ANTICYCLONE	PGTW
40	212050	17.0N 154.4E	PCN 1	T6.0/6.0 /D0.5/19HRC	DMSD36	EYE DISOCCURED BY THIN OVC	NNUL
41	212229	17.0N 153.9E			DMSD36		PGTW
42	220048	17.0N 153.7E	PCN 1	T6.5/6.5 /D1.0/25HRC	DMSD36		NNUL
43	220048	17.0N 153.2E	PCN 1		DMSD36	WELL DEFINED EYE	NNUL
44	220329	17.0N 151.5E	PCN 2		DMSD36		PGTW
45	220332	17.0N 152.4E			DMSD36		PGTW
46	221330	17.0N 151.0E	PCN 2		DMSD36		NNUL
47	221330	17.0N 151.0E	PCN 2		DMSD36		RODN
48	221330	17.0N 151.0E	PCN 2		DMSD36		NNUL
49	222211	17.0N 149.0E	PCN 1	T7.0/7.0 /D1.0/26HRC	DMSD36	STRONG LOW LVL INFLOW ALQDS	NNUL
50	222212	17.0N 148.9E	PCN 1	T7.0/7.0 /D0.5/24HRC	DMSD36		PGTW
51	230912	17.0N 146.2E	PCN 2		DMSD36		NNUL
52	231054	17.0N 145.8E	PCN 2		DMSD36		PGTW
53	231312	17.0N 145.2E	PCN 1		DMSD36		PGTW
54	232011	17.0N 142.7E	PCN 2		DMSD36		PGTW
55	232154	17.0N 142.0E	PCN 1	T7.0/7.0 /S0.0/24HRC	DMSD36		PGTW
56	240154	17.0N 141.1E	PCN 1		DMSD36		PGTW
57	240154	17.0N 141.4E	PCN 1	T7.0/7.0	DMSD36	INIT J35	RPMK
58	240852	17.0N 138.7E	PCN 2		DMSD36		RODN
59	240852	17.0N 138.7E	PCN 2		DMSD36		PGTW
60	241036	17.0N 138.0E	PCN 2		DMSD36		PGTW
61	241435	17.0N 134.7E	PCN 2		DMSD36		PGTW
62	241436	17.0N 137.0E	PCN 2		DMSD36		NNUL
63	242133	17.0N 140.1E		T7.0/7.0	DMSD36	EYE DIA 20NM	NNUL
64	242133	17.0N 134.1E	PCN 1	T7.5/7.5 /D0.5/20HRC	DMSD36	EYE DIA 25NM INIT ORS	NNUL
65	242319	17.0N 133.3E	PCN 1	T7.5/7.5 /D0.5/25HRC	DMSD36		RPMK
66	250136	17.0N 132.6E	PCN 1		DMSD36		PGTW
67	250136	17.0N 132.4E	PCN 1		DMSD36		RPMK
68	251014	17.0N 129.7E	PCN 1		DMSD36		PGTW
69	251014	17.0N 129.7E	PCN 1		DMSD36		PGTW
70	251014	17.0N 129.5E	PCN 2		DMSD36	EYE DIA 20NM	NNUL
71	251201	17.0N 128.9E	PCN 1		DMSD36		PGTW
72	251201	17.0N 129.0E	PCN 2		DMSD36		RPMK
73	251201	17.0N 129.0E	PCN 2		DMSD36	EYE DIA 20NM	NNUL
74	251418	17.0N 128.2E	PCN 1		DMSD36		PGTW
75	251418	17.0N 128.5E	PCN 2		DMSD36	EYE DIA 20NM	NNUL
76	252113	17.0N 126.1E	PCN 1		DMSD36		RPMK
77	252255	17.0N 125.6E	PCN 1	T7.0/7.0 /S0.0/25HRC	DMSD36	EYE DIA 20NM	NNUL
78	252301	17.0N 125.5E	PCN 1	T7.0/7.5 /W0.5/24HRC	DMSD36		PGTW
79	260258	17.0N 124.3E	PCN 1	T6.0/7.0 /W1.5/30HRC	DMSD36		RPMK
80	260308	17.0N 124.3E	PCN 1		DMSD36		PGTW
81	260355	17.0N 122.5E	PCN 1		DMSD36		PGTW
82	260355	17.0N 122.4E	PCN 1		DMSD36		RODN
83	260355	17.0N 122.5E	PCN 2		DMSD36		RPMK
84	261000	17.0N 122.5E	PCN 2		DMSD36	EYE DIA 25NM	NNUL
85	261143	17.0N 122.5E	PCN 1		DMSD36		PGTW
86	261542	17.0N 121.7E	PCN 2		DMSD36		RPMK
87	261542	17.0N 122.0E	PCN 1		DMSD36		RODN
88	261542	17.0N 121.9E	PCN 2		DMSD36	EYE DIA 15NM	NNUL
89	262236	17.0N 120.1E	PCN 5		DMSD36		RKSO
90	262236	17.0N 120.2E	PCN 5	T5.0/6.0 /W1.0/20HRC	DMSD36		RPMK

16	231135	12.24	145.5E	LAND	GOUD	CIRCULAR	15	13.0N	144.9E	91218
17	231210	12.24	145.3E	LAND	GOUD	CIRCULAR	15	13.0N	144.9E	91218
18	231235	12.24	145.2E	LAND	GOUD	CIRCULAR	15	13.0N	144.9E	91218
19	231310	12.24	145.0E	LAND	GOUD	CIRCULAR	14	13.0N	144.9E	91218
20	231335	12.24	144.8E	LAND	GOUD	CIRCULAR	15	13.0N	144.9E	91218
21	231410	12.24	144.7E	LAND	GOUD	CIRCULAR	15	13.0N	144.9E	91218
22	231435	12.24	144.7E	LAND	GOUD	CIRCULAR	15	13.0N	144.9E	91218
23	231510	12.24	144.5E	LAND	GOUD	CIRCULAR	15	13.0N	144.9E	91218
24	231535	12.24	144.3E	LAND	GOUD	CIRCULAR	15	13.0N	144.9E	91218
25	231610	12.24	144.2E	LAND	GOUD	CIRCULAR	15	13.0N	144.9E	91218
26	231635	12.24	144.1E	LAND	GOUD	CIRCULAR	15	13.0N	144.9E	91218
27	231710	12.24	143.8E	LAND	GOUD	CIRCULAR	15	13.0N	144.9E	91218
28	231735	12.24	143.7E	LAND	GOUD	CIRCULAR	15	13.0N	144.9E	91218
29	231810	12.14	143.6E	LAND	GOUD	CIRCULAR	15	13.0N	144.9E	91218
30	231835	12.04	143.4E	LAND	GOUD	CIRCULAR	15	13.0N	144.9E	91218
31	231910	12.04	143.2E	LAND	GOUD	CIRCULAR	15	13.0N	144.9E	91218
32	231935	11.44	143.0E	LAND	GOUD	CIRCULAR	15	13.0N	144.9E	91218
33	232010	11.44	143.0E	LAND	GOUD	CIRCULAR	15	13.0N	144.9E	91218
34	232035	11.44	142.8E	LAND	GOUD	CIRCULAR	15	13.0N	144.9E	91218
35	232100	11.44	142.6E	LAND	GOUD	CIRCULAR	15	13.0N	144.9E	91218
36	232135	11.44	142.5E	LAND	GOUD	CIRCULAR	15	13.0N	144.9E	91218
37	232200	14.01	125.5E	LAND	GOUD	CIRCULAR	33	14.0N	122.7E	98467
38	260000	14.55	124.4E	LAND			10410	52930		
39	260001	14.01	125.0E	LAND		CIRCULAR	25	14.0N	122.7E	98467
40	260100	14.01	124.8E	LAND		CIRCULAR	22	14.0N	122.7E	98467
41	260100	14.51	125.2E	LAND			10447	52730		
42	260200	14.24	124.4E	LAND			23	10410	52740	
43	260200	14.54	124.7E	LAND			11240	30877		
44	260200	14.54	124.6E	LAND			30440	52930		
45	260300	14.54	124.3E	LAND			23	20411	52518	
46	260300	14.24	124.2E	LAND			21	20440	61030	
47	260300	14.44	124.3E	LAND			4777	4777		
48	260400	14.44	124.0E	LAND			1070	4777		
49	260500	14.51	123.7E	LAND			1071	52912		
50	260500	14.51	123.6E	LAND			1071	42712		
51	260530	14.74	123.9E	LAND			1077	42710		
52	260500	14.44	123.7E	LAND			10627	4777		
53	260600	14.51	123.5E	LAND			24	21750	52708	
54	260700	14.44	123.6E	LAND			24	35750	52908	
55	260730	14.44	123.4E	LAND			23	10477	4777	
56	260800	14.44	123.3E	LAND			23	1072	4777	
57	260800	14.74	122.9E	LAND			24	1174	42708	
58	260820	14.74	123.1E	LAND			25	1073	4777	
59	260830	14.74	123.2E	LAND			20	6770	52808	
60	260830	14.74	122.7E	LAND			22	1067	43008	
61	260900	14.44	122.7E	LAND			15	1044	52707	
62	260910	14.44	122.9E	LAND			15	1044	52707	
63	260930	14.74	122.9E	LAND			15	1044	52707	
64	260930	14.74	122.6E	LAND			15	1044	52707	
65	261000	14.74	122.6E	LAND			15	1044	52707	
66	261030	14.74	122.7E	LAND			15	1044	52707	
67	261100	14.74	122.5E	LAND			15	1044	52707	
68	261100	14.44	122.6E	LAND			15	1044	52707	
69	261110	14.74	122.6E	LAND			15	1044	52707	
70	261200	14.44	122.5E	LAND			15	1044	52707	
71	261200	14.74	122.4E	LAND			15	1044	52707	
72	261200	14.74	122.6E	LAND			15	1044	52707	
73	261210	14.84	122.5E	LAND			15	1044	52707	
74	261300	14.44	122.2E	LAND			15	1044	52707	
75	261300	14.94	122.4E	LAND			15	1044	52707	
76	261310	14.44	122.2E	LAND			15	1044	52707	
77	261330	14.44	122.2E	LAND			15	1044	52707	
78	261330	14.44	122.3E	LAND			15	1044	52707	
79	261400	14.44	122.0E	LAND			15	1044	52707	
80	261400	14.94	122.1E	LAND			15	1044	52707	
81	261430	15.14	122.1E	LAND			15	1044	52707	
82	261430	15.04	122.0E	LAND			15	1044	52707	
83	261500	14.94	122.9E	LAND			15	1044	52707	
84	261500	14.94	122.1E	LAND			15	1044	52707	
85	261510	15.04	121.9E	LAND			15	1044	52707	
86	261530	15.14	121.8E	LAND			15	1044	52707	
87	261600	15.24	121.9E	LAND			15	1044	52707	
88	261700	15.34	121.6E	LAND			15	1044	52707	
89	261700	15.44	121.7E	LAND			15	1044	52707	
90	261730	15.24	121.5E	LAND			15	1044	52707	
91	261810	15.44	121.6E	LAND			15	1044	52707	
92	261830	15.54	121.2E	LAND			15	1044	52707	
93	261910	15.64	121.1E	LAND			15	1044	52707	
94	261930	15.54	120.9E	LAND			15	1044	52707	
95	262010	15.84	120.8E	LAND			15	1044	52707	
96	262032	16.04	120.5E	LAND			15	1044	52707	
97	262105	16.04	120.5E	LAND			15	1044	52707	
98	262130	16.04	120.4E	LAND			15	1044	52707	
99	262200	16.14	120.3E	LAND			15	1044	52707	
100	262235	16.34	120.2E	LAND			15	1044	52707	
101	262300	16.24	120.2E	LAND			15	1044	52707	
102	262300	16.04	120.0E	LAND			15	1044	52707	
103	262308	16.34	120.1E	LAND			15	1044	52707	
104	270000	16.54	119.7E	LAND			15	1044	52707	
105	270030	16.74	119.5E	LAND			15	1044	52707	
106	270100	16.64	119.5E	LAND			15	1044	52707	
107	270200	16.64	119.0E	LAND			15	1044	52707	
108	270200	16.64	119.2E	LAND			15	1044	52707	
109	270300	16.64	119.0E	LAND			15	1044	52707	
110	270300	16.64	119.2E	LAND			15	1044	52707	
111	270400	16.64	118.8E	LAND			15	1044	52707	
112	270500	17.04	118.5E	LAND			15	1044	52707	
113	270600	17.24	118.3E	LAND			15	1044	52707	
114	270800	16.94	117.5E	LAND			15	1044	52707	
115	271030	16.94	117.3E	LAND			15	1044	52707	

TROPICAL STORM TESS

SATELLITE FIXES

FIX NO.	TIME (Z)	FIX POSITION	ACCRY	WIND CODE	SAT	COMMENTS	SITE
1	302136	14.4N 144.7E	PCN 5	T0.0/0.0	DMSR36	INIT JFS	PGTW
2	311131	14.0N 144.0E	PCN 5		DMSR36		PGTW
3	311015	14.2N 144.8E	PCN 5		DMSR36		PGTW
4	312058	13.2N 144.5E	PCN 4	T1.0/1.0 /01.0/24HR	DMSR37		PGTW
5	312259	13.1N 145.1E	PCN 3		DMSR36		PGTW
6	010938	13.5N 143.7E	PCN 5		DMSR37		PGTW
7	011140	13.5N 143.4E	PCN 5		DMSR36		PGTW
8	011354	13.4N 143.4E	PCN 5		DMSR36		PGTW
9	012039	14.0N 143.9E	PCN 5	T2.0/2.0 /01.0/24HR	DMSR37		PGTW
10	012241	14.3N 144.8E	PCN 5		DMSR36		PGTW
11	020055	14.4N 144.5E	PCN 5		DMSR36		PGTW
12	020919	17.5N 145.4E	PCN 5		DMSR37		PGTW
13	020919	17.3N 144.9E	PCN 5		DMSR37		RODN
14	021123	14.4N 145.8E	PCN 6		DMSR36		PGTW
15	021336	14.7N 146.1E	PCN 5		DMSR36		PGTW
16	021337	14.5N 146.6E	PCN 5		DMSR36		RODN
17	022223	14.5N 145.2E	PCN 5	T2.5/2.5 /00.5/26HR	DMSR36		PGTW
18	030037	14.4N 145.3E	PCN 6		DMSR36		PGTW
19	030900	14.3N 146.5E	PCN 6		DMSR37		PGTW
20	030900	14.1N 146.4E	PCN 6		DMSR37		RODN
21	031106	14.6N 146.5E	PCN 5		DMSR36		PGTW
22	031319	14.9N 146.5E	PCN 5		DMSR36		PGTW
23	032206	21.1N 146.5E	PCN 5	T3.5/3.5 /01.0/24HR	DMSR36		PGTW
24	040201	21.4N 146.5E	PCN 5		DMSR36		PGTW
25	040940	22.4N 146.6E	PCN 5		DMSR37		PGTW
26	040940	22.7N 146.8E	PCN 4		DMSR37		RODN
27	041049	22.7N 147.0E	PCN 3		DMSR36		PGTW
28	041301	23.2N 147.0E	PCN 5		DMSR36		PGTW
29	042149	25.0N 148.2E	PCN 3	T4.0/4.0 /00.5/24HR	DMSR36		PGTW
30	042149	24.7N 147.9E	PCN 4	T3.0/3.0	DMSR36	INIT JFS	RODN
31	050143	26.0N 148.5E	PCN 4		DMSR36		PGTW
32	050921	27.3N 148.9E	PCN 4		DMSR37		PGTW
33	051031	27.7N 149.3E	PCN 3		DMSR36		PGTW
34	051031	27.7N 149.5E	PCN 4		DMSR36		RODN
35	051424	28.3N 150.1E	PCN 3		DMSR36		PGTW
36	051424	28.2N 150.0E	PCN 3		DMSR36		RKSO
37	052131	29.5N 152.0E	PCN 4	T3.5/3.5 /00.5/24HR	DMSR36		RODN
38	052131	29.9N 151.9E	PCN 4	T3.0/4.0 /01.0/24HR	DMSR36		PGTW
39	060124	30.8N 153.1E	PCN 4		DMSR36		PGTW
40	060133	32.9N 157.0E	PCN 5		DMSR36	UPR ANTCYCLOWF CI DOWN	PGTW
41	061407	33.3N 159.0E	PCN 5		DMSR36		PGTW
42	061407	34.0N 159.4E	PCN 5		DMSR36		RKSO

AIRCRAFT FIXES

FIX NO.	TIME (Z)	FIX POSITION	FLT LVL	WIN HGT	OBS MSLP	MAX-SFC-WND VEL/DRG/RNG	MAX-FLT-LVL-WND DIR/VEL/DRG/RNG	ACCRY NAV/MET	EYE SHAPE	EYE ORIEN- DIAM/TATION	EYE TEMP (C) OHT/ IN/ DP/ SST	MSU NO.
1	012157	15.4N 144.3E	700MB	3032	995	30 180 90	220 27 180 90	3 5			+26 +26 +25 24	1
2	020303	17.3N 144.5E	700MB	3005	991	15 270 90	020 20 270 120	4 8			+12 +11	1
3	021504	14.3N 144.9E	700MB	3012	992		240 33 120 120	3 2			+12 +12	2
4	021910	14.6N 145.0E	700MB	2991	989		140 40 120 90				+12 +12	2
5	022106	14.4N 145.3E	700MB	2998	990		140 44 000 120	3 4			+10 +10	2
6	030131	14.2N 145.6E	1500FT	2990	990	25 190 120	130 31 190 120				+26 +24	3
7	030229	14.5N 145.6E	1500FT	988		55 350 90	130 35 000 60	1 2			+26 +23 24	3
8	040302	14.7N 145.7E	700MB	2958							+14 +12	3
9	031429	14.5N 146.6E	700MB	2901	977		170 65 080 120	5 2	ELLIPTICAL 35 20 180		+14 +14 +12	4
10	031800	20.5N 146.4E	700MB	2914	981		140 50 360 90				+14 +14	4
11	032010	20.7N 146.3E	700MB	2922	981	35 270 90	120 77 050 90	5 3			+10 +14 +12	4
12	040003	21.2N 146.5E	700MB	2920	981	50 120 75	280 60 180 120	5 3			+14 +15 +14	5
13	041200	23.1N 147.6E	700MB	2876	973		220 77 120 90				+16 +10	5
14	041445	23.5N 147.4E	700MB	2984	974		320 62 240 90	3 5			+17 +11	5
15	050024	25.5N 148.0E	700MB	2901	976	65 190 100	160 85 040 100	2 4			+14 +15 +12	7
16	050300	26.1N 148.4E	700MB	2892	977	70 130 90	210 75 130 130	2 4			+13 +15 +13	7
17	050304	31.7N 153.2E	700MB	2874	975	65 190 30	240 80 120 90	5 5			+15 +16 +12	9

TROPICAL DEPRESSION 32

SATELLITE FIXES

FIX NO.	TIME (Z)	FIX POSITION	ACCR	DVORAK CODE	SAT	COMMENTS	SITE
1	162341	15.2N 129.7E	PCN 6	T0.0/0.0	DMS336	INIT OBS	PGTW
2	162341	15.0N 130.1E	PCN 5	T1.5/1.5	DMS336	INIT OBS	NNUL
3	162342	16.7N 131.4E	PCN 5	T1.0/1.0	DMS336	INIT OBS	RPMK
4	160149	16.2N 129.0E	PCN 5		DMS337		NNUL
5	161223	15.4N 129.7E	PCN 6		DMS336	CI UP	PGTW
6	161431	16.5N 129.8E	PCN 6		DMS335		NNUL
7	162324	16.5N 129.7E	PCN 6	T2.5/2.5 /D1.0/24HRS	DMS336		NNUL
8	162324	16.4N 130.1E	PCN 5	T1.0/1.0 /D1.0/24HRS	DMS336		PGTW
9	162324	17.1N 130.3E	PCN 5	T1.5/1.5 /D0.5/24HRS	DMS336		RPMK
10	170313	16.4N 129.0E	PCN 5		DMS335		NNUL
11	170930	16.4N 129.3E	PCN 6		DMS337	CI SAME	PGTW
12	170931	16.6N 130.3E	PCN 6		DMS337		NNUL
13	170932	17.1N 129.6E	PCN 6		DMS337		RDDN
14	171206	16.8N 130.7E	PCN 6		DMS336		NNUL
15	171206	17.0N 129.3E	PCN 6		DMS336		PGTW
16	171413	17.4N 130.5E	PCN 6		DMS335		NNUL
17	171413	17.1N 129.5E	PCN 6		DMS335		PGTW
18	171413	18.1N 130.4E	PCN 6		DMS335	UPPER LVL	RPMK
19	172212	17.0N 129.5E	PCN 5		DMS337		NNUL
20	172212	14.6N 126.8E	PCN 3	T3.0/3.0-/D2.0/23HRS	DMS337		PGTW
21	172212	14.6N 126.7E	PCN 3	T3.0/3.0	DMS337	INIT OBS	RDDN
22	172307	14.4N 126.7E	PCN 3		DMS336		PGTW
23	180255	15.1N 128.0E	PCN 5	T2.0/2.5 /W0.5/27HRS	DMS335		NNUL
24	180255	14.9N 127.0E	PCN 3		DMS335		PGTW
25	180255	15.2N 127.2E	PCN 3	T1.5/1.5 /S0.0/27HRS	DMS335		RPMK
26	181052	14.5N 127.4E	PCN 5		DMS337	BASED ON CONTINUITY OF FEATURES	PGTW
27	181052	14.8N 127.6E	PCN 5		DMS337	NO APPARENT CNTR	RDDN
28	181536	14.3N 126.8E	PCN 6		DMS335	BASED ON CONTINUITY OF FEATURES	PGTW
29	181537	14.3N 126.3E	PCN 5		DMS335		RPMK
30	182158	16.0N 125.9E	PCN 5	T1.0/2.0 /W2.0/24HRS	DMS337		PGTW
31	190237	13.4N 125.6E	PCN 3		DMS335		PGTW
32	190237	13.4N 124.9E	PCN 5	T1.0/2.0 /W1.0/24HRS	DMS335		NNUL
33	191032	13.5N 124.8E	PCN 5		DMS337		PGTW
34	191033	13.4N 125.2E	PCN 5		DMS337		RDDN
35	191518	13.5N 124.3E	PCN 5		DMS335		PGTW
36	191518	14.0N 124.0E	PCN 5		DMS335		RPMK

TYPHOON VIOLA

SATELLITE FIXES

FIX NO.	TIME (Z)	FIX POSITION	ACCR	DVORAK CODE	SAT	COMMENTS	SITE
1	152159	3.1N 155.7E	PCN 6	T0.0/0.0	DMSD36	INIT OBS	PGTW
2	161042	4.9N 154.8E	PCN 6		DMSD36	CI UP	PGTW
3	162049	6.2N 151.6E	PCN 6		DMSD37		PGTW
4	162142	6.4N 151.3E	PCN 6	T1.5/1.5 /D1.5/24HRS	DMSD36		PGTW
5	170930	8.1N 148.3E	PCN 5		DMSD37	CI UP	PGTW
6	171024	8.3N 148.9E	PCN 6		DMSD36		PGTW
7	171413	8.9N 148.0E	PCN 6		DMSD35		PGTW
8	171413	8.6N 146.6E	PCN 6		DMSD36		NNUL
9	172030	9.3N 146.8E	PCN 6		DMSD37		PGTW
10	172307	9.4N 145.9E	PCN 5	T3.0/3.0 /D1.5/25HRS	DMSD36		PGTW
11	172307	9.4N 145.7E	PCN 3	T3.0/3.0	DMSD36	INIT OBS	NNUL
12	180113	9.4N 145.4E	PCN 5		DMSD35		PGTW
13	181006	11.3N 143.3E	PCN 6		DMSD36		PGTW
14	181354	11.3N 142.2E	PCN 6		DMSD35		PGTW
15	181355	11.1N 141.8E	PCN 6		DMSD35		RODN
16	181355	11.2N 141.7E	PCN 4		DMSD34		NNUL
17	181522	11.4N 139.5E	PCN 3		DMSD37		NNUL
18	182156	11.2N 141.3E	PCN 5		DMSD37		PGTW
19	182249	11.2N 140.3E	PCN 3	T4.0/4.0 /D1.0/24HRS	DMSD36		NNUL
20	182249	11.5N 141.1E	PCN 5	T3.5/3.5 /D0.5/24HRS	DMSD36		PGTW
21	190237	12.2N 139.6E	PCN 5	T3.5/3.5	DMSD35	INIT OBS	RPMK
22	190237	11.7N 140.0E	PCN 5		DMSD35		PGTW
23	190237	12.3N 140.4E	PCN 1		DMSD35		NNUL
24	190951	12.3N 138.4E	PCN 6		DMSD37		PGTW
25	191130	12.8N 138.0E	PCN 6		DMSD36		PGTW
26	191133	13.1N 134.2E	PCN 4		DMSD36		NNUL
27	191336	12.8N 137.7E	PCN 6		DMSD35		PGTW
28	192132	14.2N 136.5E	PCN 1	T4.5/4.5 /D1.0/23HRS	DMSD37		PGTW
29	192133	14.6N 136.2E	PCN 1		DMSD37		NNUL
30	192232	14.2N 136.2E	PCN 5		DMSD36		PGTW
31	192232	14.0N 136.2E	PCN 5		DMSD36		RPMK
32	201013	15.1N 134.8E	PCN 1		DMSD37		PGTW
33	201013	15.1N 134.9E	PCN 1		DMSD37		RODN
34	201113	15.2N 135.0E	PCN 1		DMSD36		PGTW
35	201114	15.1N 134.8E	PCN 2		DMSD36		NNUL
36	201500	15.3N 134.3E	PCN 1		DMSD35		PGTW
37	201501	15.9N 134.5E	PCN 2		DMSD34		NNUL
38	202113	15.9N 133.6E	PCN 2		DMSD37		PGTW
39	202113	15.9N 133.5E	PCN 2		DMSD37		RODN
40	202356	16.0N 133.2E	PCN 2	T5.5/5.5 /D1.0/26HRS	DMSD36		PGTW
41	210200	16.1N 133.0E	PCN 1	T6.0/6.0	DMSD35	INIT OBS	RPMK
42	210201	16.2N 132.9E	PCN 1		DMSD35		PGTW
43	210201	16.2N 133.6E	PCN 1		DMSD35		NNUL
44	210954	16.7N 131.9E	PCN 1		DMSD37	CI UP	PGTW
45	210954	16.8N 132.0E	PCN 2		DMSD37		NNUL
46	211056	17.0N 131.6E	PCN 1		DMSD36		PGTW
47	211238	16.6N 131.5E	PCN 1		DMSD36		RPMK
48	211443	17.2N 131.1E	PCN 1		DMSD35		PGTW
49	211443	16.9N 131.6E	PCN 2		DMSD35		NNUL
50	212053	18.1N 130.2E	PCN 5		DMSD37		PGTW
51	212235	18.4N 129.9E	PCN 2	T5.0/5.0	DMSD37	INIT OBS	RODN
52	212338	18.3N 129.7E	PCN 1	T5.0/5.5 /W0.5/24HRS	DMSD36		PGTW
53	220143	18.5N 129.7E	PCN 1	T5.0/6.0 -W1.0/24HRS	DMSD35		RPMK
54	220143	18.6N 129.7E	PCN 1		DMSD35		PGTW
55	220143	18.9N 129.0E	PCN 1		DMSD35		NNUL
56	220934	19.7N 128.4E	PCN 5		DMSD37		PGTW
57	220934	20.3N 128.2E	PCN 4		DMSD37		RPMK
58	221220	20.2N 128.2E	PCN 5		DMSD36		PGTW
59	221255	21.2N 128.2E	PCN 6		DMSD36		NNUL
60	221425	20.2N 128.0E	PCN 5		DMSD35		PGTW
61	222215	21.5N 129.3E	PCN 1	T4.5/5.0 /W0.5/23HRS	DMSD37		PGTW
62	222321	21.8N 129.3E	PCN 1		DMSD36		PGTW
63	231056	24.1N 131.5E	PCN 3		DMSD37	CI DOWN	PGTW
64	231056	23.8N 130.7E	PCN 3		DMSD37		RODN
65	231056	24.0N 130.7E	PCN 4		DMSD37		NNUL
66	231056	23.8N 130.7E	PCN 3		DMSD37		NNUL
67	231203	24.3N 131.8E	PCN 5		DMSD36		PGTW
68	232155	25.2N 133.9E	PCN 6	T3.0/4.0 /W1.5/24HRS	DMSD37		PGTW
69	232303	25.2N 133.7E	PCN 4		DMSD36		PGTW
70	240248	25.3N 134.6E	PCN 4		DMSD35		PGTW

AIRCRAFT FIXES

FIX NO.	TIME (Z)	FIX POSITION	FLT LVL	MIN HGT	OBS MSLP	MAX-SFC-WND VEL/RRG/RNG	MAX-FLT-LVL-WND DIR/VEL/RRG/RNG	ACCR	EYE SHAPE	EYE ORIEN-DIAM/TATION	EYE TEMP. (C) OUT/ IN/ JP/SSST	MSW NO.
1	170710	8.2N 149.7E	1500FT		998	30 270	53 110	35 340 120	5 10		+23 +23 29	2
2	172118	9.2N 146.4E	700MH	3045	995	55 030	25 070	40 330 100	10 10		+11 +12 +10	3
3	180208	9.4N 144.9E	700MH	3062	999	40 360	50 060	50 360 100	4 5	CIRCULAR	+10 +10 +10	3
4	180541	10.4N 144.4E	700MH	3025	993	30 120	30 090	38 360 120			+14 +14	5
5	180832	10.6N 144.0E	700MH	3017	991	35 070	40 160	44 070 60	4 5	CIRCULAR	+12 +12 +12	5
6	182100	11.5N 141.1E	700MH	2965	984	40 060	35 140	48 060 120	3 5	ELLIPTICAL	+14 +10	5
7	190028	11.7N 140.0E	700MH	2965	986	55 010	30 100	55 010 60			+11 +11	5
8	191223	11.8N 139.7E	700MH	2964	986	55 050	50 150	57 050 90	3 5		+14 +12	5
9	191505	13.3N 137.5E	700MH	2996	977	55 050	50 160	77 090 35	10 7	CIRCULAR	+11 +15 + 9	7

2. NORTH INDIAN OCEAN CYCLONE FIX DATA

TC18-78

SATELLITE FIXES

FIX NO.	TIME (Z)	FIX POSITION	ACCRY	UVORAK CODE	SAT	COMMENTS	SITE
1	130450	10.8N 89.0E	PCN 6		DMS036		KGWC
2	140058	11.5N 89.5E	PCN 6		DMS036		KGWC
3	140432	11.8N 89.6E	PCN 6	T1.5/1.5 /10.5/24HRS	DMS036		KGWC
4	141339	11.4N 87.0E	PCN 6		DMS036		KGWC
5	141714	11.5N 86.1E	PCN 6		DMS036		KGWC
6	150040	12.5N 89.4E	PCN 6		DMS036		RPMK
7	150040	12.5N 89.9E	PCN 6		DMS036		KGWC
8	150556	13.1N 90.2E	PCN 6	T2.5/2.5 /11.0/24HRS	DMS036		KGWC
9	151323	15.0N 92.9E	PCN 6		DMS036		KGWC
10	151557	15.2N 92.4E	PCN 6		DMS036		KGWC
11	160204	15.3N 89.7E	PCN 6		DMS036		KGWC
12	160538	16.8N 90.2E	PCN 6	T1.5/2.5 /11.0/24HRS	DMS036		KGWC
13	160543	15.3N 89.2E	CONF 1		DMS0		FWS
14	161305	18.1N 91.3E	PCN 6		DMS036		KGWC
15	161447	18.1N 91.3E	PCN 6		DMS0		KGWC
16	161820	18.3N 90.8E	PCN 6		DMS036		KGWC
17	171147	18.9N 92.4E	PCN 6		DMS036		KGWC
18	170152	18.5N 92.1E	CONF 1	T3.5/3.5 /01.5/24HRS	DMS0		FWS
19	170520	18.5N 92.6E	PCN 4	T2.5/2.5 /11.0/24HRS	DMS036		KGWC
20	171429	20.0N 93.4E	PCN 2		DMS036		KGWC
21	171802	20.5N 94.3E	PCN 6		DMS036		KGWC

TC19-78

SATELLITE FIXES

FIX NO.	TIME (Z)	FIX POSITION	ACCRY	UVORAK CODE	SAT	COMMENTS	SITE
1	250056	12.7N 91.9E	PCN 6	T1.0/1.0	DMS037		KGWC
2	250459	13.0N 90.8E	PCN 3	T1.5/1.5	DMS036	INIT JYS	KGWC
3	251337	15.1N 89.8E	PCN 5		DMS037	INIT JYS	KGWC
4	260036	15.2N 87.9E	PCN 4	T2.5/2.5 /01.0/20HRS	DMS037	GOOD FEEDER BAND TO NORTH	KGWC
5	260441	16.5N 87.9E	PCN 4	T2.5/2.5 /11.0/24HRS	DMS036	FEEDER BAND IN SE QUAD	KGWC
6	261317	17.1N 86.9E	PCN 6		DMS037		KGWC
7	261723	18.0N 87.1E	PCN 6		DMS036		KGWC
8	270017	18.3N 87.3E	PCN 6		DMS037		KGWC
9	270423	19.1N 88.1E	PCN 6		DMS036		KGWC
10	270505	19.1N 88.3E	PCN 6	T3.0/3.0 /00.5/24HRS	DMS036		KGWC
11	271258	20.5N 88.8E	PCN 6		DMS037		KGWC
12	271705	20.4N 90.0E	PCN 6		DMS036		KGWC
13	280906	20.0N 92.6E	PCN 6		DMS036		ROUN

SATELLITE FIXES

FIX NO.	TIME (Z)	FIX POSITION	ACCR	ORAR CODE	SAT	COMMENTS	SITE
1	050547	10.5N 73.5E	PCN 6	T2.0/2.0	DMSR34	INIT JCS	KGWC
2	051325	10.6N 72.0E	PCN 6		DMSR37	CI OUTFLOW WEST	KGWC
3	052129	10.5N 71.6E	PCN 6		DMSR34	INCREASED CONV ACTIVITY	KGWC
4	060206	10.3N 72.6E	PCN 6	T3.0/3.0	DMSR37	INIT JCS BASED ON CI OUTFLOW	KGWC
5	060529	11.6N 71.5E	PCN 2	T3.5/3.5	DMSR34	INIT JCS RAGGED EYE FORMING	KGWC
6	061003	11.8N 71.0E		T3.0	TTR05N	CDD I JER RAD CNTR	NRPG
7	061447	13.5N 70.9E	PCN 6		DMSR37	CENTER POORLY DEFINED	KGWC
8	061911	13.5N 70.4E	PCN 6		DMSR34		KGWC
9	070146	13.2N 68.3E	PCN 6	T4.5/4.5 /01.5/24HRS	DMSR37	BANDING MORE ORGANIZED	KGWC
10	070512	13.4N 67.1E	PCN 1	T4.5/4.5 /01.0/24HRS	DMSR34	EYE CI COVERED	KGWC
11	070956	13.0N 66.9E		T5.0	TTR05N	CDD EXTENDS 150NM RAD OF CNTR	NRPG
12	071427	15.4N 66.1E	PCN 4		DMSR37		KGWC
13	071853	15.4N 65.3E	PCN 4		DMSR34		KGWC
14	080127	16.0N 63.7E	PCN 2		DMSR34	EYE 5 NM DIA	KGWC
15	080735	16.5N 63.5E	PCN 2	T6.0/6.0 /01.5/24HRS	DMSR34	EYE 20 NM DIA	KGWC
16	080948	17.5N 62.5E		T5.0	TTR05N		NRPG
17	081407	17.5N 62.9E	PCN 6		DMSR		KGWC
18	081835	17.8N 62.8E	PCN 4		DMSR34	NO EYE VSBL	KGWC
19	082019	18.2N 62.7E	PCN 4		DMSR34	BASED JN CONSERVATIVE FEATURES	KGWC
20	090249	18.6N 62.3E	PCN 2		DMSR37	RAGGED EYE VSBL LESS ORGANIZED	KGWC
21	090717	19.7N 62.2E	PCN 2	T4.5/5.5 /01.5/24HRS	DMSR34		KGWC
22	091120	20.3N 62.8E			TTR05N	CDD EXTENDS 100NM RAD OF CNTR	NRPG
23	091529	20.3N 62.8E	PCN 6		DMSR37	CDD ORIENTED NW-SW	KGWC
24	091959	20.5N 62.5E	PCN 4		DMSR34	DECREASED INTENSITY	KGWC
25	101229	21.8N 63.3E	PCN 4		DMSR37		KGWC
26	101559	22.2N 63.8E	PCN 3	T3.0/4.0 /01.5/24HRS	DMSR34	NO SIGNIFICANT LLCC	KGWC
27	101111	22.3N 64.1E		T5.0	TTR05N	45NM ILL DEFINED EYE	NRPG
28	101510	23.1N 65.2E	PCN 6		DMSR37	UPPER LVI ANTICYCLONE	KGWC
29	101941	23.5N 66.9E	PCN 6		DMSR34	BASED JN APPNT LLCC	KGWC
30	110209	22.5N 66.0E	PCN 3		DMSR37	EXPOSED LLCC	KGWC
31	110642	22.8N 66.8E	PCN 3	T1.5/2.5 /01.5/24HRS	DMSR34		KGWC
32	110905	23.0N 68.0E			TTR05N	NO OUTFLOW	NRPG
33	111450	22.9N 68.7E	PCN 6		DMSR37	NO CLEARLY DEFINED LLCC	KGWC
34	111923	23.0N 69.1E	PCN 6		DMSR34		KGWC
35	120150	22.6N 68.6E	PCN 6		DMSR37		KGWC
36	120623	22.5N 69.1E	PCN 4		DMSR34		KGWC

RAJAR FIXES

FIX NO.	TIME (Z)	FIX POSITION	RADAR	ACCR	EYE SHAPE	EYE DIA	RADAR-CODE ASWAK TDOFF	COMMENTS	RADAR POSITION	SITE WHO NO.
1	080710	16.7N 63.5E	ACFT					EYE 32 MILES WIDE		

SATELLITE FIXES.

FIX NO.	TIME (Z)	FIX POSITION	ACCRV	DVORAK CODE	SAT	COMMENTS	SITE
1	192114	7.9N 90.6E	PCN 6		DMS477		
2	200555	8.0N 91.0E	PCN 6	T3.0/3.0	DMS477	INITIAL OBS W/L ANTICYCLONE	KGWC
3	200542	8.0N 90.7E	PCN 1	T3.5/3.5	DMS475	INITIAL OBS EYE DIAM 15NM	KGWC
4	201335	8.3N 89.5E	PCN 4		DMS477		KGWC
5	201542	7.9N 89.2E	PCN 6		DMS475		KGWC
6	210035	7.6N 88.8E	PCN 3	T3.5/3.5	DMS477	INITIAL OBS	KGWC
7	210524	7.3N 88.0E	PCN 2	T4.0/4.0 /00.5/24HRS	DMS477		KGWC
8	211315	7.3N 87.4E	PCN 6		DMS477		KGWC
9	211805	7.2N 87.3E	PCN 6		DMS475		KGWC
10	220016	6.7N 86.3E	PCN 2		DMS477		KGWC
11	220505	6.8N 85.6E	PCN 2	T5.0/5.0 /01.0/24HRS	DMS475		KGWC
12	220903	7.0N 85.1E		T5.0	TR005N	CDO EXTENDS 40NM RAD FROM CNTR	KGWC
13	221257	6.7N 84.8E	PCN 2		DMS477		NRPG
14	221747	6.9N 84.6E	PCN 2		DMS475		KGWC
15	230138	7.3N 83.7E	PCN 2		DMS477		KGWC
16	230529	7.1N 83.3E	PCN 2	T6.5/6.5 /01.5/24HRS	DMS475		KGWC
17	230850	7.0N 83.0E			TR005N	WELL DEFINED EYE	NRPG
18	231237	7.6N 81.7E	PCN 2		DMS477		KGWC
19	231729	7.6N 81.4E	PCN 1		DMS475		KGWC
20	240118	8.5N 80.5E	PCN 2	T5.0/6.0 /W1.5/20HRS	DMS477		KGWC
21	240511	8.0N 79.9E	PCN 1		DMS475		KGWC
22	241400	9.3N 78.2E	PCN 3		DMS477		KGWC
23	241853	9.9N 77.5E	PCN 5		DMS475		KGWC
24	250058	11.1N 75.7E	PCN 3	T4.0/5.0 /W1.0/23HRS	DMS477		KGWC
25	250553	11.0N 74.6E	PCN 3		DMS475		KGWC
26	251015	11.2N 73.7E			TR005N		NRPG
27	251339	11.3N 73.3E	PCN 3		DMS477		KGWC
28	251835	12.2N 72.7E	PCN 5		DMS475	UPR LVL ANTICYCLONE	KGWC
29	260220	12.5N 71.5E	PCN 5	T4.5/4.5 /00.5/22HRS	DMS477		KGWC
30	260535	12.3N 71.3E	PCN 5		DMS475		KGWC
31	261006	13.1N 71.6E		T4.0	TR005N		NRPG
32	261320	13.7N 70.9E	PCN 5		DMS477		KGWC
33	261817	14.3N 71.5E	PCN 5		DMS475		KGWC
34	270201	14.2N 71.6E	PCN 5	T1.0/2.0 /W3.5/24HRS	DMS477		KGWC
35	270559	14.6N 68.6E	PCN 3		DMS475		KGWC
36	270956	14.8N 69.0E		T3.0	TR005N	UPPER LVL SHEARING OFF	NRPG
37	271442	15.1N 67.8E	PCN 3		DMS477		KGWC
38	271941	15.1N 67.8E	PCN 4		DMS475		KGWC
39	280141	14.9N 67.4E	PCN 3	T2.0/3.0 /W1.0/20HRS	DMS477		KGWC
40	280641	14.9N 69.9E	PCN 3	T1.5/2.5 /W1.5/24HRS	DMS475		KGWC
41	280945	17.5N 70.9E			TR005N		NRPG
42	281423	15.1N 67.8E	PCN 5		DMS477		KGWC
43	281923	15.8N 68.2E	PCN 5		DMS475		KGWC
44	290121	16.9N 68.2E	PCN 5		DMS477		KGWC
45	290623	17.0N 68.6E	PCN 5	T0.0/1.0 /W1.5/24HRS	DMS475		KGWC
46	291402	18.3N 68.9E	PCN 5		DMS477		KGWC

APPENDIX

I. CONTRACTIONS

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

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

2. DEFINITIONS

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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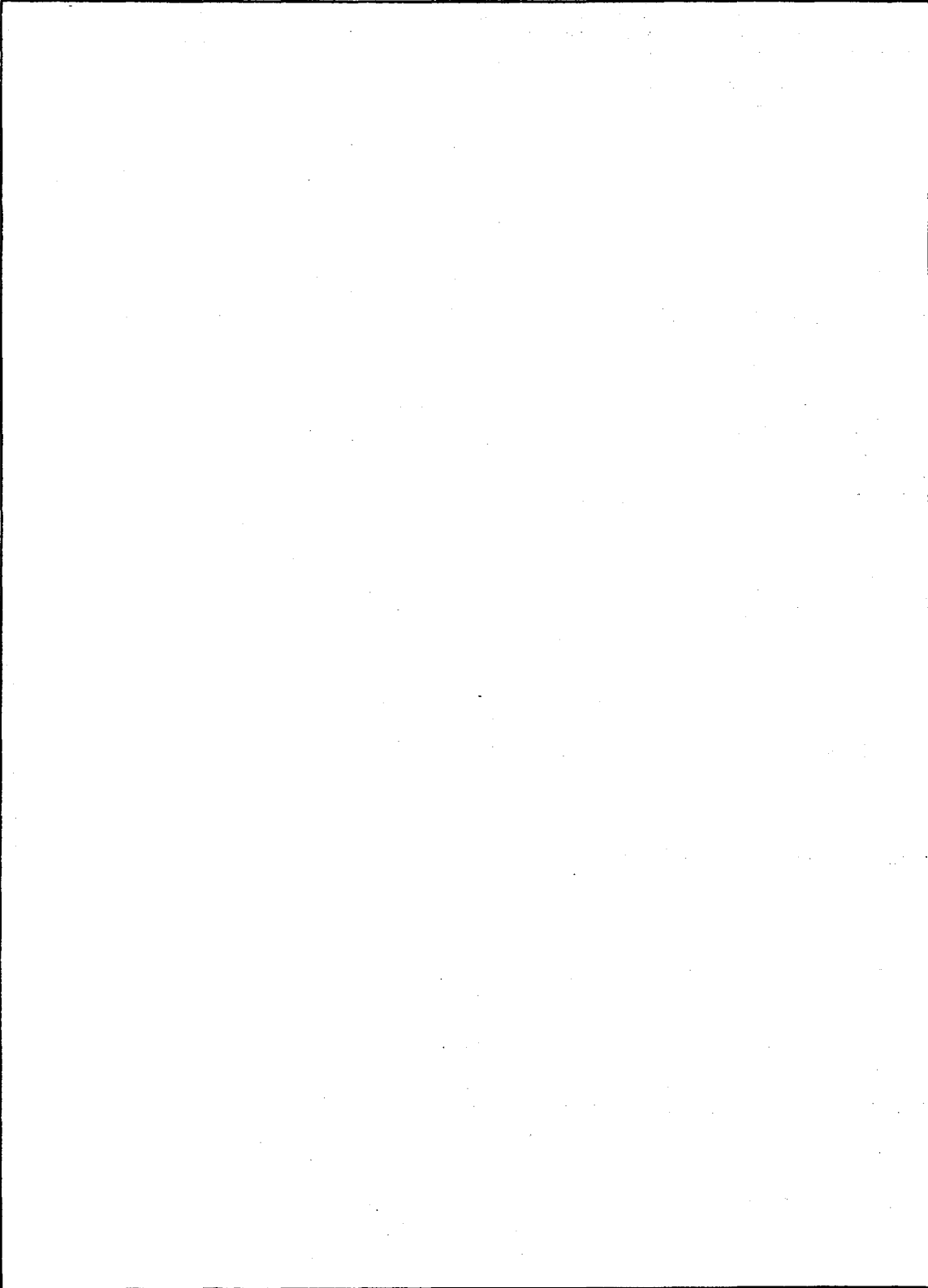
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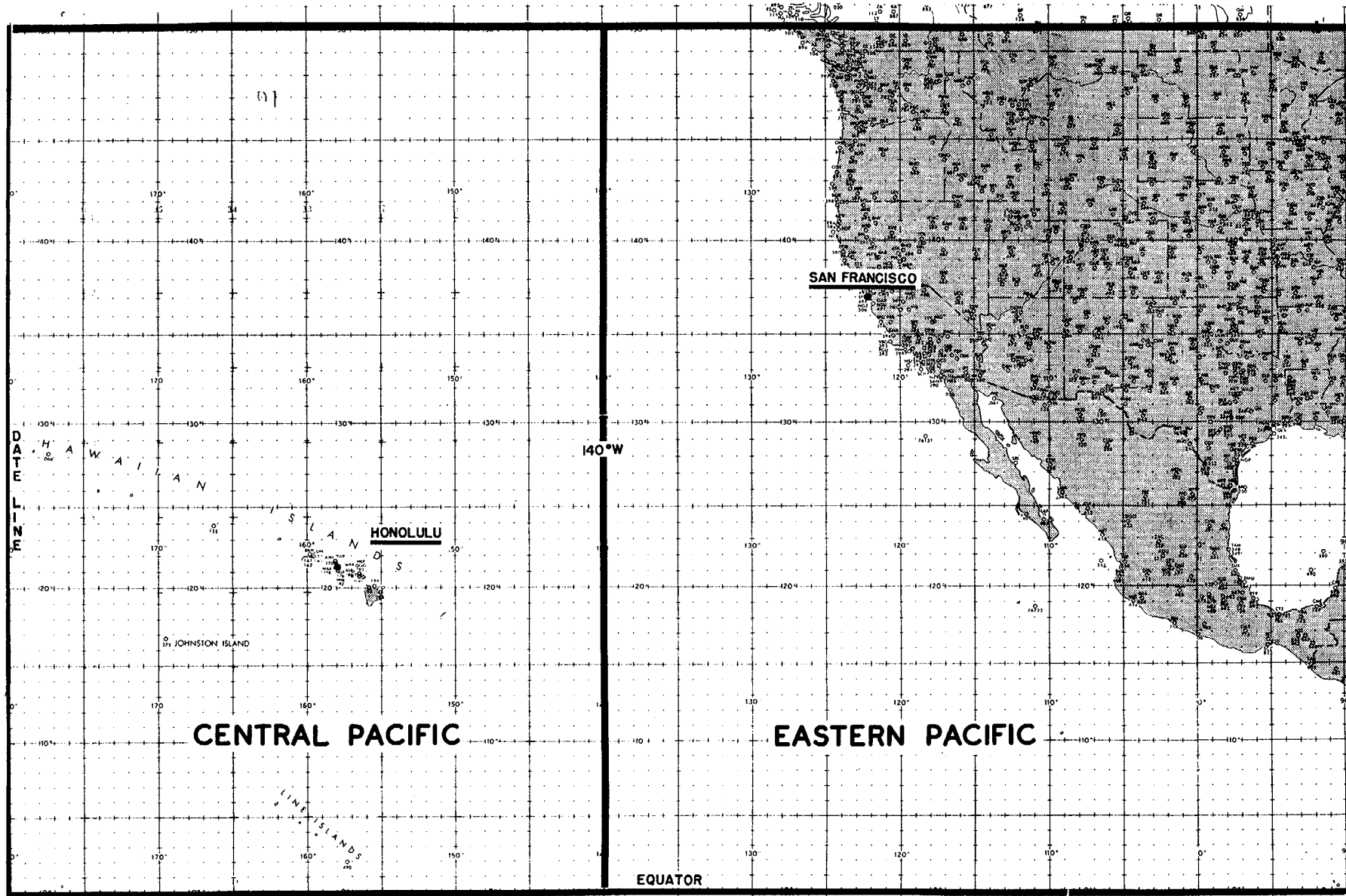
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