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ROYAL OBSERVATORY, HONG KONG

METEOROLOGICAL RESULTS 1983

PART III—TROPICAL CYCLONE SUMMARIES

90° 100° 110° 120° 130° 140° 150° 160°

40° 30° 20° 10° 0°

T.D. Aug

ABBY Aug

BEN Aug

FORREST Sep

DOM Aug

WAYNE Jul

ELLEN Sep

T.D. Aug

BEN(8306) Aug

VERA Jul

TIP Jul

GEORGIA Oct

CARMEN Aug

SARAH Jun

CARMEN(8307) Aug

GEORGIA(8311) Sep

DOM(8308) Aug

WAYNE(8304) Jul

SARAH(8301) Jun

TIP(8302) Jul

ELLEN(8 Aug

VERA(8303) Jul

FORREST(8310) Sep

ABBY(8305) Aug

R.O. 80

ROYAL OBSERVATORY HONG KONG

TRACKS OF TROPICAL CYCLONES
JANUARY–SEPTEMBER, 1983

Typhoons

Tropical Storms or Tropical Depressions

Tracks Uncertain

Daily Positions at 00 h G.M.T.

Intermediate 6 hrly Positions

Mercator Projection-Natural Scale
1 : 15m. at 22½°N.

R.O. 80

ROYAL OBSERVATORY HONG KONG

TRACKS OF TROPICAL CYCLONES
OCTOBER–DECEMBER, 1983

Typhoons

Tropical Storms or Tropical Depressions

Tracks Uncertain

Daily Positions at 00 h G.M.T.

Intermediate 6 hrly Positions

Mercator Projection-Natural Scale
1 : 15m. at 22½ °N.

90° 100° 110° 120° 130° 140° 150° 160°

40° 30° 20° 10° 0°

MARGE Nov

IDA Oct

JOE Oct

KIM Oct

T.D. Oct

LEX Oct

HERBERT Oct

T.D. Oct

ORCHID Nov

RUTH Nov

RUTH(8321) Nov

LEX(8316) Oct

JOE(8314) Oct

SPERRY (8322) Dec

SPERRY Dec

THELMA Dec

IDA (8313) Oct

NORRIS Nov

NORRIS (8318) Nov

HERBERT(8312) Oct

PERCY Nov

PERCY(8320) Nov

KIM(8315) Oct

THELMA(8323) Dec

MARGE(8317) Nov

ORCHID(8319) Nov

T.D. Nov

T.D. Nov

METEOROLOGICAL RESULTS

1983

PART III—TROPICAL CYCLONE SUMMARIES

1984

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1. INTRODUCTION

Apart from a short break 1940–1946, surface observations of meteorological elements since 1884 have been summarized and published in the Royal Observatory's Meteorological Results. Upper-air observations were begun in 1947 and from then onwards the annual volumes were divided into two parts, namely Part I—Surface Observations and Part II—Upper-air Observations. The publication of Meteorological Results Part II was terminated in 1981. Upper-air data are now archived on magnetic tape.

During the period 1884–1939, reports on some destructive typhoons were printed as Appendices to the Meteorological Results. This practice was extended and accounts of all tropical cyclones which caused gales in Hong Kong were included in the Director's Annual Departmental Reports from 1947 until 1967 inclusive. The current series—'Meteorological Results, Part III—Tropical Cyclone Summaries' was then introduced. It contains information about all tropical cyclones over the western North Pacific and the South China Sea (i.e. the area bounded by the Equator, 45°N, 100°E and 160°E). The first issue containing reports on tropical cyclones occurring during 1968, was published in 1971.

Tracks of tropical cyclones in the western North Pacific and the South China Sea were published in Meteorological Results, up to 1939 and in Meteorological Results, Part I from 1947 to 1967. During the period 1884–1960, the tracks were plotted with day circle positions only. The time of the day circle varied to some extent but remained fixed at 0000 G.M.T. after 1944. The day circle times used for earlier tropical cyclones are given in the Royal Observatory Technical Memoir No. 11, Volume 1. From 1961 onwards, 6-hourly positions were shown on the tracks of all tropical cyclones.

Provisional reports on individual tropical cyclones affecting Hong Kong have been prepared since 1960: this is done in order to meet the immediate needs of the press, shipping companies and others. These reports are cyclostyled and supplied on request. Initially, reports were only written on those tropical cyclones for which gale or storm signals had been hoisted in Hong Kong, but by 1968 it had become necessary to produce a report on every tropical cyclone during which any tropical cyclone warning signal was raised.

In this publication, tropical cyclones are classified into the following four categories according to the maximum sustained winds within their circulations:

A TROPICAL DEPRESSION (T.D.) has maximum sustained winds of less than 34 knots and at this stage the centre is often not very clearly defined and cannot always be located precisely.

A TROPICAL STORM (T.S.) has maximum sustained winds in the range 34–47 knots.

A SEVERE TROPICAL STORM (S.T.S.) has maximum sustained winds in the range 48–63 knots.

A TYPHOON (T.) has maximum sustained winds of 64 knots or more.

At the thirteenth session of the ESCAP/WMO Typhoon Committee held in December 1980, a common system for identification of tropical cyclones in the western North Pacific and the South China Sea was adopted. Since 1 January 1981, the Japan Meteorological Agency has undertaken the responsibility of assigning to each tropical cyclone which has attained tropical storm intensity a common number which is composed of 4 digits. For example, (8304) means the fourth tropical cyclone of tropical storm intensity or above in 1983. The appropriate number follows the name of the tropical cyclone in this publication.

The Royal Observatory has a network of anemographs to record surface winds in Hong Kong. The instruments used are all Dines pressure-tube anemographs or M.O. Mark IV cup-generator type anemographs manufactured by R.W. Munro Ltd. Quick-run mechanisms are also fitted to the anemographs at the Hong Kong Airport (Southeast), Waglan Island, Tate's Cairn, and Cheung Chau for recording the fine structure of the wind flow in typhoons for research purposes. Details of these stations are given below.

Station	Position		Elevation of barometer above M.S.L.	Elevation of ground above M.S.L.	Head of anemometer above M.S.L.	Type of anemometer
	Latitude N	Longitude E				
			(m)	(m)	(m)	
Royal Observatory	22° 18′	114° 10′	62	32	72	Cup
Hong Kong Airport (Southeast)	22° 20′	114° 11′	24	4	16	Dines, Cup
Hong Kong Airport (Northwest)	22° 20′	114° 11′	24	4	14	Dines, Cup
Waglan Island	22° 11′	114° 18′	62	55	75	Dines, Cup
Tate's Cairn	22° 22′	114° 13′	*	575†	588	Dines
Cheung Chau	22° 12′	114° 01′	79	72	92	Dines
King's Park	22° 19′	114° 10′	66	65	78	Cup
Star Ferry	22° 18′	114° 10′	*	3	17	Cup
Green Island	22° 17′	114° 07′	*	76	90	Cup
Tsim Bei Tsui	22° 29′	114° 00′	*	26	44	Dines
Tai O	22° 15′	113° 51′	*	76	90	Cup
Castle Peak	22° 23′	113° 58′	*	11	24	Dines
Chek Lap Kok△	22° 19′	113° 56′	53	51	65	Cup
Lei Yue Mun	22° 17′	114° 14′	*	54	73	Cup
Yau Yat Chuen	22° 20′	114° 10′	*	27	64	Cup
Kowloon Tsai Hill	22° 20′	114° 11′	*	91	105	Cup

△ Operations ceased on 9 September 1983.

* No barometer.

† Level of the ground floor of the building of the Radar Station.

Royal Observatory wind data presented in this report were obtained from an anemometer installed at the top of a mast which is about 93 metres west-southwest of the previous location on top of the old headquarters building. It became operational on 1 June 1982. Wind speed measurements have not been corrected for the reduced density of the air but in most cases this would increase the figures in the tables by less than 5 per cent.

The reports in Section 3 present a general description of the life history of each tropical cyclone affecting Hong Kong from formation to dissipation including:

(*a*) how the tropical cyclone affected Hong Kong;
(*b*) the sequence of display of tropical cyclone warning signals;
(*c*) the maximum gust peak speeds and maximum mean hourly winds recorded at various stations in Hong Kong;
(*d*) the lowest barometric pressure recorded at the Royal Observatory;
(*e*) the daily amounts of rainfall recorded at the Royal Observatory, Cheung Chau and Tate's Cairn;
(*f*) the times and heights of the highest tides and maximum storm surges recorded in Hong Kong.

Whenever practical, radar displays and pictures received from weather satellites are included together with information and data obtained from reconnaissance aircraft. With a view to providing further information on the characteristics of tropical cyclones, 6-hourly positions together with the corresponding estimated minimum central pressures and maximum sustained surface winds for individual tropical cyclones are tabulated and presented in Section 5.

In this publication different times have been in use in different contexts. The reference times of tropical cyclone warnings for shipping are given in G.M.T. Unlabelled times given in hours and minutes (e.g. 1454) on a 24-hour clock or times expressed as a.m. or p.m. are in Hong Kong Time. Hong Kong Time is 8 hours ahead of G.M.T. Times labelled 'G.M.T.' are in Greenwich Mean Time. For most practical purposes, the difference between Greenwich Mean Time and Co-ordinated Universal Time may be neglected.

Throughout this publication, maximum sustained surface winds when used without qualification refer to wind speeds averaged over a period of ten minutes. Wind data from reconnaissance aircraft were taken directly from eye-fix messages received operationally at the Royal Observatory, Hong Kong. Unless otherwise specified, no attempt has been made to convert the wind speeds into equivalent 10-minute mean winds to make them comparable with reports from surface stations. Mean hourly winds were obtained by averaging the winds over a 60-minute interval ending on the hour. Daily rainfall amounts are rainfall recorded in a 24-hour period ending at midnight Hong Kong Time.

2. TROPICAL CYCLONE SUMMARIES FOR 1983

In 1983 twenty-six tropical cyclones formed over the western North Pacific and the South China Sea. Only eight of them attained typhoon intensity, which was much less than the average of fifteen per year. Three tropical cyclones made landfall over south China, one of which hit Hong Kong directly. Two typhoons swept across Japan and seven tropical cyclones affected the Philippines. Two tropical cyclones crossed Hainan, three caused serious damage in Vietnam and another one affected Thailand.

The monthly distribution of the frequently of first occurrence of tropical cyclones is shown in Figure 1 and a brief summary of these tracks is contained in Table 1. Six-hourly positions of these tropical cyclones together with their estimated minimum central pressures and maximum sustained surface winds are tabulated in Section 5. The monthly mean frequency of first occurrence of tropical cyclones during the years 1946–1982 is given in Figure 2.

During the year there were fifteen tropical cyclones in Hong Kong's area of responsibility for tropical cyclone warnings for shipping, (i.e. the area bounded by 10°N, 30°N, 105°E and 125°E) compared with an average of seventeen over the past 37 years. Nine tropical cyclones moved into this area and six developed within it. Altogether 295 warnings for shipping were issued by the Royal Observatory in connection with fourteen of these tropical cyclones. S.T.S. Percy moved into the southern boundary of Hong Kong's area of responsibility only very briefly so that no tropical cyclone warnings for shipping were issued for Percy.

Tropical cyclone warning signals were displayed in Hong Kong for seven tropical cyclones. The Hurricane Signal, No. 10, was hoisted during the passage of T. Ellen and Gale Signals were displayed for T. Joe.

The total tropical cyclone rainfall (defined as the total rainfall recorded at the Royal Observatory, Hong Kong from the first day when a tropical cyclone was centred within 300 nautical miles of Hong Kong to the end of the third day after the tropical cyclone has dissipated or moved outside 300 nautical miles of Hong Kong) during the year 1983 amounted to 689.5 mm, which is 22 per cent above the annual average value of 566.9 mm (1884–1939 and 1947–70). It accounted for 24 per cent of the year's total rainfall of 2 893.8 mm.

In 1983, there was not a single tropical cyclone up to nearly the end of June. This is a rare situation which occurred last in 1973. The first tropical cyclone of the year was Tropical Storm Sarah (8301) which formed over the South China Sea near Nansha on 24 June. It dissipated over Vietnam on 26 June near Danang.

Three tropical cyclones formed over the western North Pacific during July and all came within 400 nautical miles of Hong Kong. Tropical Cyclone Signals were displayed in Hong Kong on all these occasions. Severe Tropical Storm Tip (8302) developed over the Philippines near Manila on 10 July, and dissipated near Zhanjiang on 13 July. Typhoon Vera (8303) originated over the Pacific about 700 nautical miles east-southeast of Manila on 12 July. It swept across the Philippines and the South China Sea between 14 and 16 July and landed at northeastern Hainan on 17 July. Vera brought a death toll of 106 in the Philippines. 138 people were reported missing and 500 000 made homeless. It finally dissipated near Hanoi early on 19 July. Typhoon Wayne (8304) passed through the Bashi Channel early on 25 July and landed near Xiamen during the day bringing thunderstorms which caused severe flooding in Fujian and Guangdong. A total of 105 people were killed and 440 were injured, and about 30 000 houses collapsed. The typhoon dissipated inland on 26 July. The effects of these tropical cyclones on Hong Kong were minimal and there were no reports of damage.

Six tropical cyclones developed during August. Typhoon Abby (8305) formed to the east of the Philippines on 5 August, recurved near the Ryukyus on 10 August and landed over Honshu about 40 nautical miles southeast of Nagoya on 17 August. It brought torrential rain to Japan and killed 2 people. One person was missing and 27 others were injured. More than 3 000 houses were flooded. Many highways, bridges and railways were damaged. Abby became an extratropical cyclone off Tokyo on 20 August. Severe Tropical Storm Ben (8306) and Tropical Storm Carmen (8307) formed on 12 August with Ben to the southeast of Japan and Carmen to the west of Luzon. The movement of both storms were influenced by the circulation of Abby. Ben dissipated close to the south of Nagoya on 15 August, two days before Abby struck Honshu. Carmen travelled eastwards through the Balintang Channel and dissipated south of the Ryukyus also on 15 August. Tropical Storm Dom (8308) developed on 19 August about 620 nautical miles west-northwest of Guam and moved away northeastwards a day later. A tropical depression formed near Okinawa on 25 August and dissipated over Korea early on 28 August. Typhoon Ellen (8309) originated near the Marshall Islands on 29 August and moved westwards.

There were three tropical cyclones over the western North Pacific and the South China Sea in September. Typhoon Ellen (8309) struck Hong Kong, Macau and Guangdong on 9 September, causing widespread damage. It dissipated near Guangzhou late on 9 September. Typhoon Forrest (8310) originated near Guam on 20 September. It came close to Okinawa on 25 September, injuring 31 people. Power supplies failed and more than 160 000 homes on Okinawa and neighbouring islands were affected. The typhoon also brought torrential rain to southwestern and central Japan. 29 prefectures were affected. 21 people died, 17 were missing and 86 others were injured. More than 46 000 houses were flooded and 441 landslips occurred. Roads were damaged at 147 places, railways were cut at 22 locations and 6 bridges were washed away. Forrest became an extratropical cyclone south of Tokyo late on 28 September. Severe Tropical Storm Georgia (8311) formed over the South China Sea on 28 September. It crossed Hainan on 30 September and dissipated near Hanoi on 1 October.

Altogether eight tropical cyclones occurred over the western North Pacific and the South China Sea during October but only Typhoon Joe and Severe Tropical Storm Lex affected Hong Kong. A tropical depression formed

near Xisha Dao on 2 October and dissipated near Hanoi the next day. Tropical Storm Herbert (8312) formed near Nansha on 7 October and landed near Danang on 9 October. Its remnant continued to move across Vietnam during the following two days. In Vietnam, about 40 people were reported killed or missing and 120 others were injured. Georgia in September and Herbert in October together destroyed hundreds of homes and flooded about 200 000 hectares of rice fields. Typhoon Ida (8313) recurved east of the Ryukyus on 9 October. It passed between Miyakejima and Hachijojima near Tokyo on 11 October and caused some landslips on the two islands. Ida became an extratropical cyclone east of Tokyo on 11 October. Typhoon Joe (8314) formed east of the Philippines on 10 October. It passed about 100 nautical miles southwest of Hong Kong on 13 October. Heavy rain affected south China coastal areas from Shantou to Zhanjiang. Joe dissipated over Guangdong the following day. Tropical Storm Kim (8315) formed near Nansha on 16 October. It passed over Bangkok on 18 October and caused severe flooding there. About 204 000 hectares of farmland in Thailand were inundated. Kim crossed the Tenasserim Mountains and southern Burma on 19 October. It dissipated near Chittagong on 20 October. Severe Tropical Storm Lex (8316) formed east of the Philippines on 20 October. It passed close to the south of Hainan during the night of 25 October. A 6 000-tonne oil-drilling ship, the 'Glomar Java Sea' sank about 50 nautical miles southwest of Hainan. None of the 81 crew members were known to have survived. Lex dissipated over Vietnam on 26 October. During the passage of Lex, about 300 Vietnamese junks sank. More than 200 fishermen were reported killed or missing. Thousands of hectares of rice and subsidiary crops were inundated. Typhoon Marge (8317) originated near Guam on 31 October.

In November, six tropical cyclones were reported over the Pacific and the South China Sea. Tropical Storm Norris (8318) formed about 570 nautical miles to the northeast of Guam on 8 November. Both Typhoon Marge and Tropical Storm Norris recurved to the northeast over the Pacific and moved northeastwards away from the Asian continent. Typhoon Orchid (8319) originated near Yap on 17 November and affected the central Philippines on 20–24 November. About 170 people were drowned or missing when the 500-tonne Philippine ferry 'Dona Casandra', capsized about 400 nautical miles southeast of Manila on 21 November. Orchid dissipated east of Luzon on 26 November. Severe Tropical Storm Percy (8320) formed near Nansha on 18 November. The 300-tonne Singaporean freighter, 'Jotun', was reported missing on 20 November when Percy was near 7°N. It was quite unusual for tropical cyclones to develop at low latitudes. There were only 9 tropical cyclones which developed south of 8°N in the South China Sea since 1946. Percy dissipated near Palawan on 25 November. A tropical depression appeared near the Caroline Islands from 21 to 24 November. Tropical Storm Ruth (8321) developed near the Philippines on 27 November and dissipated east of Luzon on 30 November.

Tropical Storm Sperry (8322) and Severe Tropical Storm Thelma (8323) developed during December. They formed to the east of the Philippines on 2 and 15 December respectively. Both dissipated over the ocean within three days.

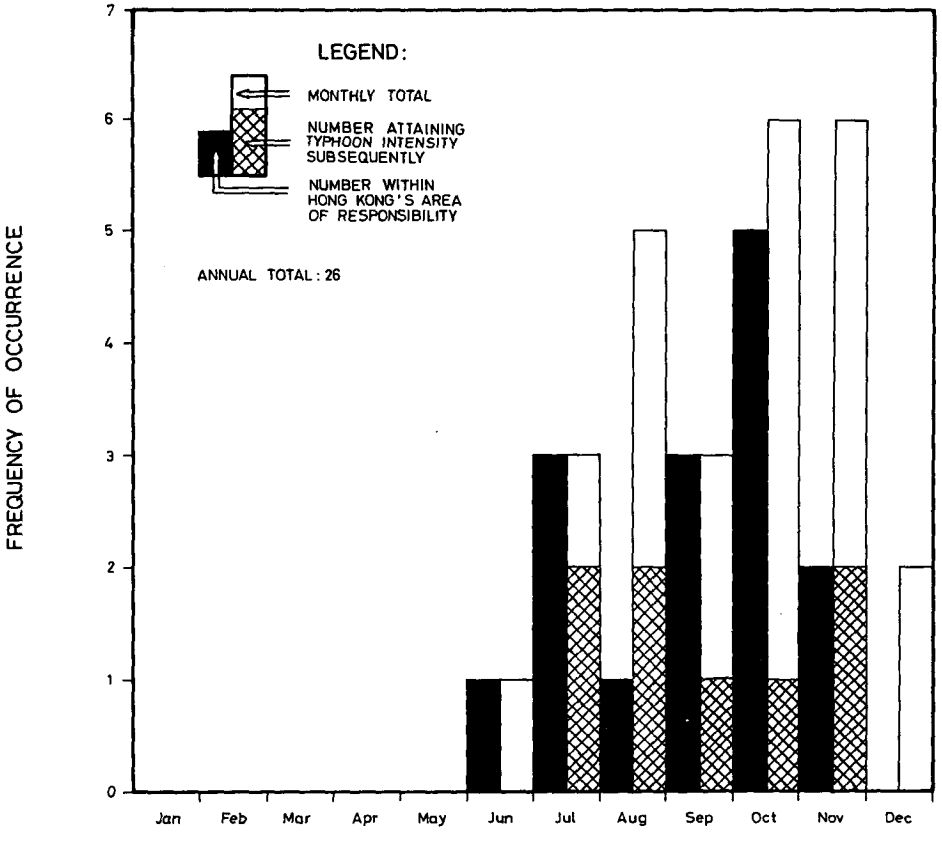


Figure 1. **Monthly distribution of the frequency of first occurrence of tropical cyclones in the western North Pacific and the South China Sea in 1983.**

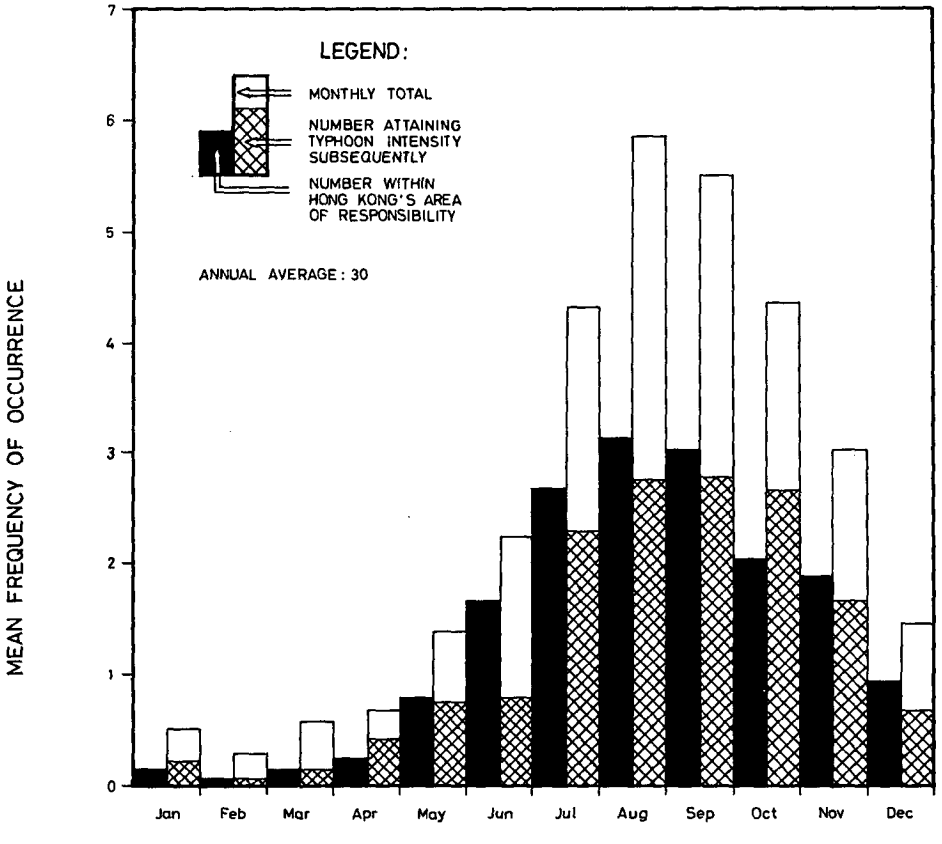


Figure 2. **Monthly distribution of the mean frequency of first occurrence of tropical cyclones in the western North Pacific and the South China Sea, 1946–1982.**

3. REPORTS ON TROPICAL CYCLONES AFFECTING HONG KONG IN 1983

(a) Severe Tropical Storm Tip (8302)

10–13 July 1983

The track of this severe tropical storm is shown in Figure 3

Tip developed as a tropical depression about 130 nautical miles southeast of Manila on 10 July. It moved westwards initially at about 18 knots and intensified into a tropical storm on entering the South China Sea on 11 July. Satellite pictures revealed that the main cloud mass was displaced to the southwest of the centre, but the storm's circulation was well-defined. In the afternoon of 11 July, Tip slowed down and turned northwest moving at 9 knots and intensifying further into a severe tropical storm. At 5.00 p.m. on 11 July, the M.V. 'Stenaoceanica' reported sustained surface winds of 50 knots about 40 nautical miles northwest of the centre. Tip was most intense during the evening and at 6.56 p.m. a reconnaissance aircraft reported a minimum sea-level pressure of 977 millibars and maximum surface winds of 70 knots. Tip maintained its northwest track on 12 July and at 2.00 p.m. it passed about 50 nautical miles northeast of Xisha, where sustained winds of 48 knots and a sea-level pressure of 999.3 millibars were recorded. Tip continued to move northwest and passed just off the northeast coast of Hainan on 13 July while weakening rapidly (Figure 4). It finally dissipated about 30 nautical miles southeast of Zhanjiang in the afternoon.

In Hong Kong, the Stand By Signal, No. 1, was hoisted at 6.00 a.m. on 12 July when Tip was centred about 350 nautical miles to the south. Winds were moderate easterly and gradually turned southeasterly on 13 July. All signals were lowered at 2.00 p.m. on 13 July. Tip was closest to Hong Kong 3 hours later when it was dissipating about 210 nautical miles to the west-southwest. The minimum sea-level pressure at the Royal Observatory was 1 003.7 millibars recorded at 5.00 p.m. on 12 July when Tip was about 290 nautical miles to the south-southwest. The maximum mean hourly winds and the maximum gust peak speeds together with associated wind directions recorded at some selected locations during the display of the Stand by Signal were as follows:

Location	*Maximum mean hourly wind speed in knots with direction in points*		*Maximum gust peak speed in knots with direction in points*	
Royal Observatory	E	13	E	22
Hong Kong Airport (SE)	E	14	E	24
Hong Kong Airport (NW)	E	12	ESE	27
Waglan Island	ESE	19	ESE	32
Tate's Cairn	E	20	E	34
Cheung Chau	ESE	16	ESE	28
King's Park	E	13	E	23
Star Ferry	E	15	E	24
Green Island	E	19	E	27
Tsim Bei Tsui	E	14	E	26
Tai O	ESE	18	ESE	32
Castle Peak	SE	10	ESE	25
Chek Lap Kok	E	16	E	23
Lei Yue Mun	E	18	E	30
Yau Yat Chuen	E	10	ESE	22
Kowloon Tsai Hill	E	14	E	26

The weather was sunny and very hot on 11 July and the temperature rose to a maximum of 33.6°C. There were some scattered showers from 12 to 14 July, but the weather remained generally fine and hot. The daily amounts of rainfall recorded were as follows:

	Royal Observatory	*Cheung Chau*	*Tate's Cairn*
12 July	9.9 mm	Trace	Nil
13 July	6.8 mm	2.0 mm	2.2 mm
14 July	0.3 mm	0.7 mm	27.0 mm
Total:	17.0 mm	2.7 mm	29.2 mm

The times and heights of the highest tides and maximum storm surges recorded at various locations in Hong Kong during the passage of Tip were as follows:

Location	Highest tide above chart datum			Maximum storm surge above astronomical tide		
	Height	Date	Time	Height	Date	Time
	(m)			(m)		
North Point	2.53	12 July	9.00 a.m.	0.41	12 July	2.45 p.m.
Tai Po Kau	2.35	12 July	11.30 a.m.	0.48	12 July	1.30 p.m.
Chi Ma Wan* (Lantau Island)	—	—	—	—	—	—

* Data not available.

There were no reports of damage in Hong Kong.

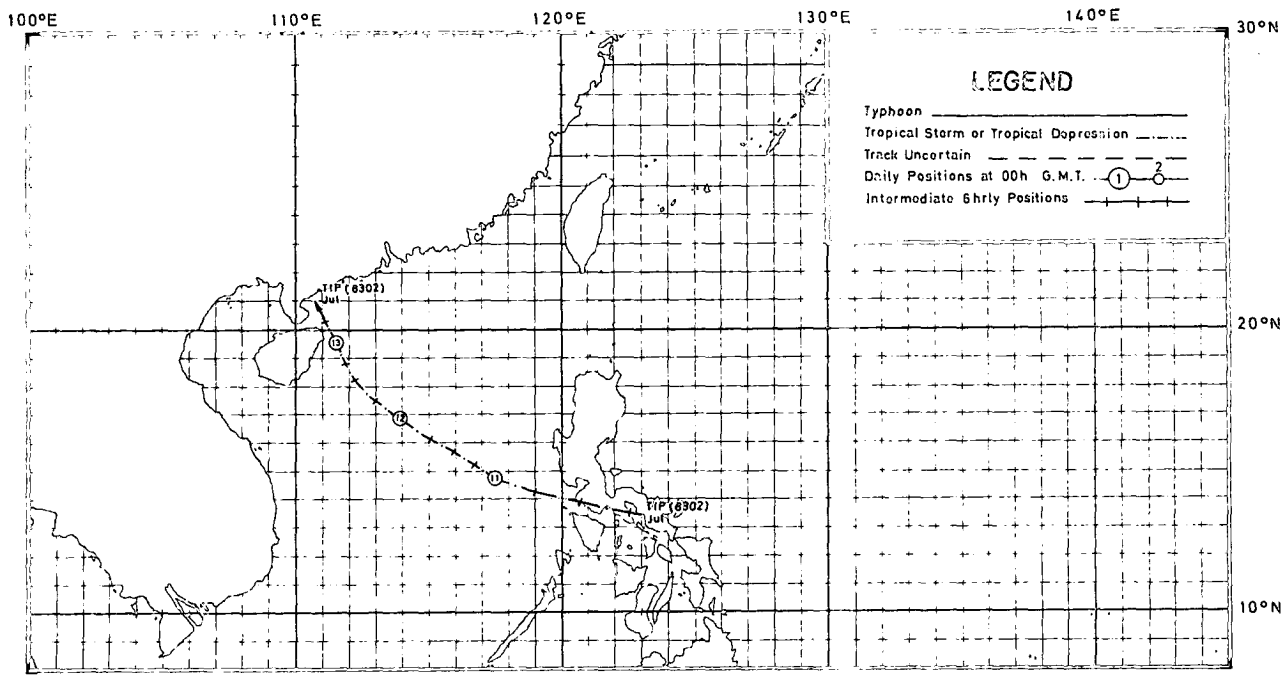


Figure 3. Track of Severe Tropical Storm Tip (8302): 10–13 July.

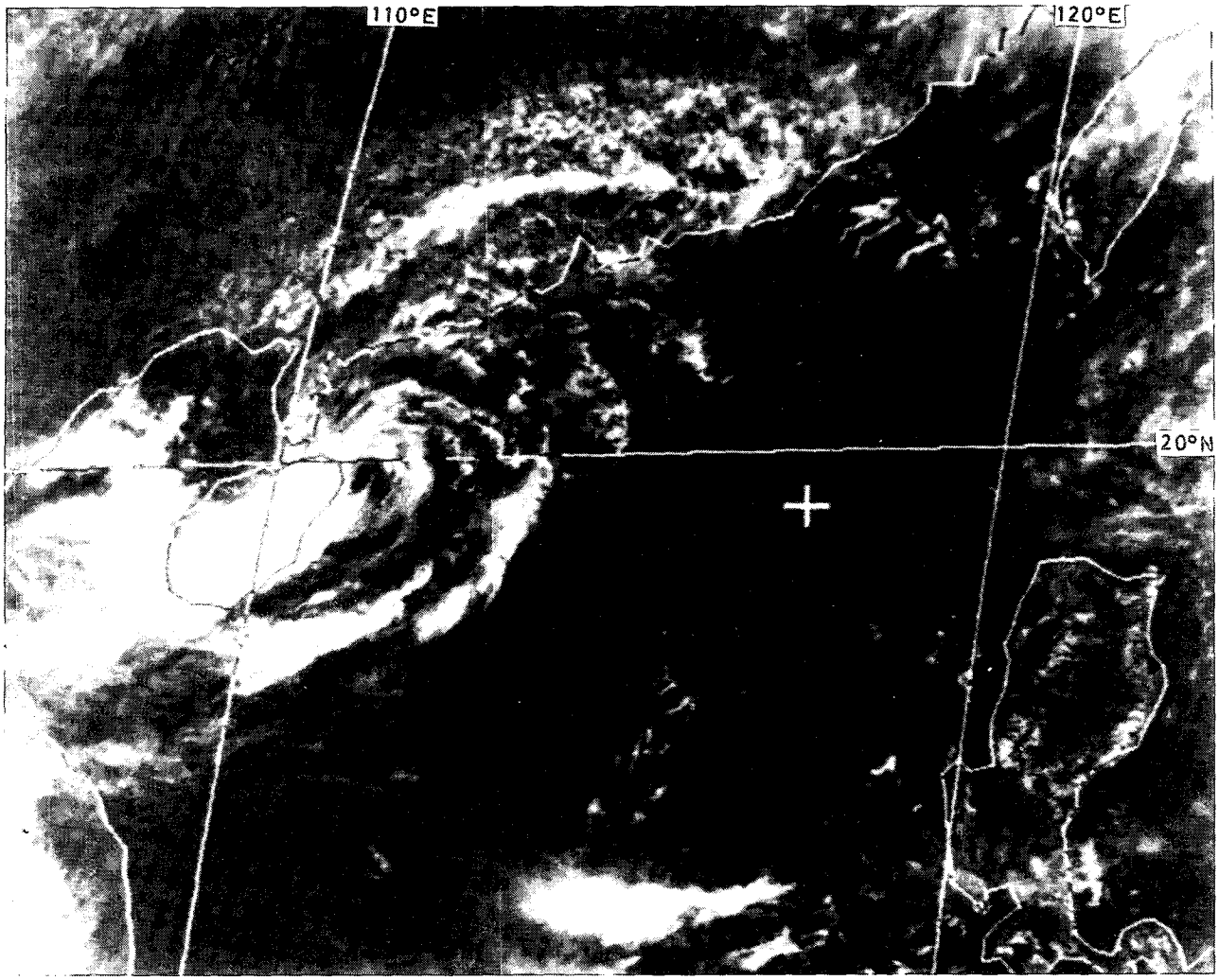


Figure 4. GMS-2 visible imagery of Severe Tropical Storm Tip (8302) taken around 11.00 a.m. on 13 July 1983.

(b) Typhoon Vera (8303)

12–19 July 1983

The track of this typhoon is shown in Figure 5

Typhoon Vera originated as a tropical depression about 700 nautical miles east-southeast of Manila on 12 July. It deepened into a tropical storm in the evening and moved westwards towards the Philippines. It intensified into a severe tropical storm on 13 July and turned northwest. Vera became a typhoon in the morning of 14 July as the eye took shape. Satellite pictures showed that the central cloud mass was about 300 nautical miles in diameter but active spiral cloud bands in its circulation extended over an area of about 600 nautical miles in diameter. The typhoon swept across the central Philippines at 12 knots on 14 July and attained its highest intensity during the night, when maximum sustained winds were estimated to be 70 knots near the centre. At 11.00 a.m. on 15 July, Vera passed about 10 nautical miles southwest of Manila, where sustained winds of 52 knots and a sea-level pressure of 990.2 millibars were recorded. The tanker, M.V. 'Malitan', ran aground in Manila Bay and was half submerged. According to press reports, Vera brought a death toll of 106 in the Philippines. 138 people were reported missing and 500 000 made homeless. Most of the fatalities were on Bataan Peninsula on the west shore of Manila Bay, where huge waves affected coastal villages. Total damage was estimated at US$9 million.

Vera weakened into a severe tropical storm after crossing Luzon. The cloud bands to its north diminished but those to the south and southwest remained extensive. Vera re-intensified into a typhoon over the South China Sea during the morning of 16 July. Satellite pictures showed a ragged eye. At 8.00 a.m. on 16 July, a ship reported sustained winds of 41 knots about 140 nautical miles east of the centre. At 4.56 p.m. on 16 July, a reconnaissance aircraft reported a maximum surface wind of 70 knots around the centre. Vera continued to move northwest at about 13 knots towards Hainan, with its main cloud mass shrinking to 200 nautical miles in diameter (Figure 6). Vera weakened into a severe tropical storm in the afternoon of 17 July as it struck the northeast coast of Hainan. At 5.00 p.m. Vera passed about 30 nautical miles to the south of Haikou, where a sea-level pressure of 975.5 millibars was recorded. Vera passed close to the south of Hanoi on 18 July, bringing rain to several drought-stricken areas in Vietnam. It finally dissipated about 200 nautical miles west of Hanoi early on 19 July.

In Hong Kong, the Stand by Signal, No. 1, was hoisted at 6.30 a.m. on 16 July, when Vera was about 370 nautical miles south-southeast of Hong Kong. Winds were moderate to fresh east-northeasterly during the morning. The Strong Wind Signal, No. 3, was hoisted at 4.00 p.m. on 16 July when Vera was about 300 nautical miles to the south. The lowest sea-level pressure at the Royal Observatory was 1 001.4 millibars and was recorded two hours later. Winds turned easterly and strengthened during the night with gusts reaching 60 knots at Tate's Cairn and 58 knots at Waglan Island. Vera was closest to Hong Kong at 8.00 a.m. on 17 July when it was 230 nautical miles to the south-southwest. Winds turned east-southeasterly on 17 July and moderated in the afternoon. All signals were lowered at 4.05 p.m. on 17 July when Vera landed near Haikou and was moving away from Hong Kong. Winds remained fresh southeasterly off shore for most of the day on 18 July. The maximum mean hourly winds and the maximum gust peak speeds together with associated wind directions recorded at some selected locations during the display of signals were as follows:

Location	*Maximum mean hourly wind speed in knots with direction in points*		*Maximum gust peak speed in knots with direction in points*	
Royal Observatory	E	20	E	45
Hong Kong Airport (SE)	E	23	E	45
Hong Kong Airport (NW)	ESE	23	E	49
Waglan Island	E	30	E	58
Tate's Cairn	E	30	E	60
Cheung Chau	E	30	E	52
King's Park	E	14	E	45
Star Ferry	ESE	25	ESE	50
Green Island	E	29	E	54
Tsim Bei Tsui	SSE	24	SSE	48
Tai O	ESE	29	ESE	59
Castle Peak	Not available		Not available	
Chek Lap Kok	ESE	32	ESE	58
Lei Yue Mun	E	32	E	52
Yau Yat Chuen	ESE	20	E	41
Kowloon Tsai Hill	E	24	E	45

The weather was fine and hot on 15 July. There were scattered showers and sunny periods on 16 July. Some isolated thunderstorms occurred at night and there were more heavy showers on 17 July. The weather improved during the day on 18 July and it was again sunny and hot. The daily amounts of rainfall recorded were as follows:

	Royal Observatory	*Cheung Chau*	*Tate's Cairn*
16 July	13.3 mm	10.1 mm	47.2 mm
17 July	26.5 mm	23.6 mm	33.7 mm
18 July	8.9 mm	6.8 mm	11.1 mm
Total:	48.7 mm	40.5 mm	92.0 mm

The times and heights of the highest tides and maximum storm surges recorded at various locations in Hong Kong during the passage of Vera were as follows:

Location	Highest tide above chart datum			Maximum storm surge above astronomical tide		
	Height	Date	Time	Height	Date	Time
	(m)			(m)		
North Point	2.14	16 July	12.15 p.m.	0.50	16 July	6.30 p.m.
Tai Po Kau	2.05	16 July	3.30 p.m.	0.66	16 July	5.00 p.m.
Chi Ma Wan* (Lantau Island)	—	—	—	—	—	—

* Data not available.

There were no reports of serious damage in Hong Kong but ferry services were slightly affected on 17 July.

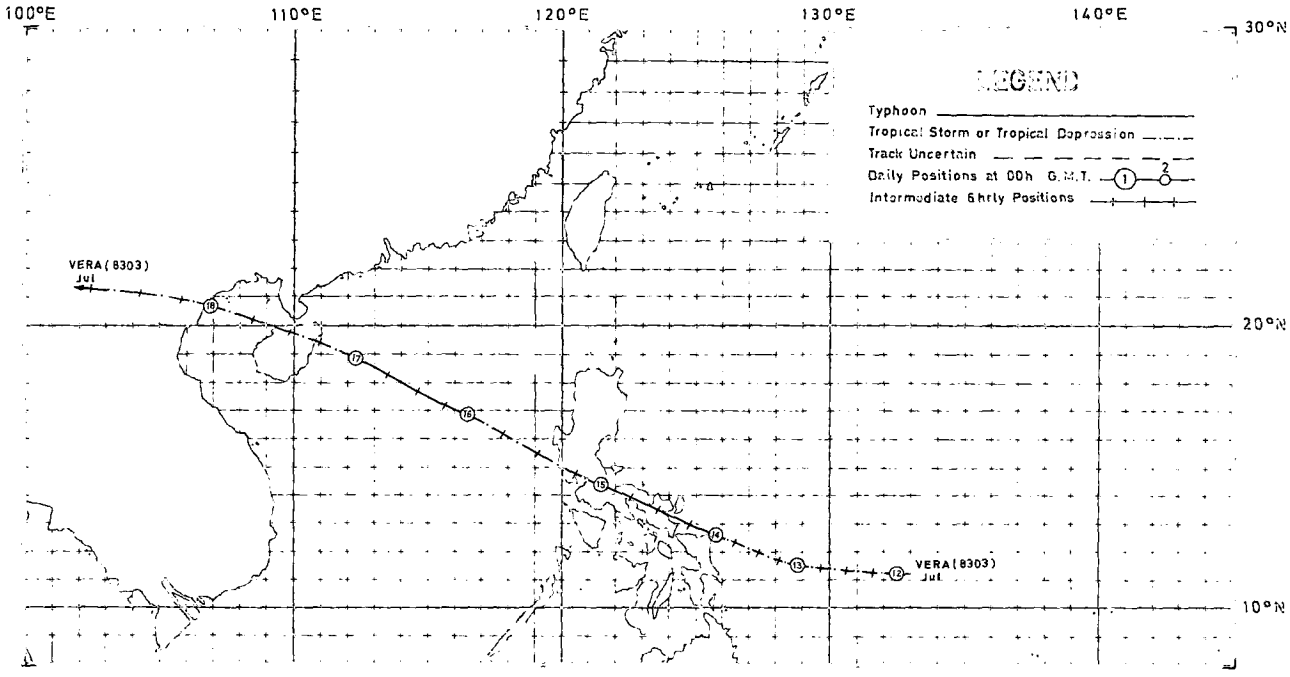


Figure 5. Track of Typhoon Vera (8303): 12–19 July.

Figure 6. GMS-2 visible imagery of Typhoon Vera (8303) taken around 8.00 a.m. on 17 July 1983.

(c) Typhoon Wayne (8304)

22–26 July 1983

The track of this typhoon is shown in Figure 7

Wayne developed as a tropical depression about 510 nautical miles west of Guam on 22 July. It moved northwestwards at about 14 knots at first and intensified rapidly into a severe tropical storm the following day. It became a typhoon in the evening of 23 July when it was about 430 nautical miles eastnortheast of Manila. The eye of the typhoon was well-developed on 24 July. The main cloud mass was almost circular with a diameter of about 220 nautical miles. Convection was most active within the southern half of the typhoon's circulation. At 7.25 a.m. on 24 July, a reconnaissance aircraft reported sustained winds of 130 knots and a sea-level pressure of 921 millibars near the centre. Wayne accelerated and moved west-northwestwards at 18 knots towards Bashi Channel. At 2.00 p.m. on 24 July, the M.V. 'Nedlloyd Franklin' reported surface winds of 36 knots about 90 nautical miles south of the centre. Wayne changed its course to northwest later in the afternoon. Satellite pictures taken on 25 July showed that the main cloud mass had decreased in size to about 150 nautical miles in diameter. However, there was still extensive convective activity over the Philippines and the South China Sea (Figure 8). At 11.00 a.m. on 25 July, Wayne passed about 60 nautical miles southwest of Penghu Dao, where surface winds of 38 knots were reported. Wayne continued to head towards the China coast at about 15 knots and around 5.00 p.m., Wayne landed about 30 nautical miles southwest of Xiamen, where surface winds of 38 knots and a sea-level pressure of 997.4 millibars were recorded. Wayne weakened rapidly during the night and dissipated about 230 nautical miles northwest of Xiamen early on 26 July. The thunderstorms and heavy rain associated with Wayne caused severe flooding in Fujian and Guangdong. According to press reports, a total of 105 people were killed and 440 were injured, and about 30 000 houses collapsed.

In Hong Kong, the Stand By Signal, No. 1, was hoisted at 9.50 p.m. on 24 July, when Wayne was about 400 nautical miles east-southeast of Hong Kong. Winds were moderate westerly. All signals were lowered at 4.10 p.m. on 25 July when Wayne was about to land near Xiamen. The lowest sea-level pressure at the Royal Observatory was 1 002.6 millibars recorded at 7.00 p.m. when Wayne began to weaken after crossing the coast. Wayne was closest to Hong Kong around 10.00 p.m. on 25 July when it was centred about 220 nautical miles to the northeast. Southwesterly winds were fresh during the night but they abated on 26 July. The maximum mean hourly wind speeds, the maximum gust peak speeds and the associated wind directions recorded at some selected locations during the passage of Typhoon Wayne were as follows:

Location	*Maximum mean hourly wind speed in knots with direction in points*		*Maximum gust peak speed in knots with direction in points*	
Royal Observatory	SSW	11	SSW	24
Hong Kong Airport (SE)	W	15	WSW	25
Hong Kong Airport (NW)	W	7	W	17
Waglan Island	SW	23	W	30
Tate's Cairn	SW	19	SSW	32
Cheung Chau	SSW	16	SSW	28
King's Park	W	10	W	19
Star Ferry	SSW	14	SSW	24
Green Island	SW	12	W	19
Tsim Bei Tsui	SSW	6	WSW	17
Tai O	S	18	S	26
Castle Peak	WSW	10	WSW	20
Chek Lap Kok	SSW	14	SSW	24
Lei Yue Mun	W	16	W	23
Yau Yat Chuen	WSW	9	WSW	19
Kowloon Tsai Hill	W	13	W	23

Apart from some isolated showers, the weather was sunny and hot on 24 July. It became cloudy with sunny intervals on 25 July. Some showers occurred on 26 July. During the morning of 27 July thunderstorms and heavy showers affected Hong Kong, particularly in Sai Kung and Kwun Tong. There were also isolated thunderstorms on 28 July. The weather became fine again on 29 July although there were a few isolated showers. The daily amounts of rainfall recorded were as follows:

	Royal Observatory	*Cheung Chau*	*Tate's Cairn*
24 July	0.2 mm	Nil	Nil
25 July	Nil	Nil	Nil
26 July	4.7 mm	1.3 mm	3.8 mm
27 July	38.2 mm	46.9 mm	96.8 mm
28 July	13.4 mm	39.1 mm	10.5 mm
29 July	6.5 mm	Nil	2.8 mm
Total:	63.0 mm	87.3 mm	113.9 mm

The times and heights of the highest tides and maximum storm surges recorded at various locations in Hong Kong during the passage of Wayne were as follows:

Location	Highest tide above chart datum			Maximum storm surge above astronomical tide		
	Height	Date	Time	Height	Date	Time
	(m)			(m)		
North Point	2.18	25 July	8.15 a.m.	0.14	24 July	12.45 p.m.
Tai Po Kau	2.04	24 July	8.00 a.m.	0.47	24 July	12.00 noon
Chi Ma Wan* (Lantau Island)	—	—	—	—	—	—

* Data not available.

There were no reports of damage in Hong Kong.

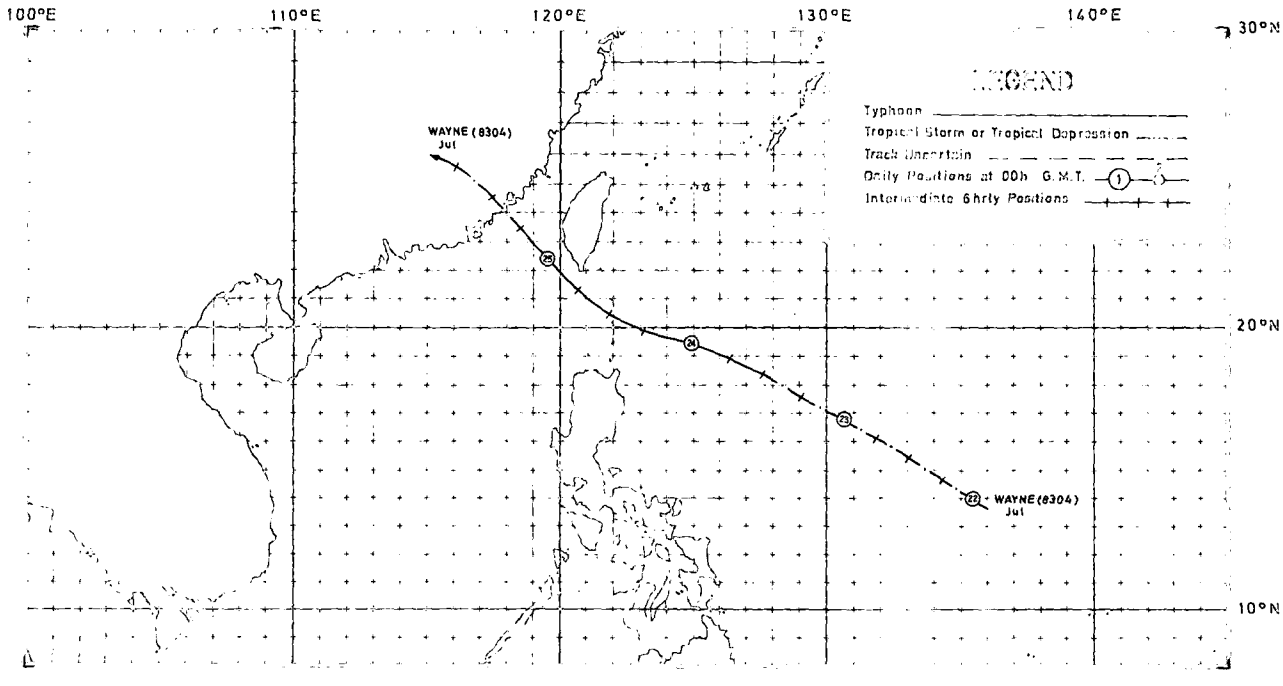


Figure 7. Track of Typhoon Wayne (8304): 22–26 July.

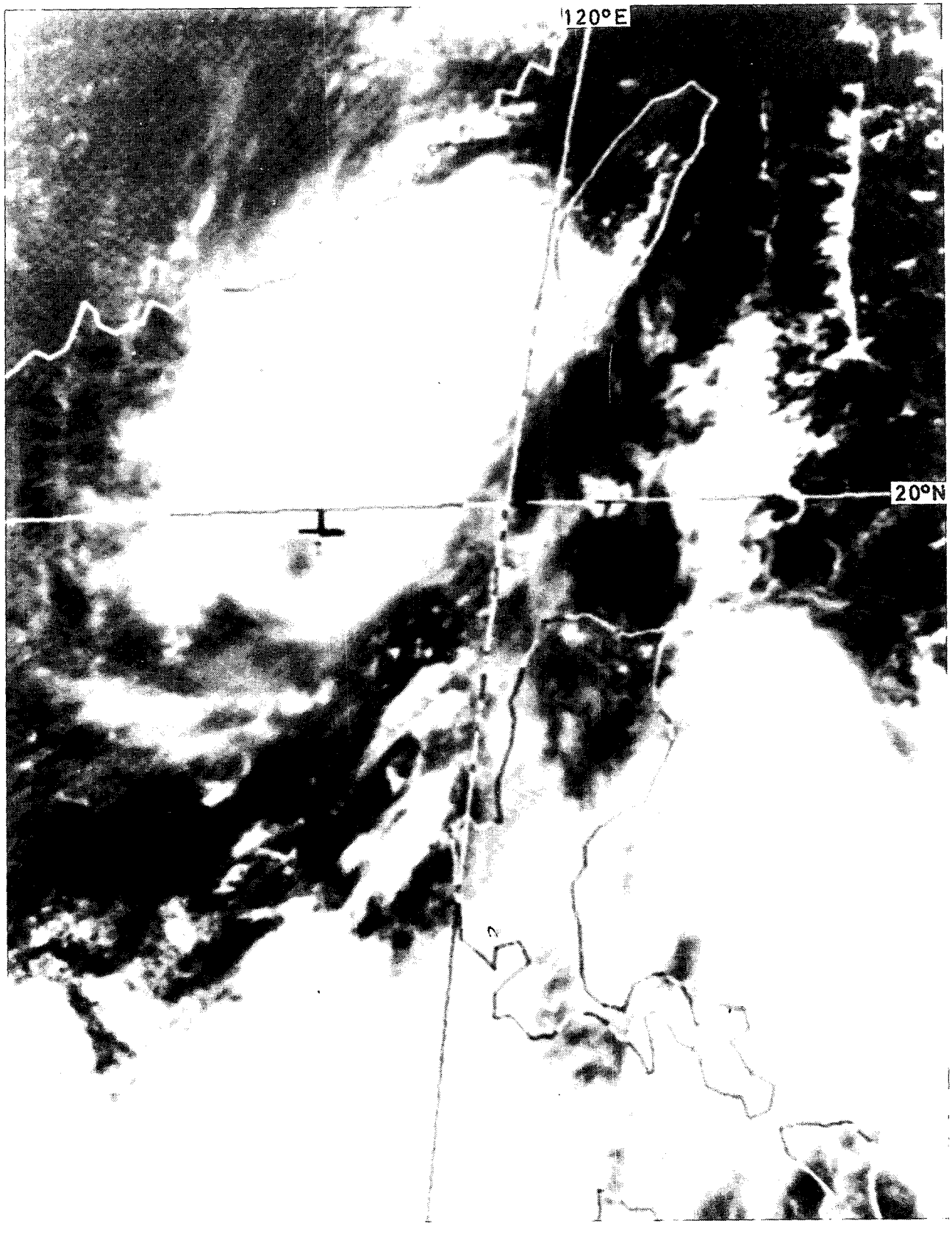


Figure 8. GMS-2 visible imagery of Typhoon Wayne (8304) taken around 11.00 a.m. on 25 July 1983.

(d) Typhoon Ellen (8309)

29 August–9 September 1983

The track of this typhoon is shown in Figures 9 and 10

Typhoon Ellen was the worst typhoon to strike Hong Kong since Typhoon Hope in 1979. It passed about 7 nautical miles southwest of Fan Lau, the southwestern tip of Lantau Island. 10 people were killed and 12 were missing. The Hurricane Signal, No. 10, was hoisted for a duration of 8 hours, which was the same as during Typhoon Wanda in 1962. Hurricane force winds lasted for 5 hours at Cheung Chau. This was a longer duration than in Typhoon Wanda in 1962, Typhoon Hope in 1979 or Typhoon Rose in 1971 as a result of Ellen's track and its relatively slow movement. The highest gust over Hong Kong, 134 knots, was recorded at Stanley. A maximum gust of 128 knots was recorded at Cheung Chau, which was the highest gust there since 1953. At Waglan Island, the maximum gust of 122 knots was the highest since Typhoon Ruby of 1964.

Typhoon Ellen originated as a tropical depression near the Marshall Islands over the Pacific on 29 August. It moved westwards and intensified into a typhoon on 4 September about 520 nautical miles east of Manila. Ellen continued to intensify and its eye became discernible on satellite pictures as it travelled northwestwards at 12 knots towards the Balintang Channel. Ellen attained its maximum intensity during the morning on 6 September (Figure 11a). At 7.43 a.m. a reconnaissance aircraft reported a minimum sea-level pressure of 928 millibars and a maximum sustained surface wind of about 110 knots near the centre about 270 nautical miles northeast of Manila. 21 Taiwanese fishermen were drowned when their boats capsized in waters off the Philippines. Ellen weakened as it crossed the Balintang Channel at 10 knots in a west-northwest direction. It passed about 20 nautical miles off the northern coast of Luzon and entered the South China Sea in the morning of 7 September (Figure 11b). At 7.49 a.m. a reconnaissance aircraft reported a minimum pressure of 966 millibars and a maximum sustained surface wind of 70 knots. It moved west-northwestwards towards Dongsha at 8 knots and both satellite pictures and aircraft reconnaissance reports showed that it reintensified slightly. At 7.15 p.m. on 7 September, a reconnaissance aircraft reported a minimum sea-level pressure of 959 millibars near the centre. Ellen passed about 15 nautical miles southwest of Dongsha at about 9.00 a.m. on 8 September (Figure 11c). Two fishing junks from Hong Kong capsized and three others went aground while they were taking shelter there. 46 people were saved but 5 were missing. 10 fishing junks from Taiwan also took shelter near Dongsha Qundao and were either sunk or driven aground. 100 fishermen were saved but 41 were missing. In the afternoon of 8 September, an eye was again observed on the satellite picture (Figure 11d). Ellen continued west-northwestwards at 8 knots approaching the south China coast. At 11.00 p.m. on 8 September, the M.V. 'Frankfurt Express' reported a surface wind of 52 knots about 80 nautical miles northeast of the centre. A Taiwanese junk capsized about 120 nautical miles south of Hong Kong during the night. One fisherman was saved but 6 were missing. Satellite pictures taken during the night of 8 September are shown in Figure 12.

Ellen passed to the south of Hong Kong moving in a northwest direction. It came closest to Hong Kong around 7.00 a.m. on 9 September (Figure 12d) with its centre about 7 nautical miles off Fan Lau, the southwestern tip of Lantau Island. The minimum pressure and maximum sustained surface wind near the centre were estimated to be 960 millibars and 85 knots respectively. The eye of Ellen was over Macau from about 8.20 a.m. to 8.45 a.m. when winds there dropped to about 15 knots for 25 minutes. Maximum surface winds of 52 knots and a minimum sea-level pressure of 970 millibars were recorded at Macau. 16 people were killed and about 50 sampans and junks capsized. Ellen then moved north-northwest into Guangdong causing tremendous damage to eight counties in the province. A total of 16 people were killed, 92 injured and 16 were missing in Zhuhai, Shenzhen and Panyu. In Zhuhai, 180 houses were completely destroyed and almost 1 000 hectares of crops damaged. One person was killed. 6 boats were wrecked near the town and thousands of telephone and telegraph poles were brought down. 5 people were killed in Shenzhen and 3 in Panyu. 7 Chinese navy sailors were killed during rescue operations in the Zhu Jiang estuary. At 4.00 p.m. on 9 September, the centre of Ellen passed about 10 nautical miles west of Guangzhou, where a sea-level pressure of 993.5 millibars was recorded. At 4.10 p.m. the water level of Zhu Jiang near Guangzhou rose to 2.42 metres, the highest since 1942. In Dongguan county, 100 hectares of crops were inundated and more than 32 000 people were marooned as a result of extensive flooding. As Ellen moved further inland it weakened into a tropical storm and dissipated rapidly during the night.

In Hong Kong the Stand By Signal, No. 1, was hoisted at 5.00 a.m. on 7 September when Ellen was about 420 nautical miles east-southeast of Hong Kong. Winds in Hong Kong were light and mainly from the east. Winds became northerly the next morning. The Strong Wind Signal, No. 3, was hoisted at 7.45 a.m. and the wind became fresh to strong during the afternoon. The Northeasterly Gale or Storm Signal, No. 8 NE, was hoisted at 4.45 p.m. By 9.00 p.m., winds over Hong Kong were generally strong from the north to northeast and gale was reported at Waglan Island. Between midnight and 1.00 a.m., the hourly mean wind speed at Waglan Island increased rapidly from 59 knots to 76 knots. The Increasing Gale or Storm Signal, No. 9, was hoisted at 1.00 a.m. on 9 September. The Hurricane Signal, No. 10, was hoisted at 2.00 a.m. As Ellen passed to the south of Hong Kong moving in a northwest direction, Waglan Island was the first to experience hurricane force winds. Between 4.00 and 5.00 a.m. Waglan Island reported its maximum hourly mean wind, 86 knots from the southeast. Between 6.00 a.m. and 7.00 a.m. Cheung Chau reported its maximum hourly mean wind of 90 knots and the maximum gust of 128 knots

from the south-southeast. Hurricane force winds continued to affect Hong Kong for the next few hours. Winds dropped below hurricane force at Cheung Chau around 10.00 a.m. and the No. 10 Signal was replaced by the Southeasterly Gale or Storm Signal, No. 8 SE. Winds veered from southeast to southwest as Ellen moved further away on a northwesterly track. At 2.00 p.m., the No. 8 SE Signal was replaced by the Southwesterly Gale or Storm Signal, No. 8 SW Signal. The No. 8 SW Signal was replaced by the No. 3 Signal at 5.37 p.m. when gales subsided. Winds remained gusty fresh to strong for most of the night and all signals were lowered at 9.20 p.m. on 9 September.

The minimum values of mean sea-level pressure recorded at various stations were as follows:

Station	*Minimum mean sea-level pressure in millibars*
Cheung Chau	972.7
Waglan Island	976.7
Tate's Cairn	980.0
Royal Observatory	983.1
Hong Kong Airport	987.4

The maximum hourly mean wind speeds and maximum gust peak speeds together with associated wind directions recorded at some selected locations during the display of signals were as follows:

Location	*Maximum mean hourly wind speed in knots with direction in points*		*Maximum gust peak speed in knots with direction in points*	
Royal Observatory	ENE & E	46	E	100
* Hong Kong Airport (SE)	E	57	E	110
* Hong Kong Airport (NW)	SE	57	E	93
* Waglan Island	SE	86	E	122
* Tate's Cairn	E	68	ENE	118
* Cheung Chau	SE & SSE	90	SSE	128
King's Park	E	52	ESE	90
Star Ferry	E	54	ESE	93
Green Island	S	74	S	119†
* Tsim Bei Tsui	SSE	61	SSE	97
Tai O	E	61	E	119†
* Castle Peak	SSE	48	SSE	92
Chek Lap Kok	Not available		Not available	
Lei Yue Mun	ENE	68	E	100
Yau Yat Chuen	SE	49	SE	88
Kowloon Tsai Hill	ESE	56	E	109
Kwai Chung	SE	60	SE	91
Stanley	SE	87	ESE	134

† estimated, exceeding upper limit of anemogram.

(Stations marked with an asterisk were equipped with Dines pressure-tube anemographs and wind speeds should be adjusted to compensate for variations in air density for investigations requiring high precision)

Barograms and anemograms of Typhoon Ellen recorded at various meteorological stations in Hong Kong during the period 8–9 September are reproduced in Figures 14 and 15.

The weather was fine and hot in Hong Kong on 7 September. It became cloudy with scattered showers and squally thunderstorms during the morning on 8 September when the outer rainbands of Ellen began to affect the territory. The rain became more frequent as Ellen approached Hong Kong during the night. The radar showed a circular eye and intense echoes in the southern quadrant of the typhoon (Figure 13). The rain was heaviest just after dawn on 9 September. A tornado was reported at Shek Wu Wai San Tsuen, San Tin, around 1.15 p.m. The effects of the tornado were felt at ground level for a few seconds. Several wooden huts were destroyed but no one was injured. This was the second tornado known to cause some damage in Hong Kong. It was also the first tornado reported during the passage of a typhoon in Hong Kong. It remained overcast with rain for most of 9 September. The weather improved the next day. There were scattered showers but also sunny periods. The daily amounts of rainfall recorded were as follows:

	Royal Observatory	*Cheung Chau*	*Tate's Cairn*
7 September	Nil	2.1 mm	0.2 mm
8 September	57.8 mm	46.5 mm	34.4 mm
9 September	172.4 mm	79.6 mm	86.7 mm
10 September	1.6 mm	Nil	2.5 mm
Total:	231.8 mm	128.2 mm	123.8 mm

The times and heights of the highest tides and maximum storm surges recorded at various locations in Hong Kong during the passage of Ellen were as follows:

Location	Highest tide above chart datum			Maximum storm surge above astronomical tide		
	Height	Date	Time	Height	Date	Time
	(m)			(m)		
Chi Ma Wan	3.06	9 Sep.	7.00 a.m.	1.80	9 Sep.	5.30 a.m.
Tai Po Kau	3.06	9 Sep.	7.30 a.m.	1.74	9 Sep.	2.00 a.m.
Tsim Bei Tsui	3.62	9 Sep.	10.30 a.m.	1.22	9 Sep.	10.00 a.m.
Lok On Pai	3.20	9 Sep.	10.30 a.m.	0.75	9 Sep.	10.30 a.m.

On this occasion, it was fortunate that the maximum storm surges occurred at times when the normal tide levels were relatively low. The highest tide levels were therefore not as high as they would have been had the maximum surges occurred at the times of normal high tides.

Typhoon Ellen brought about a death toll of 10 with 12 people missing and 333 people injured. (The incidents involving the 'Osprey', a 56-metre pleasure yacht, and fishing boats near Dongsha are included). 274 huts collapsed and about 1 600 people were made homeless. At the height of the typhoon, 44 ocean-going vessels were in serious difficulties. 26 ships totalling 250 000 tonnes ran aground, mainly in north Lantao and the Kau Yi Chau area. A couple of the ships listed badly and 23 others were involved in a total of 15 collisions. The stern of the 9 500-tonne Singapore freighter, 'Golden Fortune', one of 5 ships which went aground at Kau Yi Chau, was partly awash. The 9 300-tonne Taiwanese vessel 'Hua Lien' smashed the Mobil Oil Co.'s berth on Tsing Yi Island. About 100 metres of the jetty, pipeline, supporting piles and mooring dolphins were completely destroyed. The 6 000-tonne Cypriot cargo ship, 'City of Lobito', came close to slamming into a modern beachside apartment complex on Tung Wan, Cheung Chau. The 5 300-tonne 'Pacific Coral' was stranded on a shallow bank off northern Lantao and listed heavily. The 1 000-tonne container ship, 'Zim Manila II', crunched high on the rocks at Hei Ling Chau. Ellen's toll on shipping in terms of numbers exceeded those of Typhoon Rose in 1971 and Typhoon Wanda in 1962. Rose claimed 34 shipping casualties and Wanda 36. But unlike the other two, Ellen caused no reported casualties among seamen. However, 2 fishermen were drowned and 1 was missing after a fishing boat went aground at Tai Long Wan on Lantao. 5 others were missing when their junks capsized at Dongsha Dao. The pleasure vessel 'Osprey' sank about 12 nautical miles south of Hong Kong. Only 1 crew member was saved near Wanshan Qundao about 60 natical miles south of Hong Kong. 2 bodies were found and 6 other crew members were missing. 135 small craft were sunk and 225 others were damaged. These included pleasure craft, fishing vessels, dwelling boats, etc. Of these, about 200 pleasure craft were sunk or damaged, mostly in Pak Sha Wan, Sai Kung, Aberdeen and Deep Water Bay.

Initial reports indicated that 1 500 hectares of crops and about 80 per cent of the territory's vegetables under cultivation were damaged by floods and winds. About 10 000 farmers were affected. About 100 000 chickens and 2 300 pigs were drowned in the flooding. The most seriously affected areas were Yuen Long and Kam Tin. 120 hectares of fish ponds were flooded, mostly in Tin Shui Wai, Kam Tin and Ngau Tam Mei. There was also tremendous destruction to mariculture craft in Sok Kwu Wan, Silver Mine Bay, Sha Tau Kok and Tap Mun. The total loss of crops and livestock amounted to HK$50 million.

Some 80 000 households in Kowloon and the New Territories suffered power failure when Ellen was closest to Hong Kong. Power went out on Lantao Island around 3.00 a.m. There were no major disruptions on Hong Kong Island. Some places in Kwun Tong, Sha Tin, Fanling, Sai Kung, Yuen Long and Lantau Island had no electricity supply for more than 4 days. Water supply was interrupted at several estates in Ha Kwai Chung because of the power failure at Lai Chi Kok Pumping Station. Water supply at Mei Foo Sun Chuen was also interrupted due to the failure of the estate's internal service pumps which were flooded.

There was a total of 150 reports of flooding and 250 reports of roads being blocked by fallen trees, collapsed scaffolding, sign-boards and other debris. Mei Foo Sun Chuen was flooded by sea water up to a maximum depth of about 2 metres in places. 12 000 trees in the urban area and another 2 000 in the New Territories were uprooted or broken. 1 092 traffic lights were damaged and 542 bollards smashed. Public transport came to a complete halt at the height of the typhoon. At the airport, there were 7 flight cancellations, 13 delayed departures and 9 diversions.

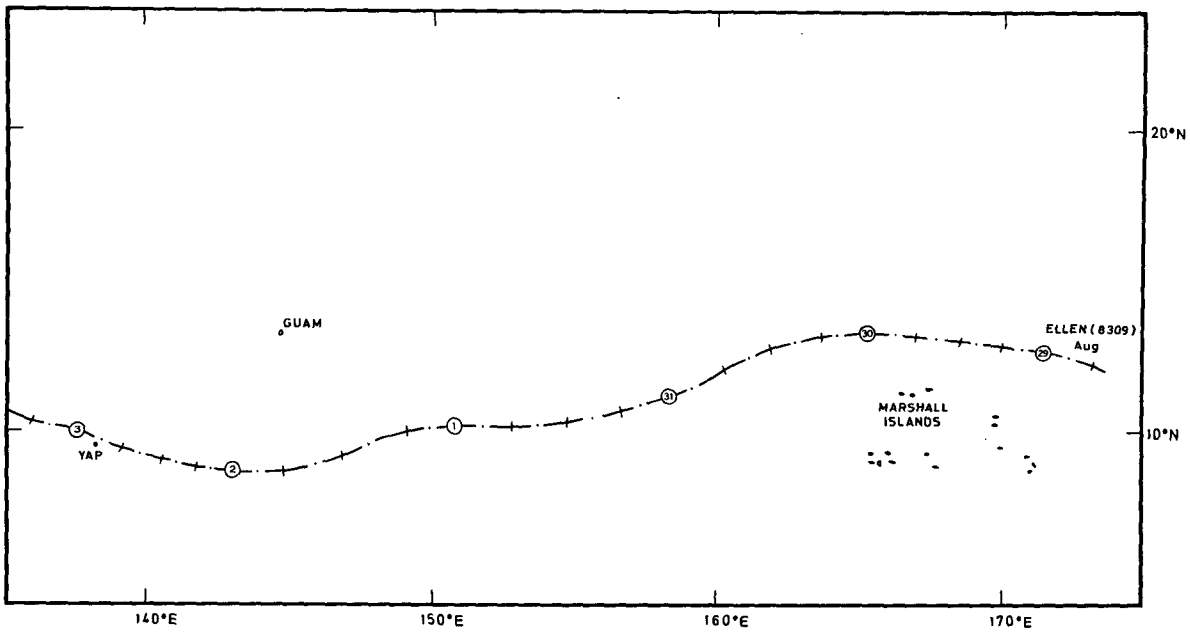
From a survey of loss adjusters and underwriters, insurance claims totalled about HK$300 million, including HK$180 million for wind and water damage to domestic, commercial and industrial premises, HK$90 million for damage on construction sites, HK$20 million for salvage and repairs to grounded ships and HK$10 million for pleasure boats destroyed or damaged.

The only relief was the water Ellen brought to the reservoirs—32 million cubic metres. High Island Reservoir was full for the first time since its completion in 1978, and of Hong Kong's 17 reservoirs, 11 were full.

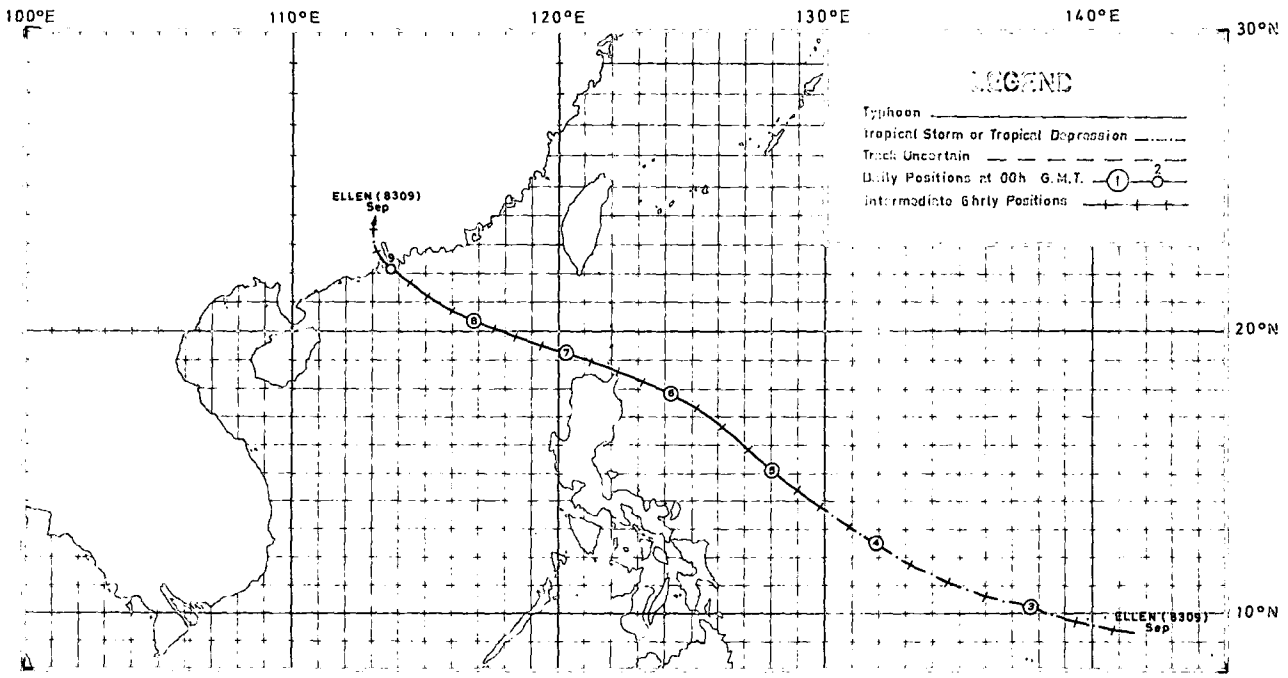
Some photographs showing damage and disruption caused by Typhoon Ellen are shown in Figures 16–30.

Comparison with a few major typhoons

		Maximum wind speeds in knots				Duration in hours of		Rainfall in mm	Storm surge in metres	
						Gales	Hurricane force winds			
Typhoons \ Stations		Royal Observatory	Hong Kong Airport	Waglan Island	Cheung Chau	Waglan Island		Royal Observatory	Tai Po Kau	Chi Ma Wan
Wanda	1962	72 (140)	58 (123)	80 (117)	64 (125)	14	1	262.8 (31 Aug–2 Sep)	3.2	—*
Rose	1971	55 (121)	66 (114)	76 (102)	71 (105)	15	3	340.9 (16–17 Aug)	1.0	1.2
Hope	1979	40 (94)	62 (98)	78 (107)	63 (100)	6	2	287.4 (2–4 Aug)	3.2	1.5
Ellen	1983	50 (100)	60 (110)	91 (122)	92 (128)	18	8	231.8 (8–10 Sep)	1.7	1.8
Remarks		Maximum 60-minute mean winds with maximum gust peak speed in brackets				Due to the exposure of the anemometer at Waglan Island, hourly mean winds of $\geqslant$ 39 and $\geqslant$ 68 knots are taken to be equivalent to gales and hurricane force winds near sea level respectively. (Ref: R.O. Tech. Note No. 45)		Rainfall directly attributable to the typhoon	* no records	



(I)



(II)

Figure 9. Track of Typhoon Ellen (8309): 29 August–9 September.

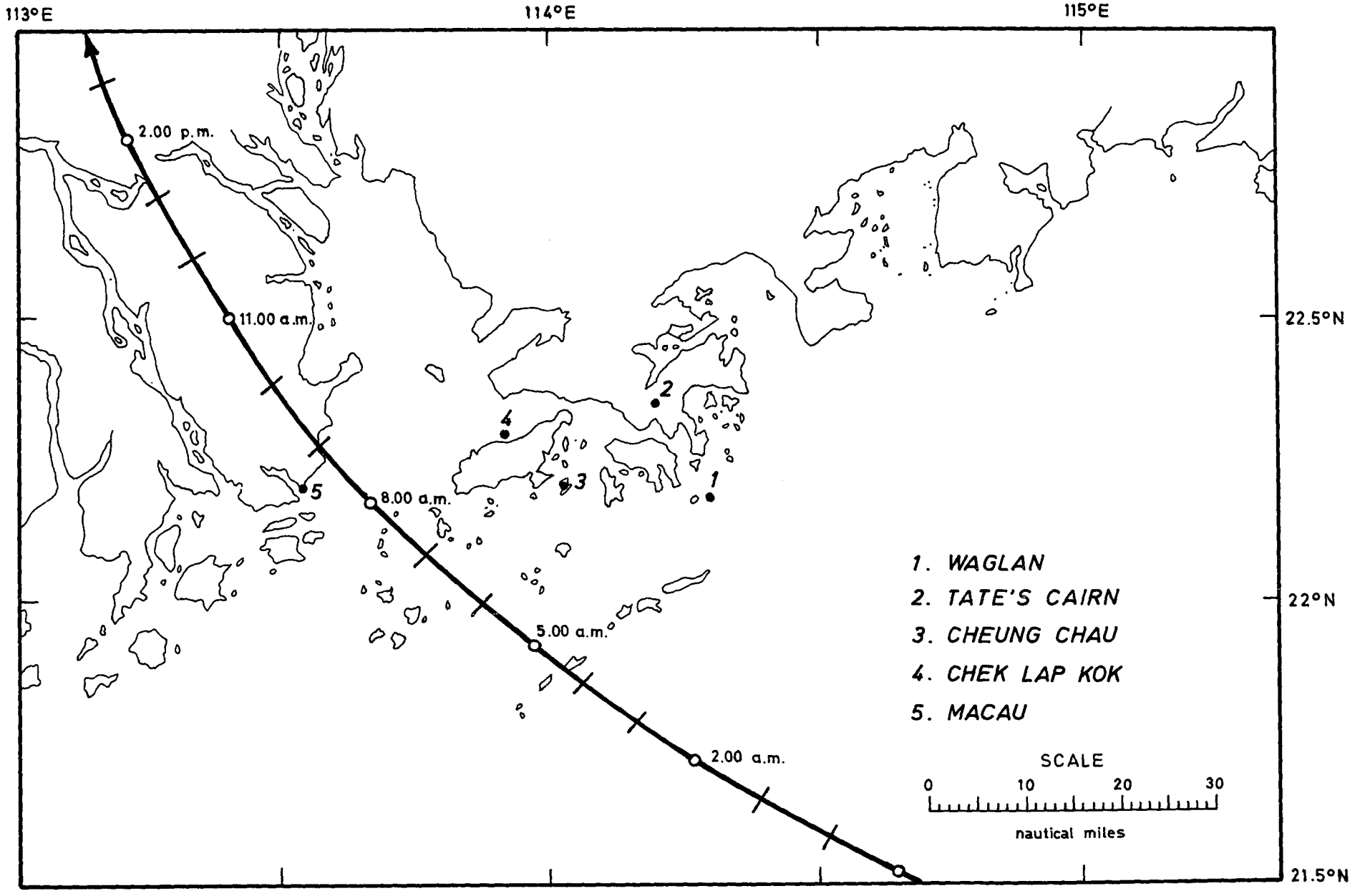
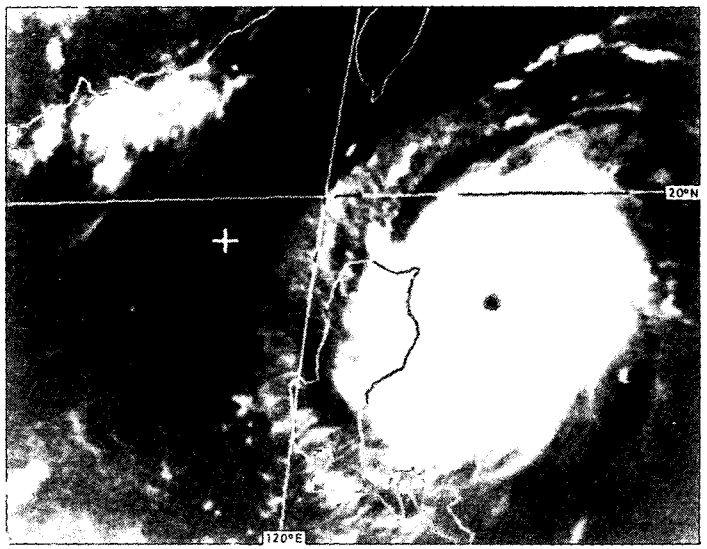
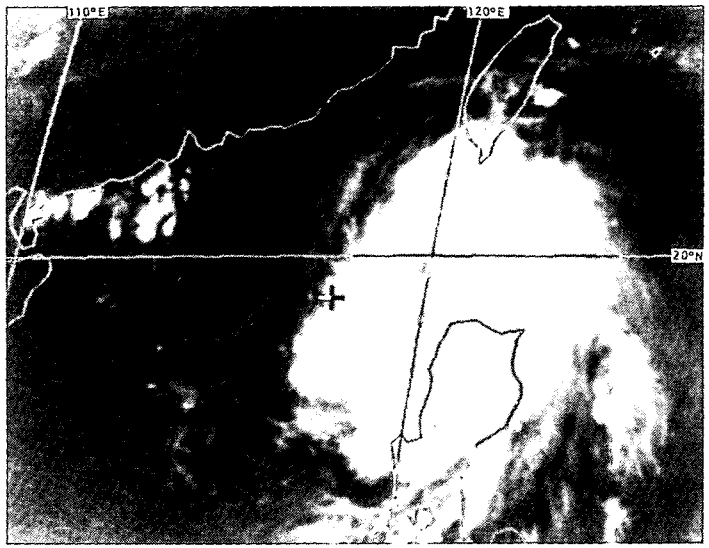


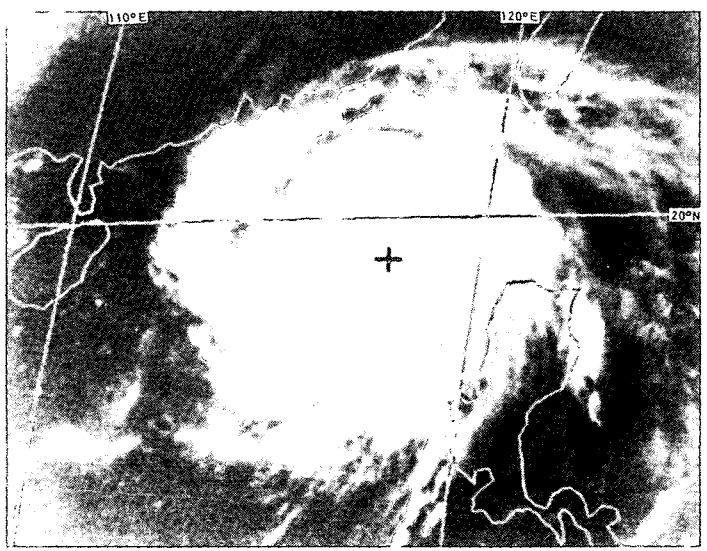
Figure 10. Trajectory of the centre of the eye of Typhoon Ellen near Hong Kong on 9 September 1983.



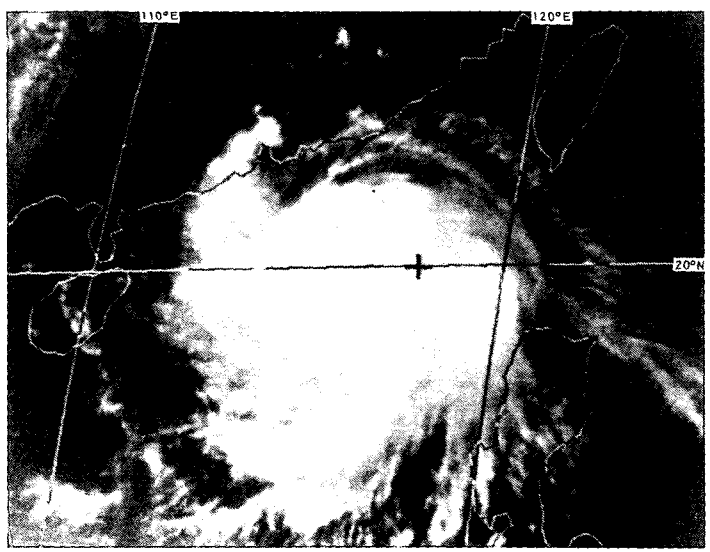
(a) 8.00 a.m. on 6 September 1983.



(b) 8.00 a.m. on 7 September 1983.

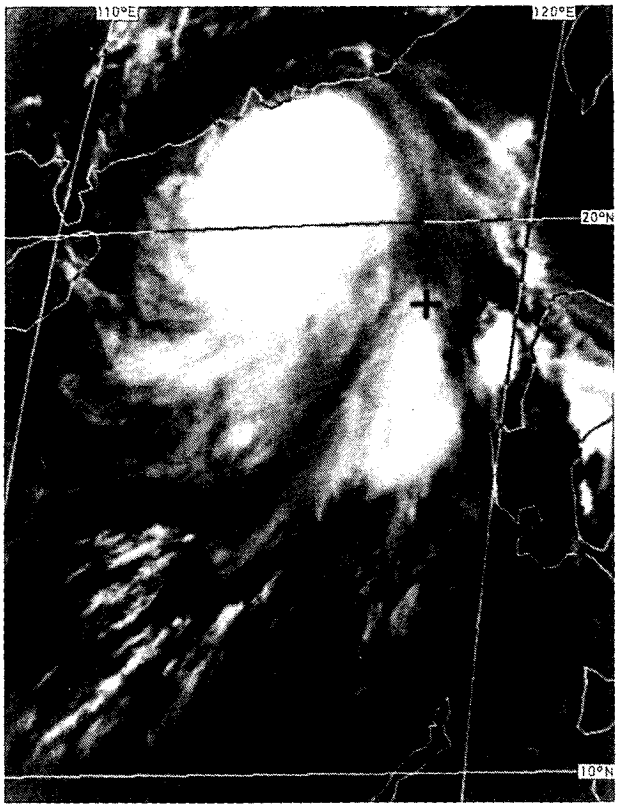


(c) 8.00 a.m. on 8 September 1983.

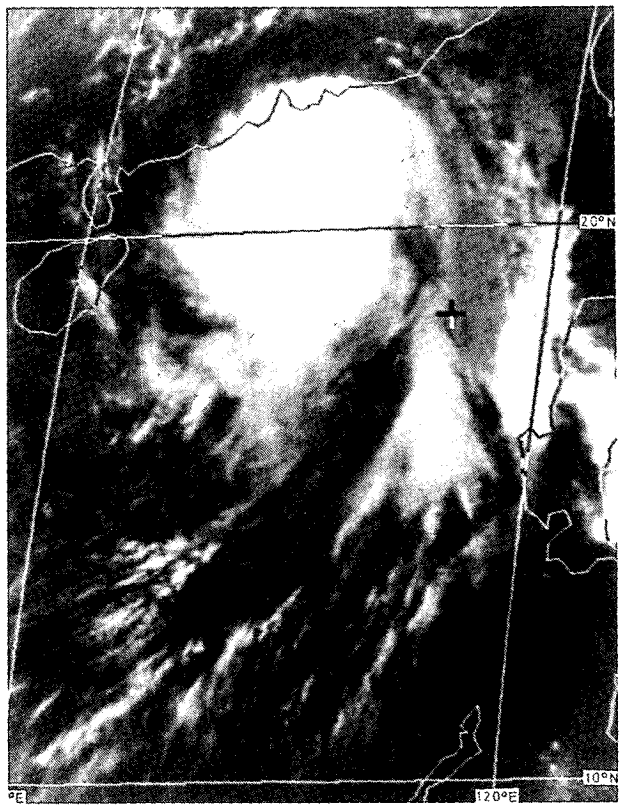


(d) 2.00 p.m. on 8 September 1983.

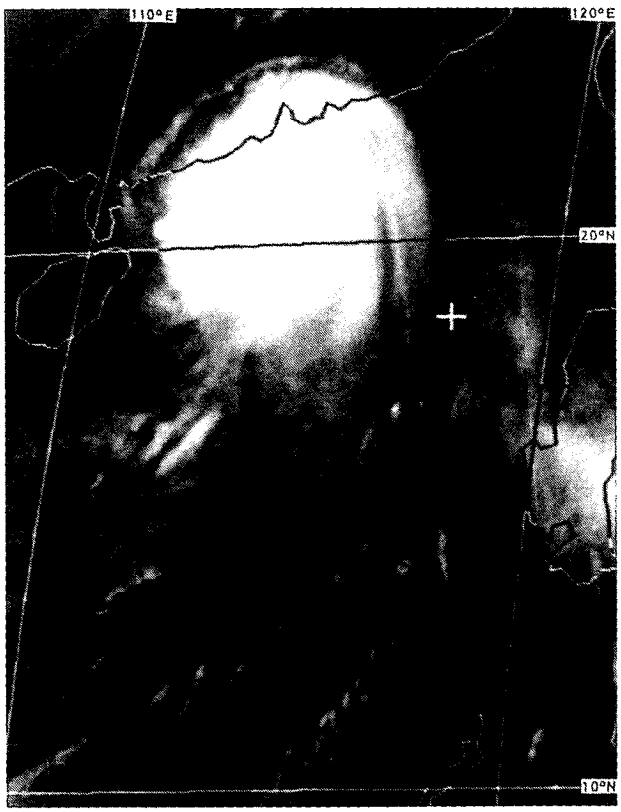
Figure 11. GMS-2 infra-red imagery of Typhoon Ellen (8309).



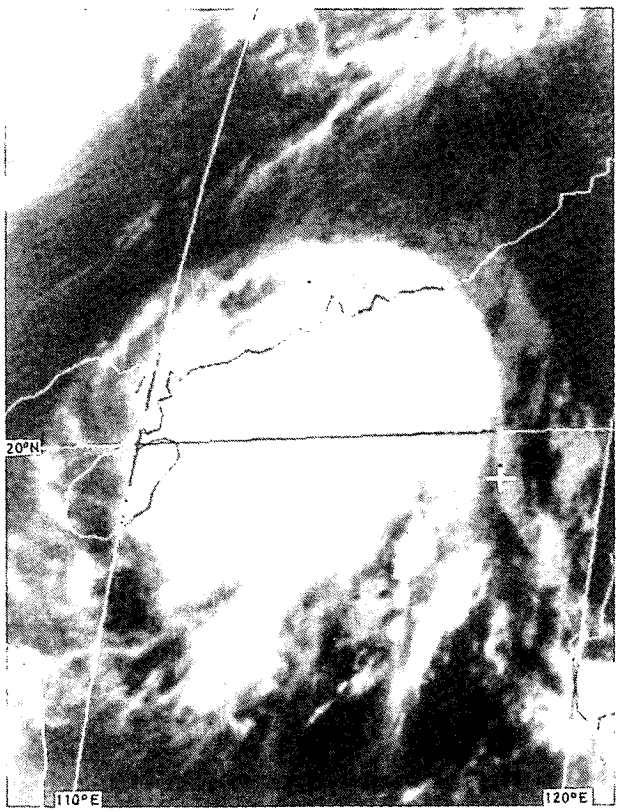
(a) 12.00 midnight on 8 September 1983.



(b) 2.00 a.m. on 9 September 1983.



(c) 5.00 a.m. on 9 September 1983.



(d) 8.00 a.m. on 9 September 1983.

Figure 12. GMS-2 infra-red imagery of Typhoon Ellen (8309).

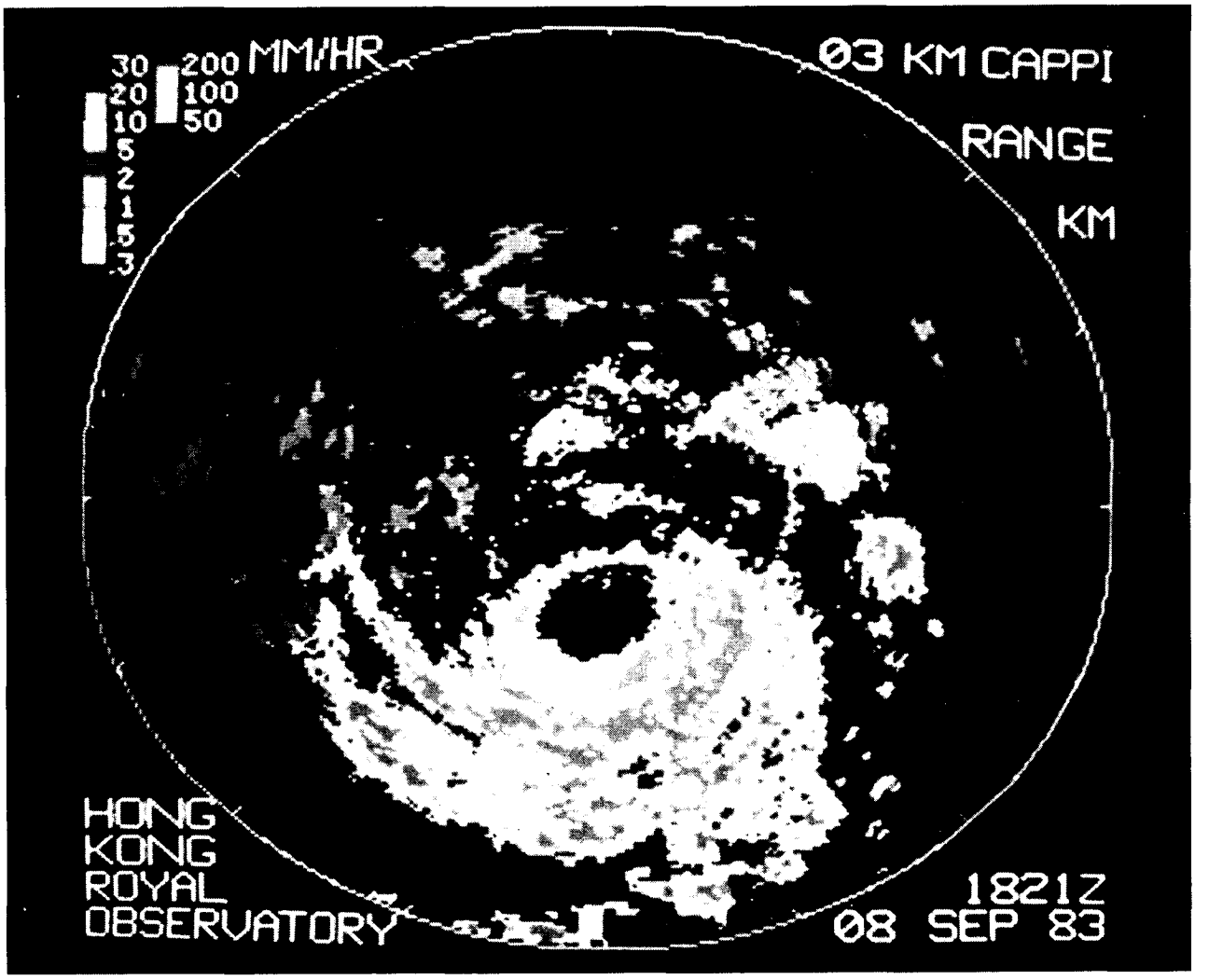


Figure 13. Radar display of Typhoon Ellen at 2.21 a.m. on 9 September 1983.

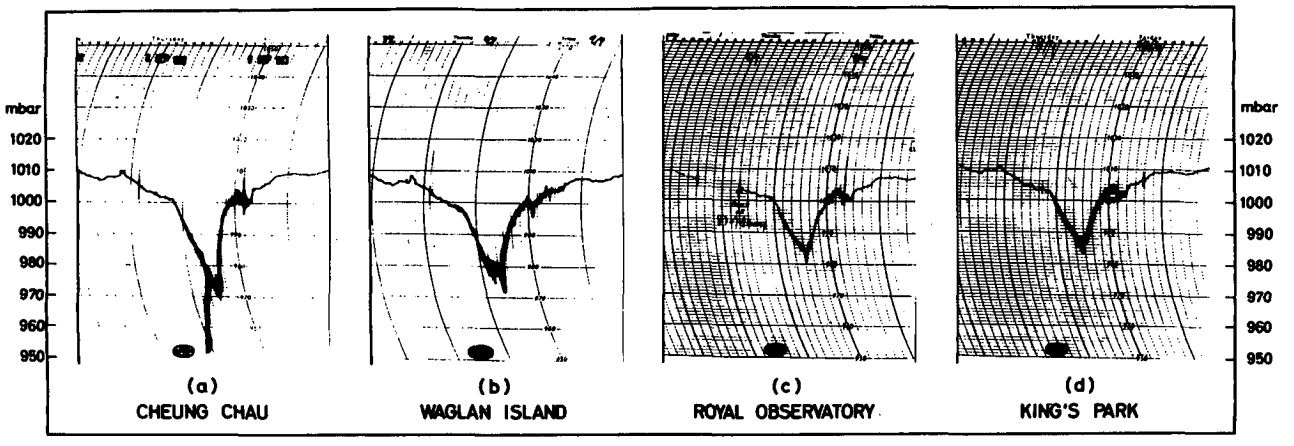
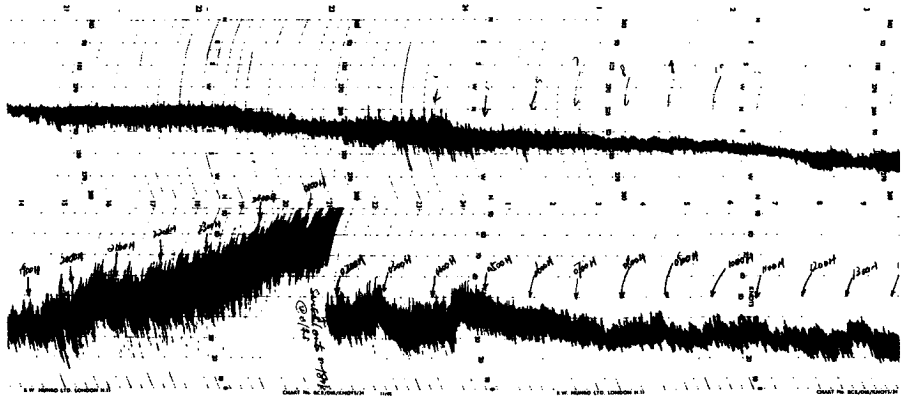
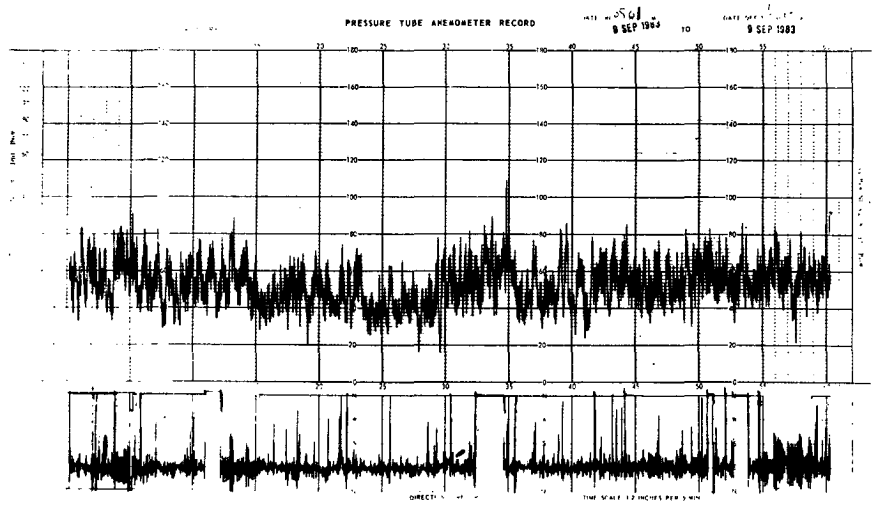


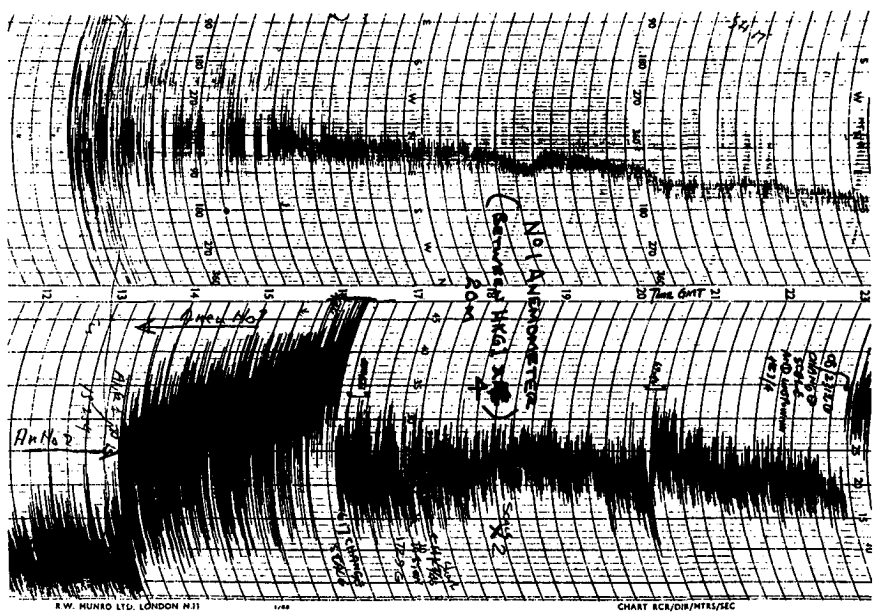
Figure 14. Barograms during the passage of Typhoon Ellen, 8–9 September 1983.



(a) Waglan Island.



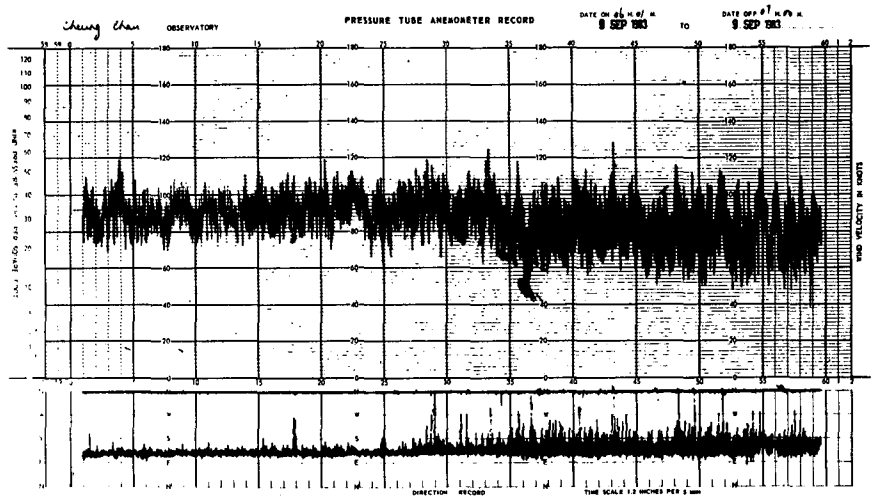
(b) Hong Kong Airport.



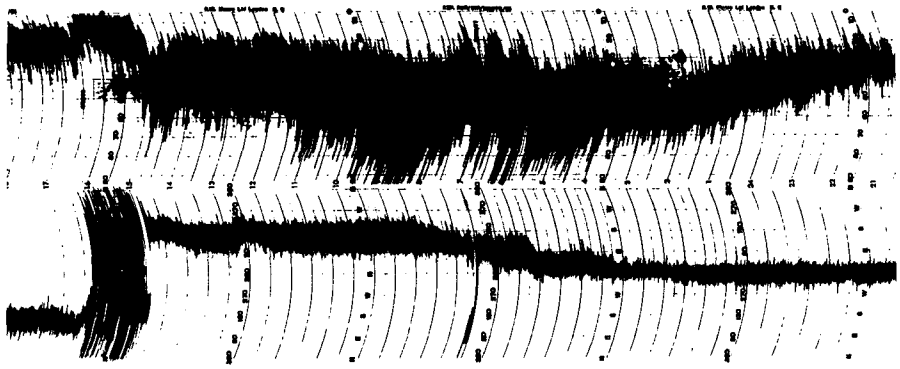
(c) Stanley Earth Station.

(By courtesy of Cable & Wireless Co. Ltd.)

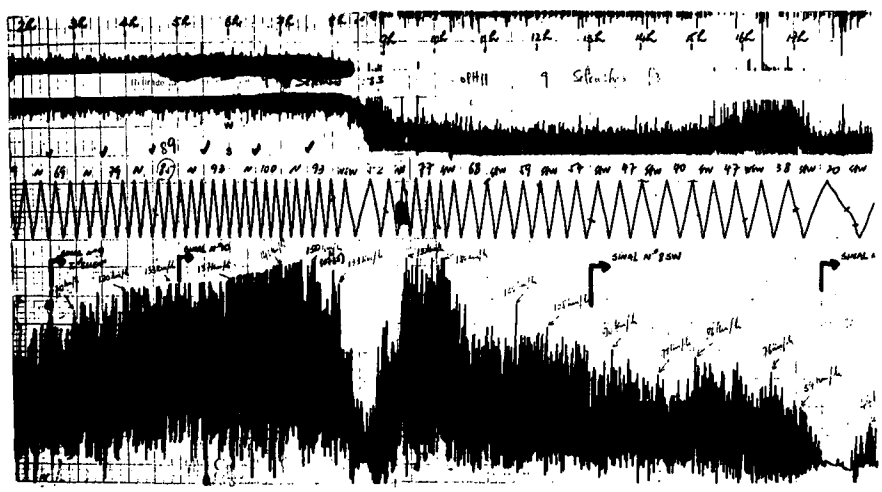
Figure 15. Anemograms during the passage of Typhoon Ellen, 8–9 September 1983.



(d) Cheung Chau.



(e) Tai O.



(f) Macau.

(By courtesy of Macau Meteorological Observatory)

Figure 15. Anemograms during the passage of Typhoon Ellen, 8–9 September 1983.

Figure 16. **The M.V. 'Golden Fortune' aground and partly submerged on Kau Yi Chau.**
(By courtesy of South China Morning Post)

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Figure 17. **The M.V. 'Hua Lien' damaged the Mobil Oil Company's berth on Tsing Yi Island.**
(By courtesy of Wah Kiu Yat Po)

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Figure 18. **The M.V. 'City of Lobito' aground on Tung Wan, Cheung Chau.**
(By courtesy of South China Morning Post)

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Figure 19. **The M.V. 'Oriental Empress' aground at Tap Shek Kok.**
(By courtesy of Ta Kung Pao)

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Figure 20. **The M.V. 'Yeh Yung' aground near Pillar Point, Castle Peak Bay.**
(By courtesy of Ta Kung Pao)

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Figure 21. **The M.V. 'Xin Feng' stranded off the east coast of Lantau.**
(By courtesy of South China Morning Post)

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Figure 22. **The M.V. 'Wing Cheong' (front) and 'Queen God' stranded on Little Green Island.**
(By courtesy of South China Morning Post)

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Figure 23. **A fishing junk sunk in Castle Peak Bay.**
(By courtesy of Ta Kung Pao)

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Figure 24. Wrecked and damaged pleasure boats in Aberdeen Typhoon Shelter.
(By courtesy of South China Morning Post)

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Figure 25. Huge waves at the Kennedy Town praya.
(By courtesy of South China Morning Post)

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Figure 26. **Mei Foo Sun Chuen flooded by sea water.**
(By courtesy of Ta Kung Pao)

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Figure 27. **Collapsed scaffolding in Nathan Road, Yau Ma Tei.**
(By courtesy of Ta Kung Pao)

Figure 28. **Containers blown down at Kwai Chung Container Terminal.**
(By courtesy of Wah Kiu Yat Po)

Figure 29. **A section of Kwai Chung Road was broken by huge waves.**
(By courtesy of Ta Kung Pao)

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Figure 30. An empty coach was thrown onto parked lorries on Ko Chiu Road, Yau Tong.
(By courtesy of South China Morning Post)

(e) Severe Tropical Storm Georgia (8311)

28 September–1 October 1983

The track of this severe tropical storm is shown in Figure 31

Georgia formed over the South China Sea about 420 nautical miles southeast of Hong Kong on 28 September. In moved northwestwards at about 10 knots and intensified into a tropical storm the following day. Georgia turned westwards in the morning of 29 September when it was about 180 nautical miles south of Hong Kong. It further intensified into a severe tropical storm during the evening of 29 September. At 8.00 p.m. the M.V. 'Mah II' reported sustained winds of 47 knots about 50 nautical miles southwest of the centre. Satellite pictures showed that the main cloud mass was about 100 nautical miles in diameter (Figure 32). The south China coastal areas were affected by rainbands extending from Georgia. Georgia slowed down to about 7 knots as it approached Hainan. On 30 September, Georgia crossed the northeastern part of Hainan with a speed of 11 knots. At 2.00 p.m Georgia passed about 10 nautical miles southwest of Haikou, where sustained winds of 34 knots, gusts reaching 78 knots and a minimum sea-level pressure of 982.1 millibars were recorded. Georgia weakened into a tropical storm on entering the Gulf of Tonkin. The tropical storm passed about 30 nautical miles south of Hanoi in the afternoon of 1 October and dissipated about 80 nautical miles west-southwest of Hanoi during the night.

In Hong Kong, the Stand By Signal, No. 1, was hoisted at 6.08 a.m. on 29 September, when Georgia was about 200 nautical miles to the south-southeast. Winds were moderate northeasterly in Hong Kong. Georgia was closest to Hong Kong around noon when it was about 170 nautical miles to the south. Winds strengthened off shore during the afternoon and the Strong Wind Signal, No. 3, was hoisted at 7.20 p.m. Winds gradually turned east-northeasterly during the night and became generally strong over Hong Kong early on 30 September. Winds were strongest around 5.00 a.m. when Georgia was about 240 nautical miles southwest of Hong Kong. Gales were reported at Waglan Island for a brief period. Gusts reaching 60 knots and 52 knots were recorded at Tate's Cairn and Waglan Island respectively. Winds in the harbour subsided slightly in the afternoon and all signals were lowered at 1.40 p.m. on 30 September. Monsoon winds became strong during the night of 30 September and the Strong Monsoon Signal was hoisted between 11.00 a.m. on 1 October and 10.05 a.m. on 2 October. The maximum hourly mean wind speeds and maximum gust peak speeds together with associated wind directions recorded at some selected locations during the display of signals were as follows:

Location	*Maximum mean hourly wind speed in knots with direction in points*		*Maximum gust peak speed in knots with direction in points*	
Royal Observatory	ENE	22	ENE	40
Hong Kong Airport (SE)	ENE	20	ENE	44
Hong Kong Airport (NW)	ENE	21	ENE	46
Waglan Island	E	40	E	52
Tate's Cairn	ENE	31	ENE	60
Cheung Chau	ENE & E	24	ENE & E	40
King's Park	ENE	16	ENE	36
Star Ferry	E	22	E	37
Green Island	E	32	E	53
Tsim Bei Tsui	ENE	15	ENE	22
Tai O	NE	24	ENE	46
Castle Peak	NNE	16	NNE	28
Lei Yue Mun	ENE	34	ENE	55
Yau Yat Chuen	E	26	E	46
Kowloon Tsai Hill	NE	28	NE	60

The lowest sea-level pressure at the Royal Observatory was 1 008.0 millibars recorded at 4.00 p.m. on 29 September and at 4.00 a.m. on 30 September.

The weather was fine and very hot on 28 September. Temperatures rose to a maximum of 33.9°C in the afternoon. Some showers set in during the evening and it rained almost continuously for the next two days. Heavy showers became more frequent on 30 September. The weather improved on 1 October, but it remained cloudy with some showers on 2 October. The daily amounts of rainfall recorded were as follows:

	Royal Observatory	*Cheung Chau*	*Tate's Cairn*
28 September	24.1 mm	17.0 mm	9.0 mm
29 September	27.6 mm	25.2 mm	20.7 mm
30 September	66.3 mm	31.6 mm	61.7 mm
1 October	1.0 mm	3.1 mm	0.7 mm
2 October	4.3 mm	Nil	Nil
Total:	123.3 mm	76.9 mm	92.1 mm

The times and heights of the highest tides and maximum storm surges recorded at various locations in Hong Kong during the passage of Georgia were as follows:

Location	Highest tide above chart datum			Maximum storm surge above astronomical tide		
	Height	Date	Time	Height	Date	Time
	(m)			(m)		
North Point	2.43	29 Sep.	11.15 p.m.	0.64	30 Sep.	3.15 p.m.
Tai Po Kau	2.58	30 Sep.	3.00 a.m.	0.66	29 Sep.	2.00 p.m.
Chi Ma Wan (Lantau Island)	2.74	30 Sep.	1.30 a.m.	0.69	29 Sep.	2.45 p.m.

Georgia caused minor disruption to traffic and affected a number of public examinations and community activities. Schools were closed on 30 September. The Kowloon-bound carriageway of Tuen Mun Highway between Sham Tseng and Chai Wan Kok was closed to traffic during the morning of 30 September following reports of soil movement at a slope in Pun Shan Tsuen in Tsuen Wan. There were no other reports or serious damage in Hong Kong.

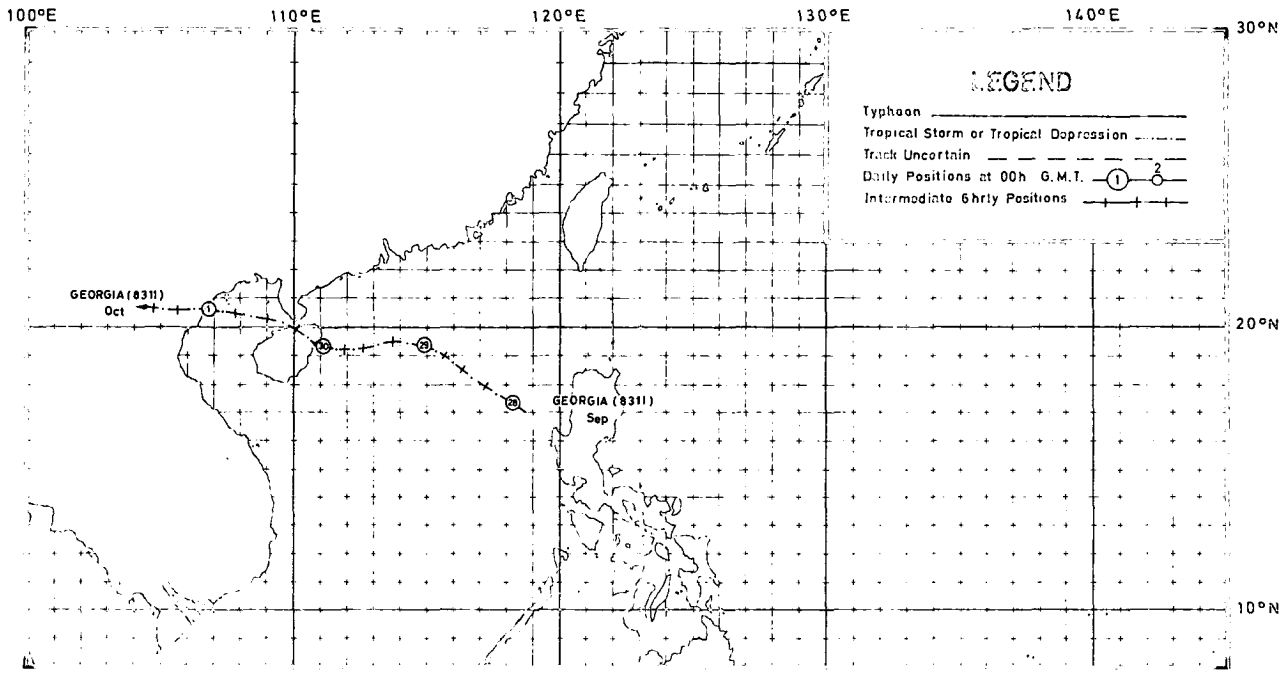

Figure 31. Track of Severe Tropical Storm Georgia (8311): 28 September–1 October.

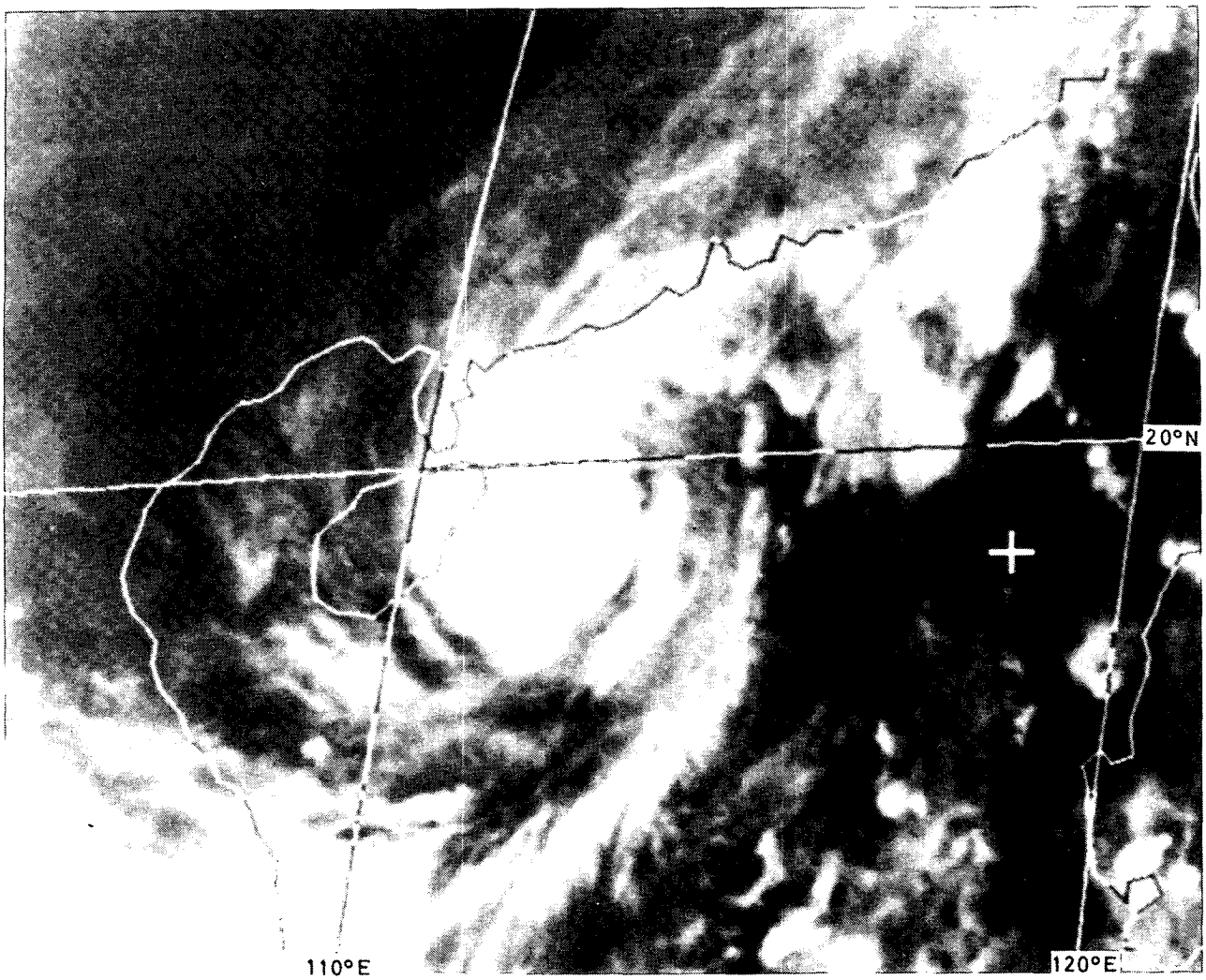

Figure 32. **GMS-2 infra-red imagery of Severe Tropical Storm Georgia (8311) taken around 8.00 p.m. on 29 September 1983.**

(f) Typhoon Joe (8314)

10–14 October 1983

The track of this typhoon is shown in Figure 33

Joe developed as a tropical depression about 460 nautical miles east of Manila on 10 October. It moved west-northwestwards and crossed Luzon the following day. Monsoon winds over the northern part of the South China Sea were enhanced by the presence of the tropical depression and sustained winds reaching 50 knots were reported by ships more than 120 nautical miles north of the centre. Joe intensified into a tropical storm early on 12 October and continued moving west-northwestwards at about 12 knots. Gales persisted during the morning of 12 October at Dongsha Dao, about 220 nautical miles north of the centre. Joe slowed down to 9 knots and turned northwestwards in the afternoon. It intensified into a severe tropical storm about 240 nautical miles south of Hong Kong. At 5.05 p.m. a reconnaissance aircraft reported maximum sustained surface winds of 57 knots and a minimum sea-level pressure of 988 millibars near the centre. Joe took a north-northwestward track during the night of 12 October and intensified into a typhoon in the morning of 13 October. The eye of Joe appeared on satellite pictures taken at 11.00 a.m. (Figure 34) and these pictures showed that Joe had a main cloud mass of about 130 nautical miles in diameter with spiral rainbands to its north affecting coastal regions around Hong Kong. Joe turned northwestwards in the afternoon when it was about 110 nautical miles south-southwest of Hong Kong. The typhoon was most intense during the afternoon of 13 October when maximum sustained winds near the centre were estimated to be about 70 knots. At 8.00 p.m. Typhoon Joe passed about 20 nautical miles south of Shangchuan Dao, where sustained winds of 62 knots and a sea-level pressure of 986.4 millibars were recorded. Around 11.00 p.m. Joe crossed the China coast about 20 nautical miles east of Yangjiang where sustained winds of 34 knots and a sea-level pressure of 988.4 millibars were recorded. The typhoon weakened rapidly overnight and dissipated about 100 nautical miles northwest of Yangjiang in the morning of 14 October. Heavy rain affected south China coastal areas from Shantou to Zhanjiang. Paddy fields and sugar canes were severely damaged. Yangjiang and Taishan counties were the worst hit. Power supplies and telecommunications were interrupted. Embankments were broken and many trees blown down.

In Hong Kong, the Stand By Signal, No. 1, was hoisted at 10.40 p.m. on 11 October, when Joe was about 400 nautical miles to the southeast. Winds were moderate northerly. The Strong Wind Signal, No. 3, was hoisted at 4.15 p.m. on 12 October. Northerly winds freshened and became strong off shore during the night when they turned northeasterly. Winds were generally strong over Hong Kong in the morning of 13 October. The Gale or Storm Signal, No. 8 NE, was hoisted at 11.45 a.m. when the typhoon was about 130 nautical miles to the south-southwest. Winds turned easterly in the afternoon and gales were reported off shore. Gusts reaching 78 knots and 66 knots were reported at Tai O and Cheung Chau respectively. Inside the harbour, an hourly mean wind of 34 knots was recorded at Star Ferry Pier, Kowloon, and the highest gust was 54 knots. The Gale or Storm Signal, No. 8 SE, was hoisted at 5.45 p.m. on 13 October. Joe was closest to Hong Kong around 6.00 p.m. when it was centred about 100 nautical miles to the southwest. Gales persisted for a few more hours off shore. Winds turned southeasterly in the evening. As Joe moved further away, gales subsided and the Strong Wind Signal, No. 3, replaced the Gale Signal at 10.15 p.m. Southeasterly winds remained strong in the early hours of 14 October. The winds then moderated rapidly and all signals were lowered at 5.15 a.m. on 14 October when Joe was weakening about 150 nautical miles west of Hong Kong. The maximum hourly mean wind speeds and maximum gust peak speeds together with associated wind directions recorded at some selected locations during the display of signals were as follows:

Location	*Maximum mean hourly wind speed in knots with direction in points*		*Maximum gust peak speed in knots with direction in points*	
Royal Observatory	E	25	E	53
Hong Kong Airport (SE)	E	30	E	57
Hong Kong Airport (NW)	E	28	E	54
Waglan Island	E	45	E	62
Tate's Cairn	E	43	E	70
Cheung Chau	E	44	E	66
King's Park	ESE	29	ESE	53
Star Ferry	E	34	E	54
Green Island	ESE	40	ESE	66
Tsim Bei Tsui	ESE	28	ESE	52
Tai O	ESE	42	ESE	78
Castle Peak	E	16	E	43
Lei Yue Mun	E	44	E	62
Yau Yat Chuen	ESE	25	ESE	54
Kowloon Tsai Hill	E	32	ESE	57

The weather was fine and hot on 11 October. There was some rain during the afternoon of 12 October. Rain was almost continuous from 13 October until the morning of 14 October. Some heavy showers also occurred on 14 and 15 October. There were frequent slight showers on 15 October and early on 16 October. The weather became fine and sunny again during the day on 16 October. The daily amounts of rainfall recorded were as follows:

	Royal Observatory	*Cheung Chau*	*Tate's Cairn*
11 October	Nil	Nil	Nil
12 October	1.7 mm	2.7 mm	Trace
13 October	100.1 mm	68.4 mm	90.9 mm
14 October	53.8 mm	17.1 mm	70.2 mm
15 October	25.3 mm	13.2 mm	19.9 mm
16 October	1.7 mm	0.2 mm	2.9 mm
Total:	182.6 mm	101.6 mm	183.9 mm

The lowest sea-level pressure at the Royal Observatory was 1 002.1 millibars recorded at 3.00 p.m. on 13 October.

The times and heights of the highest tides and maximum storm surges recorded at various locations in Hong Kong during the passage of Joe were as follows:

Location	Highest tide above chart datum			Maximum storm surge above astronomical tide		
	Height	Date	Time	Height	Date	Time
	(m)			(m)		
Chi Ma Wan	2.70	13 Oct.	1.00 a.m.	0.69	13 Oct.	2.15 p.m.
North Point	2.66	13 Oct.	1.15 a.m.	0.62	13 Oct.	4.15 a.m.
Tai Po Kau	2.65	13 Oct.	1.30 a.m.	0.62	12 Oct.	2.00 p.m.

Hong Kong was spared major damage during the passage of Typhoon Joe. 58 people were injured, of whom 16 were hospitalized. 559 people sought refuge in 107 temporary shelters. Among those taking refuge were 130 students from the floating university, the S.S. Universe. There were reports of severe flooding in the central and western New Territories, seriously affecting Pat Heung and the area from Fanling to Sha Tau Kok. More than 60 hectares of vegetable and fish farms were inundated. Tai Kong Po area in Kam Tin was also severely flooded as the Kam Tin River overflowed. Several minor floods were reported near Che Kung Temple Road and Sha Tin Wai Tsuen in Sha Tin, Ting Kok Road in Tai Po and Castle Peak Road near San Tin.

There were a few reports of minor landslips and scaffolding collapsing. In Tsuen Wan, 11 families were evacuated from huts in Tso Kung Tam Village following a minor landslip. A Kowloon-bound section of the Tuen Mun Highway between Sham Tseng and Chai Wan Kok was closed in the afternoon of 13 October when minor mud movement was reported in a slope at Pun Shan Tsuen, Tsuen Wan.

Public transport gradually came to a halt late in the afternoon but the Mass Transit Railway and the Kowloon-Canton Railway maintained their services. Ferry services were suspended early in the afternoon. Two ocean-going vessels broke free of their moorings off Stonecutters Island. They were the 'Stephanos Nersopis' and the 'Hua Lien'. At the airport, 14 scheduled in-coming flights were diverted, 25 delayed and 7 cancelled. Of the scheduled out-going flights, 7 were cancelled and 24 delayed.

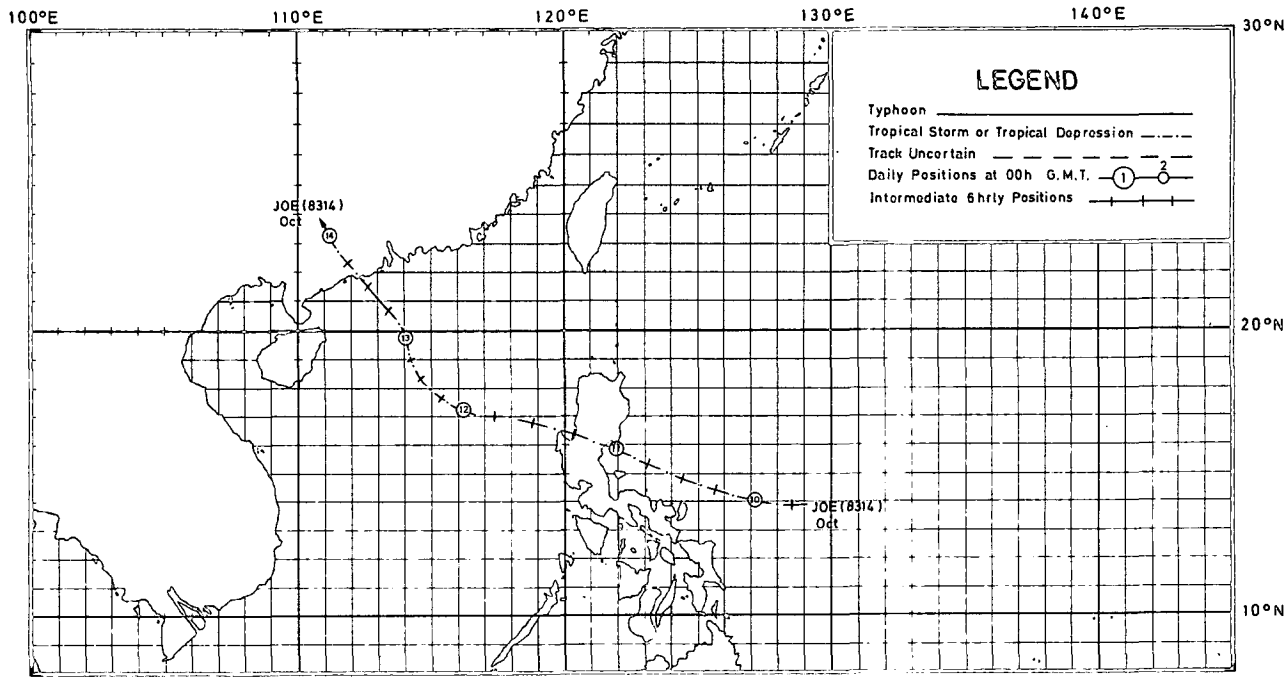

Figure 33. Track of Typhoon Joe (8314): 10–14 October.

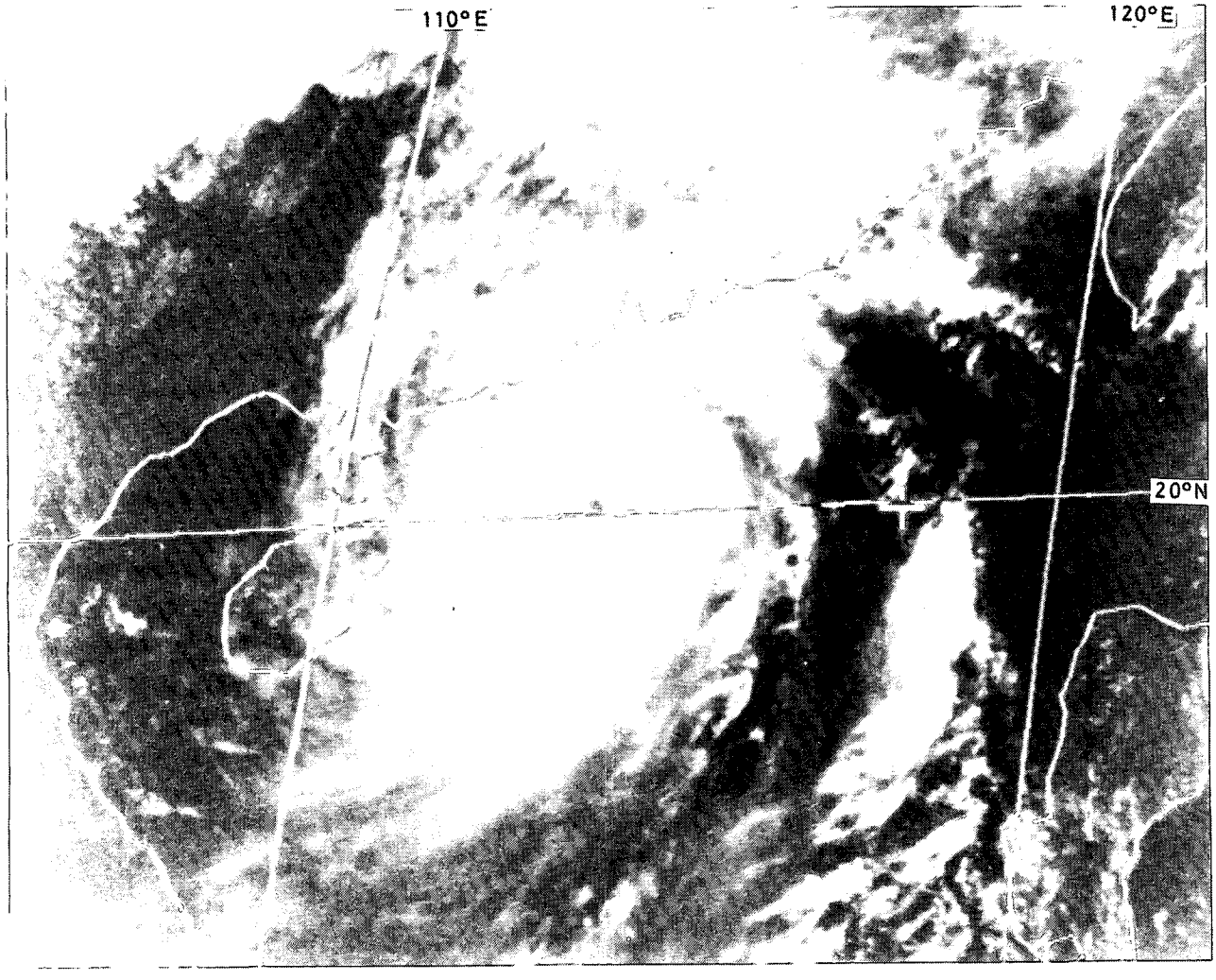

Figure 34. GMS-2 visible imagery of Typhoon Joe (8314) taken around 11.00 a.m. on 13 October 1983.

(g) Severe Tropical Storm Lex (8316)

20–26 October 1983

The track of this severe tropical storm is shown in Figure 35

Lex developed as a tropical depression about 440 nautical miles east of Manila on 20 October and crossed Luzon the following day. It intensified into a tropical storm over the South China Sea on 22 October while moving westwards at about 10 knots. Lex turned north-northwestward and slowed down to about 3 knots during the night of 22 October. It remained slow-moving on 23 October and intensified into a severe tropical storm about 250 nautical miles south of Hong Kong early on 24 October. The combined effect of the winter monsoon and the circulation of Lex caused gale-force winds over the northern part of the South China Sea as far as 300 nautical miles north of the centre. Lex drifted southwestwards during the morning of 24 October. However, it reverted to a westerly course in the afternoon and accelerated to about 8 knots that night. At 2.00 a.m. on 25 October, Lex passed about 15 nautical miles north of Xisha Dao, where a sea-level pressure of 987.0 millibars was recorded. At 8.00 a.m. Lex passed about 40 nautical miles north of Sanhu Dao, where sustained winds reached 56 knots. Satellite pictures indicated that Lex attained its highest intensity on 25 October when maximum sustained winds and minimum sea-level pressure near the centre were estimated to be about 60 knots and 980 millibars respectively. At 11.00 p.m. on 25 October, sustained winds of 46 knots and gusts reaching 72 knots were recorded at Yulin, about 50 nautical miles north of the centre. Lex passed about 35 nautical miles off the coast of southern Hainan during the night of 25 October (Figure 36). A 6 000-tonne oil-drilling ship, the 'Glomar Jave Sea', sank about 50 nautical miles southwest of Hainan. None of the 81 crew members were known to have survived. Lex crossed the Vietnam coast about 190 nautical miles south of Hanoi in the afternoon of 26 October. It dissipated overland later that night. According to press reports, about 300 Vietnamese junks sank during the passage of Lex. More than 200 fishermen were killed or missing. Thousands of hectares of rice and subsidiary crops were inundated.

In Hong Kong, the Stand By Signal, No. 1, was hoisted at 7.10 a.m. on 23 October when Lex was about 300 nautical miles to the south. Winds were moderate from the northeast but they turned east-northeasterly and strengthened off shore in the afternoon. The Strong Wind Signal, No. 3, was hoisted at 7.00 p.m. on 23 October when Lex was about 250 nautical miles to the south. Winds remained strong off shore overnight, but began to moderate in the morning of 24 October as Lex moved southwestwards. The Stand By Signal, No. 1, replaced the Strong Wind Signal at 6.15 a.m. on 24 October. However, winds were occasionally strong off shore partly due to the influence of the winter monsoon. All signals were lowered at 2.30 p.m. on 25 October when Lex was about 370 nautical miles southwest of Hong Kong. The maximum hourly mean winds and maximum gust peak speeds together with associated wind directions at selected stations during the display of signals were as follows:

Location	*Maximum mean hourly wind speed in knots with direction in points*		*Maximum gust peak speed in knots with direction in points*	
Royal Observatory	ENE	13	ENE	28
Hong Kong Airport (SE)	E	18	E	32
Hong Kong Airport (NW)	ENE	14	ENE	36
Waglan Island	E & ENE	37	E	48
Tate's Cairn	NE	27	NE	42
Cheung Chau	NNE & NE	16	NE	28
King's Park	E	11	E	31
Star Ferry	ENE	18	ENE	28
Tsim Bei Tsui	ENE & NE	16	ENE	22
Tai O	NNE	22	N	28
Castle Peak	NNE	13	NNE	28
Lei Yue Mun	E	25	E	41
Yau Yat Chuen	E	15	E	27
Kowloon Tsai Hill	ENE	16	ENE	32

The weather was cloudy with some showers in the afternoon of 23 October. It continued to be cloudy with periods of light rain on 24–26 October. The temperature dropped to a minimum of 21.0°C in the morning of 26 October. Cloudy conditions persisted on 27 October but the weather became fine and sunny on 28 October. The daily amounts of rainfall recorded were as follows:

	Royal Observatory	*Cheung Chau*	*Tate's Cairn*
23 October	6.2 mm	1.1 mm	12.4 mm
24 October	Trace	Trace	Nil
25 October	0.2 mm	0.5 mm	Nil
26 October	1.9 mm	2.1 mm	Nil
Total:	8.3 mm	3.7 mm	12.4 mm

Lex was closest to Hong Kong during the night of 23 October when it was about 250 nautical miles to the south. The lowest sea-level pressure at the Royal Observatory was 1 010.6 millibars recorded at 3.00 p.m. on 23 October.

The times and heights of the highest tides and maximum storm surges recorded at various locations in Hong Kong during the passage of Lex were as follows:

Location	Highest tide above chart datum			Maximum storm surge above astronomical tide		
	Height	Date	Time	Height	Date	Time
	(m)			(m)		
North Point	2.81	24 Oct.	10.30 p.m.	0.59	24 Oct.	11.45 p.m.
Tai Po Kau	2.87	24 Oct.	11.30 p.m.	0.87	24 Oct.	0.00 a.m.
Chi Ma Wan (Lantau Island)	2.85	24 Oct.	10.45 p.m.	0.64	25 Oct.	12.30 p.m.

Ferry services were slightly affected but there were no reports of serious damage in Hong Kong.

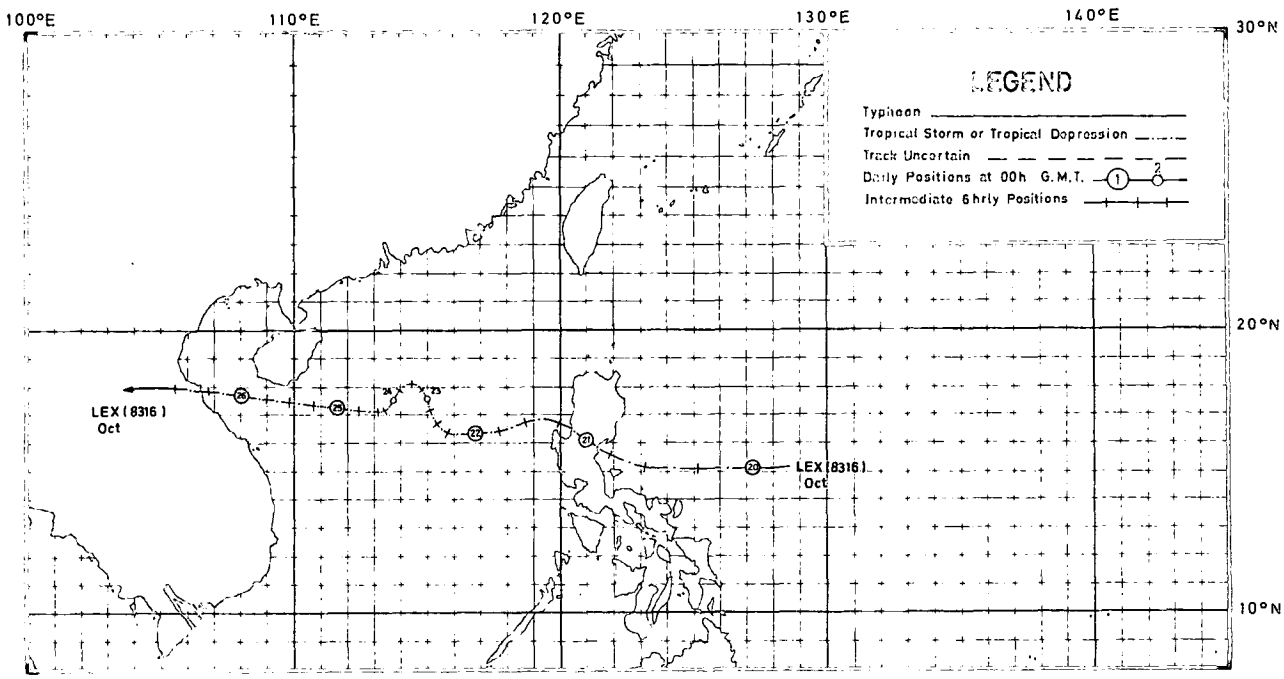

Figure 35. Track of Severe Tropical Storm Lex (8316): 20–26 October.

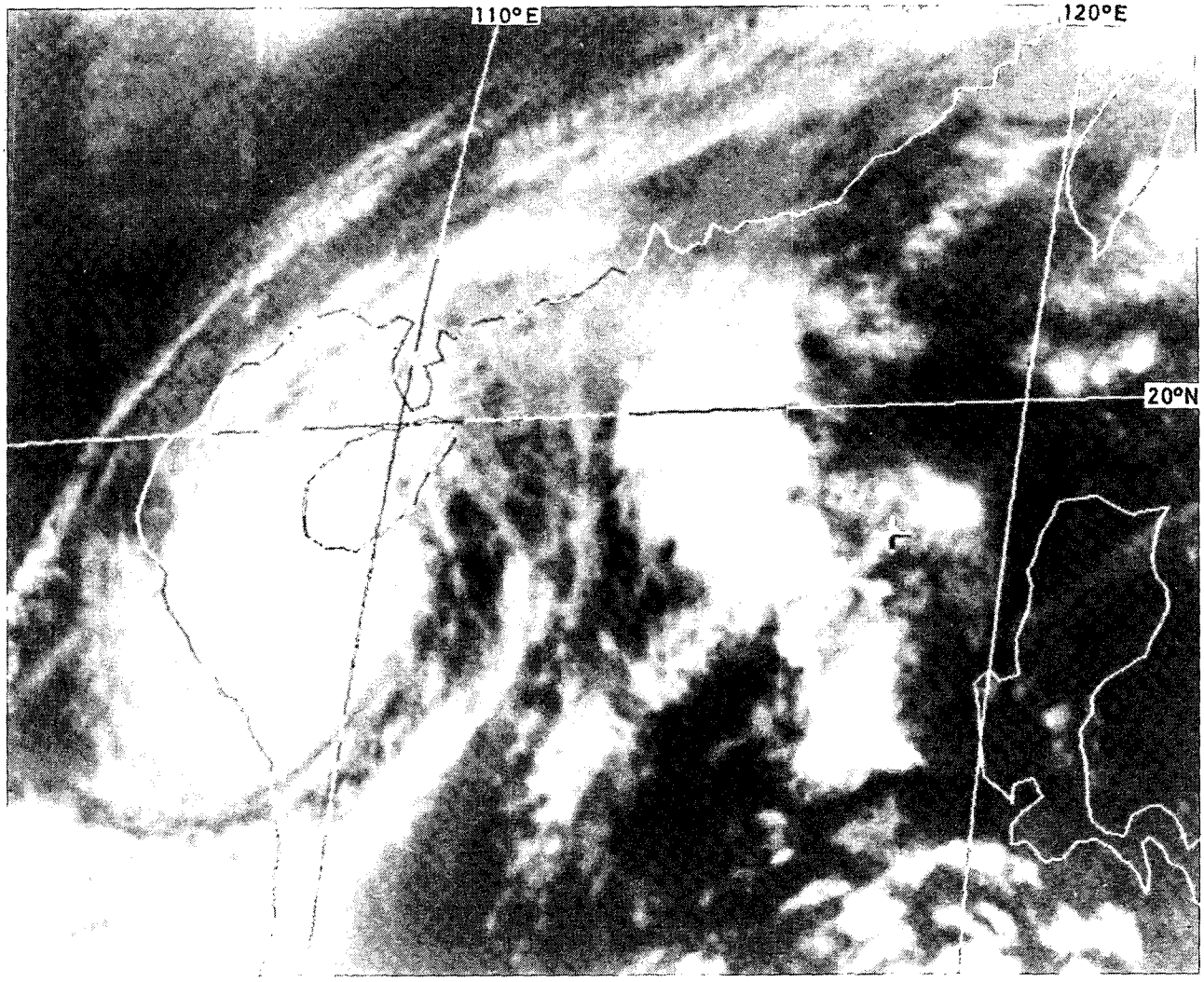

Figure 36. **GMS-2 infra-red imagery of Severe Tropical Storm Lex (8316) taken around 12.00 midnight on 25 October 1983.**

4. DESCRIPTION OF TABLES

TABLE 1 is a list of tropical cyclones in 1983 in the western North Pacific and the South China Sea (i.e. in the area bounded by the Equator, 45°N, 100°E and 160°E). The names of these tropical cyclones are those used by the U.S. Naval Oceanography Command Center/Joint Typhoon Warning Center, Guam. The four-digit numbers in parentheses are numbers assigned to each tropical cyclone of tropical storm intensity or above by the Japan Meteorological Agency. The dates cited cover the period during which the track of each tropical cyclone lay within the above-mentioned region and may not necessarily represent its full life-span. This limitation applies to all other elements in the table.

TABLE 2 gives the number of tropical cyclone warnings for shipping issued by the Royal Observatory, Hong Kong in 1983, the duration of these warnings and the time of issue of the first and last warnings for all tropical cyclones in Hong Kong's area of responsibility (i.e. the area bounded by 10°N, 30°N, 105°E and 125°E). Times are given in hours G.M.T.

TABLE 3 presents a summary of the occasions on which tropical cyclone warning signals were hoisted during 1983. The sequence of the signals displayed and the number of tropical cyclone warning bulletins issued for each tropical cyclone are also given. Times are given in hours and minutes in Hong Kong Time.

TABLE 4 presents a summary of the occasions on which tropical cyclone warning signals were hoisted between 1946 and 1983. Between 1946 and 1955 the Stand By Signal, No. 1, was also used to warn strong winds. A Strong Wind Signal was introduced in 1950 to warn the onset of strong winds which were not expected to reach gale force (the symbol used was a black ball). The figures in the column under the No. 3 Signal for the years between 1950 and 1955 refer to occasions for which Strong Wind Signals were hoisted due to tropical cyclones. The Strong Wind Signal, No. 3, (represented by the symbol ⊥) was introduced in 1956 and the Stand By Signal, No. 1, was redefined the same year. At the same time the black ball symbol was utilized to warn strong or gale monsoon winds and was named the Strong Monsoon Signal. With effect from 1 January 1973 the Gale or Storm Signals 5, 6, 7 and 8 were renumbered as 8 NW, 8 SW, 8 NE and 8 SE respectively.

TABLE 5 gives the annual number of tropical cyclones in Hong Kong's area of responsibility between 1946 and 1983. The annual number of tropical cyclones which caused tropical cyclone warning signals to be raised in Hong Kong is also included.

TABLE 6 shows the maximum, mean and minimum duration of display of each tropical cyclone warning signal during the period 1946–1983.

TABLE 7 presents the casualties and damage figures associated with tropical cyclones in Hong Kong for the period 1937–1983. The information is compiled from local newspaper reports and from the Marine Department's records.

TABLE 8 contains the particulars of ships sunk, damaged, grounded, etc., by various tropical cyclones in 1983. The information is compiled from local newspapers and from the Marine Department's records.

TABLE 9 presents the maximum storm surge (the excess, in metres, of the actual water level over that predicted in the Tide Tables) for each tropical cyclone affecting Hong Kong in 1983. Information on the nearest approach, the maximum winds at the Royal Observatory and Waglan Island, the minimum mean sea-level pressure and the total rainfall recorded at the Royal Observatory are also included together with an estimate of the minimum central pressure of each tropical cyclone during its closest approach.

TABLE 10 presents some meteorological information for those typhoons which required the hoisting of the Hurricane Signal, No. 10, in Hong Kong since 1946. The information presented includes the distances and the bearings of nearest approach, the minimum mean sea-level pressures recorded at the Royal Observatory and the maximum 60-minute mean winds and maximum gust peak speeds recorded at some selected stations in Hong Kong.

TABLE 1. LIST OF TROPICAL CYCLONES IN THE WESTERN NORTH PACIFIC AND THE SOUTH CHINA SEA IN 1983

Name of tropical cyclone		Beginning of track				First day circle	Last day circle	End of track				Remark
		Date	Time G.M.T.	Position °N	Position °E	Date	Date	Date	Time G.M.T.	Position °N	Position °E	
Tropical Storm Sarah	(8301)	24 Jun	0600	13.0	113.0	25	26	26 Jun	0600	17.1	106.9	dissipated
Severe Tropical Storm Tip	(8302)	10 Jul	0600	13.4	122.5	11	13	13 Jul	0600	20.3	111.1	dissipated
Typhoon Vera	(8303)	12 Jul	0000	11.1	132.3	12	18	18 Jul	1800	21.4	102.5	dissipated
Typhoon Wayne	(8304)	22 Jul	0000	13.8	135.2	22	25	25 Jul	1800	25.5	116.0	dissipated
Typhoon Abby	(8305)	4 Aug	1800	9.0	141.3	5	19	19 Aug	1800	37.2	145.2	became extratropical
Tropical Storm Ben	(8306)	12 Aug	0600	24.9	146.1	13	15	15 Aug	0600	34.4	137.1	dissipated
Tropical Storm Carmen	(8307)	12 Aug	0600	17.5	116.8	13	15	15 Aug	0000	21.1	128.2	dissipated
Tropical Storm Dom	(8308)	19 Aug	0000	15.9	134.2	19	26	26 Aug	0000	30.1	141.1	dissipated
Tropical Depression		25 Aug	0600	25.0	128.3	26	27	27 Aug	1800	36.5	127.0	dissipated
Typhoon Ellen	(8309)	28 Aug	1800	12.2	173.2	29	9	9 Sep	1200	23.5	113.0	dissipated
Typhoon Forrest	(8310)	20 Sep	0600	10.3	144.6	21	28	28 Sep	0600	33.6	133.1	became extratropical
Severe Tropical Storm Georgia	(8311)	28 Sep	0000	17.2	118.3	28	1	1 Oct	1200	20.6	105.0	dissipated
Tropical Depression		1 Oct	1200	14.8	114.0	2	3	3 Oct	1200	19.2	106.7	dissipated
Tropical Storm Herbert	(8312)	7 Oct	0600	11.5	113.0	8	9	9 Oct	0000	14.3	108.4	dissipated
Severe Tropical Storm Ida	(8313)	7 Oct	0600	17.7	142.6	8	11	11 Oct	0600	34.6	142.6	became extratropical
Typhoon Joe	(8314)	9 Oct	1800	13.7	128.4	10	14	14 Oct	0000	23.1	111.2	dissipated
Tropical Storm Kim	(8315)	16 Oct	0000	9.0	114.0	16	20	20 Oct	1200	20.2	93.2	dissipated
Severe Tropical Storm Lex	(8316)	20 Oct	0000	15.0	127.0	20	26	26 Oct	1200	18.0	105.5	dissipated
Typhoon Marge	(8317)	1 Nov	0000	11.5	143.1	1	7	7 Nov	1200	37.5	160.0	became extratropical
Tropical Storm Norris	(8318)	8 Nov	1200	18.0	153.0	9	10	10 Nov	1800	25.8	155.5	dissipated
Typhoon Orchid	(8319)	17 Nov	0600	10.3	135.4	18	26	26 Nov	0600	17.5	124.7	dissipated
Severe Tropical Storm Percy	(8320)	19 Nov	0000	9.4	113.1	19	24	24 Nov	1800	11.1	121.0	dissipated
Tropical Depression		21 Nov	0000	8.1	147.0	21	24	24 Nov	0000	8.4	138.4	dissipated
Severe Tropical Storm Ruth	(8321)	27 Nov	0600	16.3	129.7	28	30	30 Nov	1200	17.6	125.2	dissipated
Tropical Storm Sperry	(8322)	2 Dec	1200	16.3	133.6	3	5	5 Dec	0000	15.6	133.3	dissipated
Severe Tropical Storm Thelma	(8323)	15 Dec	0000	10.9	138.5	15	18	18 Dec	0600	17.6	139.9	dissipated

TABLE 2. TROPICAL CYCLONE WARNINGS FOR SHIPPING ISSUED IN 1983

Tropical cyclone	No. of warnings issued	Date and time+ of issue of		Duration of warnings (hours)
		First warning	Last warning	
Tropical Storm Sarah	18	24 Jun 0600	26 Jun 0900	51
Severe Tropical Storm Tip*	24	10 Jul 1200	13 Jul 0900	69
Typhoon Vera*	36	14 Jul 0300	18 Jul 1200	105
Typhoon Wayne*	14	24 Jul 0000	25 Jul 1500	39
Tropical Storm Carmen	19	12 Aug 1200	14 Aug 1800	54
Typhoon Ellen*	34	5 Sep 1800	9 Sep 2100	99
Typhoon Forrest	9	26 Sep 0300	27 Sep 0300	24
Severe Tropical Storm Georgia*	22	28 Sep 2100	1 Oct 1200	63
Tropical Depression	6	3 Oct 0300	3 Oct 1800	15
Tropical Storm Herbert	17	7 Oct 0300	9 Oct 0300	48
Typhoon Joe*	29	10 Oct 1500	14 Oct 0300	84
Tropical Storm Kim	4	16 Oct 2100	17 Oct 0600	9
Severe Tropical Storm Lex*	49	20 Oct 1500	26 Oct 1500	144
Typhoon Orchid	14	24 Nov 1800	26 Nov 0900	39
Total	295			843

* Tropical cyclones for which tropical cyclone warning signals were hoisted in Hong Kong

\+ Times are given in hours G.M.T.

TABLE 3. TROPICAL CYCLONE WARNING SIGNALS HOISTED IN HONG KONG AND NUMBER OF WARNING BULLETINS ISSUED IN 1983

SUMMARY

Signal	No. of Occasions	Total duration
1	8	161 h 27 min
3	7	92 h 53 min
8 NORTHWEST	-	-
8 SOUTHWEST	1	3 h 37 min
8 NORTHEAST	2	14 h 15 min
8 SOUTHEAST	2	8 h 30 min
9	1	1 h
10	1	8 h
Total	22	289 h 42 min

DETAILS

Tropical cyclone	No. of warning bulletins issued	Signal	Hoisted		Lowered	
			Date	Time*	Date	Time*
Severe Tropical Storm Tip	18	1	12 Jul	0600	13 Jul	1400
Typhoon Vera	19	1	16 Jul	0630	16 Jul	1600
		3	16 Jul	1600	17 Jul	1605
Typhoon Wayne	11	1	24 Jul	2150	25 Jul	1610
Typhoon Ellen	45	1	7 Sep	0500	8 Sep	0745
		3	8 Sep	0745	8 Sep	1645
		8 NE	8 Sep	1645	9 Sep	0100
		9	9 Sep	0100	9 Sep	0200
		10	9 Sep	0200	9 Sep	1000
		8 SE	9 Sep	1000	9 Sep	1400
		8 SW	9 Sep	1400	9 Sep	1737
		3	9 Sep	1737	9 Sep	2120
Severe Tropical Storm Georgia	17	1	29 Sep	0608	29 Sep	1920
		3	29 Sep	1920	30 Sep	1340
Typhoon Joe	34	1	11 Oct	2240	12 Oct	1615
		3	12 Oct	1615	13 Oct	1145
		8 NE	13 Oct	1145	13 Oct	1745
		8 SE	13 Oct	1745	13 Oct	2215
		3	13 Oct	2215	14 Oct	0515
Severe Tropical Storm Lex	30	1	23 Oct	0710	23 Oct	1900
		3	23 Oct	1900	24 Oct	0615
		1	24 Oct	0615	25 Oct	1430

* Hong Kong Time (G.M.T. + 8)

TABLE 4. FREQUENCY AND TOTAL DURATION OF DISPLAY OF TROPICAL CYCLONE WARNING SIGNALS : 1946-1983

Year \ Signals	1*	3*	8 NW+	8 SW+	8 NE+	8 SE+	9	10	Total	Total duration (hours)
1946	7	-	1	0	1	2	1	1	13	154.2
1947	6	-	1	0	1	0	0	0	8	124.2
1948	5	-	1	1	3	2	0	0	12	111.5
1949	4	-	0	0	1	1	1	0	7	67.1
1950	2	3	0	0	1	1	1	0	5	153.8
1951	4	3	0	0	2	3	1	0	10	182.8
1952	2	7	0	0	1	1	0	0	4	212.7
1953	2	4	1	1	2	1	1	0	8	251.2
1954	5	4	0	0	3	2	2	0	12	210.7
1955	0	3	0	0	0	0	0	0	0	100.8
1956	5	4	0	0	0	0	0	0	9	191.4
1957	4	9	1	1	2	2	0	1	20	295.8
1958	4	5	0	0	1	0	0	0	10	214.1
1959	1	1	0	0	0	0	0	0	2	36.6
1960	11	7	0	2	2	2	1	1	26	432.6
1961	6	7	1	2	1	0	1	1	19	192.9
1962	4	3	0	1	1	0	1	1	11	158.2
1963	4	5	0	0	1	0	0	0	10	175.8
1964	11	14	1	3	5	3	3	2	42	570.3
1965	7	6	0	0	1	1	0	0	15	239.7
1966	6	5	0	0	2	2	0	0	15	284.7
1967	8	6	0	0	2	1	0	0	17	339.2
1968	7	7	0	1	1	0	1	1	18	290.2
1969	4	2	0	0	0	0	0	0	6	110.3
1970	6	8	2	1	2	0	0	0	19	286.8
1971	9	10	1	3	2	2	1	1	29	323.4
1972	8	6	0	0	1	1	0	0	16	288.3
1973	8	6	1	1	1	0	1	0	18	416.8
1974	12	10	0	0	2	1	1	0	26	525.3
1975	8	6	1	0	0	1	1	1	18	292.3
1976	6	6	0	0	1	2	0	0	15	351.5
1977	8	6	0	0	1	0	0	0	15	395.2
1978	8	9	1	1	3	2	0	0	24	462.2
1979	5	5	1	0	2	2	1	1	17	281.3
1980	10	8	0	0	1	1	0	0	20	414.1
1981	5	4	0	0	1	1	0	0	11	202.3
1982	7	4	0	0	0	0	0	0	11	247.6
1983	8	7	0	1	2	2	1	1	22	289.7
Total △	190	176	14	19	53	39	20	12	560	9 877.0
Mean △	6.8	6.3	0.4	0.5	1.4	1.0	0.5	0.3	14.7	259.9

* Figures in the columns under Signals No. 1 and No. 3 have different meanings prior to 1956 and care is required in interpreting these figures. Reference may be made to paragraph 4 on page page 49

\+ Gale or Storm Signals, 5, 6, 7 and 8 were renumbered as 8 NW, 8 SW, 8 NE, 8 SE respectively with effect from 1 January 1973.

△ The total and annual mean values for the frequency of display of Stand By Signal No. 1 and the Strong Wind Signal No. 3 are calculated for the period 1956-1983. The corresponding values for higher signals and the total duration are calculated for the period 1946-1983.

TABLE 5. NUMBER OF TROPICAL CYCLONES IN HONG KONG'S AREA OF RESPONSIBILITY AND THE NUMBER THAT NECESSITATED THE DISPLAY OF TROPICAL CYCLONE WARNING SIGNALS IN HONG KONG : 1946 - 1983

Year	Number in Hong Kong's Area of responsibility	Number necessitating the display of signals in Hong Kong
1946	13	6
1947	21	6
1948	15	4
1949	17	4
1950	14	5
1951	13	7
1952	21	9
1953	19	6
1954	18	7
1955	14	3
1956	23	5
1957	12	6
1958	15	5
1959	18	2
1960	18	9
1961	24	6
1962	20	4
1963	13	4
1964	26	10
1965	16	6
1966	17	6
1967	17	8
1968	12	6
1969	11	4
1970	21	6
1971	20	9
1972	15	5
1973	17	9
1974	21	11
1975	12	7
1976	10	5
1977	10	8
1978	20	8
1979	18	6
1980	17	10
1981	15	5
1982	16	5
1983	15	7
Total	634	239
Mean	16.7	6.3

TABLE 6. DURATION OF DISPLAY OF TROPICAL CYCLONE WARNING SIGNALS IN HONG KONG : 1946 - 1983

Signal	Duration of each occasion			Duration per year		
	Mean	Maximum	Minimum	Mean	Maximum	Minimum
1*	20 h 30 min	124 h 40 min	1 h 20 min	139 h 05 min	273 h 15 min	12 h 40 min
3*	20 36	71 45	1 00	129 28	267 45	23 55
8 NW+	6 39	13 00	1 30	2 27	13 00	0 0
8 SW+	5 15	11 10	2 30	2 37	16 10	0 0
8 NE+	10 50	35 35	2 15	15 06	61 45	0 0
8 SE+	7 41	21 45	0 20	7 53	31 15	0 0
8	8 24	35 35	0 20	28 04	82 25	0 0
9	3 31	6 30	0 25	1 51	11 00	0 0
10	6 03	9 10	2 30	1 54	12 10	0 0

* 1956 - 1983

\+ Gale or Storm Signals, 5, 6, 7, and 8 were renumbered as 8 NW, 8 SW, 8 NE, and 8 SE respectively with effect from 1 January 1973

TABLE 7. CASUALTIES AND DAMAGE CAUSED BY TROPICAL CYCLONES IN HONG KONG : 1937-1983

Year	Date	Name of tropical cyclone	Ocean-going vessels in trouble	Small craft sunk or wrecked	Small craft damaged	Persons dead	Persons missing	Persons injured
1937	1 - 2 Sep	Typhoon	28	1 255	600	11 000	*	*
1957	20 - 23 Sep	T. Gloria	5	2	Several	8	*	111
1960	4 - 12 Jun	T. Mary	6	352	462	45	11	127
1961	17 - 21 May	T. Alice	*	*	*	4	0	20
	7 - 10 Sep	S.T.S. Olga	0	1	0	7	0	0
1962	28 Aug - 2 Sep	T. Wanda	36	1 297	756	130	53	*
1963	1 - 9 Sep	T. Faye	0	2	0	3	0	51
1964	26 - 28 May	T. Viola	5	18	18	0	0	41
	2 - 9 Aug	T. Ida	3	7	60	5	4	56
	2 - 6 Sep	T. Ruby	20	32	282	38	6	300
	4 - 10 Sep	T. Sally	0	0	0	9	0	24
	7 - 13 Oct	T. Dot	2	31	59	26	10	85
1965	6 - 16 Jul	T. Freda	0	1	0	2	0	16
	25 - 28 Sep	T.S. Agnes	0	0	0	5	0	3
1966	12 - 14 Jul	S.T.S. Lola	0	*	6	1	0	6
1967	19 - 22 Aug	S.T.S. Kate	3	1	0	0	0	3
1968	17 - 22 Aug	T. Shirley	1	*	3	0	0	4
1969	22 - 29 Jul	T. Viola	0	3	0	0	0	0
1970	1 - 3 Aug	T. D.	0	0	0	2+	0	0
	8 - 14 Sep	T. Georgia	2	0	*	0	0	0
1971	15 - 18 Jun	T. Freda	8	0	0	2	0	30
	16 - 22 Jul	T. Lucy	10	2	13	0	0	38
	10 - 17 Aug	T. Rose	33**	303	*	110	5	286
1972	4 - 9 Nov	T. Pamela	3	0	0	1	0	8
1973	14 - 20 Jul	T. Dot	14	*	*	1	0	38
1974	7 - 14 Jun	T. Dinah	1	*	*	0	0	0
	18 - 22 Jul	T. Ivy	2	*	*	0	0	0
	15 - 19 Oct	T. Carmen	5	*	*	1	0	0
	21 - 27 Oct	T. Della	2	*	*	0	0	0
1975	10 - 14 Aug	T. D.	3	1	*	2	1	0
	9 - 14 Oct	T. Elsie	7	2	1	0	0	46
	16 - 23 Oct	S.T.S. Flossie	1	*	*	0	0	0
1976	22 Jun - 4 Jul	T. Ruby	0	0	0	3	2	2
	21 - 26 Jul	S.T.S. Violet	0	0	0	2	1	1
	5 - 6 Aug	S.T.S. Clara	0	0	0	0	0	4
	21 - 24 Aug	T.S. Ellen	0	4	7	27	3	65
	15 - 21 Sep	T. Iris	6	0	1	0	0	27
1977	4 - 6 Jul	T. D.	0	0	0	0	0	2
	3 - 5 Sep	T.S. Carla	1	0	0	0	0	1
	22 - 25 Sep	S.T.S. Freda	2	0	0	1	0	37
1978	24 - 30 Jul	S.T.S. Agnes	0	25	42	3	0	134
	9 - 12 Aug	T.S. Bonnie	2	0	0	0	0	0
	23 - 28 Aug	S.T.S. Elaine	8	5	8	1	0	51
	22 - 26 Sep	S.T.S. Kit	0	1	0	0	7	0
	7 - 16 Oct	S.T.S. Nina	0	0	0	0	0	2
	17 - 29 Oct	T. Rita	1	5	0	0	0	3
1979	1 - 6 Jul	T. Ellis	0	2	0	0	0	0
	26 - 30 Jul	T.S. Gordon	0	2	0	0	0	0
	28 Jul - 3 Aug	T. Hope	29	167	207	12	0	260
	6 - 9 Aug	T. D.	0	3	0	0	0	0
	16 - 24 Sep	S.T.S. Mac	2	12	0	1	0	67
1980	5 - 12 Jul	S.T.S. Ida	1	0	0	0	0	0
	18 - 23 Jul	T. Joe	4	0	1	2	1	59
	20 - 28 Jul	T. Kim	0	2	1	0	0	0
	29 Oct - 2 Nov	T.S. Cary	0	0	2	0	0	0
1981	3 - 7 Jul	S.T.S. Lynn	0	0	3	0	0	32
1982	27 Jun - 2 Jul	T.S. Tess	0	1	0	0	0	16
	22 - 30 Jul	T. Andy	0	0	1	0	0	0
	5 - 16 Sep	T. Irving	0	0	2	0	0	0
1983	12 - 19 Jul	T. Vera	0	1	0	0	0	0
	29 Aug - 9 Sep	T. Ellen	44	135	225	10	12	333
	10 - 14 Oct	T. Joe	2	0	3	0	0	58
	20 - 26 Oct	S.T.S. Lex	0	0	1	0	0	0

N.B. Information compiled from Hong Kong newspapers and from Marine Department records

* Data unavailable

\+ Struck by lightning

**Note: Number of Ocean-going vessels in trouble is revised on 30 Jul 2021.

TABLE 8. SHIPS GROUNDED, DAMAGED, ETC. BY TROPICAL CYCLONES IN HONG KONG, 1983

Name of tropical cyclone	Name of ship	Gross tonnage	Location of grounding, etc.	Nature of incident	Remarks
T. Ellen	Wing Cheong	490	Little Green Island	Aground. 35° list to port	To be demolished on site
	Queen God	499	Little Green Island	Aground. 5-10° list to port	
	Mosel Express	17 107	Kau Yi Chau	Collided with M.V. Yong Kang and M.V. Oriental Fairy and went aground	
	Jin Hai	21 819	Kau Yi Chau	Aground	
	Golden Fortune	9 538	Kau Yi Chau	Aground. 40° list to starboard	To be demolished on site
	Bunga Srigading	35 552	Kau Yi Chau	Aground	
	Golden Builder	3 300	Kau Yi Chau	Aground	
	City of Lobito	5 927	Tung Wan, Cheung Chau	Aground	
	Andhika Tarunaga	3 280	Shap Long Wan	Collided with M.V. Liao Hai and went aground	
	Zim Manila II	996	Hei Ling Chau	Aground	
	Glorious No. 1	13 855	Silver Mine Bay	Aground	
	Japan Express	8 301	Discovery Bay	Aground	
	Xin Feng	9 105	east coast of Lantau	Aground	
	Hua Lien	9 317	Rambler Channel	Aground	Causing severe damage to Mobil Tsing Yi Terminal
	Yeh Yung	11 169	west of Pillar Point	Aground	
	Oriental Empress	15 349	Tap Shek Kok	Aground	
	Asia Lane	6 603	north coast of Lantau off Pak Mong	Aground	
	Oriental Destiny	13 877	Sha Chau	Aground	
	Nihon Jade	3 813	east coast of Chek Lap Kok	Aground	
	Song Hua Jiang	10 006	Kap Shui Mun	Aground	
	San Hwa	483	Junk Bay	Aground	
	Marcia	8 944	Tolo Harbour	Collided with M.V. Cynthia G. and went aground	
	Cynthia G.	8 896	Tolo Harbour	Collided with M.V. Marcia and went aground	
	Maritime Reliance	15 525	Tolo Harbour	Aground	
	Maritime Pioneer	11 312	Tolo Harbour	Aground	
	Aesarea	3 992	north Lantau	Aground	

TABLE 8. (cont'd) SHIPS GROUNDED, DAMAGED, ETC. BY TROPICAL CYCLONES IN HONG KONG, 1983

Name of tropical cyclone	Name of ship	Gross tonnage	Location of grounding, etc.	Nature of incident	Remarks
T. Ellen	Pacific Coral	5 300	north Lantau	Collided with M.V. Singapore Car and listed 20° to port	
	Singapore Car	-	- " -	Collided with M.V. Pacific Coral	
	Tak Pao	-	Yau Ma Tei Anchorage	Collided with M.V. Full Glory	
	Full Glory	551	- " -	Collided with M.V. Tak Pao	
	Blue Crystal	-	- " -	Collided with M.V. Ocean Faith	
	Ocean Faith	17 253	- " -	Collided with M.V. Blue Crystal	
	Flavian	-	Western Anchorage	Collided with M.V. Xuan Wu	
	Xuan Wu	-	- " -	Collided with M.V. Flavian, M.V. Everspring and M.V. Luo Fu Shan	
	Yong Kang	-	- " -	Collided with M.V. Mosel Express	
	Oriental Fairy	-	- " -	Collided with M.V. Yong Kang and M.V. Mosel Express	
	Jin Cheng Jiang	-	- " -	Collided with M.V. Ling Jiang	
	Ling Jiang	-	- " -	Collided with M.V. Jin Cheng Jiang	
	Long Chuan Jiang	-	- " -	Collided with M.V. Rio Plata	
	Rio Plata	13 855	- " -	Collided with M.V. Long Chuan Jiang	
	Luo Fu Shan	-	Pun Shan Shek	Collided with M.V. Xuan Wu and M.V. Neptune Zircon	
	Neptune Zircon	9 948	Pun Shan Shek	Collided with M.V. Luo Fu Shan	
	Oriental Charger	12 276	Western Anchorage	Collided with M.V. Everspring	
	Everyspring	12 413	- " -	Collided with M.V. Oriental Charger and M.V. Xuan Wu	
	Liao Hai	-	- " -	Collided with M.V. Andhika Tarunaga	
	Shanghai	-	Buoy A-28	Adrift	
	Feng Jin	-	Buoy A-41	Adrift	
	Wah Sang	-	Buoy B-22	Adrift	
T. Joe	Stephanos Nersopis	-	Stonecutters Island	Adrift	
	Hua Lien	9 317	- " -	Adrift	

N.B. Information compiled from Hong Kong newspapers and from the Marine Department's records

TABLE 9. A SUMMARY OF METEOROLOGICAL OBSERVATIONS RECORDED IN HONG KONG DURING THE PASSAGES OF TROPICAL CYCLONES IN 1983

(a)

Name of tropical cyclone	Month	Nearest approach to Hong Kong						Minimum hourly M.S.L. pressure at the Royal Observatory			Maximum storm surge		
		Day	Time*	Direction	Distance	Movement	Estimated minimum central pressure	Day	Time*	Pressure	North Point	Tai Po Kau	Chi Ma Wan
					n miles	kn	mbar			mbar	m	m	m
S.T.S. Tip	Jul	13	1700	WSW	210	NNW 9	998	12	1700	1 003.7	0.4	0.5	-
T. Vera	Jul	17	0800	SSW	230	WNW 13	965	16	1800	1 001.4	0.5	0.7	-
T. Wayne	Jul	25	2200	NE	220	NW 15	990	25	1900	1 002.6	0.1	0.5	-
T. Ellen	Aug-Sep	9	0700	SW	7	NW 8	960	9	0500	983.9	-	1.7	1.8
S.T.S. Georgia	Sep-Oct	29	1200	S	170	WNW 11	980	29	1600	1 008.0	0.6	0.7	0.7
T. Joe	Oct	13	1800	SW	100	NW 10	970	13	1500	1 002.1	0.6	0.6	0.7
S.T.S. Lex	Oct	23	1900	S	250	W 4	992	23	1500	1 010.6	0.6	0.9	0.6

* Hong Kong Time (G.M.T. + 8)

(b)

Name of tropical cyclone	Month	Maximum 60-min mean wind in points and knots		Maximum 10-min mean wind in points and knots		Maximum gust peak speed in knots with direction in points		Rainfall at the Royal Observatory (mm)				
		Royal Observatory	Waglan Island	Royal Observatory	Waglan Island	Royal Observatory	Waglan Island	(i) 300 n miles	(ii) 24 hours	(iii) 48 hours	(iv) 72 hours	(i)+(iv)
S.T.S. Tip	Jul	E 14	SE 20	E 14	ESE 23	E 22	ESE 32	6.8	0.3	0.3	3.7	10.5
T. Vera	Jul	E 21	E 30	E 25	E 35	E 45	E 59	32.0	10.7	13.3	13.3	45.3
T. Wayne	Jul	SSW 11	W 24	W 12	W 25	SSW 24	W 30	3.2	9.6	47.6	53.6	56.8
T. Ellen	Aug-Sep	E 50	ESE 91	E 54	E 95	E 100	E 122	230.2	1.6	30.6	32.0	262.2
S.T.S. Georgia	Sep-Oct	ENE 22	E 41	ENE 23	E 43	ENE 40	E 52	106.1	12.9	17.2	17.2	123.3
T. Joe	Oct	ENE 28	E 46	ENE 30	E 46	E 53	E 62	132.2	39.5	50.4	50.9	183.1
S.T.S. Lex	Oct	ENE 14	E 37	ENE 17	ESE 37	ENE 28	E 48	6.2	NIL	2.1	2.1	8.3

N.B. (i) during the period when the tropical cyclone was centred within 300 n miles of Hong Kong
(ii) during the 24-hour period after the tropical cyclone moved outside (or dissipated within) the 300-n mile radius
(iii) during the 48-hour period after the tropical cyclone moved outside (or dissipated within) the 300-n mile radius
(iv) during the 72-hour period after the tropical cyclone moved outside (or dissipated within) the 300-n mile radius

TABLE 10. TYPHOONS WHICH REQUIRED THE HOISTING OF THE HURRICANE SIGNAL NO. 10 DURING THE PERIOD 1946-1983

Name of typhoon	Date	Nearest approach to Royal Observatory n miles	Minimum M.S.L. pressure (mbar)		Maximum 60-min mean winds in points and knots								Maximum gust peak speed in knots with direction in points							
			Hourly	Inst.	Royal Observatory	Hong Kong Airport	Waglan Island	Cheung Chau	Tate's Cairn	Cape Collinson	Green Island	Castle Peak	Royal Observatory	Hong Kong Airport	Waglan Island	Cheung Chau	Tate's Cairn	Cape Collinson	Green Island	Castle Peak
-	18 Jul 1946	S 37	985.7	-	NE -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gloria	22 Sep 1957	SW 30	986.2	984.3	ESE 62	ESE 39	E 61	-	-	-	-	-	E 101	ENE 86	ENE 100	-	-	-	-	-
Mary	9 Jun 1960	WNW 5	974.3	973.8	SSE 52	SSE 50	SSW 60	-	-	-	-	-	SSE 103	SE 88	SSW 105	-	-	-	-	-
Alice	19 May 1961	0	981.6	981.1	ENE 45	E 38	ESE 49	ENE 41	-	-	-	-	E 89	ENE 75	SW 69	ENE 73	-	-	-	-
Wanda	1 Sep 1962	SSW 10	955.1	953.2	N 72	N 58	NW 80	NW 64	SE 102	-	-	-	N 140	N 123	NNW 117	NW 125	ESE 154	-	-	-
Ruby	5 Sep 1964	SW 17	971.0	968.2	E 59	N 64	ENE 80	NE 61	ESE 90	SSE 83	-	-	NNE 122	NW 110	E 124	NNE 117	E 145	S 120	-	-
Dot	13 Oct 1964	E 18	978.9	977.3	NNW 48	N 36	N 63	NNW 52	NNE 85	N 54	-	-	N 94	N 107	N 99	WNW 111	NE 119	NNE 101	-	-
Shirley	21 Aug 1968	0	968.7	968.6	N 37	N 40	NNE 67	SSW 49	NNE 68	SSW 46	-	-	N 72	N 82	NE 113	SSW 90	NNE 110	N 93	-	-
Rose	17 Aug 1971	WSW 11	984.5	982.8	SE 55	SE 66	ESE 76	SE 71	S 80	SSW 74	-	-	ESE 121	ESE 114	ESE 102	SE 105	S 120	S 103	-	-
Elsie	14 Oct 1975	S 27	996.4	996.2	ENE 31	NNW 36	NNE 64	N 57	NE 70	-	NNW 64	N 35	NE 76	N 76	ENE 95	NE 86	NNE 97	-	NE 90	N 65
Hope	2 Aug 1979	NNW 6	961.8	961.6	W 40	W 62	SW 78	SSW 63	NW 62	-	W 58	- 52	W 94	WNW 98	SW 107	WSW 100	WNW 123	-	W 90	- 93
Ellen	9 Sep 1983	SW 24	983.9	983.1	E 50	E 60	ESE 91	ESE 92	E 68	-	S 74	SE 51	E 100	E 110	E 122	SSE 128	ENE 118	-	S 119*	SE 92

* *estimated, exceeding upper limit of anemogram.*

5. TROPICAL CYCLONE POSITION AND INTENSITY DATA 1983

Six-hourly position and intensity data are tabulated for the following tropical cyclones in 1983 in the western North Pacific and the South China Sea.

Surface winds in this section refer to wind speeds averaged over a period of 10 minutes.

SIX-HOURLY POSITION AND INTENSITY DATA OF TROPICAL STORM SARAH (8301)

MONTH	DAY	TIME G.M.T.	INTENSITY	ESTIMATED MINIMUM CENTRAL PRESSURE (MILLIBARS)	ESTIMATED MAXIMUM SURFACE WIND (KNOTS)	LAT. N	LONG. E
JUNE	24	0600	T.D.	1002	30	13.0	113.0
		1200	T.D.	1002	30	13.4	112.0
		1800	T.D.	1000	30	14.2	111.2
	25	0000	T.D.	998	30	15.0	110.5
		0600	T.S.	996	35	15.5	110.0
		1200	T.S.	996	35	16.0	109.2
		1800	T.S.	996	35	16.5	108.4
	26	0000	T.D.	998	30	16.8	107.5
		0600	T.D.	998	25	17.1	106.9

DISSIPATED

SIX-HOURLY POSITION AND INTENSITY DATA OF SEVERE TROPICAL STORM TIP (8302)

MONTH	DAY	TIME G.M.T.	INTENSITY	ESTIMATED MINIMUM CENTRAL PRESSURE (MILLIBARS)	ESTIMATED MAXIMUM SURFACE WIND (KNOTS)	LAT. N	LONG. E
JULY	10	0600	T.D.	1004	25	13.4	122.5
		1200	T.D.	1002	30	13.6	120.7
		1800	T.D.	995	30	14.0	118.9
	11	0000	T.S.	985	40	14.6	117.4
		0600	S.T.S.	980	60	15.1	116.7
		1200	S.T.S.	975	60	15.6	116.0
		1800	S.T.S.	980	60	16.1	115.1
	12	0000	S.T.S.	980	60	16.8	114.0
		0600	S.T.S.	980	60	17.4	113.0
		1200	S.T.S.	985	55	18.2	112.2
		1800	S.T.S.	985	50	18.7	111.9
	13	0000	T.S.	995	35	19.5	111.5
		0600	T.D.	998	30	20.3	111.1

DISSIPATED

SIX-HOURLY POSITION AND INTENSITY DATA OF TYPHOON VERA (8303)

MONTH	DAY	TIME G.M.T.	INTENSITY	ESTIMATED MINIMUM CENTRAL PRESSURE (MILLIBARS)	ESTIMATED MAXIMUM SURFACE WIND (KNOTS)	LAT. N	LONG. E
JULY	12	0000	T.D.	1004	30	11.1	132.3
		0600	T.D.	1002	30	11.1	131.4
		1200	T.S.	1000	35	11.1	130.4
		1800	T.S.	995	35	11.2	129.5
	13	0000	T.S.	992	40	11.3	128.6
		0600	T.S.	998	45	11.4	128.0
		1200	S.T.S.	985	50	11.8	127.1
		1800	S.T.S.	980	60	12.1	126.3
	14	0000	T.	975	65	12.4	125.6
		0600	T.	970	65	12.9	124.5
		1200	T.	960	70	13.4	123.4
		1800	T.	960	70	13.8	122.3
	15	0000	T.	970	65	14.2	121.2
		0600	S.T.S.	980	60	14.7	120.3
		1200	S.T.S.	985	55	15.5	119.0
		1800	S.T.S.	970	60	16.1	117.7
	16	0000	T.	965	65	16.8	116.4
		0600	T.	965	65	17.2	115.5
		1200	T.	965	65	17.6	114.5
		1800	T.	965	65	18.3	113.3
	17	0000	T.	965	65	18.9	112.1
		0600	S.T.S.	970	60	19.4	110.9
		1200	S.T.S.	975	55	19.7	109.8
		1800	S.T.S.	975	55	20.2	108.4
	18	0000	S.T.S.	975	55	20.6	106.9
		0600	S.T.S.	980	50	20.9	105.8
		1200	T.S.	990	40	21.2	104.3
		1800	T.D.	997	30	21.4	102.5

DISSIPATED

SIX-HOURLY POSITION AND INTENSITY DATA OF TYPHOON WAYNE (8304)

MONTH	DAY	TIME G.M.T.	INTENSITY	ESTIMATED MINIMUM CENTRAL PRESSURE (MILLIBARS)	ESTIMATED MAXIMUM SURFACE WIND (KNOTS)	LAT. N	LONG. E
JULY	22	0000	T.D.	1006	25	13.8	135.2
		0600	T.D.	1004	30	14.6	134.1
		1200	T.S.	998	35	15.3	132.9
		1800	T.S.	991	40	16.0	131.7
	23	0000	S.T.S.	988	50	16.7	130.3
		0600	S.T.S.	982	55	17.4	128.8
		1200	T.	970	70	18.2	127.4
		1800	T.	940	90	18.8	126.2
	24	0000	T.	920	110	19.4	124.8
		0600	T.	920	110	19.9	123.0
		1200	T.	930	105	20.4	121.6
		1800	T.	940	100	21.3	120.4
	25	0000	T.	955	90	22.3	119.3
		0600	T.	965	75	23.4	118.2
		1200	S.T.S.	990	50	24.5.	117.2
		1800	T.S.	1001	35	25.5	116.0

DISSIPATED

SIX-HOURLY POSITION AND INTENSITY DATA OF TYPHOON ABBY (8305)

MONTH	DAY	TIME G.M.T.	INTENSITY	ESTIMATED MINIMUM CENTRAL PRESSURE (MILLIBARS)	ESTIMATED MAXIMUM SURFACE WIND (KNOTS)	LAT. N	LONG. E
AUGUST	4	1800	T.D.	1004	25	9.0	141.3
	5	0000	T.D.	1004	30	9.2	140.8
		0600	T.D.	1002	30	9.4	140.5
		1200	T.S.	1000	35	9.6	140.0
		1800	T.S.	999	40	9.9	139.5
	6	0000	T.S.	996	40	10.4	138.8
		0600	T.S.	991	45	11.0	138.2
		1200	S.T.S.	985	50	11.8	137.4
		1800	S.T.S.	980	55	12.3	136.7
	7	0000	T.	970	65	12.8	135.8
		0600	T.	965	70	13.5	134.9
		1200	T.	945	80	14.3	134.0
		1800	T.	920	95	15.0	133.4
	8	0000	T.	910	110	15.7	132.9
		0600	T.	900	120	16.4	132.4
		1200	T.	900	125	17.0	131.9
		1800	T.	890	125	17.4	131.5
	9	0000	T.	890	125	17.8	131.0
		0600	T.	900	125	18.2	130.7
		1200	T.	910	120	18.7	130.5
		1800	T.	920	114	18.9	130.5
	10	0000	T.	925	105	19.0	130.4
		0600	T.	925	105	19.4	130.4
		1200	T.	925	100	19.8	130.5
		1800	T.	930	100	20.1	130.5
	11	0000	T.	935	100	20.3	130.6
		0600	T.	925	100	20.9	130.6
		1200	T.	920	105	21.6	130.6
		1800	T.	920	110	22.1	130.6
	12	0000	T.	920	110	22.5	130.7
		0600	T.	920	110	23.0	130.8
		1200	T.	915	110	23.5	131.0
		1800	T.	920	110	24.0	131.3

MONTH	DAY	TIME G.M.T.	INTENSITY	ESTIMATED MINIMUM CENTRAL PRESSURE (MILLIBARS)	ESTIMATED MAXIMUM SURFACE WIND (KNOTS)	LAT. N	LONG. E
	13	0000	T.	925	110	24.6	131.7
		0600	T.	925	105	25.1	132.3
		1200	T.	930	100	25.7	132.8
		1800	T.	935	95	26.1	133.1
	14	0000	T.	940	90	26.7	133.3
		0600	T.	940	85	27.2	133.4
		1200	T.	945	85	27.7	133.5
		1800	T.	950	85	28.1	133.5
	15	0000	T.	950	85	28.4	133.6
		0600	T.	955	85	29.0	133.8
		1200	T.	960	80	29.7	134.2
		1800	T.	960	80	30.4	134.7
	16	0000	T.	965	70	31.2	135.3
		0600	T.	970	70	31.9	135.9
		1200	S.T.S.	970	60	32.6	136.4
		1800	S.T.S.	970	55	33.8	137.1
	17	0000	T.S.	975	45	34.6	137.4
		0600	T.S.	980	40	35.1	138.2
		1200	T.S.	985	40	35.5	139.3
		1800	T.S.	990	40	36.5	140.5
	18	0000	T.S.	992	40	37.5	141.4
		0600	T.S.	994	40	38.2	142.2
		1200	T.S.	994	35	38.4	143.0
		1800	T.S.	994	35	38.0	143.8
	19	0000	T.D.	992	30	37.7	144.3
		0600	T.D.	990	30	37.5	144.7
		1200	T.D.	990	30	37.3	144.9
		1800	T.D.	990	30	37.2	145.2

BECAME EXTRATROPICAL

SIX-HOURLY POSITION AND INTENSITY DATA OF TROPICAL STORM BEN (8306)

MONTH	DAY	TIME G.M.T.	INTENSITY	ESTIMATED MINIMUM CENTRAL PRESSURE (MILLIBARS)	ESTIMATED MAXIMUM SURFACE WIND (KNOTS)	LAT. N	LONG. E
AUGUST	12	0600	T.D.	997	30	24.9	146.1
		1200	T.S.	996	35	26.1	145.8
		1800	T.S.	995	40	27.1	145.6
	13	0000	T.S.	994	40	28.0	145.5
		0600	T.S.	990	45	28.6	145.4
		1200	S.T.S.	987	50	29.3	145.3
		1800	S.T.S.	988	50	30.1	145.2
	14	0000	T.S.	990	45	30.8	145.1
		0600	T.S.	991	45	32.0	144.6
		1200	T.S.	992	45	33.0	143.4
		1800	T.S.	990	45	33.9	141.4
	15	0000	T.S.	993	40	34.3	139.3
		0600	T.D.	995	30	34.4	137.1

DISSIPATED

SIX-HOURLY POSITION AND INTENSITY DATA OF TROPICAL STORM CARMEN (8307)

MONTH	DAY	TIME G.M.T.	INTENSITY	ESTIMATED MINIMUM CENTRAL PRESSURE (MILLIBARS)	ESTIMATED MAXIMUM SURFACE WIND (KNOTS)	LAT. N	LONG. E
AUGUST	12	0600	T.D.	999	25	17.5	116.8
		1200	T.D.	999	25	17.7	116.9
		1800	T.D.	999	25	18.0	116.9
	13	0000	T.D.	999	25	18.5	117.1
		0600	T.D.	999	25	19.4	117.8
		1200	T.D.	999	25	19.8	119.0
		1800	T.D.	996	30	19.9	120.2
	14	0000	T.S.	993	40	20.0	121.5
		0600	T.S.	993	40	19.9	122.7
		1200	T.S.	995	35	19.8	124.3
		1800	T.D.	998	30	20.2	126.3
	15	0000	T.D.	1000	25	21.1	128.2

DISSIPATED

SIX-HOURLY POSITION AND INTENSITY DATA OF TROPICAL STORM DOM (8308)

MONTH	DAY	TIME G.M.T.	INTENSITY	ESTIMATED MINIMUM CENTRAL PRESSURE (MILLIBARS)	ESTIMATED MAXIMUM SURFACE WIND (KNOTS)	LAT. N	LONG. E
AUGUST	19	0000	T.D.	1004	25	15.9	134.2
		0600	T.D.	1004	30	16.1	133.2
		1200	T.D.	1003	30	16.3	132.6
		1800	T.D.	1002	30	16.5	132.2
	20	0000	T.D.	1002	30	16.9	132.0
		0600	T.D.	1000	30	17.4	132.4
		1200	T.D.	1000	30	18.1	133.1
		1800	T.D.	1002	25	18.7	133.9
	21	0000	T.D.	1002	25	19.5	134.8
		0600	T.D.	1000	30	20.1	135.4
		1200	T.D.	1003	25	20.7	136.1
		1800	T.D.	1003	25	21.5	136.9
	22	0000	T.D.	1003	25	22.5	137.6
		0600	T.D.	1003	25	23.6	138.7
		1200	T.D.	1000	30	24.2	140.1
		1800	T.S.	998	35	24.7	141.6
	23	0000	T.S.	996	35	24.9	142.6
		0600	T.S.	1001	35	25.0	143.2
		1200	T.S.	1004	35	25.0	143.6
		1800	T.S.	1007	35	25.1	144.0
	24	0000	T.S.	1000	35	25.2	144.3
		0600	T.S.	998	40	25.3	144.5
		1200	T.S.	999	35	25.5	144.5
		1800	T.S.	998	35	26.0	144.1
	25	0000	T.D.	998	30	26.4	143.5
		0600	T.D.	1002	30	27.1	142.7
		1200	T.D.	1003	25	27.9	141.9
		1800	T.D.	1003	25	28.9	141.3
	26	0000	T.D.	1004	25	30.1	141.1

DISSIPATED

SIX-HOURLY POSITION AND INTENSITY DATA OF THE TROPICAL DEPRESSION (25-28 AUGUST)

MONTH	DAY	TIME G.M.T.	INTENSITY	ESTIMATED MINIMUM CENTRAL PRESSURE (MILLIBARS)	ESTIMATED MAXIMUM SURFACE WIND (KNOTS)	LAT. N	LONG. E
AUGUST	25	0600	T.D.	1000	25	25.0	128.3
		1200	T.D.	1000	25	25.6	128.5
		1800	T.D.	1000	25	26.3	128.7
	26	0000	T.D.	1000	25	27.3	129.1
		0600	T.D.	998	25	28.7	129.2
		1200	T.D.	998	25	30.3	128.7
		1800	T.D.	998	25	31.8	127.9
	27	0000	T.D.	998	25	33.4	127.3
		0600	T.D.	998	25	34.9	127.0
		1200	T.D.	999	25	35.8	127.0
		1800	T.D.	1000	25	36.5	127.0

DISSIPATED

SIX-HOURLY POSITION AND INTENSITY DATA OF TYPHOON ELLEN (8309)

MONTH	DAY	TIME G.M.T.	INTENSITY	ESTIMATED MINIMUM CENTRAL PRESSURE (MILLIBARS)	ESTIMATED MAXIMUM SURFACE WIND (KNOTS)	LAT. N	LONG. E
AUGUST	28	1800	T.D.	1010	25	12.2	173.2
	29	0000	T.D.	1010	25	12.6	171.4
		0600	T.D.	1010	30	12.8	170.0
		1200	T.D.	1010	30	13.1	168.5
		1800	T.S.	1010	35	13.2	166.9
	30	0000	T.S.	1008	35	13.3	165.2
		0600	T.S.	1008	35	13.2	163.6
		1200	T.S.	1010	35	12.8	161.8
		1800	T.S.	1010	35	12.0	160.2
	31	0000	T.S.	1009	35	11.2	158.4
		0600	T.S.	1008	35	10.6	156.6
		1200	T.S.	1007	35	10.2	154.8
		1800	T.S.	1006	35	10.2	152.8
SEPTEMBER	1	0000	T.S.	1006	35	10.2	150.8
		0600	T.S.	1006	35	10.0	149.1
		1200	T.S.	1005	35	9.2	146.9
		1800	T.S.	1003	35	8.7	144.8
	2	0000	T.S.	1000	35	8.7	143.0
		0600	T.S.	1000	35	8.9	141.6
		1200	T.S.	998	40	9.2	140.5
		1800	T.S.	994	45	9.5	139.1
	3	0000	T.S.	991	45	10.0	137.5
		0600	S.T.S.	988	50	10.4	135.9
		1200	S.T.S.	986	55	10.9	134.4
		1800	S.T.S.	984	55	11.6	133.0
	4	0000	S.T.S.	983	60	12.3	131.7
		0600	S.T.S.	982	60	13.0	130.7
		1200	T.	980	65	13.7	129.8
		1800	T.	975	70	14.4	128.9
	5	0000	T.	970	75	15.1	127.9
		0600	T.	960	85	15.8	127.0
		1200	T.	950	90	16.6	126.0
		1800	T.	940	95	17.2	125.1

MONTH	DAY	TIME G.M.T.	INTENSITY	ESTIMATED MINIMUM CENTRAL PRESSURE (MILLIBARS)	ESTIMATED MAXIMUM SURFACE WIND (KNOTS)	LAT. N	LONG. E
	6	0000	T.	930	110	17.8	124.1
		0600	T.	940	110	18.3	123.1
		1200	T.	945	105	18.7	122.1
		1800	T.	955	90	19.0	121.1
	7	0000	T.	965	70	19.2	120.2
		0600	T.	965	75	19.5	119.2
		1200	T.	960	85	19.8	118.3
		1800	T.	960	90	20.1	117.5
	8	0000	T.	965	90	20.4	116.7
		0600	T.	965	90	20.8	115.9
		1200	T.	965	90	21.3	115.0
		1800	T.	960	90	21.7	114.3
	9	0000	T.	960	85	22.2	113.7
		0600	T.	970	80	22.8	113.2
		1200	T.S.	1000	40	23.5	113.0

DISSIPATED

SIX-HOURLY POSITION AND INTENSITY DATA OF TYPHOON FORREST (8310)

MONTH	DAY	TIME G.M.T.	INTENSITY	ESTIMATED MINIMUM CENTRAL PRESSURE (MILLIBARS)	ESTIMATED MAXIMUM SURFACE WIND (KNOTS)	LAT. N	LONG. E
SEPTEMBER	20	0600	T.D.	1000	25	10.3	144.6
		1200	T.D.	999	30	10.8	143.8
		1800	T.S.	997	35	11.4	142.8
	21	0000	T.S.	994	40	12.0	141.9
		0600	S.T.S.	989	50	12.7	140.9
		1200	S.T.S.	984	55	13.4	139.9
		1800	S.T.S.	980	60	14.3	139.0
	22	0000	T.	975	65	15.2	138.0
		0600	T.	945	90	16.2	137.0
		1200	T.	915	110	17.2	135.9
		1800	T.	890	115	18.0	134.8
	23	0000	T.	885	120	18.6	133.6
		0600	T.	895	115	19.0	132.7
		1200	T.	900	115	19.6	131.9
		1800	T.	910	110	20.1	131.1
	24	0000	T.	910	110	20.7	130.3
		0600	T.	915	105	21.5	129.5
		1200	T.	920	100	22.3	128.7
		1800	T.	915	105	23.0	128.0
	25	0000	T.	915	105	23.7	127.4
		0600	T.	910	110	24.3	126.9
		1200	T.	915	105	25.0	126.4
		1800	T.	920	100	25.9	125.7
	26	0000	T.	920	100	26.7	125.1
		0600	T.	925	95	27.5	124.6
		1200	T.	930	95	28.1	124.2
		1800	T.	940	90	28.8	124.0
	27	0000	T.	945	90	29.6	124.1
		0600	T.	955	85	30.6	124.7
		1200	T.	960	80	31.4	126.0
		1800	T.	970	70	32.2	127.6
	28	0000	S.T.S.	980	60	32.8	129.5
		0600	T.S.	985	45	33.6	133.1

BECAME EXTRATROPICAL

SIX-HOURLY POSITION AND INTENSITY DATA OF SEVERE TROPICAL STORM GEORGIA (8311)

MONTH	DAY	TIME G.M.T.	INTENSITY	ESTIMATED MINIMUM CENTRAL PRESSURE (MILLIBARS)	ESTIMATED MAXIMUM SURFACE WIND (KNOTS)	LAT. N	LONG. E
SEPTEMBER	28	0000	T.D.	1000	25	17.2	118.3
		0600	T.D.	1000	25	17.8	117.3
		1200	T.D.	998	30	18.4	116.5
		1800	T.D.	995	30	18.9	115.7
	29	0000	T.S.	992	40	19.3	115.0
		0600	T.S.	985	45	19.4	113.8
		1200	S.T.S.	980	55	19.2	112.7
		1800	S.T.S.	980	55	19.2	112.0
	30	0000	S.T.S.	980	50	19.3	111.2
		0600	S.T.S.	980	50	19.9	110.2
		1200	T.S.	983	45	20.2	109.1
		1800	T.S.	985	45	20.4	108.0
OCTOBER	1	0000	T.S.	990	45	20.5	107.0
		0600	T.S.	995	40	20.5	105.9
		1200	T.D.	1000	30	20.6	105.0

DISSIPATED

SIX-HOURLY POSITION AND INTENSITY DATA OF THE TROPICAL DEPRESSION (1-3 OCTOBER)

MONTH	DAY	TIME G.M.T.	INTENSITY	ESTIMATED MINIMUM CENTRAL PRESSURE (MILLIBARS)	ESTIMATED MAXIMUM SURFACE WIND (KNOTS)	LAT. N	LONG. E
OCTOBER	1	1200	T.D.	1001	25	14.8	114.0
		1800	T.D.	1001	25	15.0	112.7
	2	0000	T.D.	1000	30	15.5	111.5
		0600	T.D.	999	30	16.0	110.6
		1200	T.D.	998	30	16.5	109.9
		1800	T.D.	998	30	16.9	109.3
	3	0000	T.D.	997	30	17.6	108.5
		0600	T.D.	997	30	18.5	107.5
		1200	T.D.	998	30	19.2	106.7

DISSIPATED

SIX-HOURLY POSITION AND INTENSITY DATA OF TROPICAL STORM HERBERT (8312)

MONTH	DAY	TIME G.M.T.	INTENSITY	ESTIMATED MINIMUM CENTRAL PRESSURE (MILLIBARS)	ESTIMATED MAXIMUM SURFACE WIND (KNOTS)	LAT. N	LONG. E
OCTOBER	7	0600	T.D.	998	30	11.5	113.0
		1200	T.S.	995	35	11.7	112.3
		1800	T.S.	992	40	11.9	111.7
	8	0000	T.S.	990	45	12.1	111.1
		0600	T.S.	990	45	12.4	110.4
		1200	T.S.	990	45	12.9	109.7
		1800	T.S.	995	40	13.6	109.0
	9	0000	T.D.	1000	30	14.3	108.4

DISSIPATED

SIX-HOURLY POSITION AND INTENSITY DATA OF SEVERE TROPICAL STORM IDA (8313)

MONTH	DAY	TIME G.M.T.	INTENSITY	ESTIMATED MINIMUM CENTRAL PRESSURE (MILLIBARS)	ESTIMATED MAXIMUM SURFACE WIND (KNOTS)	LAT. N	LONG. E
OCTOBER	7	0600	T.D.	1004	25	17.7	142.6
		1200	T.D.	1004	30	18.4	141.2
		1800	T.S.	1002	35	19.2	139.6
	8	0000	T.S.	1000	40	20.0	138.0
		0600	T.S.	997	45	20.8	136.3
		1200	T.S.	994	45	21.5	134.6
		1800	S.T.S.	990	50	22.5	133.0
	9	0000	S.T.S.	987	55	23.8	131.8
		0600	S.T.S.	984	60	24.9	131.8
		1200	S.T.S.	982	60	26.1	132.4
		1800	S.T.S.	980	60	27.5	132.9
	10	0000	S.T.S.	975	60	29.0	133.2
		0600	S.T.S.	975	60	30.3	133.7
		1200	S.T.S.	980	55	31.4	134.8
		1800	S.T.S.	980	55	32.2	136.4
	11	0000	S.T.S.	980	50	33.6	139.2
		0600	T.S.	985	45	34.6	142.6

BECAME EXTRATROPICAL

SIX-HOURLY POSITION AND INTENSITY DATA OF TYPHOON JOE (8314)

MONTH	DAY	TIME G.M.T.	INTENSITY	ESTIMATED MINIMUM CENTRAL PRESSURE (MILLIBARS)	ESTIMATED MAXIMUM SURFACE WIND (KNOTS)	LAT. N	LONG. E
OCTOBER	9	1800	T.D.	1000	25	13.7	128.4
	10	0000	T.D.	1000	25	13.9	127.0
		0600	T.D.	1000	30	14.2	125.6
		1200	T.D.	1000	30	14.7	124.3
		1800	T.D.	1000	30	15.2	123.0
	11	0000	T.D.	1000	30	15.7	121.8
		0600	T.D.	997	30	16.2	120.2
		1200	T.D.	993	30	16.7	118.8
		1800	T.S.	991	40	16.9	117.3
	12	0000	T.S.	990	45	17.1	116.1
		0600	T.S.	989	45	17.5	115.3
		1200	S.T.S.	988	50	18.2	114.6
		1800	S.T.S.	987	50	18.9	114.2
	13	0000	S.T.S.	985	60	19.7	114.0
		0600	T.	970	70	20.6	113.4
		1200	T.	970	70	21.4	112.7
		1800	S.T.S.	990	50	22.2	111.9
	14	0000	T.D.	1006	25	23.1	111.2

DISSIPATED

SIX-HOURLY POSITION AND INTENSITY DATA OF TROPICAL STORM KIM (8315)

MONTH	DAY	TIME G.M.T.	INTENSITY	ESTIMATED MINIMUM CENTRAL PRESSURE (MILLIBARS)	ESTIMATED MAXIMUM SURFACE WIND (KNOTS)	LAT. N	LONG. E
OCTOBER	16	0000	T.D.	1000	30	9.0	114.0
		0600	T.D.	1000	30	9.2	112.9
		1200	T.S.	997	35	9.5	111.6
		1800	T.S.	997	35	10.1	110.0
	17	0000	T.S.	995	40	11.0	108.1
		0600	T.S.	998	35	12.0	105.9
		1200	T.D.	999	30	12.6	104.3
		1800	T.D.	1000	25	13.1	103.1
	18	0000	T.D.	1000	25	13.4	102.2
		0600	T.D.	1000	25	13.9	101.1
		1200	T.D.	1000	25	14.6	99.6
		1800	T.D.	1000	25	14.7	98.4
	19	0000	T.D.	998	30	14.8	96.8
		0600	T.D.	998	30	15.9	95.6
		1200	T.D.	998	30	17.2	94.6
		1800	T.D.	1000	25	18.0	94.1
	20	0000	T.D.	1000	25	18.7	93.7
		0600	T.D.	1000	25	19.5	93.4
		1200	T.D.	1002	25	20.2	93.2

DISSIPATED

SIX-HOURLY POSITION AND INTENSITY DATA OF SEVERE TROPICAL STORM LEX (8316)

MONTH	DAY	TIME G.M.T.	INTENSITY	ESTIMATED MINIMUM CENTRAL PRESSURE (MILLIBARS)	ESTIMATED MAXIMUM SURFACE WIND (KNOTS)	LAT. N	LONG. E
OCTOBER	20	0000	T.D.	1004	25	15.0	127.0
		0600	T.D.	1003	25	15.0	125.0
		1200	T.D.	1002	25	15.1	123.0
		1800	T.D.	1000	30	15.5	121.7
	21	0000	T.D.	1000	30	16.0	120.8
		0600	T.D.	1000	30	16.7	119.8
		1200	T.D.	999	30	16.7	118.6
		1800	T.D.	998	30	16.3	117.6
	22	0000	T.S.	997	35	16.2	116.6
		0600	T.S.	997	35	16.3	115.6
		1200	T.S.	997	35	16.7	115.1
		1800	T.S.	995	40	17.1	115.0
	23	0000	T.S.	992	45	17.5	114.9
		0600	T.S.	992	45	17.9	114.7
		1200	T.S.	992	45	18.1	114.3
		1800	S.T.S.	990	50	17.9	113.9
	24	0000	S.T.S.	990	50	17.5	113.7
		0600	S.T.S.	990	50	17.2	113.4
		1200	S.T.S.	985	55	17.1	113.1
		1800	S.T.S.	985	55	17.1	112.3
	25	0000	S.T.S.	980	60	17.2	111.5
		0600	S.T.S.	980	60	17.3	110.7
		1200	S.T.S.	980	60	17.4	109.8
		1800	S.T.S.	980	60	17.5	108.9
	26	0000	S.T.S.	985	55	17.7	108.0
		0600	T.S.	992	45	17.9	106.8
		1200	T.S.	997	35	18.0	105.5

DISSIPATED

SIX-HOURLY POSITION AND INTENSITY DATA OF TYPHOON MARGE (8317)

MONTH	DAY	TIME G.M.T.	INTENSITY	ESTIMATED MINIMUM CENTRAL PRESSURE (MILLIBARS)	ESTIMATED MAXIMUM SURFACE WIND (KNOTS)	LAT. N	LONG. E
NOVEMBER	1	0000	T.D.	1005	30	11.5	143.1
		0600	T.S.	1000	35	12.1	142.1
		1200	T.S.	996	40	12.7	141.3
		1800	T.S.	993	40	13.6	140.7
	2	0000	T.S.	990	45	14.5	140.3
		0600	S.T.S.	986	50	15.3	140.1
		1200	S.T.S.	980	55	16.0	139.9
		1800	S.T.S.	970	60	16.6	139.4
	3	0000	T.	960	70	17.0	139.0
		0600	T.	950	80	17.4	138.2
		1200	T.	930	95	17.7	137.3
		1800	T.	915	110	18.0	136.2
	4	0000	T.	895	130	18.2	135.2
		0600	T.	895	130	18.5	134.5
		1200	T.	900	125	18.9	134.0
		1800	T.	905	120	19.3	133.6
	5	0000	T.	910	115	19.8	133.5
		0600	T.	910	115	20.3	133.5
		1200	T.	915	110	21.0	133.7
		1800	T.	920	105	21.7	134.4
	6	0000	T.	925	100	22.6	135.6
		0600	T.	925	100	23.8	137.3
		1200	T.	930	95	25.4	140.0
		1800	T.	940	85	27.7	143.6
	7	0000	T.	955	80	31.2	148.2
		0600	T.	960	75	35.3	153.9
		1200	S.T.S.	980	55	37.5	160.0

BECAME EXTRATROPICAL

SIX-HOURLY POSITION AND INTENSITY DATA OF TROPICAL STORM NORRIS (8318)

MONTH	DAY	TIME G.M.T.	INTENSITY	ESTIMATED MINIMUM CENTRAL PRESSURE (MILLIBARS)	ESTIMATED MAXIMUM SURFACE WIND (KNOTS)	LAT. N	LONG. E
NOVEMBER	8	1200	T.D.	1000	25	18.0	153.0
		1800	T.D.	998	30	18.3	152.3
	9	0000	T.S.	995	45	18.8	151.7
		0600	T.S.	994	45	19.4	151.5
		1200	T.S.	997	40	20.4	151.6
		1800	T.S.	998	40	21.2	152.1
	10	0000	T.S.	998	40	22.1	152.7
		0600	T.S.	998	40	23.2	153.5
		1200	T.S.	1000	35	24.5	154.5
		1800	T.D.	1002	30	25.8	155.5

DISSIPATED

SIX-HOURLY POSITION AND INTENSITY DATA OF TYPHOON ORCHID (8319)

MONTH	DAY	TIME G.M.T.	INTENSITY	ESTIMATED MINIMUM CENTRAL PRESSURE (MILLIBARS)	ESTIMATED MAXIMUM SURFACE WIND (KNOTS)	LAT. N	LONG. E
NOVEMBER	17	0600	T.D.	1002	25	10.3	135.4
		1200	T.D.	1002	25	10.9	133.9
		1800	T.D.	1001	30	11.7	132.3
	18	0000	T.D.	1000	30	12.6	130.6
		0600	T.D.	997	30	13.1	129.6
		1200	T.S.	992	35	13.1	129.0
		1800	T.S.	988	40	12.8	128.6
	19	0000	T.S.	988	40	12.5	128.2
		0600	T.S.	984	45	12.4	128.0
		1200	S.T.S.	980	50	12.4	127.8
		1800	S.T.S.	975	55	12.4	127.7
	20	0000	S.T.S.	970	60	12.5	127.5
		0600	T.	960	70	12.6	127.2
		1200	T.	955	75	12.8	126.8
		1800	T.	950	80	13.1	126.5
	21	0000	T.	950	80	13.4	126.2
		0600	T.	945	85	13.7	125.9
		1200	T.	940	90	14.1	125.6
		1800	T.	940	90	14.5	125.5
	22	0000	T.	945	85	14.9	125.5
		0600	T.	950	80	15.3	125.7
		1200	T.	950	80	15.6	126.0
		1800	T.	945	85	16.0	126.2
	23	0000	T.	940	90	16.5	126.3
		0600	T.	935	95	16.9	126.3
		1200	T.	935	100	17.1	126.1
		1800	T.	930	115	17.3	125.9
	24	0000	T.	930	115	17.4	125.7
		0600	T.	940	95	17.5	125.5
		1200	T.	950	85	17.6	125.2
		1800	T.	960	75	17.7	124.9

MONTH	DAY	TIME G.M.T.	INTENSITY	ESTIMATED MINIMUM CENTRAL PRESSURE (MILLIBARS)	ESTIMATED MAXIMUM SURFACE WIND (KNOTS)	LAT. N	LONG. E
	25	0000	T.	970	65	17.9	124.7
		0600	S.T.S.	982	55	18.1	124.5
		1200	T.S.	990	45	18.4	124.4
		1800	T.S.	994	40	18.3	124.4
	26	0000	T.S.	1005	35	18.2	124.4
		0600	T.D.	1006	30	17.5	124.7

DISSIPATED

SIX-HOURLY POSITION AND INTENSITY DATA OF SEVERE TROPICAL STORM PERCY (8320)

MONTH	DAY	TIME G.M.T.	INTENSITY	ESTIMATED MINIMUM CENTRAL PRESSURE (MILLIBARS)	ESTIMATED MAXIMUM SURFACE WIND (KNOTS)	LAT. N	LONG. E
NOVEMBER	19	0000	T.D.	1000	30	9.4	113.1
		0600	T.S.	992	40	8.7	112.9
		1200	S.T.S.	985	50	8.1	112.5
		1800	S.T.S.	983	50	7.7	112.1
	20	0000	S.T.S.	980	55	7.4	111.7
		0600	S.T.S.	975	60	7.2	111.5
		1200	S.T.S.	970	60	7.2	111.3
		1800	S.T.S.	975	60	7.4	111.3
	21	0000	S.T.S.	980	55	7.5	111.5
		0600	S.T.S.	983	55	7.5	111.8
		1200	S.T.S.	986	50	7.6	112.1
		1800	S.T.S.	989	50	7.6	112.4
	22	0000	T.S.	992	45	7.6	112.7
		0600	T.S.	996	40	7.7	113.1
		1200	T.S.	1002	35	7.9	113.5
		1800	T.S.	1002	35	8.1	114.2
	23	0000	T.D.	1003	30	8.4	114.9
		0600	T.D.	1004	30	8.7	115.7
		1200	T.D.	1004	30	9.0	116.5
		1800	T.D.	1004	25	9.3	117.2
	24	0000	T.D.	1004	25	9.6	118.0
		0600	T.D.	1004	25	10.1	118.9
		1200	T.D.	1004	25	10.6	120.0
		1800	T.D.	1004	25	11.1	121.0

DISSIPATED

SIX-HOURLY POSITION AND INTENSITY DATA OF THE TROPICAL DEPRESSION (21-24 NOVEMBER)

MONTH	DAY	TIME G.M.T.	INTENSITY	ESTIMATED MINIMUM CENTRAL PRESSURE (MILLIBARS)	ESTIMATED MAXIMUM SURFACE WIND (KNOTS)	LAT. N	LONG. E
NOVEMBER	21	0000	T.D.	1002	25	8.1	147.0
		0600	T.D.	1002	25	8.4	146.4
		1200	T.D.	1002	25	8.8	145.8
		1800	T.D.	1001	25	9.2	145.2
	22	0000	T.D.	1000	30	9.6	144.3
		0600	T.D.	1000	30	9.4	143.2
		1200	T.D.	1000	30	9.1	142.1
		1800	T.D.	1001	25	9.1	141.3
	23	0000	T.D.	1001	25	9.0	140.4
		0600	T.D.	1001	25	8.9	140.0
		1200	T.D.	1002	25	8.8	139.5
		1800	T.D.	1004	25	8.6	139.0
	24	0000	T.D.	1005	25	8.4	138.4

DISSIPATED

SIX-HOURLY POSITION AND INTENSITY DATA OF SEVERE TROPICAL STORM RUTH (8321)

MONTH	DAY	TIME G.M.T.	INTENSITY	ESTIMATED MINIMUM CENTRAL PRESSURE (MILLIBARS)	ESTIMATED MAXIMUM SURFACE WIND (KNOTS)	LAT. N	LONG. E
NOVEMBER	27	0600	T.D.	1000	25	16.3	129.7
		1200	T.D.	998	30	16.7	129.3
		1800	T.S.	996	35	17.0	129.0
	28	0000	T.S.	993	45	17.4	128.6
		0600	S.T.S.	991	50	17.8	128.3
		1200	S.T.S.	990	50	18.1	127.9
		1800	T.S.	991	45	18.2	127.3
	29	0000	T.S.	996	40	18.2	126.7
		0600	T.S.	1002	35	18.4	126.5
		1200	T.D.	1005	30	18.6	126.2
		1800	T.D.	1006	30	18.6	125.9
	30	0000	T.D.	1006	30	18.5	125.6
		0600	T.D.	1006	30	18.0	125.5
		1200	T.D.	1008	25	17.6	125.2

DISSIPATED

SIX-HOURLY POSITION AND INTENSITY DATA OF TROPICAL STORM SPERRY (8322)

MONTH	DAY	TIME G.M.T.	INTENSITY	ESTIMATED MINIMUM CENTRAL PRESSURE (MILLIBARS)	ESTIMATED MAXIMUM SURFACE WIND (KNOTS)	LAT. N	LONG. E
DECEMBER	2	1200	T.D.	1006	30	16.3	133.6
		1800	T.S.	1004	40	16.1	132.3
	3	0000	T.S.	1002	45	16.5	131.5
		0600	T.S.	997	45	17.0	131.5
		1200	T.S.	996	45	17.6	131.8
		1800	T.S.	998	45	17.9	132.3
	4	0000	T.S.	1003	40	17.8	132.7
		0600	T.S.	1005	40	17.3	133.0
		1200	T.S.	1008	35	16.6	133.1
		1800	T.D.	1009	30	16.1	133.2
	5	0000	T.D.	1010	25	15.6	133.3

DISSIPATED

SIX-HOURLY POSITION AND INTENSITY DATA OF SEVERE TROPICAL STORM THELMA (8323)

MONTH	DAY	TIME G.M.T.	INTENSITY	ESTIMATED MINIMUM CENTRAL PRESSURE (MILLIBARS)	ESTIMATED MAXIMUM SURFACE WIND (KNOTS)	LAT. N	LONG. E
DECEMBER	15	0000	T.D.	1000	25	10.9	138.5
		0600	T.D.	998	30	11.3	137.4
		1200	T.S.	997	35	11.6	136.5
		1800	T.S.	996	35	11.8	135.6
	16	0000	T.S.	996	40	12.0	134.8
		0600	T.S.	995	40	12.8	134.0
		1200	T.S.	994	45	13.5	133.6
		1800	T.S.	993	45	14.1	133.3
	17	0000	S.T.S.	990	50	14.7	133.2
		0600	S.T.S.	996	50	15.5	133.2
		1200	T.S.	1000	40	16.3	133.7
		1800	T.S.	1002	35	17.0	134.9
	18	0000	T.D.	1004	30	17.4	136.5
		0600	T.D.	1004	25	17.6	139.9

DISSIPATED