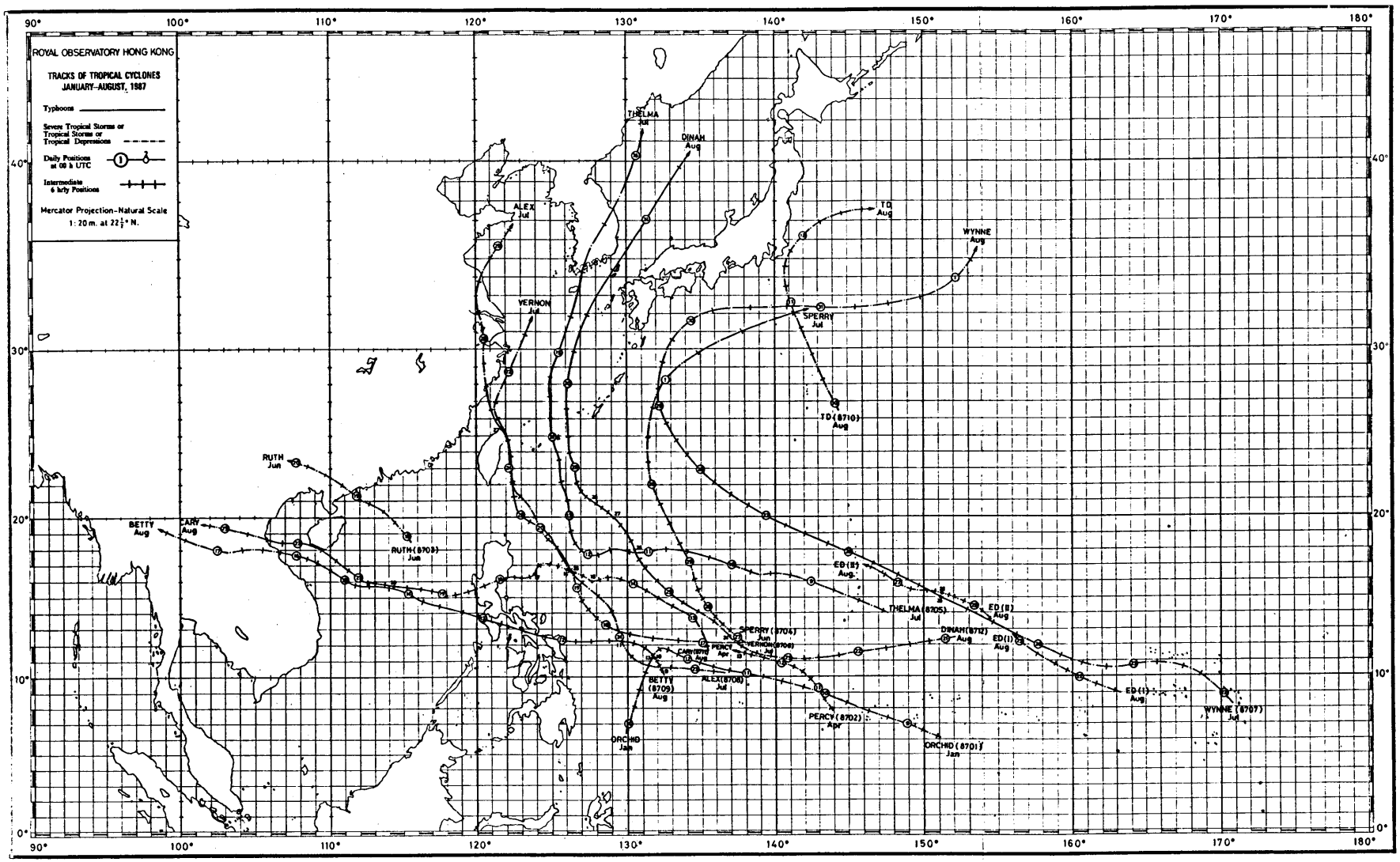
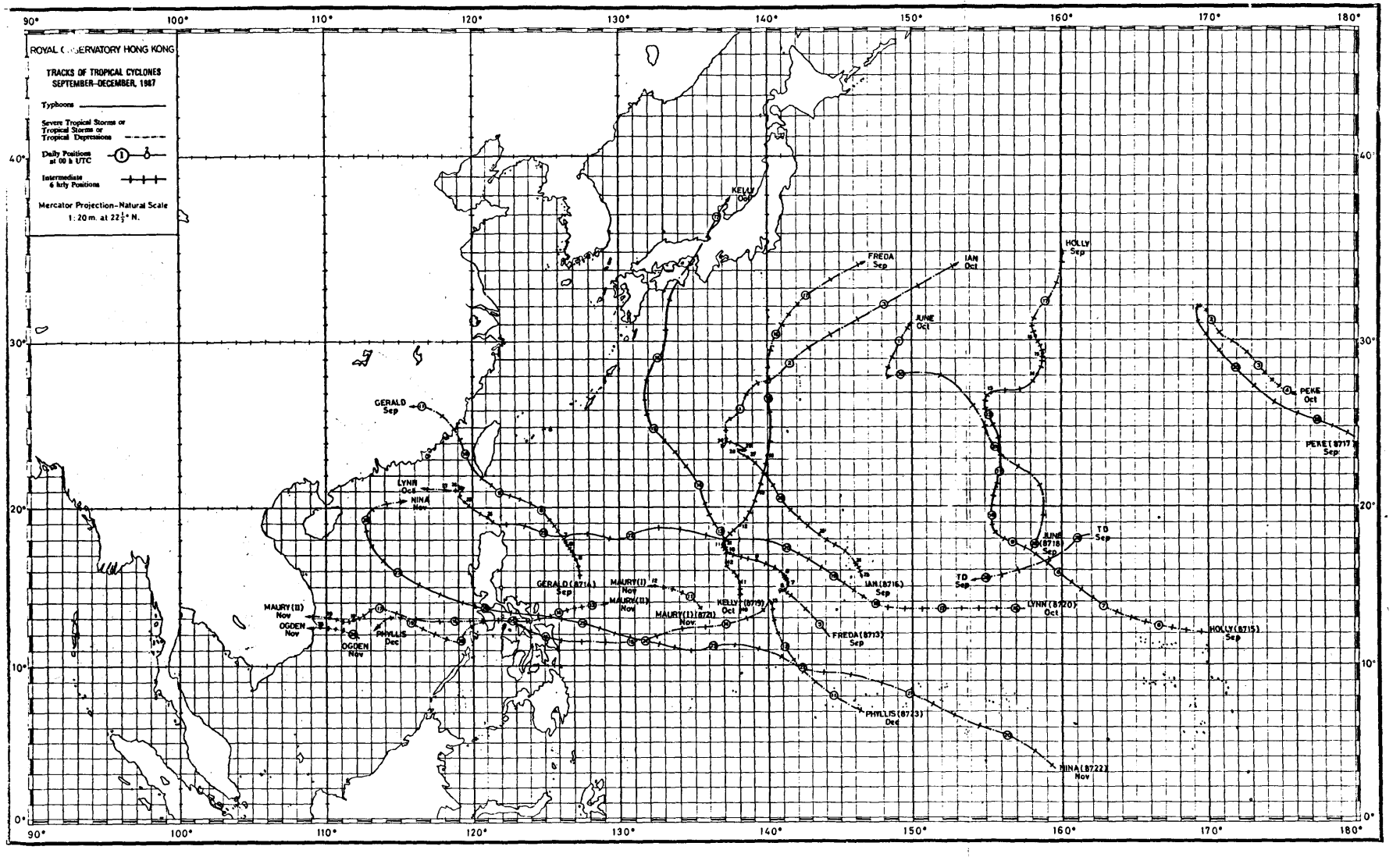

ROYAL OBSERVATORY HONG KONG
TRACKS OF TROPICAL CYCLONES
JANUARY–AUGUST, 1987
Typhoons
Severe Tropical Storms or Tropical Storms or Tropical Depressions
Daily Positions at 00 h UTC
Intermediate 6 hrly Positions
Mercator Projection–Natural Scale
1: 20 m. at 22½° N.
90°
100°
110°
120°
130°
140°
150°
160°
170°
180°
40°
30°
20°
10°
0°
THELMA Jul
DINAH Aug
ALEX Jul
TD Aug
WYNNE Aug
VERNON Jul
SPERRY Jul
TD (8710) Aug
RUTH Jun
BETTY Aug
CARY Aug
RUTH (8703) Jun
ED (II) Aug
THELMA (8705) Jul
ED (II) Aug
SPERRY (8704) Jun
VERNON (8706) Jul
DINAH (8712) Aug
ED (I) Aug
CARY (8707) Aug
PERCY Apr
BETTY (8709) Aug
ALEX (8708) Jul
ED (I) Aug
WYNNE (8707) Jul
PERCY (8702) Apr
ORCHID Jan
ORCHID (8701) Jan


ROYAL OBSERVATORY HONG KONG
TRACKS OF TROPICAL CYCLONES
SEPTEMBER–DECEMBER, 1987
Typhoons
Severe Tropical Storms or Tropical Storms or Tropical Depressions
Daily Positions at 00 h UTC
Intermediate 6 hrly Positions
Mercator Projection–Natural Scale
1: 20 m. at 22½° N.
90°
100°
110°
120°
130°
140°
150°
160°
170°
180°
40°
30°
20°
10°
0°
KELLY Oct
FREDA Sep
IAN Oct
HOLLY Sep
JUNE Oct
PEKE Oct
PEKE (8717) Sep
GERALD Sep
LYNN Oct
NINA Nov
JUNE (8718) Sep
TD Sep
TD Sep
GERALD (8714) Sep
MAURY (I) Nov
IAN (8716) Sep
MAURY (II) Nov
MAURY (II) Nov
OGDEN Nov
PHYLLIS Dec
KELLY (8719) Oct
MAURY (I) (8721) Nov
LYNN (8720) Oct
HOLLY (8715) Sep
FREDA (8713) Sep
OGDEN Nov
PHYLLIS (8723) Dec
NINA (8722) Nov

ROYAL OBSERVATORY HONG KONG

TROPICAL CYCLONES IN 1987

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1. INTRODUCTION

Apart from a short break during 1940-1946, surface observations of meteorological elements since 1884 have been summarized and published in the Royal Observatory's Meteorological Results. Upper-air observations began in 1947 and from then onwards the annual publication was 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. Starting from the 1987 issue, Part I was re-titled as Surface Observations in Hong Kong with the format and contents remaining unchanged.

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 series 'Meteorological Results, Part III-Tropical Cyclone Summaries' was subsequently introduced. It contains information on tropical cyclones over the western North Pacific and the South China Sea. The first issue containing reports on tropical cyclones occurring during 1968, was published in 1971. In the 1984 issue, all tropical cyclones within the area bounded by the equator, 45°N, 100°E and 160°E, were described in the publication. Reconnaissance aircraft reports which had been available until August 1987 and terminated thereafter and satellite pictures have facilitated the tracking of tropical cyclones over the otherwise data-sparse ocean. Beginning from 1985, the area of coverage is extended from east of 160°E to 180°. Starting from the 1987 issue, the series was re-titled to the present format with its contents largely remaining the same.

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. For the period 1884-1960, only daily positions were plotted on the tracks. The time of the daily positions varied to some extent but remained fixed at 0000 UTC after 1944. Details of the variation are given in the Royal Observatory Technical Memoir No. 11, Volume 1. From 1961 onwards, six-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 to meet the immediate needs of the press, shipping companies and others. These reports are printed 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 which necessitated the hoisting of a tropical cyclone warning signal.

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

A TROPICAL DEPRESSION (T.D.) has maximum sustained winds of less than 63 km/h 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 63-87 km/h.

A SEVERE TROPICAL STORM (S.T.S.) has maximum sustained winds in the range 88-l17 km/h.

A TYPHOON (T.) has maximum sustained winds of 118 km/h or more.

At the 13th 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 of tropical storm intensity or above a common code which is composed of four digits. For example, the ninth tropical cyclone of tropical storm intensity or above which occurred within the area in 1987 was assigned the code (8709). The appropriate code immediately follows the name of the tropical cyclone in this publication, for example, Typhoon Betty (8709).

Surface wind data presented in this report were obtained from a network of anemometers operated by the Royal Observatory. Instruments used in 1987 included M.O. Mark IV/V cup anemometers manufactured by R.W. Munro Ltd., WS 201 cup anemometers manufactured by Teledyne Geotech and Gill propeller anemometers manufactured by R.M. Young Co. Details of the stations are listed 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	22°20′	114°11′	24	4	14(NW)	Cup
					16(SE)‡	Cup
Waglan Island	22°11′	114°18′	62	55	75	Cup
Tate's Cairn	22°22′	114°13′	*	575	588	Cup
Cheung Chau	22°12′	114°01′	79	72	92	Cup
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
Tai O	22°15′	113°51′	*	76	90	Cup
Sha Tin$^{\Delta}$	22°24′	114°12′	8	7	16	Cup
Chek Lap Kok$^{\Delta}$	22°19′	113°56′	53	51	65	Cup
Lau Fau Shan$^{\Delta}$	22°28′	113°59′	35	34	50	Cup
Ta Kwu Ling$^{\Delta}$	22°32′	114°09′	13	12	28	Cup
Tai Mo Shan	22°25′	114°07′	*	950	969	Cup
Tsing Yi† (Mobil Oil Co.)	22°21′	114°06′	*	7	18	propeller

* No barometer.

Anemometer located near 22°19' 114°12'.

Automatic weather station: operations commencing on 10 August 1984, 7 September 1984, 16 September 1985 and 14 October 1985 respectively.

Operations commencing on 9 September 1985.

Wind reports were also provided by Hong Kong International Terminal Ltd. at Kwai Chung. Maximum storm surges caused by tropical cyclones are measured by tide gauges installed at several locations in Hong Kong. The locations of these anemometers and tide gauges are shown in Figure 1.

The reports in Section 3 present a general description of the life history of each tropical cyclone which affected Hong Kong in 1987 and include the following information:-

(a) the effect of the tropical cyclone on 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 selected 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 and selected locations;
(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 (up to August 1987). With a view of providing further information on the characteristics of tropical cyclones, six-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 are used in different contexts. The reference times of tropical cyclone warnings for shipping are given in UTC. 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 eight hours ahead of UTC. Times labelled UTC are in Co-ordinated Universal Time.

Throughout this publication, maximum sustained surface winds when used without qualification refer to wind speeds averaged over a period of 10 minutes. Wind data from reconnaissance aircraft have been converted into equivalent lo-minute mean winds for comparison 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.

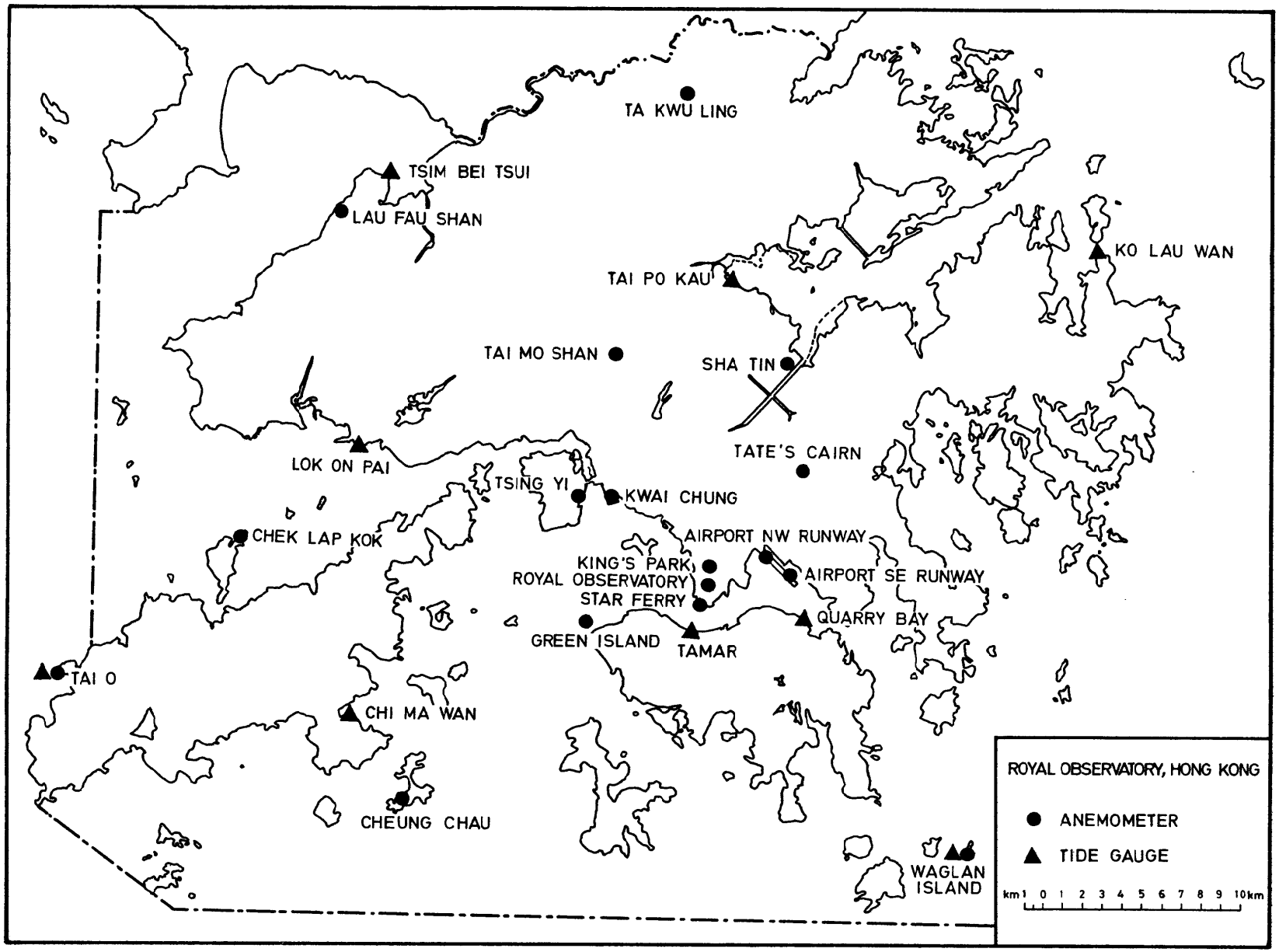

Figure 1. Locations of anemometer and tide gauge stations in Hong Kong.

2. TROPICAL CYCLONE SUMMARIES FOR 1987

In 1987, only 26* tropical cyclones affected the western North Pacific and the South China Sea bounded by the equator, 45°N, 100°E and 180°. This number falls below the annual average (1951-1980) of 32 tropical cyclones in the region. Seventeen of them attained typhoon intensity, which was slightly higher than the annual average of sixteen.

The tropical cyclones in 1987 in the western North Pacific were characterized by their tendency to form in the eastern part of the region and their subsequent northward movement. As a result, only nine† tropical cyclones affected the South China Sea. This is the fewest since 1976. Among these, only two actually formed within this part of the ocean basin, one in June and the other in November. Since 1975, this is the first year when no tropical cyclone occurred in the South China Sea during the month of July. A total of six tropical cyclones traversed the Philippines. Among those that made landfall, three were over the mainland of China, three crossed or passed close to Taiwan, four over Vietnam, one over Korea and one over Japan, None of the tropical cyclones came close enough to affect Hong Kong significantly.

The monthly distribution of the frequency of first occurrence of tropical cyclones and that of typhoons for 1987 are shown in Figure 2 and a brief summary 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 frequencies of these two parameters during the years 1951-1980 are shown in Figure 3.

During the year, 13† tropical cyclones occurred within the area of responsibility of Hong Kong for tropical cyclone warnings for shipping, (i.e. the area bounded by 10°N, 30°N, 105°E and 125°E) compared with the 30-year annual average of 17. Eleven† tropical cyclones moved into this area and two developed within it. Altogether 336 †warnings for shipping were issued by the Royal Observatory in connection with these tropical cyclones.

Tropical cyclone warning signals were displayed in Hong Kong for 5 tropical cyclones. Only Typhoon Lynn necessitated the hoisting of the Strong Wind Signal No. 3.

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 600 km of Hong Kong to the end of the third day after the tropical cyclone has dissipated or moved outside 600 km of Hong Kong) during 1987 amounted to 193.2 mm, which is 34 per cent of the annual average value of 566.9 mm (18841939 and 1947-1970). It accounted for only 8 per cent of the year's total rainfall of 2 319.3 mm. Four tropical cyclones came within 600 km of Hong Kong. Typhoon Nina (8722), for which no warning signals were hoisted in Hong Kong, brought 54.7 mm of rainfall. Rainfall figures associated with the three other tropical cyclones are given in Table 8.

Typhoon Norris (8629), which crossed the central Philippines late in December 1986, weakened and turned northwestwards on entering the South China Sea. It eventually dissipated about 360 km north-northeast of Nansha early on 2 January.

Orchid (8701) was the first tropical cyclone to form in 1987. It formed as a tropical depression about 180 km southwest of Truk on the evening of 8 January. Moving west-northwestwards, Orchid became a typhoon early on 11 January about 140 km east-northeast of Yap. Later that morning, it passed about 80 km north of the island. Under the influence of the northeast monsoon, Orchid turned south-southwestwards and weakened to a tropical storm on 13 January about 1 210 km east-southeast of Manila. It dissipated on 14 January about 380 km east of Mindanao.

Almost three months later, Tropical Depression Percy (8702) formed over the Pacific about 650 km east of Yap on 10 April. It intensified to a tropical storm the next morning. However, it was rather short-lived as it dissipated on the morning of 13 April about 240 km north-northwest of Yap.

Two more months passed before another tropical cyclone formed. This was the first one to develop over the South China Sea in 1987. On the morning of 18 June, a tropical depression formed about 260 km southwest of Dongsha, and intensified to Tropical Storm Ruth (8703) while moving northwestwards. The next morning, it crossed the south China coast between Yangjiang and Zhanjiang about 290 km west-southwest of Hong Kong while moving on a west-northwestward course. Soon after landfall, Ruth reached its maximum intensity and then weakened into a tropical depression and eventually dissipated about 80 km northwest of Nanning on the morning of 20 June. Extensive damage was inflicted in the provinces of Guangdong and Guangxi of China.

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* Typhoon Norris (8629) developed on 22 December 1986 near the Marshall Islands. In this publication, tropical cyclones are classified in accordance with the month of the first six-hourly position of each track. Therefore Typhoon Norris was not counted as a tropical cyclone in 1987. This practice is intended to maintain consistency in the preparation of tropical cyclone statistics. The number 26 includes Typhoon Peke (8717) which formed over the central North Pacific and moved across the International Date Line.

† including Typhoon Norris.

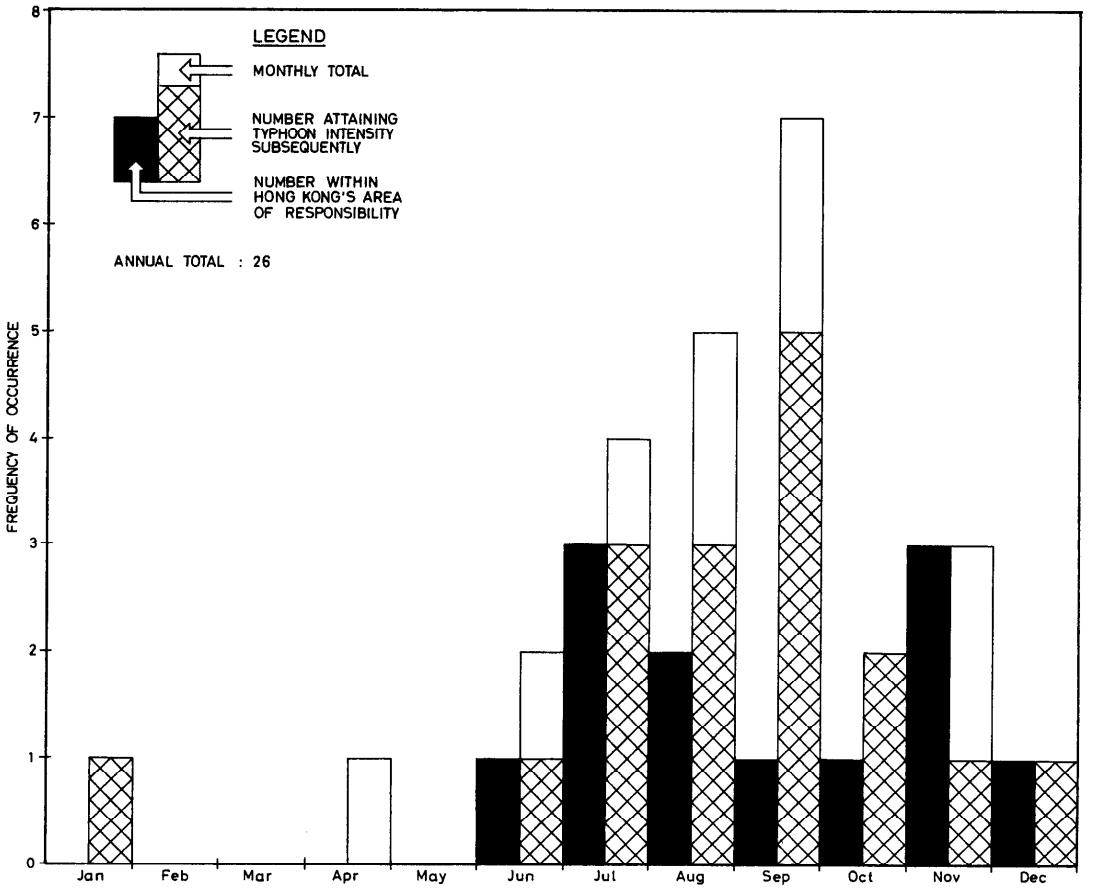


Figure 2. Monthly distribution of the frequency of first occurrence of tropical cyclones in the western North Pacific and the South China Sea in 1987.

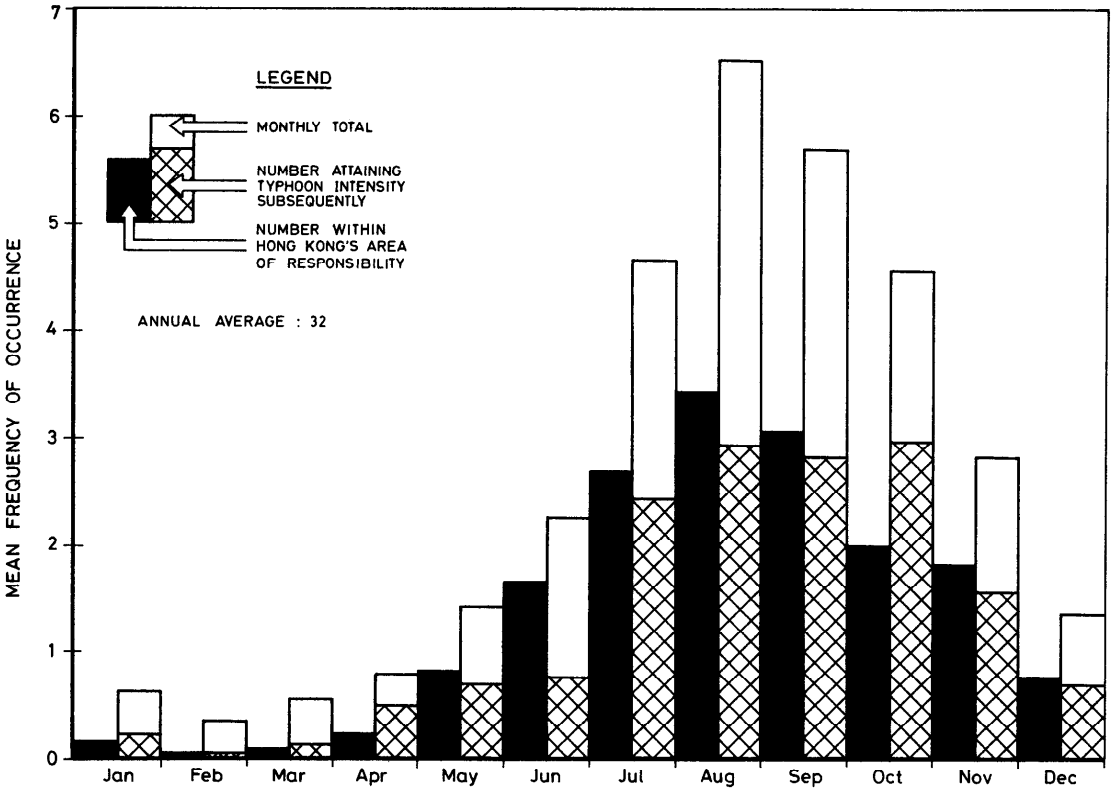


Figure 3. Monthly distribution of the mean frequency of first occurrence of tropical cyclones in the western North Pacific and the South China Sea, 1951–1980.

On 27 June, another tropical cyclone, Sperry (8704), developed over the Pacific about 340 km north-northwest of Yap. It soon intensified into a tropical storm and moved steadily north-northwestwards. Sperry further deepened to a typhoon on 29 June. It then began to weaken to a severe tropical storm that evening. Sperry turned northwards about 370 km east of Okinawa on 30 June and further weakened into a tropical storm. On 1 July, it recurved rapidly east-northeastwards and became extratropical to the southeast of Japan the next day.

On the average, about two tropical cyclones occur over the South China Sea in July. However, 1987 was the first year since 1975 in which all July tropical cyclones were outside this area. The first of these was Typhoon Thelma (8705). It formed as a tropical depression about 270 km east-northeast of Guam on 8 July. Moving in a west-northwest direction, Thelma attained typhoon intensity two days later. On 12 July when it was about 730 km east-northeast of Manila, Thelma took on a north-northwestward course. Although Thelma did not cross any of the Philippine islands, storm surge associated with its circulation swept away some 500 houses in the southern islands of the Philippines, killing a man and leaving over 3 500 people homeless. For the next three days, Thelma traversed the East China Sea and finally made landfall over southern Korea about 180 km west-southwest of Pusan on the evening of 15 July. It then weakened rapidly while moving northeastwards across Korea. Early on 16 July, Thelma entered the Sea of Japan and dissipated near Vladivostok. In southern Korea, 111 people were killed while 257 others missing. Over 6 500 houses were destroyed leaving over 20 000 people homeless. In addition, about 62 000 hectares of farmland were inundated and more than 2 800 boats damaged. The total damage was estimated at US$140 million. Torrential rain associated with Thelma also resulted in three deaths, three injuries and three people missing in Japan.

The day after Thelma dissipated, another tropical depression, Vernon (8706), formed over the Pacific about 1 800 km east of Manila. Initially, it moved westwards but turned northwestwards about 840 km east of Manila on 18 July. No significant intensification occurred throughout this period. However, Vernon intensified to a severe tropical storm on 19 July. It then turned northwards during the night on 20 July and skirted the northeast coast of Taiwan the next day while moving north-northwestwards. Heavy rain and flooding in Taiwan resulted in four deaths and two others missing. On 22 July, Vernon turned north-northeastwards and skirted the Zhejiang Province along the east coast of China and dissipated in the afternoon over the East China Sea to the east of Shanghai.

While Vernon was dissipating over the East China Sea, Tropical Depression Wynne (8707) developed about 1 210 km south-southeast of Wake Island on 22 July. Moving in a generally west-northwestward direction, it intensified to a typhoon on 24 July. Wynne attained peak intensity on 26 July about 470 km north of Guam. The maximum sustained winds near the centre were in excess of 200 km/h. It recurved east of 132^{o}E and tracked eastwards off the southern coastal waters of Japan. Wynne weakened into a severe tropical storm early on 30 July and further into a tropical storm on the afternoon of 31 July about 640 km east-southeast of Tokyo. It finally became an extratropical cyclone about 1 280 km east of Tokyo during the evening of 1 August.

Alex (8708) formed as a tropical depression about 1 680 km east-southeast of Manila on 23 July. It moved westwards initially, but took on a northwestward track the next day. Alex intensified to a typhoon about 630 km south-southeast of Taibei on 26 July. It then turned northwards and followed almost exactly the same course as Vernon (8706) later in the day. Alex passed the northern tip of Taiwan on 27 July. One person was killed during its passage. It then began to weaken and made landfall along the east coast of China near Wenzhou that evening. Alex became a severe tropical storm and tracked northwards across the Yangtze estuary and weakened further to a tropical storm on 28 July. A tornado was spawned in suburban Shanghai in the afternoon. On the same evening, Alex turned north-northeastwards, moved out to sea and dissipated over the Yellow Sea off the Shandong Peninsula the next day. A total of 125 deaths and about 200 injuries were reported in east China due to the passage of Alex. About 700 houses were also demolished and more than 270 000 hectares of farmland inundated. About 200 fishing boats were also damaged.

August again saw two tropical cyclones, Betty (8709) and Cary (8711) that followed almost identical tracks for a period of their lifetime. Betty developed as a tropical depression about 1 320 km east-southeast of Manila during the morning of 9 August. It quickly intensified to a tropical storm while moving slowly north-northwestwards. Betty further intensified to a typhoon the next day and underwent explosive deepening. On 11 August, Betty took on a westward course and crossed the central Philippines the next day. Betty became the most destructive typhoon to affect the Philippines since Ike (8411). The total damage was estimated at US$32.8 million. On the morning of 13 August, it became the first tropical cyclone in 1987 to enter the South China Sea from the western North Pacific after traversing the Philippines. Betty re-intensified slightly for 36 hours and then weakened gradually as it approached Vietnam. It made landfall over northern Vietnam on 16 August, At least one person was killed and four others were injured in the coastal provinces of Vietnam, Betty weakened to a severe tropical storm that evening. It then swept across Laos and eventually dissipated over northern Thailand near Chiang Mai during the evening of 17 August.

On 10 August, another tropical depression (8710) formed about 1 070 km south-southeast of Tokyo. It initially moved north-northwestwards but then recurved and passed about 120 km east-southeast of Tokyo early on 12 August. It eventually dissipated over the sea to the east of Japan the following morning.

Early on 13 August, the day after Betty battered central Philippines, Tropical Depression Cary (8711) formed about 1 580 km east-southeast of Manila. This position was about 370 km east-northeast of the breeding ground of Betty which formed four days earlier. Initially, Cary moved rapidly north-northwestwards and quickly intensified into a tropical storm. It then took on a west-northwestward track while continuing to intensify. On 17

August, Cary became a typhoon. The next day, it crossed Luzon and passed about 140 km north-northwest of Manila. While traversing the Philippines, Cary temporarily weakened to a severe tropical storm. It re-intensified to a typhoon on the morning of 19 August after entering the South China Sea. Cary moved across the central part of the South China Sea on a track almost parallel to that of Betty. When it skirted the southwest coast of Hainan Island early on 22 August, hurricane force winds and torrential rain resulted in the disruption of power supply to the area. Hundreds of houses were also damaged and more than 500 hectares of crops and sugar cane fields were destroyed. Fortunately, no casualties were reported. On the evening of 22 August, Cary landed in northern Vietnam about 260 km south of Hanoi. It was the second typhoon to make landfall in northern Vietnam within a week. At least 20 people were killed and several hundred were injured in the coastal provinces of northern and central Vietnam during the approach of the two typhoons. Cary continued to move westwards after landfall. It weakened rapidly and eventually dissipated over northern Laos about 180 km north-northwest of Vientiane on 23 August.

Dinah (8712) was the fourth tropical cyclone in August. It formed as a tropical depression about 720 km east of Guam on 21 August. While moving on a westward course, it intensified to a severe tropical storm on 23 August and then turned northwestwards to reach typhoon strength the next day. Dinah crossed the Ryukyu Islands during the night of 29 August and then accelerated rapidly, heading towards the Korea Strait. It entered the Sea of Japan on 31 August and became extratropical while maintaining typhoon strength. In Korea, the passage of Dinah resulted in 23 people dead, 52 missing and over 11 000 homeless. About 85 000 hectares of farmland were inundated. The total damage was estimated at US$15 million. In southwestern Japan, three people were also reported dead, one missing and 57 others injured. Over 250 houses were flooded. Off the coast of Kyushu, a 7 567-ton vessel went aground and 41 boats were sunk. In Okinawa, a 150-ton ferry also sank, and a 3 010-ton vessel and another ferry went aground.

Tropical Depression Ed developed about 1 200 km south-southwest of Wake Island on 21 August. It weakened into an area of low pressure on 23 August while moving on a northwestward course, but regenerated to a tropical depression the next day. Ed eventually dissipated about 400 km north of Guam on the evening of 27 August.

Within an 18-hour period on 4 and 5 September, three tropical cyclones formed over the western North Pacific. Freda (8713) formed as a tropical depression 180 km southwest of Guam on 5 September and moved northwestwards. It gradually deepened to a typhoon on 8 September. Freda turned northeastwards on 11 September and then moved gradually northwards early on 13 September. Continuing on this course, Freda weakened to a severe tropical storm during the evening of 15 September. It then recurved to northeast and finally became extratropical during the night of 17 September.

About 12 hours before Freda formed, another tropical depression developed about 690 km east of Manila. It intensified to Tropical Storm Gerald (8714) on 5 September. Drifting slowly north-northwestwards, it attained typhoon intensity on 7 September. As it approached the Bashi Channel on 8 September, it took on a west-northwestward course. Gerald crossed the Bashi Channel during the day on 9 September. That evening, it passed about 20 km off the southern tip of Taiwan on a north-northwestward course and inflicted some damage to the island. Gerald crossed the Taiwan Strait on 10 September and landed in Fujian Province about 70 km northeast of Xiamen while weakening to a severe tropical storm. After making landfall, Gerald rapidly degenerated to a tropical storm early on 11 September and eventually dissipated about 280 km west of Fuzhou later that morning. Heavier damages were incurred in the coastal provinces of Fujian and Zhejiang.

The last of the triplet, Holly (8715), developed as a tropical depression about 860 km south-southeast of Wake Island on 5 September. It intensified to a tropical storm and then a typhoon on 7 September. Throughout this period and until 9 September, it was moving steadily northwestwards. Holly then turned northwards on the evening of 9 September and maintained such a course for the following 3 days. A sharp recurvature towards the east occurred on 13 September but Holly then turned north again on 14 September and weakened to a tropical storm that evening. Holly gradually decreased in intensity and dissipated on 17 September.

Ian (8716) formed as a tropical depression about 300 km northeast of Guam on 23 September. It moved northwestwards and gradually strengthened to a typhoon on 25 September. Typhoon Ian moved steadily northwestwards until 27 September when it encountered a surge of the winter monsoon. It then became slow-moving and weakened to a severe tropical storm on 30 September. The next day, it accelerated northeastwards and further degenerated to a tropical storm on 2 October. It eventually became an extratropical cyclone about 1 200 km east of Tokyo the next day.

On 25 September, another tropical depression formed over the western North Pacific about 610 km west-southwest of Wake Island. It moved west-southwestwards at about 30 km/h and dissipated over the ocean about 24 hours later.

On 28 September, Hurricane Peke (8717) over the central North Pacific crossed the International Date Line into the western North Pacific while moving west-northwestwards. However, it changed to a northwestward course on 30 September. Peke slowed down on the morning of 1 October and weakened to a severe tropical storm that evening. At about the same time, Peke made an almost complete reversal in direction and moved southeastwards for the rest of its life span. It further weakened to a tropical storm on the evening of 2 October and eventually dissipated during the day of 4 October about 1 250 km northeast of Wake Island.

June (8718), developed as a tropical depression about 910 km west of Wake Island on 28 September. It initially moved northwards but turned towards the northwest on the evening of 28 September and then westwards early on 30 September. June slowed down rapidly and then turned north-northeastwards that afternoon and finally dissipated the next day about 1 080 km east-southeast of Tokyo.

During October, only two tropical cyclones developed. This is less than half of the average number of October cyclones in the western North Pacific. The first of the two was Kelly (8719) which formed as a tropical depression about 450 km north of Yap on 10 October. Moving generally northwards, Kelly intensified to a tropical storm early on 11 October and eventually became a typhoon on the evening of 12 October. It then took on a north-northwestward course for the following three days. Early on 16 October, Kelly recurved north-northeastwards about 400 km to the east-northeast of Okinawa and accelerated towards central Japan. Kelly made landfall over Shikoku just before midnight on 16 October and soon weakened to a severe tropical storm. The next morning, it swept across Honshu, passing close to the city of Kobe. Kelly then entered the Sea of Japan and became an extratropical cyclone soon afterwards. The casualties in Japan due to Kelly included eight deaths and 13 injuries. In addition, thousands of houses were flooded and over 400 incidents of landslides occurred. A 12 376-ton freighter, the 'Eleftheria II', went aground in the coastal waters near Shikoku and Honshu due to high winds.

Lynn (8720) was the other October tropical cyclone in 1987. It developed as a tropical depression about 1 300 km east of Guam on 16 October and reached typhoon strength on 18 October. It swept across the northern Marianas Islands, passing about 170 km northeast of Guam and attained peak intensity on the afternoon of 20 October when maximum sustained winds were estimated to be in excess of 200 km/h. Moving on a westward track, Lynn entered the South China Sea on 24 October. As it encountered a surge of the winter monsoon in that region, Lynn weakened to a severe tropical storm. After making a loop about 190 km southwest of Gaoxiong on 26 October, it moved westwards and dissipated into an area of low pressure over the South China Sea on 27 October. Lynn caused 45 deaths in Taiwan and more than 60 in northern Luzon. Damage in Hong Kong was minor, with one woman injured and a few houses collapsed.

For the first ten days in November, the western North Pacific was void of tropical cyclone activity. Then, early on 11 November, Maury (8721) formed as a tropical depression about 1 550 km east of Manila and moved west-northwestwards. It weakened into a low pressure area the next day but regenerated about 860 km east of Manila on 13 November. It swept across the southeastern part of Luzon on 14 November and passed about 200 km south of Manila. Maury entered the South China Sea on the night of 15 November and intensified to a tropical storm on 17 November. However, it weakened into a tropical depression on 19 November and landed over southern Vietnam about 350 km south-southeast of Danang in the early afternoon. It dissipated rather rapidly soon afterwards. Heavy rain associated with Maury caused widespread damage in Vietnam. At least 86 people were killed and more than 56 000 houses and 15 bridges were damaged. Crops and livestock were also severely affected. Total loss was estimated at more than US$20 million.

Just as Maury was dissipating over Vietnam, Tropical Depression Nina (8722) formed about 930 km east-southeast of Truk on the evening of 19 November. It was the tropical cyclone that developed closest to the equator in 1987. Traversing over open waters in a west-northwestward direction, Nina passed about 30 km south-southwest of Truk overnight on 20 November leaving four deaths, one missing and thousands homeless. It became a typhoon about 220 km northeast of Yap on the evening of 22 November. A rapid intensification of Nina occurred on the morning of 25 November and its maximum sustained winds reached around 200 km/h. Nina swept across the Philippines overnight on 25 November, passing about 110 km south of Manila the next morning. Prior to Nina, Betty (8709) was the most destructive typhoon to hit the Philippines since Ike (8411) in 1984. However, the damage and casualties as a result of the passage of Nina far exceeded those associated with Betty. The death toll was 656 while 152 were reported missing and about 390 injured. Over 300 000 houses were destroyed and more than 1.3 million people became homeless. A total of seven vessels was either reported missing or went aground. The total damage was estimated to be about US$26 million.

Upon entering the South China Sea later that morning, Nina turned west-northwestwards. However, it took on a northwestward course on the morning of 27 November when it was about 570 km south-southwest of Dongsha. It also began to slow down. Later that evening, Nina turned northwards and headed for the south China coast, still maintaining typhoon intensity with maximum sustained winds of over 160 km/h. A very intense surge of the winter monsoon reached the south China coast on the morning of 28 November, causing significant temperature drops and gale force winds over the coastal waters. Nina turned eastwards while it was about 290 km south-southwest of Hong Kong that afternoon. This surge of the winter monsoon injected large amounts of cold air into the circulation of Nina which then weakened rapidly to a severe tropical storm that evening. Overnight on 28 November, Nina further weakened into a tropical storm and dissipated over open waters soon afterwards.

Ogden formed on 24 November over the South China Sea about 280 km off the coast of southern Vietnam. It moved west-northwestwards and landed about 330 km northeast of Ho Chi Minh City the next morning and soon weakened into an area of low pressure.

The last tropical cyclone of 1987 was Phyllis (8723). It formed as a tropical depression about 750 km south-southeast of Guam on 11 December and moved northwestwards. On 13 December it turned abruptly west-southwestwards. Intensification took place quickly and Phyllis became a typhoon on 15 December. Phyllis devastated farmlands in the central Philippines on 16 December, leaving several hundred dead in the Sorsogon Province. It also generated high waves that sank a ferry. At least 10 people were drowned and 13 others were reported missing. Phyllis then began to weaken and entered the South China Sea on 17 December. It finally dissipated about 700 km east of Ho Chi Minh City on 20 December.

Note: Casualties and damage figures were consolidated from press reports.

3. REPORTS ON TROPICAL CYCLONES AFFECTING HONG KONG IN 1987

(a) Tropical Storm Ruth (8703)

18-20 June 1987

The track of Tropical Storm Ruth is shown in Figure 4

Ruth was the first tropical cyclone in the South China Sea and the third tropical cyclone in the western North Pacific in 1987. It developed as a tropical depression about 260 km southwest of Dongsha during the morning of 18 June. In its incipient stage, Ruth was well-organized with maximum sustained winds of about 55 km/h near the centre. Meteorological satellite pictures received on 18 June showed that despite having only a relatively small circulation, Ruth had good banding features and its centre was neatly defined by spirals. By the afternoon of 18 June, the circulation of Ruth also became discernible on the Royal Observatory radarscope.

Ruth moved northwestwards at about 22 km/h initially and intensified into a tropical storm about 12 hours after its formation. It then tracked west-northwest across the northern part of the South China Sea at about 20 km/h. Throughout the rest of its sea track, Ruth maintained at tropical storm intensity with maximum sustained winds of about 65 km/h. It crossed the south China coast between Yangjiang and Zhanjiang about 290 km west-southwest of Hong Kong on the morning of 19 June and moved further inland on a west-northwesterly course at 22 km/h. Soon after landfall, Ruth reached its peak intensity with maximum sustained winds of about 83 km/h and then weakened into a tropical depression that evening and eventually dissipated as an area of low pressure about 80 km northwest of Nanning in Guangxi on the morning of 20 June.

According to press reports, Ruth inflicted widespread damage and casualties in southwest Guangdong and southeast Guangxi. In Guangdong, about 113 000 hectares of farmland were inundated and 63 000 hectares of banana plantations were affected. Extensive irrigation works were also damaged and 17 cows were killed. Casualty figures included seven dead and 86 injured. Over 45 000 houses collapsed in the fury of Ruth and more than 210 000 houses were partially damaged. Roads were flooded and about 345 bridges were destroyed. In Guangxi, three deaths and 26 injuries were reported. As a result of the heavy rain, 45 bridges and over 780 houses were damaged. In addition, over 7 000 hectares of farmland and about 6 000 hectares of economic plantation were inundated. The railway service was also temporarily disrupted.

In Hong Kong the Stand By Signal No. 1 was hoisted at 3.45 p.m. on 18 June when Ruth was centred about 260 km to the south. Local winds were fresh gusty easterly, strong offshore in the afternoon. Ruth came closest to Hong Kong around 11.00 p.m. on 18 June when it was about 220 km to the south-southwest but the lowest mean sea-level pressure during Ruth's passage, 1 002.0 hPa, was registered five hours later at around 4.00 a.m. on 19 June. By morning of 19 June, Ruth had landed in western Guangdong and local winds had started to moderate and veer to the southeast. All signals were lowered in Hong Kong at 11.15 a.m. the same day. The maximum mean hourly wind speeds, the maximum gust peak speeds and the associated wind directions at selected locations during the passage of Ruth were as follows:

Location	*Maximum mean hourly wind speed in km/h with direction in points*		*Maximum gust peak speed in km/h with direction in points*	
Royal Observatory	E	36	E	72
Hong Kong Airport (SE)	ESE	43	E	72
Hong Kong Airport (NW)	E	36	ENE	83
Waglan Island	ENE	65	ENE	87
Tate's Cairn	E	58	E	110
Cheung Chau	ESE	54	ESE	85
King's Park	E	19	E	31
Star Ferry	E & ESE	36	E	72
Green Island	ENE	62	ENE	94
Tai O	ESE	30	ESE	56
Sha Tin	E	23	E	43
Kwai Chung	ESE	27	E	56
Chek Lap Kok	E	56	E	77
Lau Fau Shan	ENE	27	ENE	52
Ta Kwu Ling	E	27	E	75
Tai Mo Shan	ESE	87	ESE	115
Tsing Yi	ESE	25	E	58

Locally the weather was cloudy on 18 June with increasing showery activities in the afternoon and during the night. Unsettled weather conditions persisted on the ensuing day and there were occasional heavy squally showers. The weather improved slightly on 20 June with only scattered showers reported. For the next two days, the weather was sunny apart from some isolated showers. The daily amounts of rainfall recorded at some selected stations were as follows:

Date	*Royal Observatory* mm	*Hong Kong Airport* mm	*Tai Po* mm	*Tai Mei Tuk* mm
18 June	2.7	4.0	5.0	6.5
19 June	61.0	108.5	47.0	7.0
20 June	9.2	5.0	26.5	9.5
21 June	1.9	3.0	0.5	1.0
22 June	0.3	1.0	1.0	2.5
Total	75.1	121.5	80.0	26.5

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

Location	Highest tide above chart datum			Maximum storm surge above astronomical tide		
	Height (m)	Date	Time	Height (m)	Date	Time
Lok On Pai	2.44	18 June	2.58 p.m.	0.43	18 June	9.45 p.m.
Quarry Bay	2.35	18 June	2.23 p.m.	0.51	18 June	11.30 p.m.
Tamar	2.40	18 June	3.00 p.m.	0.55	18 June	5.00 p.m.
Tsim Bei Tsui	2.43	18 June	4.15 p.m.	0.46	18 June	1.15 a.m.

In Hong Kong damage was minimal. Gusty winds in parts of the urban area resulted in the collapse of scaffoldings at a construction site at Lai Chi Kok Road.

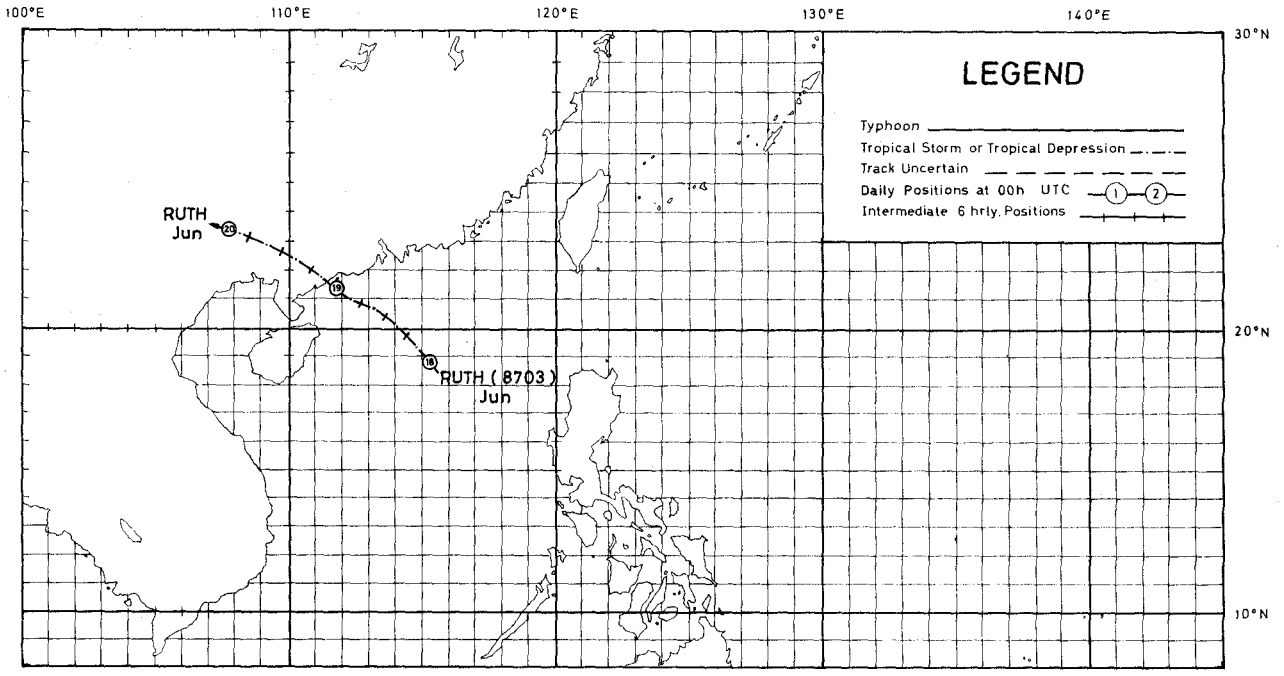


Figure 4. Track of Tropical Storm Ruth (8703): 18–20 June 1987.

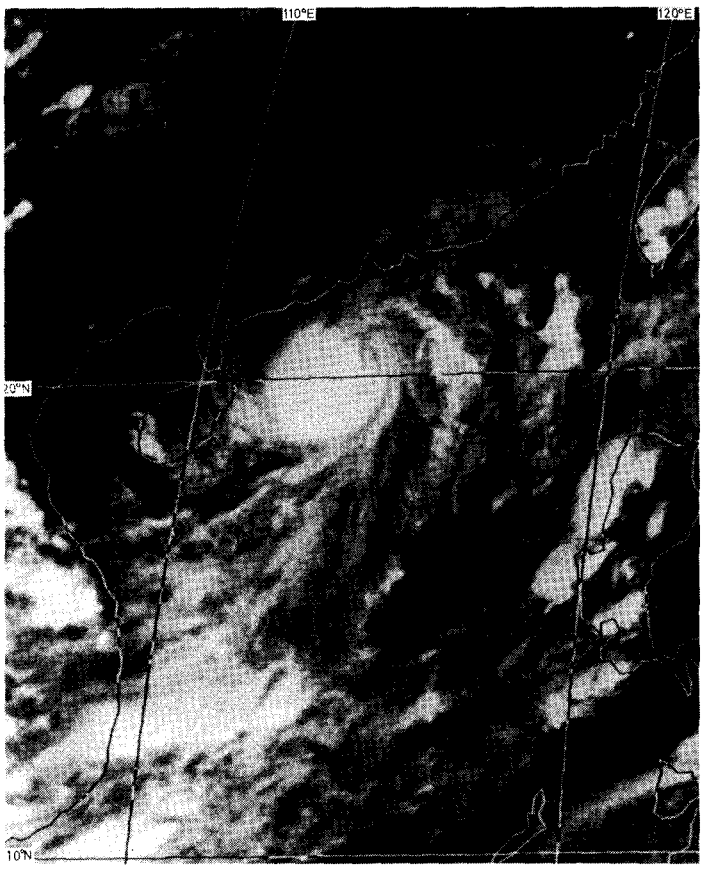


Figure 5. GMS-3 infra-red imagery of Tropical Depression Ruth (8703) around 5.00 p.m. on 18 June 1987.

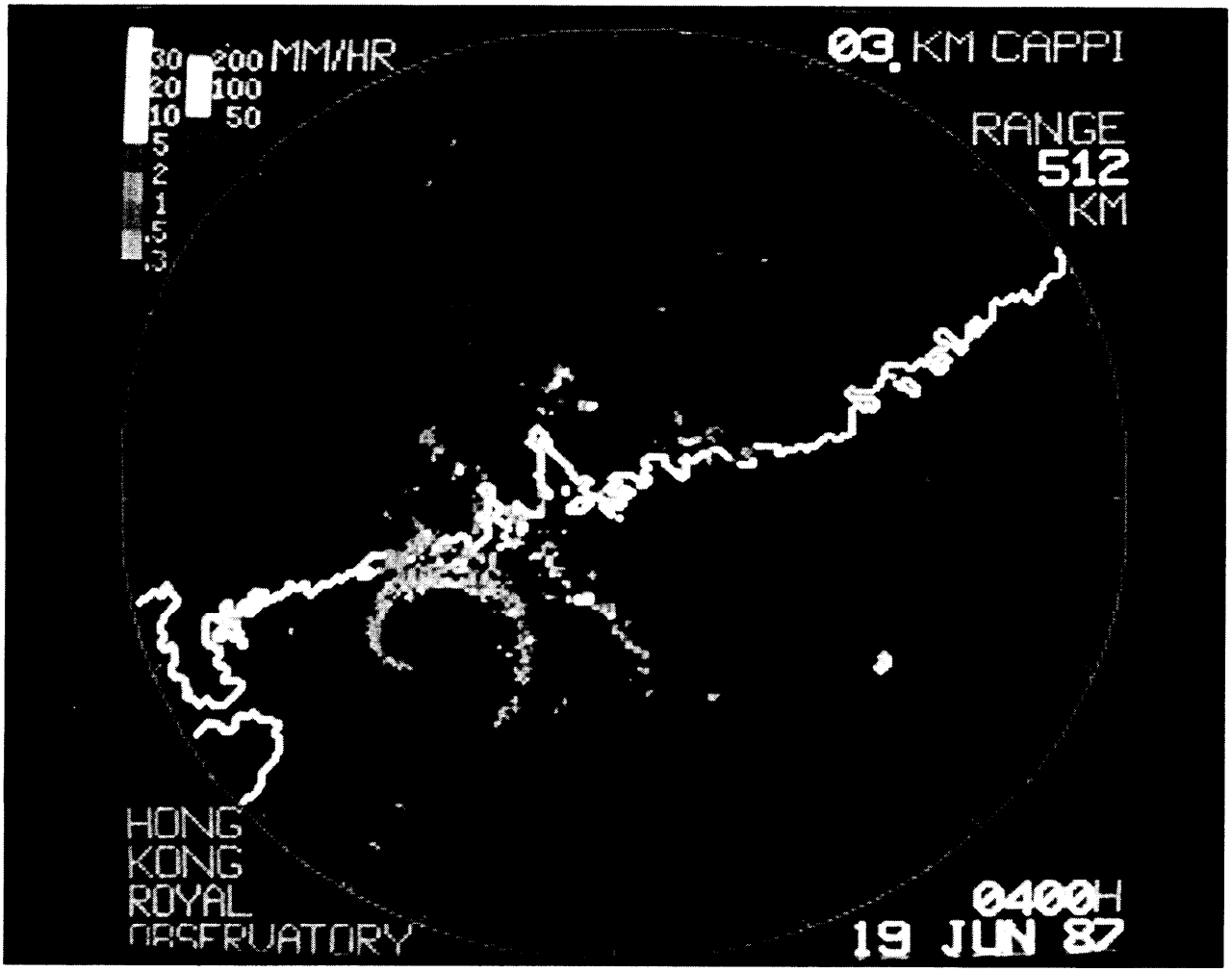


Figure 6. Radar display of the rainbands of Tropical Storm Ruth (8703) at 4.00 a.m. on 19 June 1987.

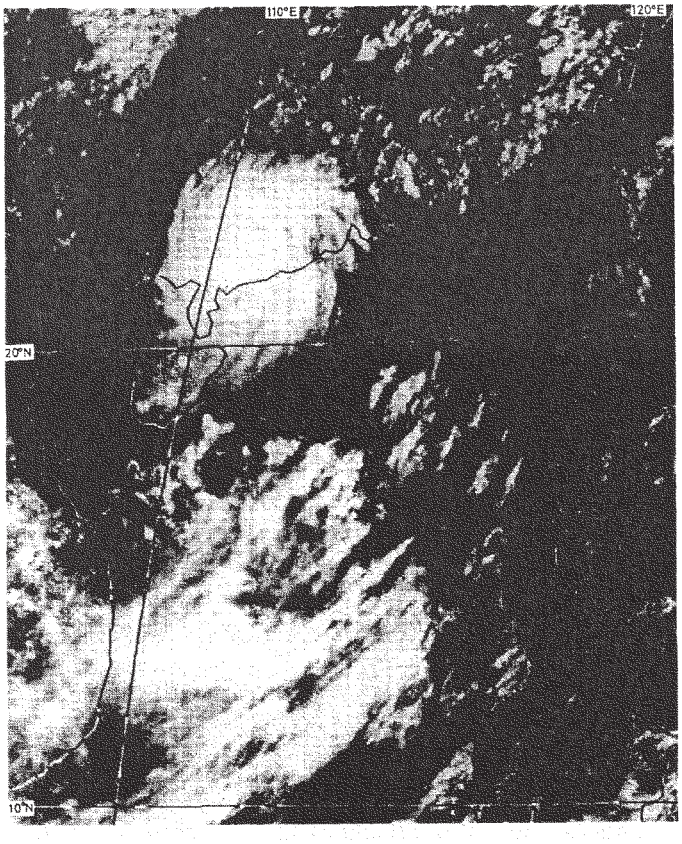


Figure 7. GMS-3 visible imagery of Tropical Storm Ruth (8703) around 2.00 p.m. on 19 June 1987.

Figure 8. Scaffolding at a construction site at Lai Chi Kok Road collapsed around 1.15 a.m. on 19 June 1987 (By courtesy of Oriental Daily News).

(b) Typhoon Betty (8709)

9-17 August 1987

The track of Typhoon Betty is shown in Figure 9

Typhoon Betty developed as a tropical depression over the western North Pacific about 1 320 km east-southeast of Manila during the morning of 9 August 1987. It intensified to a tropical storm six hours after its formation and moved slowly north-northwestwards during the following 24 hours.

Betty further intensified to a severe tropical storm at 8 a.m. on 10 August and to a typhoon about six hours later. For the ensuing 24 hours, it underwent 'explosive' deepening, with the minimum sea-level pressure near the centre dropping from 970 hPa to 910 hPa, a fall of 60 hPa in 24 hours. Maximum sustained winds were estimated to have increased from 121 km/h to 221 km/h. This deepening process was documented by aircraft reconnaissance data and satellite imageries received at the Royal Observatory. A faint ragged eye of Betty first appeared at 11 a.m. on 10 August. The eye rapidly turned circular in the following 3 hours and subsequently became increasingly well-defined. During this period of deepening, Betty took on a westerly track and headed towards the central Philippines at an average speed of 12 km/h.

Betty reached peak intensity around 8 p.m. on 11 August when the minimum sea-level pressure and maximum sustained winds were estimated to be 900 hPa and 241 km/h respectively. A reconnaissance aircraft reported a minimum sea-level pressure of 900 hPa at 5.01 a.m. on 12 August, indicating that the intensity had been maintained for at least nine hours. Meanwhile it continued to head for the central Philippines at an accelerated speed of about 20 km/h and landed at Samar Island shortly after 8 a.m. on 12 August. Winds of 180 km/h were reported from an island station about 40 km south-southwest of the centre that evening. According to press reports, Betty was the most devastating typhoon to affect the Philippines since Typhoon Ike in 1984. Altogether 94 people were killed and about 700 000 others were rendered homeless. The total damage was estimated at US$32.8 million.

Betty changed to a west-northwesterly course while crossing the central Philippines and the maximum sustained winds dropped to about 167 km/h. During the morning of 13 August, it became the first tropical cyclone in the year to enter the South China Sea from the western Pacific after traversing the Philippines.

During the next 36 hours, Typhoon Betty slowly re-intensified while maintaining a west-northwestward track at an average speed of 23 km/h. When it passed about 135 km to the south-southwest of Xisha early on 15 August, maximum sustained winds were estimated to be around 185 km/h. Betty weakened gradually as it approached Vietnam, while maintaining typhoon intensity with maximum sustained winds of about 121 km/h. It made landfall in northern Vietnam about 350 km south-southeast of Hanoi during the afternoon of 16 August. At least one person was killed and four others were injured in the coastal provinces of Vietnam. Betty weakened to a severe tropical storm that evening, swept across Laos and eventually dissipated over northern Thailand near Chiang Mai during the evening of 17 August.

In Hong Kong the Stand By Signal No. 1 was hoisted at 2.45 p.m. on 14 August when Betty was centred about 750 km to the south of Hong Kong. The signal was lowered at noon the following day when Betty was about 760 km to the southwest. Betty came closest to Hong Kong at around 5 p.m. on 14 August when it was about 740 km to the south. The lowest sea-level pressure of 1 006.1 hPa was recorded at the Royal Observatory at around 6 p.m. on 14 August. Local winds were moderate gusty easterly, fresh offshore. The maximum hourly mean winds and maximum gust peak speeds together with associated wind direction at selected locations during the display of the Stand By Signal were listed underneath:

Location	*Maximum mean hourly wind speed in km/h with direction in points*		*Maximum gust peak speed in km/h with direction in points*	
Royal Observatory	ESE	25	ESE	51
Hong Kong Airport (SE)	E	31	E	52
Hong Kong Airport (NW)	SE	30	E	63
Waglan Island	E	40	ENE	63
Tate's Cairn	ESE	40	ESE&E	68
Cheung Chau	E	27	E	52
King's Park	ESE	22	ESE	52
Star Ferry	ESE	25	ESE	47
Green Island	ENE	43	ENE	72
Tai Mo Shan	SE	58	SE	75
Tai O	ESE	25	ESE	59
Sha Tin	ESE	16	SSW	34
Kwai Chung	E	20	E	44
Chek Lap Kok	E	40	E	53
Lau Fau Shan	E	25	E	41
Ta Kwu Ling	ESE	21	SE	53

The local weather was fine at first on 14 August, but became cloudy with scattered showers later. The showery conditions persisted on 15 August and there were also some morning thunderstorms. The daily amounts of rainfall recorded at some selected stations were as follows:

Date	*Royal Observatory* mm	*Hong Kong Airport* mm	*Cheung Chau* mm
14 August	4.7	2.5	Trace
15 August	20.8	26.0	12.0
Total	25.5	28.5	12.0

The times and heights of the highest tides and maximum storm surges recorded at various locations during the passage of Betty were also tabulated below:

Location	Highest tide above chart datum			Maximum storm surge above astronomical tide		
	Height (m)	Date	Time	Height (m)	Date	Time
Quarry Bay	2.01	14 Aug	12.53 p.m.	0.43	14 Aug	10.30 p.m.
Tai Po Kau	2.08	14 Aug	1.45 p.m.	0.78	14 Aug	9.45 p.m.
Tamar	2.05	14 Aug	1.00 p.m.	0.36	14 Aug	10.15 p.m.
Lok On Pai	2.11	14 Aug	1.30 p.m.	0.30	14 Aug	10.45 p.m.
Tsim Bei Tsui	2.16	14 Aug	1.45 p.m.	0.35	15 Aug	0.45 a.m.
Waglan Island	2.04	14 Aug	1.09 a.m.	0.33	14 Aug	9.30 a.m.

There were no reports of damage and casualties in Hong Kong.

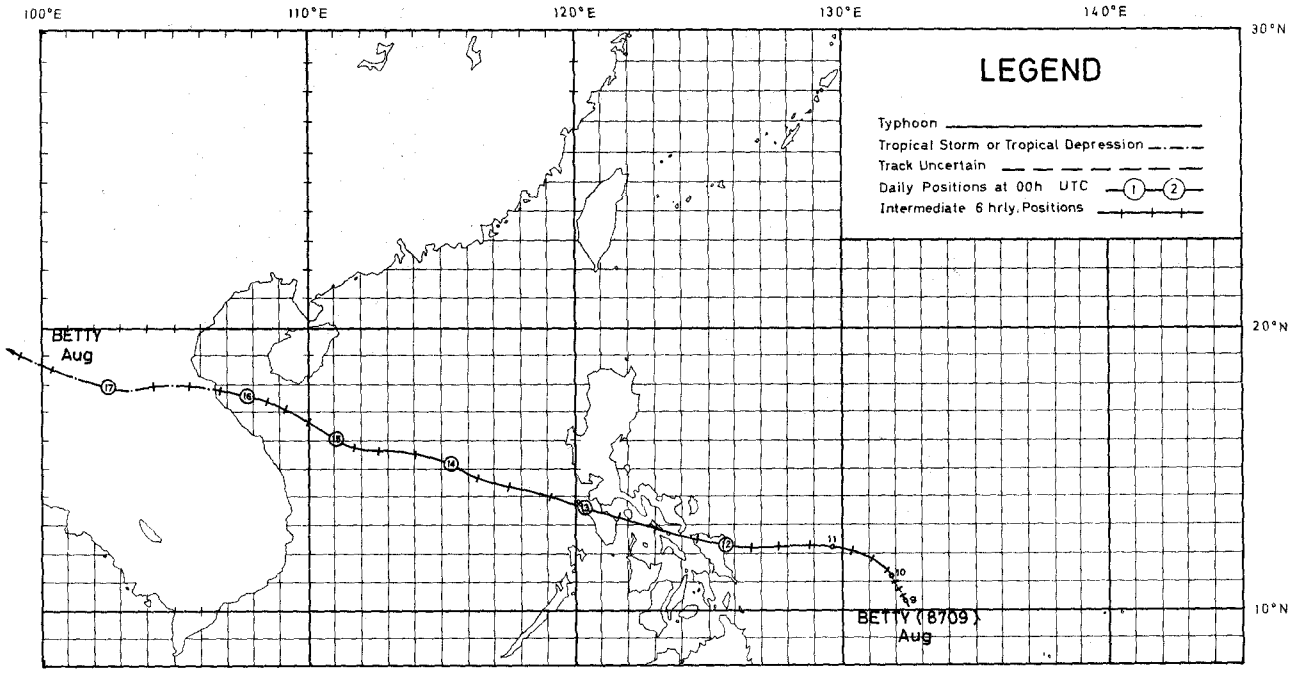


Figure 9. Track of Typhoon Betty (8709): 9–17 August 1987.

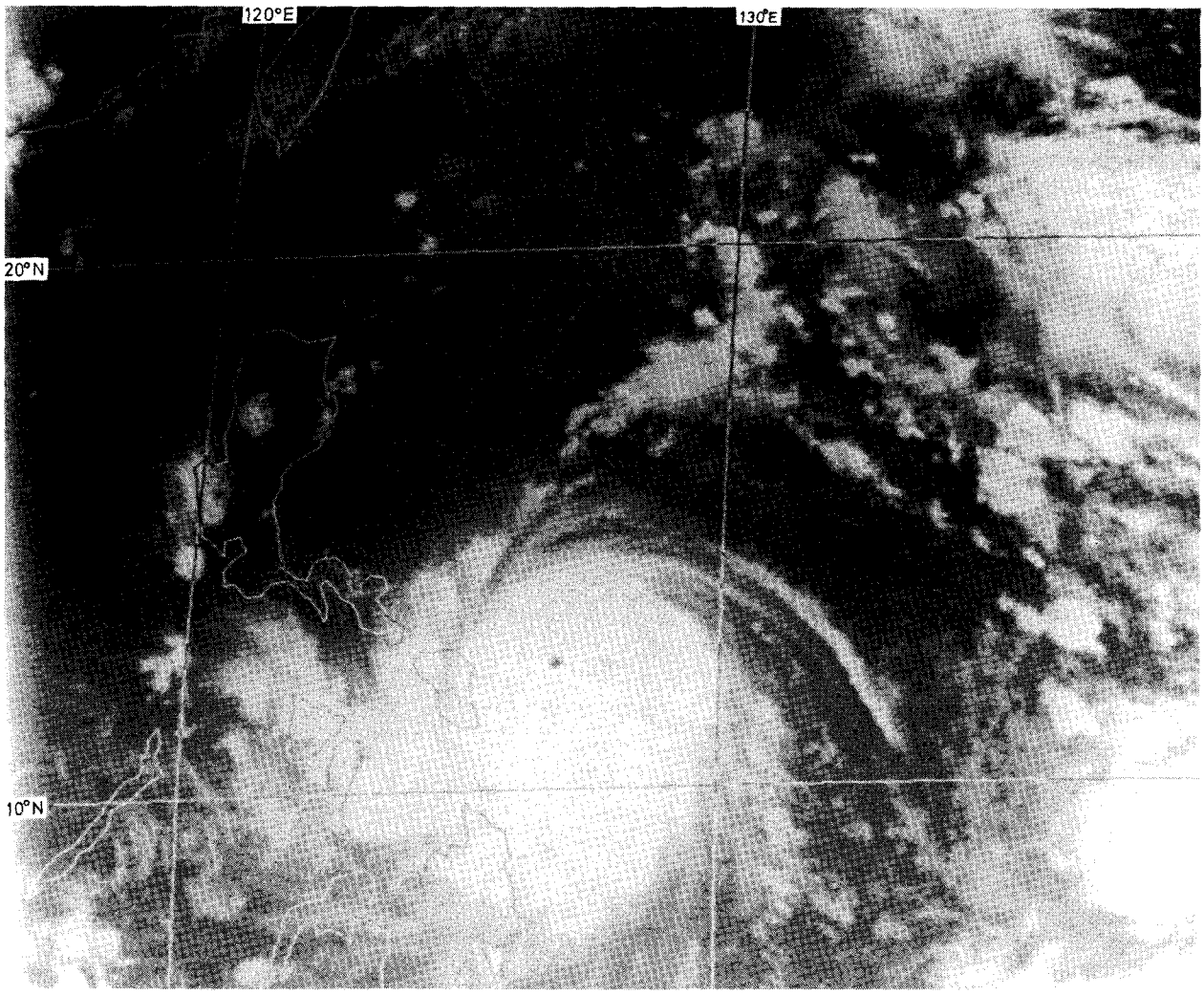


Figure 10. GMS-3 *infra-red* imagery of Typhoon Betty (8709) around 11.00 p.m. on 11 August 1987.

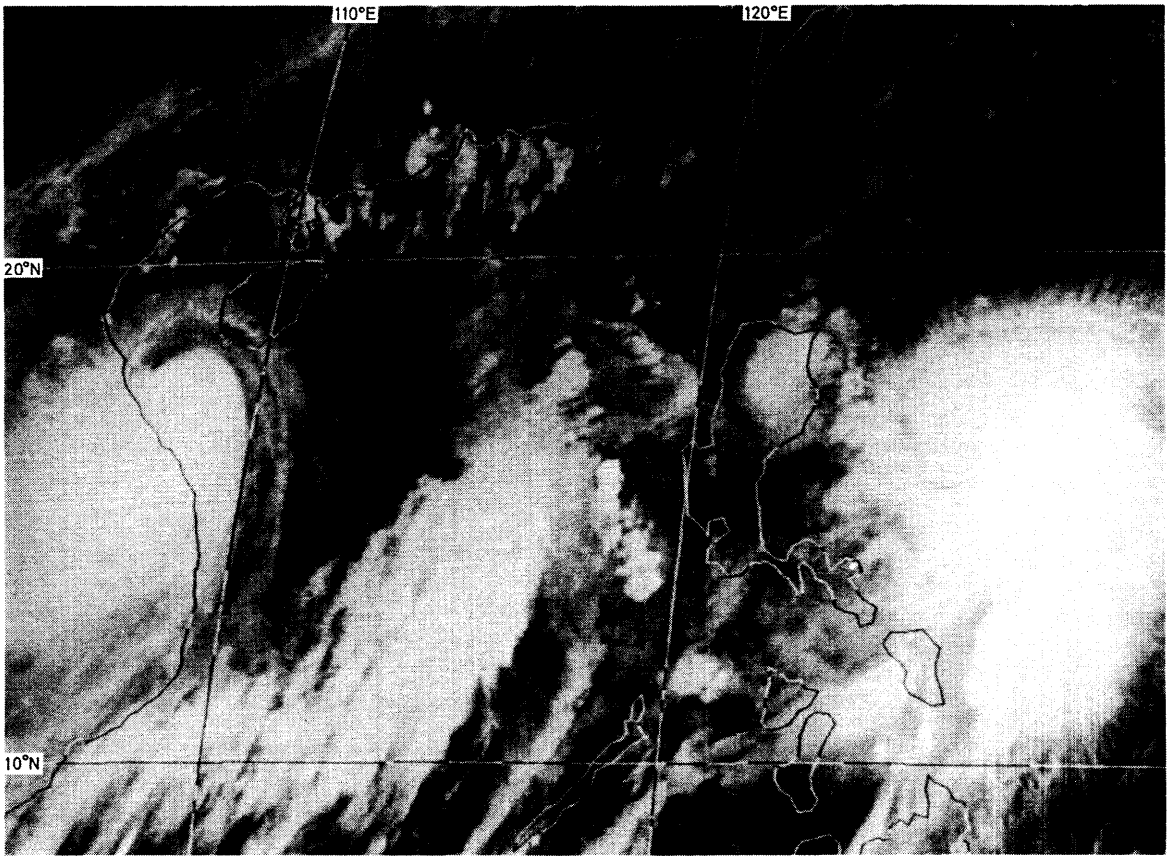


Figure 11. GMS-3 infra-red imagery of Typhoon Betty (8709) around 8.00 a.m. on 16 August 1987. Cary (8711), a severe tropical storm at this time, can be seen to the east of Luzon.

(c) Typhoon Cary (8711)

13-23 August 1987

The track of Typhoon Cary is shown in Figure 12

Typhoon Cary developed as a tropical depression over the western North Pacific early on 13 August about 1 580 km east-southeast of Manila. This position was about 370 km east-northeast of the breeding ground of Typhoon Betty which formed four days earlier.

Initially, Cary moved rapidly north-northwestwards and within six hours of its formation, intensified into a tropical storm. It then turned onto a west-northwesterly track at an average speed of 14 km/h. It continued to intensify and attained severe tropical storm intensity during the afternoon of 14 August.

Cary slowed down to about nine km/h while maintaining a west-northwestward track on 16 August. It changed course and moved southwest to west-southwest towards Luzon on 17 August. At about the same time, it further strengthened to a typhoon. Meanwhile a ragged eye also became discernible on the satellite imagery received at 11.00 a.m. on 17 August.

Cary crossed the island of Luzon on 18 August and passed about 140 km north-northwest of Manila. While traversing the Philippines, Cary temporarily weakended to a severe tropical storm. It re-intensified to a typhoon on the morning of 19 August after entering the South China Sea.

Cary moved across the central part of the South China Sea on a westward track at an average speed of 13 km/h on 19 and 20 August. It attained peak intensity around 7 to 8 p.m. on 19 August when sustained winds of 157 km/h were reported by a ship about 35 km from its centre.

On the morning of 21 August, Typhoon Cary passed about 80 km southwest of Xisha and moved northwestwards at about 19 km/h. When it passed close to the southwest coast of Hainan Island early on 22 August, hurricane force winds and torrential rain resulted in the disruption of water and electricity supplies to the area. Hundreds of houses were damaged and more than 500 hectares of crops and sugar cane were destroyed. However, there were no reports of casualties.

Afterwards, Cary took on a westward track and moved at about 22 km/h. It landed in northern Vietnam about 260 km south of Hanoi during the evening of 22 August. It was the second typhoon after Typhoon Betty to make landfall in northern Vietnam within a week. According to press reports, at least 20 people were killed and several hundred were injured in the coastal provinces of north and central Vietnam during the approach of the two typhoons.

Cary continued to move westwards at about 25 km/h after landfall. It weakened rapidly to a severe tropical storm and then a tropical storm during the morning of 23 August and eventually dissipated over northern Laos about 180 km north-northwest of Vientiane that afternoon.

In Hong Kong, the Stand By Signal No. 1 was hoisted at 11.00 p.m. on 19 August when Cary was 770 km south-southeast of Hong Kong and lowered at noon on 21 August when the typhoon was 700 km to the south-southwest. The lowest sea-level pressure of 1 004.8 hPa was recorded at the Royal Observatory at 5.00 a.m. on 21 August. Cary came closest to Hong Kong at around 9 p.m. on the same day when it was about 670 km to the southwest. During the period when the Stand By Signal was hoisted, local winds were light to moderate easterly at first, but became occasionally fresh gusty later. The maximum mean hourly wind speeds and maximum gust peak speeds together with associated directions recorded at selected locations during the passage of Cary were as follows:

Location	*Maximum mean hourly wind speed in km/h with direction in points*		*Maximum gust peak speed in km/h with direction in points*	
Royal Observatory	E	30	E	56
Hong Kong Airport (SE)	E	38	E	63
Hong Kong Airport (NW)	SE	31	SE	70
Waglan Island	E	38	E	76
Tate's Cairn	ESE	47	SE	81
Cheung Chau	E	34	E	72
King's Park	E	25	E	59
Star Ferry	ESE	30	ESE	76
Green Island	ENE	54	ENE	72
Tai O	E	36	E	68
Sha Tin	E	16	S	47
Kwai Chung	E	27	SE	58
Chek Lap Kok	E	41	E	67
Lau Fau Shan	ESE	30	ESE	67
Ta Kwu Ling	ESE	22	S	70
Tai MO Shan	SE	65	SE	94
Tsing Yi	ESE	25	SE	54

The weather was fine and hot in Hong Kong on 19 August. It became cloudy with scattered showers and thunderstorms the next day. Cloudy conditions persisted on 21 August, but there were only isolated showers. The daily amounts of rainfall recorded at selected locations were as follows:

Date	*Royal Observatory*	*Hong Kong Airport*	*Cheung Chau*
	mm	mm	mm
19 August	Nil	Nil	Nil
20 August	41.5	22.0	6.0
21 August	4.0	3.5	10.6
Total	45.5	25.5	16.6

The times and heights of the highest tides and maximum storm surges recorded at various locations during the passage of Cary were also tabulated below:

Location	Highest tide above chart datum			Maximum storm surge above astronomical tide		
	Height (m)	Date	Time	Height (m)	Date	Time
Lok On Pai	2.26	21 Aug	7.05 a.m.	0.41	20 Aug	7.30 p.m.
Quarry Bay	2.21	21 Aug	5.30 a.m.	0.28	20 Aug	7.45 p.m.
Tai Po Kau	2.19	21 Aug	5.15 a.m.	0.49	21 Aug	5.15 p.m.
Tamar	2.05	21 Aug	6.41 a.m.	0.14	20 Aug	6.30 p.m.
Tsim Bei Tsui	2.26	21 Aug	8.08 a.m.	0.55	20 Aug	8.00 p.m.
Waglan Island	2.16	20 Aug	5.11 a.m.	0.09	20 Aug	8.45 a.m.

There were no reports of damage and casualties in Hong Kong.

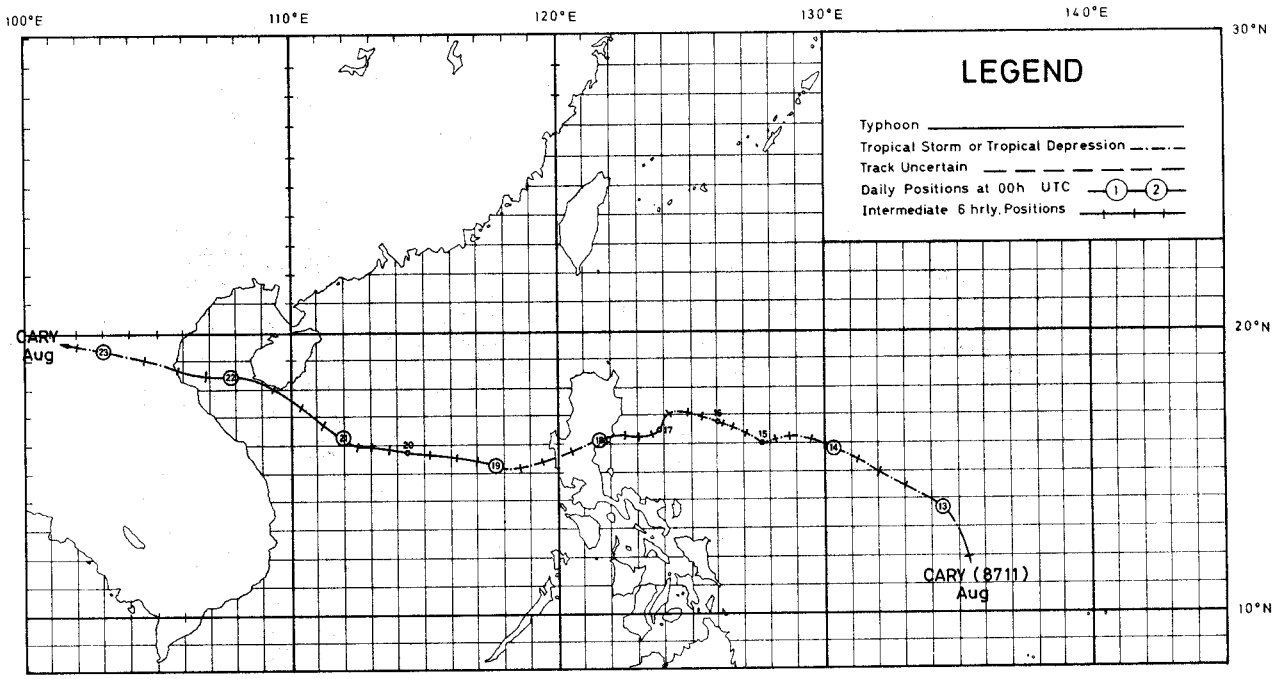


Figure 12. Track of Typhoon Cary (8711): 13–23 August 1987.

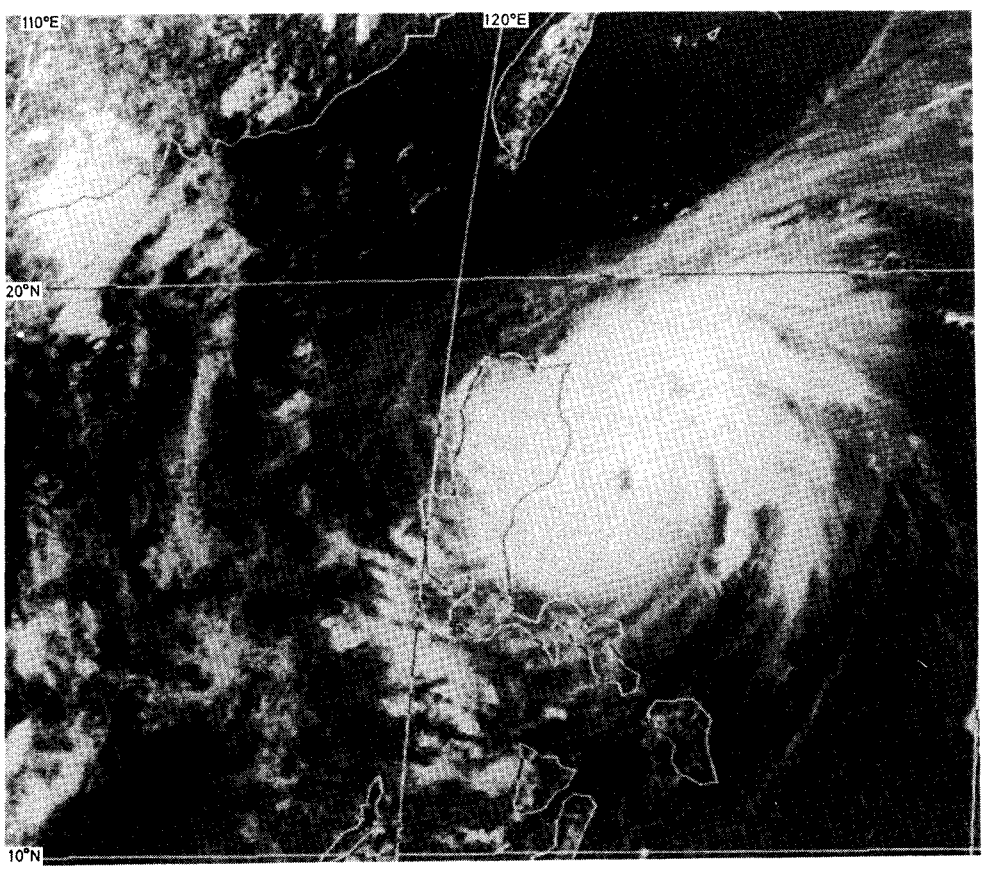


Figure 13. GMS-3 visible imagery of Typhoon Cary (8711) around 2.00 p.m. on 17 August 1987.

Figure 14. GMS-3 infra-red imagery of Typhoon Cary (8711) around 8.00 p.m. on 21 August 1987.

(d) Typhoon Gerald (8714)

4-11 September 1987

The track of Typhoon Gerald is shown in Figure 15

Gerald developed as a tropical depression over the western North Pacific about 690 km east of Manila during the evening of 4 September. It intensified to a tropical storm the following afternoon and further strengthened to a severe tropical storm on 6 September. On 7 September, Gerald attained typhoon intensity with maximum sustained winds of about 120 km/h. Throughout this intensification period, Gerald was drifting slowly north-northwestwards.

Gerald accelerated to a speed of around 14 km/h on 8 September and took on a west-northwesterly course as it approached the Bashi Channel. The satellite imagery received at 8.00 a.m. that morning revealed the formation of a large ragged eye, indicating that the typhoon had deepened further.

Gerald crossed the Bashi Channel during the day on 9 September on a northwestward track and passed about 20 km off the southern tip of Taiwan that evening. It then entered the Taiwan Strait and moved north-northwestwards at an average speed of about 17 km/h. On the morning of 10 September, Gerald passed about 15 km west of the island of Magong, where sustained winds in excess of 150 km/h were recorded. During the evening, it weakened to a severe tropical storm and landed in Fujian about 70 km northeast of Xiamen. After making landfall, Gerald rapidly degenerated to a tropical storm early on 11 September and eventually dissipated about 280 km west of Fuzhou later that morning.

Damage and casualties were reported in Taiwan when Gerald skirted the southern and western parts of the island on 9 and 10 September. Altogether five people were killed, 26 were injured and another 15 were missing. Power supplies to 800 000 homes were disrupted and over 12 000 hectares of farmland were flooded. In Gaoxiong, seven fishing boats were sunk and three ships were sent adrift by hurricane force winds. Gerald also brought torrential rain to the coastal provinces of Fujian and Zhejiang in southeast China where extensive damage and casualties were inflicted. According to press reports, 122 people were killed, 158 were injured and another 13 were missing. Over 0.5 million hectares of farmland were inundated and thousands of houses were destroyed. Two boats were also sunk in the coastal waters of Fujian and another two ran aground during the passage of Gerald.

In Hong Kong the Stand By Signal No. 1 was hoisted at noon on 9 September when Gerald was about 770 km east of Hong Kong. The Signal was lowered at 11.00 a.m. on 10 September when Gerald was over the Taiwan Strait about 550 km to the east-northeast of Hong Kong. The lowest sea-level pressure of 1 000.8 hPa was recorded at the Royal Observatory at 4.00 p.m. on 9 September when the typhoon was about 720 km east of Hong Kong. Gerald was closest to Hong Kong shortly before it weakened to an area of low pressure when it was about 490 km to north-northeast. During the display of the Stand By Signal, local winds were fresh gusty northerly off-shore and in exposed places and occasionally strong on hilltops. The maximum hourly mean winds and maximum gust peak speeds together with associated wind directions at selected locations were as follows:

Location	*Maximum mean hourly wind speed in km/h with direction in points*		*Maximum gust peak speed in km/h with direction in points*	
Royal Observatory	WNW	14	NW	36
Hong Kong Airport (SE)	NNW	25	NNW	52
Hong Kong Airport (NW)	N	25	N	52
Waglan Island	NNW	45	NNW	68
Tate's Cairn	N	54	N	87
Cheung Chau	NNW	40	NNW	63
King's Park	N	14	NNW	38
Star Ferry	WNW	19	NW	31
Tai O	N	31	N	51
Sha Tin	N	19	NNE&NNW	31
Kwai Chung	WNW	12	WNW	31
Chek Lap Kok	NW	36	NNW	43
Lau Fau Shan	NW&N	30	NW	45
Ta Kwu Ling	N	16	NNE	41
Tai Mo Shan	NNW	49	NNW	62
Tsing Yi	N	13	N	31

The weather in Hong Kong was fine and hot on 9 and 10 September. It became cloudy on 11 September and there were some isolated showers on 12 and 13 September. Some more showers and isolated thunderstorms occurred during the morning of 14 September, but it became fine in the afternoon. The daily amounts of rainfall recorded at some selected locations were as follows:

Date	*Royal Observatory* mm	*Hong Kong Airport* mm	*Cheung Chau* mm
9 September	Nil	Nil	Nil
10 September	Nil	Nil	Nil
11 September	Nil	Nil	Nil
12 September	0.2	0.5	Trace
13 September	1.7	Trace	16.5
14 September	0.9	4.0	Trace
Total	2.8	4.5	16.5

The times and heights of the highest tides and maximum storm surges recorded at various locations during the passage of Gerald were also tabulated below:

Location	Highest tide above chart datum			Maximum storm surge above astronomical tide		
	Height (m)	Date	Time	Height (m)	Date	Time
Chi Ma Wan	2.42	10 Sep	11.06 a.m.	0.43	10 Sep	1.00 p.m.
Lok On Pai	2.65	9 Sep	11.15 a.m.	0.41	10 Sep	2.00 p.m.
Quarry Bay	2.53	9 Sep	10.45 a.m.	0.38	10 Sep	12.30 p.m.
Tai Po Kau	2.57	9 Sep	10.15 a.m.	0.83	9 Sep	6.00 a.m.
Tamar	2.49	9 Sep	10.27 a.m.	0.31	10 Sep	12.30 p.m.
Tsim Bei Tsui	2.60	10 Sep	12.45 p.m.	0.33	9 Sep	5.00 p.m.

There were no reports of damage and casualties in Hong Kong.

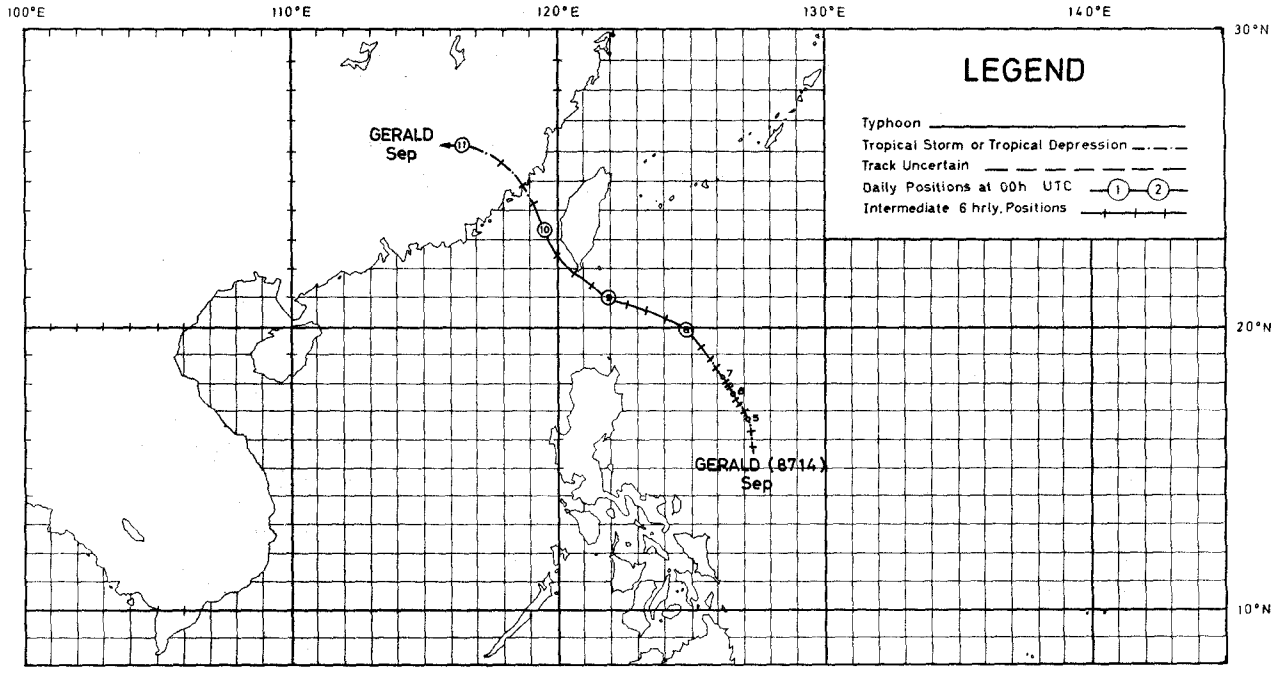


Figure 15. Track of Typhoon Gerald (8714): 4–11 September 1987.

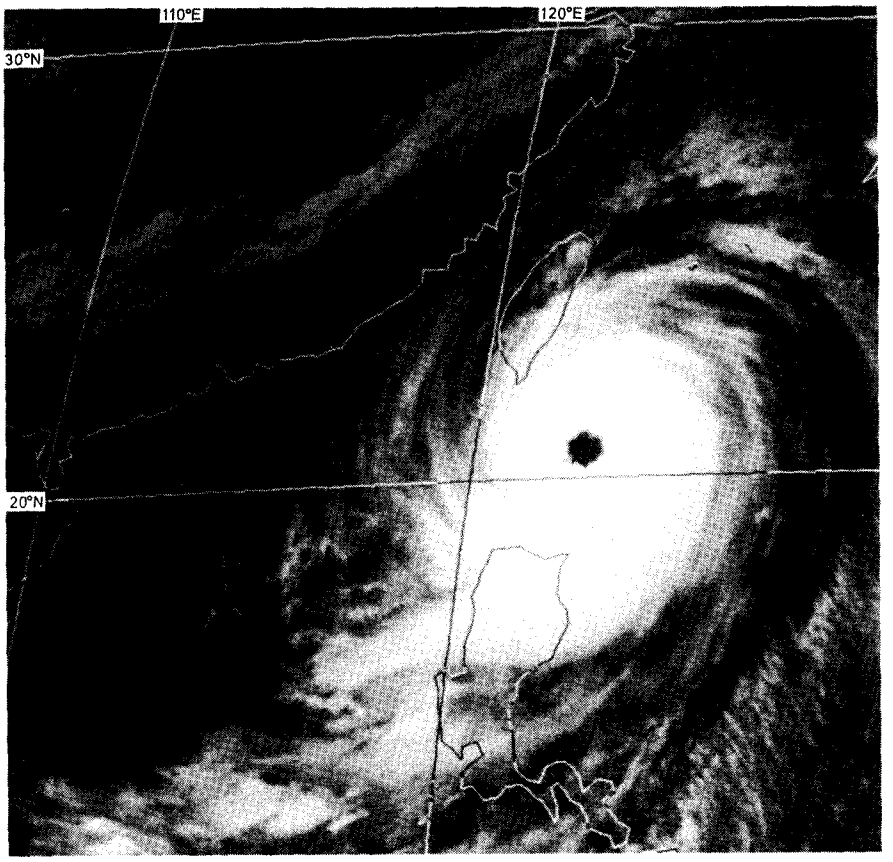


Figure 16. GMS-3 infra-red imagery of Typhoon Gerald (8714) around 2.00 a.m. on 9 September 1987.

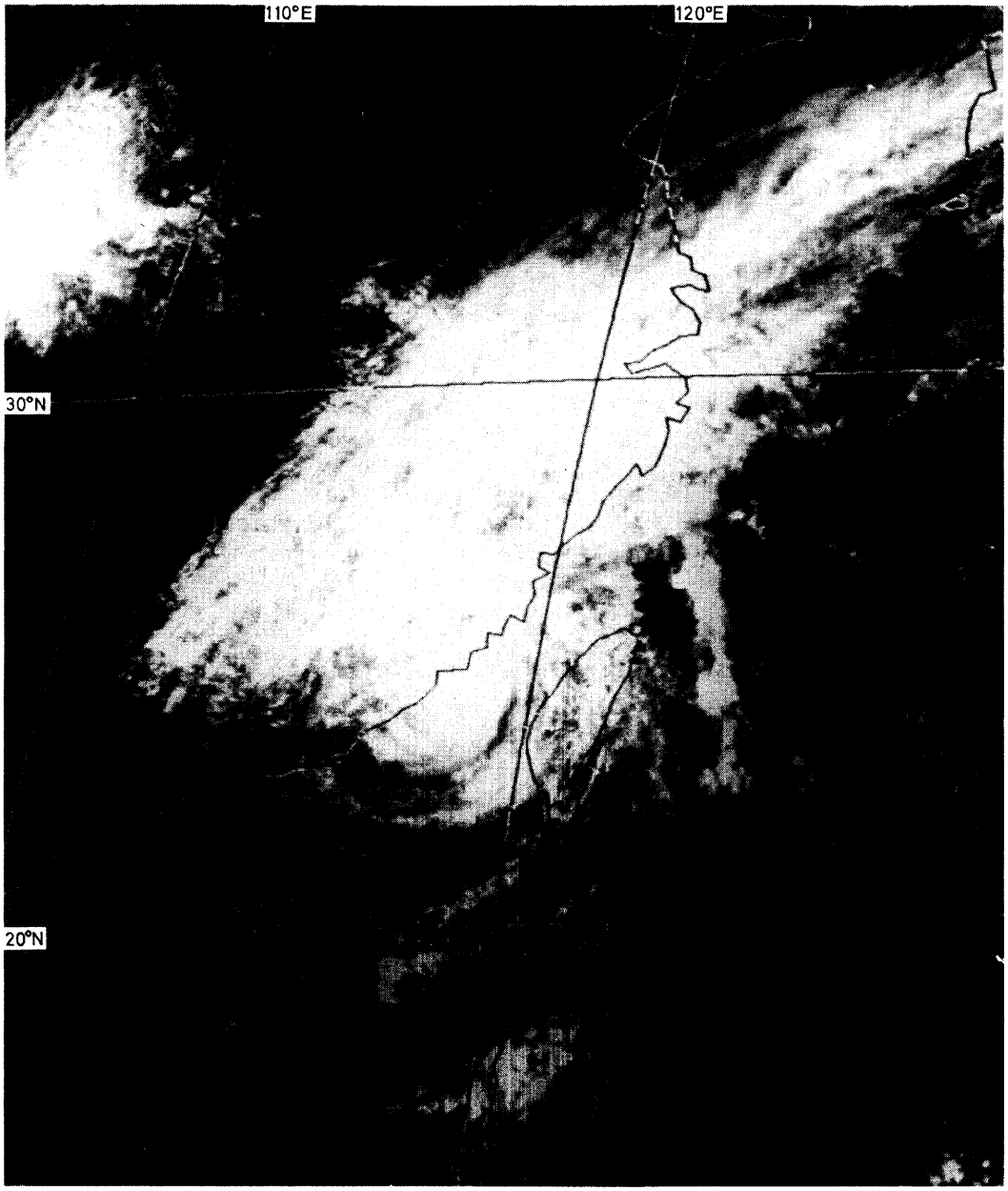


Figure 17. GMS-3 visible imagery of Typhoon Gerald (8714) around 2.00 p.m. on 10 September 1987.

(e) Typhoon Lynn (8720)

16-27 October 1987

The track of Typhoon Lynn is shown in Figure 18

Typhoon Lynn developed as a tropical depression over the western North Pacific on the morning of 16 October about 1 300 km due east of Guam. It moved steadily westwards at about 22 km/h for the following two days. It intensified to a tropical storm early on 17 October and a severe tropical storm about 24 hours later.

Lynn turned west-northwestwards on the morning of 18 October and at the same time slowed down to about 15 km/h. It further strengthened to a typhoon that evening and swept across the Marianas Islands later during the night, passing about 170 km northeast of Guam. According to press reports, the power supply on Guam was disrupted early on 19 October during the passage of Lynn.

Typhoon Lynn continued to intensify while maintaining a steady west-northwestward course. It attained peak intensity on the afternoon of 20 October when maximum sustained winds were estimated to be in excess of 200 km/h. Satellite imageries revealed that Lynn had a well-defined eye.

Soon afterwards, Lynn again moved westwards towards the Balintang Channel at an average speed of 25 km/h. At 11.00 p.m. on 23 October, Lynn was over the Balintang Channel about 490 km north of Manila. It turned west-northwestwards and slowed down to about 10 km/h as a surge of the winter monsoon was affecting the south China coastal waters.

Typhoon Lynn further slowed down to about 7 km/h and entered the South China Sea during the evening of 24 October. It took on a northwestward course early on 25 October and weakened to a severe tropical storm that afternoon. On 26 October, Lynn became slow-moving over the northern part of the South China Sea about 190 km southwest of Gaoxiong and weakened to a tropical storm later in the day. The next day, Lynn moved westwards and further degenerated to a tropical depression in the afternoon. It soon weakened into an area of low pressure.

Typhoon Lynn brought torrential rain to northern Luzon, causing serious flooding and triggering landslides. According to press reports, more than 60 people were killed there. High winds and heavy downpours associated with Lynn also inflicted serious damage and casualties in Taiwan. Casualty figures showed 45 people killed and 16 others missing. This included nine school children who were swept away by tidal waves in Hengchun in southern Taiwan while on a field trip. Press reports also indicated that more than 100 homes were destroyed and over 100 fishing boats lost or damaged. A 110 000-tonne freighter, 'Barkla of Hong Kong', also ran aground in southern Taiwan during the passage of Lynn.

In Hong Kong, the Stand By Signal No. 1 was hoisted at 11.00 p.m. on 23 October when Typhoon Lynn was about 880 km east-southeast of Hong Kong. The signal was hoisted before Lynn entered within 800 km of Hong Kong as the typhoon was expected to enhance the winter monsoon over south China and the combined effected would be felt sooner. Local winds were moderate to fresh gusty northerly, strong off-shore on 23 October. As winds were expected to strengthen further, the Strong Wind Signal, No. 3, was hoisted at 5.00 a.m. on 24 October. Lynn was then about 800 km east-southeast of Hong Kong. For the rest of 24 October and the morning of 25 October, strong gusty northerly winds persisted off-shore and in exposed areas. Winds moderated during the afternoon of 25 October as Typhoon Lynn weakened to a severe tropical storm. The Strong Wind Signal, No. 3, was then replaced by the Stand By Signal, No. 1 at 3.00 p.m. on 25 October. As Lynn further weakened to a tropical storm during the afternoon of 26 October and continual weakening was predicted, all signals were lowered at 4.00 p.m. when Lynn was about 500 km east-southeast of Hong Kong. Lynn was closest to Hong Kong around 2.00 p.m. on 27 October when it was about 310 km to the east-southeast before it weakened to an area of low pressure. The lowest mean sea-level pressure at the Royal Observatory was 1 010.2 hPa, recorded earlier at 5.00 p.m. on 24 October when Lynn was 700 km east-southeast of Hong Kong. The maximum mean hourly wind speeds and maximum gust peak speeds together with associated wind directions recorded at selected locations during the passage of Lynn were as follows:

Location	*Maximum mean hourly wind speed in km/h with direction in points*		*Maximum gust peak speed in km/h with direction in points*	
Royal Observatory	NW	25	*N*	62
Hong Kong Airport (SE)	NW	36	N	72
Hong Kong Airport (NW)	NNW	45	NNW	79
Waglan Island	N	72	N	104
Tate's Cairn	N	87	N	130
Cheung Chau	NNW	70	NNW	103
King's Park	NW	25	NW	68
Star Ferry	NW	30	WNW	63
Green Island	N & NNW	63	N	96
Tai O	N	62	N	88
Sha Tin	N	34	N	54
Kwai Chung	N	12	NE	47
Chek Lap Kok	NW	47	N	92
Lau Fau Shan	NNW	43	N	63
Ta Kwu Ling	NNE	31	NNE	72
Tai Mo Shan	N	76	NNW	96
Tsing Yi	N	22	NE	54

The weather in Hong Kong was fine and sunny on 23 and 24 October. It became cloudy on 25 October and there was some light rain during the evening. Light rain was again reported early on 26 October, but the weather improved rapidly during the day. However, the weather deteriorated with rain setting in during the afternoon of 27 October. Rain became heavy on the morning of 28 October and winds were strong gusty, reaching gale force offshore due to the combined effect of the remnant of Lynn and the northeast monsoon. The weather improved during the afternoon but showers and thunderstorms developed during the night and lasted till the next morning. Gradual improvement took place on 29 October with the weather turning fine and sunny on 30 October.

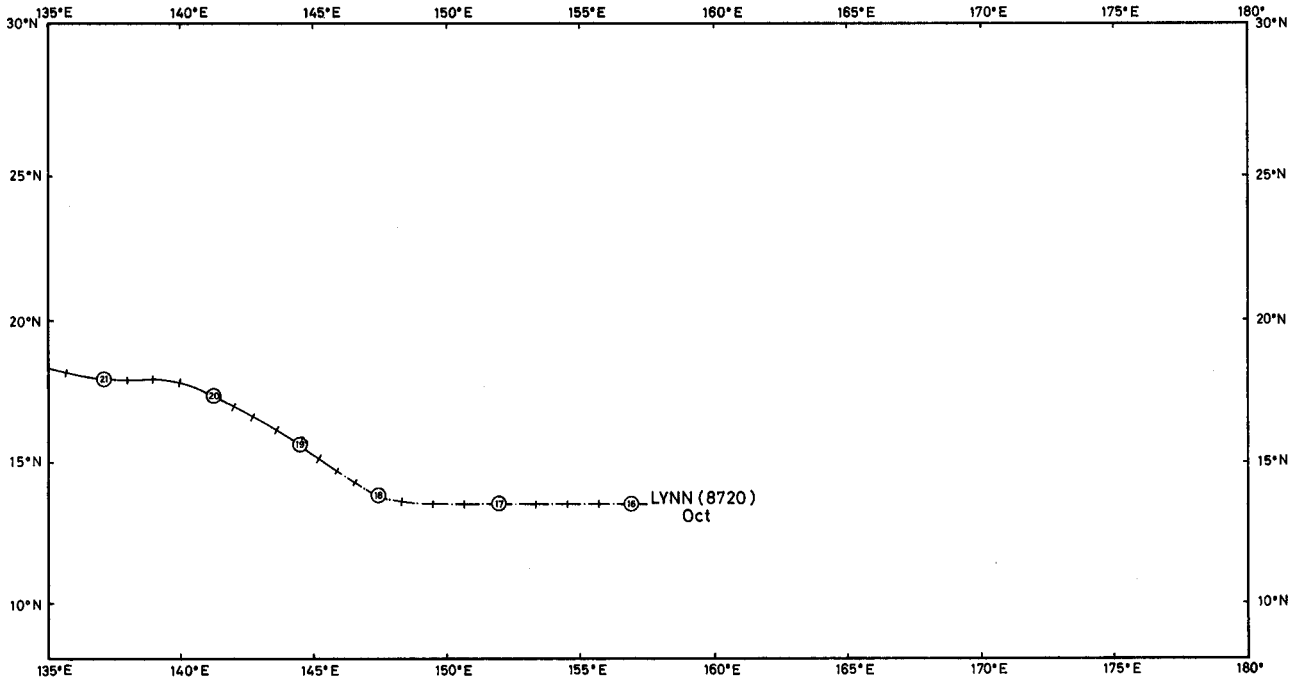
The daily amounts of rainfall recorded at various locations in Hong Kong were as follows:

Date	*Royal Observatory* mm	*Hong Kong Airport* mm	*Cheung Chau* mm	*Cape D'Aguilar* mm
23 October	Nil	Nil	Nil	Nil
24 October	Nil	Nil	Nil	Nil
25 October	0.1	Nil	Nil	Nil
26 October	Trace	Trace	Trace	Nil
27 October	2.8	Trace	Nil	5.0
28 October	47.9	39.7	24.5	42.0
29 October	10.7	5.1	18.9	12.0
30 October	Trace	Nil	Nil	Nil
Total	61.5	44.8	43.4	59.0

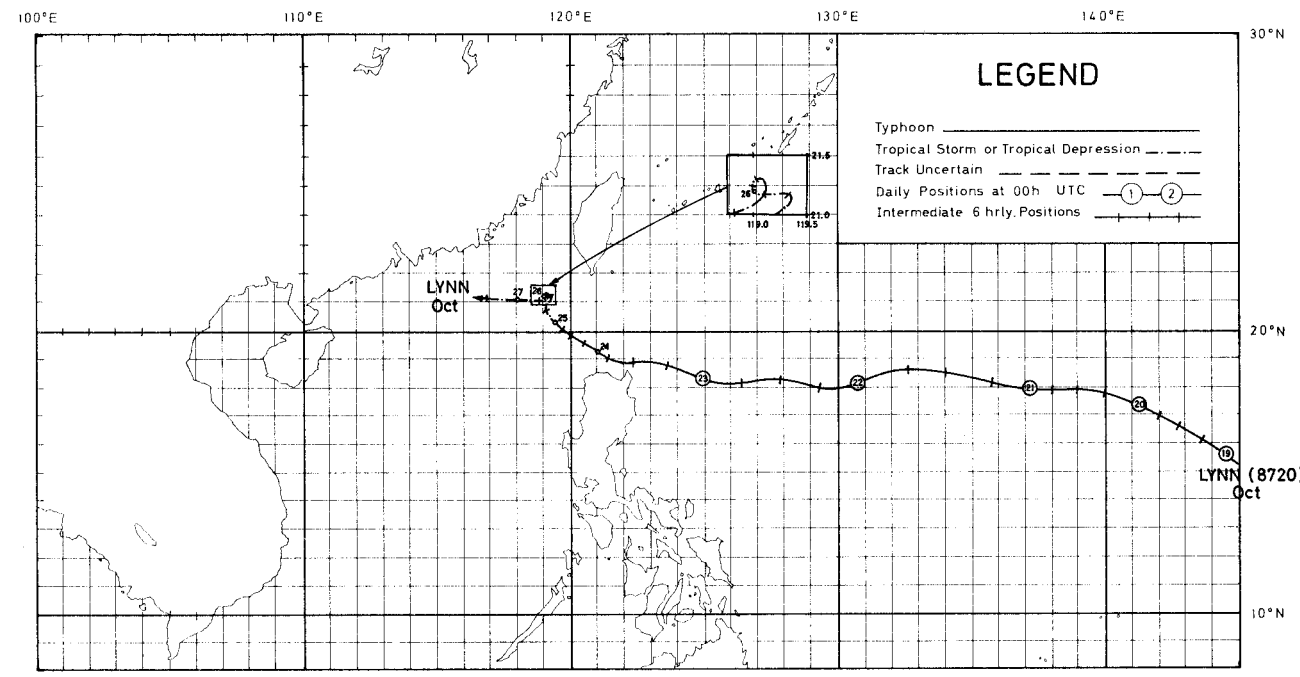
The times and heights of the highest tides and maximum storm surges recorded at various locations in Hong Kong during the passage of Lynn were as follows:

Location	Highest tide above chart datum			Maximum storm surge above astronomical tide		
	Height (m)	Date	Time	Height (m)	Date	Time
Lok On Pai	2.99	25 Oct	11.30 p.m.	0.72	26 Oct	2.00 a.m.
Quarry Bay	3.06	25 Oct	11.08 p.m.	0.72	26 Oct	0.00 a.m.
Tai Po Kau	3.09	25 Oct	10.54 p.m.	0.87	25 Oct	5.30 p.m.
Tamar	2.96	25 Oct	10.58 p.m.	0.65	26 Oct	1.00 a.m.
Tsim Bei Tsui	2.91	26 Oct	0.37 a.m.	0.60	26 Oct	9.00 a.m.
Waglan Island	2.74	25 Oct	10.16 p.m.	0.56	26 Oct	4.45 a.m.

In Hong Kong, Lynn only caused some minor damage. There were a few reports of fallen advertising signs and a woman was injured in one of the incidents. A tree collapsed in Kwai Chung, slightly damaging the roof-top of a hut, while another in Kowloon Tong was also blown down by strong winds. A wooden board was blown loose in a construction site in Kowloon City, damaging two vehicles nearby.



(I)



(II)

Figure 18. Track of Typhoon Lynn (8720): 16–27 October 1987.

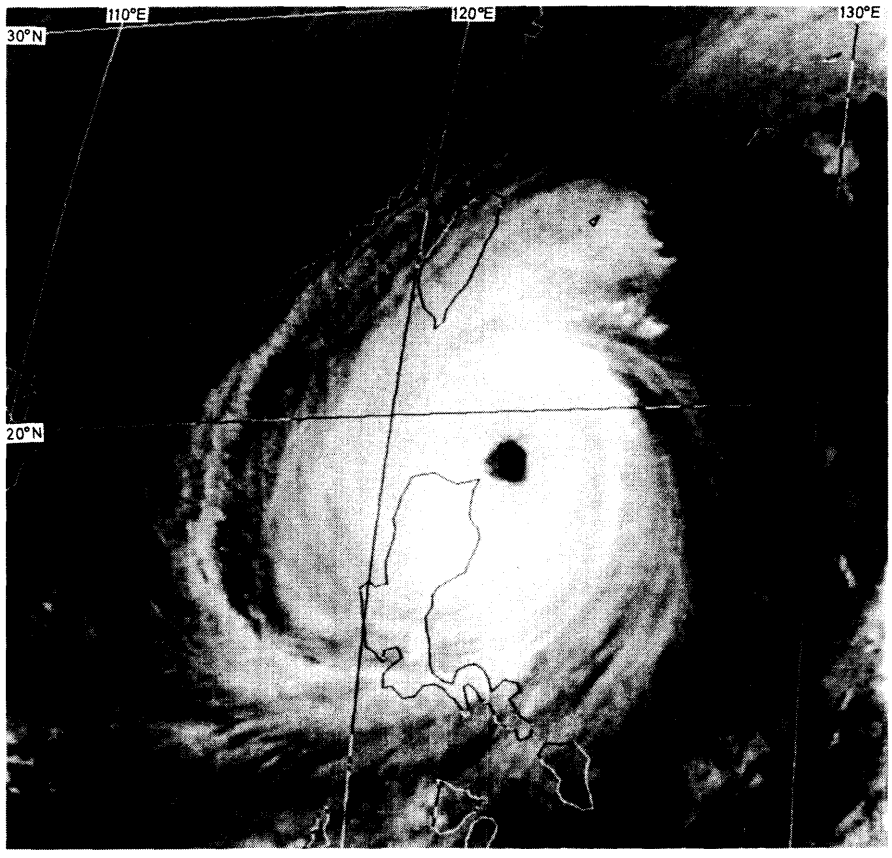


Figure 19. GMS-3 infra-red imagery of Typhoon Lynn (8720) around 5.00 p.m. on 23 October 1987.

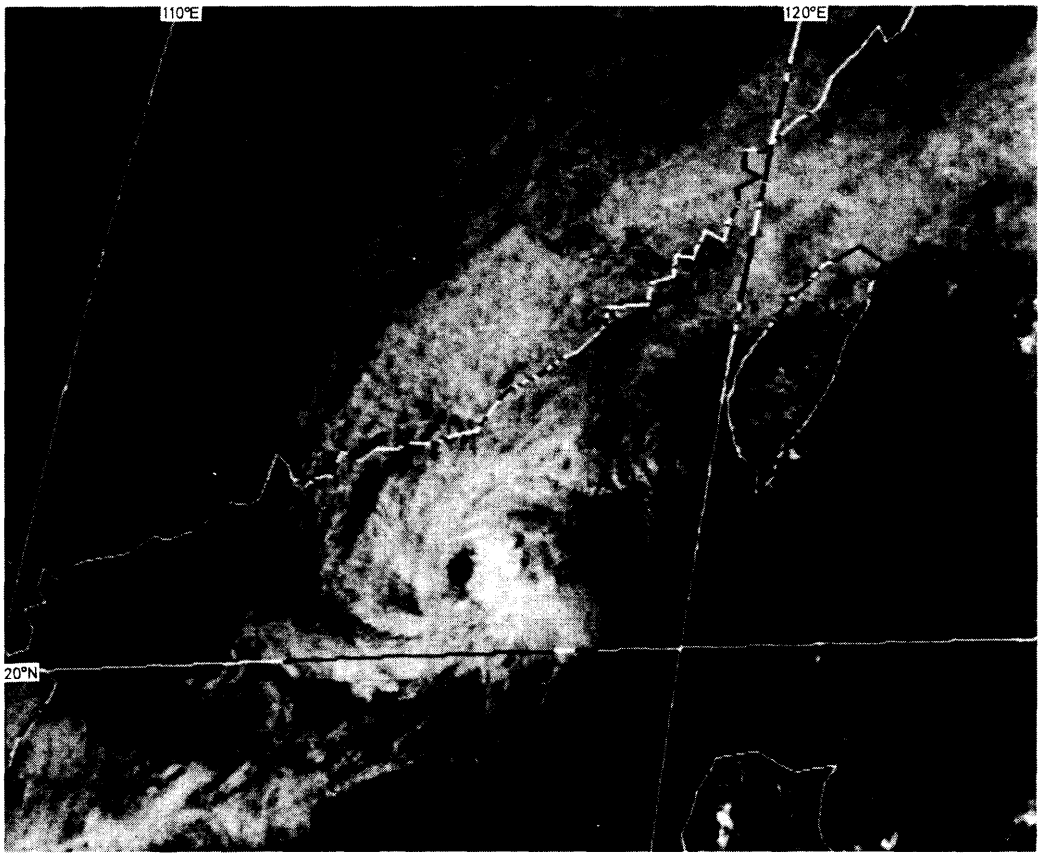


Figure 20. GMS-3 visible imagery of Tropical Depression Lynn (8720) around 2.00 p.m. on 27 October 1987.

Figure 21. A tree was blown down by strong winds in Kowloon Tong on the afternoon of 24 October 1987 (By courtesy of Wah Kiu Yat Po).

Figure 22. A sign board fell in Tsuen Wan on 24 October 1987 (By courtesy of Wah Kiu Yat Po).

Figure 23. A tree collapsed and damaged the roof-top of a hut in Kwai Chung on 24 October 1987 (By courtesy of Oriental Daily News).

4. DESCRIPTION OF TABLES

TABLE 1 is a list of tropical cyclones in 1987 in the western North Pacific and the South China Sea (i.e. in the area bounded by the Equator, 45°N, 100°E and 180°). The names of these tropical cyclones are those used by the U.S. Naval Oceanography Command Center/Joint Typhoon Warning Center in 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 might not cover 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 1987, 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 l0°N, 30°N, 105°E and 125°E). Times are given in hours UTC.

TABLE 3 presents a summary of the occasions on which tropical cyclone warning signals were hoisted during 1987. 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 1987. 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 1987. 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 1946-1987.

TABLE 7 presents the casualties and damage figures associated with tropical cyclones in Hong Kong for the period 1937-1987. The information is compiled from local newspaper reports and from the Marine Department's records.

TABLE 8 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 1987. 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 9 provides 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 stations in Hong Kong.

TABLE 1. LIST OF TROPICAL CYCLONES IN THE WESTERN NORTH PACIFIC AND THE SOUTH CHINA SEA IN 1987

Name of tropical cyclone		Beginning of track				First day circle	Last day circle	End of track				Remarks
		Date	Time UTC	Position °N	Position °E	Date	Date	Date	Time UTC	Position °N	Position °E	
Typhoon Orchid	(8701)	8 Jan	1200	6.2	150.8	9	14	14 Jan	0000	7.0	130.0	dissipated
Tropical Storm Percy	(8702)	10 Apr	1200	8.0	143.8	11	13	13 Apr	0000	11.6	137.5	dissipated
Tropical Storm Ruth	(8703)	18 Jun	0000	18.8	115.2	18	20	20 Jun	0000	23.3	107.8	dissipated
Typhoon Sperry	(8704)	27 Jun	0000	12.5	137.4	27	1	1 Jul	1800	32.0	141.2	became extratropical
Typhoon Thelma	(8705)	8 Jul	0600	14.1	147.3	9	16	16 Jul	0000	40.2	130.6	dissipated
Severe Tropical Storm Vernon	(8706)	16 Jul	1800	12.2	137.5	17	22	22 Jul	0600	30.8	123.2	dissipated
Typhoon Wynne	(8707)	22 Jul	0000	8.9	170.1	22	1	1 Aug	0600	34.9	153.1	became extratropical
Typhoon Alex	(8708)	22 Jul	1800	10.3	135.8	23	29	29 Jul	0600	36.5	122.5	dissipated
Typhoon Betty	(8709)	9 Aug	0000	10.3	132.3	9	17	17 Aug	1200	19.1	99.1	dissipated
Tropical Depression	(8710)	10 Aug	0000	26.8	144.1	10	12	12 Aug	1800	37.5	146.0	dissipated
Typhoon Cary	(8711)	12 Aug	1800	11.9	135.3	13	23	23 Aug	0600	19.5	102.0	dissipated
Typhoon Dinah	(8712)	21 Aug	0000	12.4	151.4	21	31	31 Aug	0600	39.6	133.6	became extratropical
Tropical Depression Ed (I)		21 Aug	1200	9.1	162.8	22	23	23 Aug	0000	12.2	156.5	dissipated
(II)		24 Aug	1200	13.7	154.4	25	27	27 Aug	1200	16.8	146.5	dissipated
Typhoon Gerald	(8714)	4 Sep	1200	15.7	127.3	5	11	11 Sep	0000	26.2	116.5	dissipated
Typhoon Freda	(8713)	5 Sep	0000	12.6	143.5	5	17	17 Sep	1200	34.2	146.2	became extratropical
Typhoon Holly	(8715)	5 Sep	0600	12.0	169.4	6	17	17 Sep	1200	34.3	160.0	dissipated
Typhoon Ian	(8716)	23 Sep	0000	15.7	146.5	23	3	3 Oct	1200	34.1	152.8	became extratropical
Tropical Depression		25 Sep	0000	18.0	161.0	25	26	26 Sep	0000	15.5	155.0	dissipated
Tropical Depression June	(8718)	28 Sep	0000	17.6	158.2	28	1	1 Oct	0600	30.7	149.7	dissipated
Typhoon Peke	(8717)	28 Sep	1200	24.5	179.5	29	4	4 Oct	0000	27.0	175.4	dissipated
Typhoon Kelly	(8719)	10 Oct	0000	13.5	138.0	10	17	17 Oct	0000	36.8	136.6	became extratropical
Typhoon Lynn	(8720)	16 Oct	0000	13.5	156.9	16	27	27 Oct	0600	21.1	116.9	dissipated
Tropical Depression Maury (I)	(8721)	10 Nov	1800	13.6	135.3	11	12	12 Nov	0000	15.0	132.3	dissipated
Tropical Storm Maury (II)		12 Nov	1800	13.8	128.9	13	19	19 Nov	0600	13.1	109.1	dissipated
Typhoon Nina	(8722)	19 Nov	1200	3.4	159.2	20	28	28 Nov	1800	20.3	115.0	dissipated
Tropical Depression Ogden		24 Nov	0000	12.0	111.7	24	25	25 Nov	0600	12.4	109.1	dissipated
Typhoon Phyllis	(8723)	10 Dec	1800	7.0	146.3	11	19	19 Dec	1800	12.5	113.5	dissipated

TABLE 2. TROPICAL CYCLONE WARNINGS FOR SHIPPING. ISSUED IN 1987

Tropical Cyclone	No. of warnings issued	Date and time+ of issue of		Duration of warnings (hours)
		First warning	Last warning	
Typhoon Norris	11	31 Dec 1800	2 Jan 0000	30
* Tropical Storm Ruth	17	18 Jun 0000	20 Jun 0000	48
Typhoon Thelma	8	14 Jul 0300	15 Jul 0000	21
Severe Tropical Storm Vernon	20	19 Jul 1800	22 Jul 0300	57
Typhoon Alex	22	25 Jul 1200	28 Jul 0000	60
* Typhoon Betty	37	12 Aug 0300	16 Aug 1500	108
* Typhoon Cary	51	16 Aug 1200	22 Aug 1800	150
* Typhoon Gerald	25	8 Sep 0000	11 Sep 0000	72
* Typhoon Lynn	35	23 Oct 0000	27 Oct 0600	102
Tropical Storm Maury	39	14 Nov 1500	19 Nov 0900	114
Tropical Depression Ogden	9	24 Nov 0600	25 Nov 0600	24
Typhoon Nina	30	25 Nov 1200	29 Nov 0300	87
Typhoon Phyllis	32	16 Dec 0300	20 Dec 0000	93
Total	336			966

* Tropical cyclones for which tropical cyclone warning signals were hoiated in H.K.
+ Times are given in hours UTC

TABLE 3. TROPICAL CYCLONE WARNING SIGNALS HOISTED IN HONG KONG AN NUMBER OF WARNING BULLETING ISSUED IN 1987.

SUMMARY

Signal	No. of occasions	Total duration
1	6	131 h 45 min
3	1	34 h
8 NORTHWEST	-	-
8 SOUTHWEST	-	-
8 NORTHEAST	-	-
8 SOUTHEAST	-	-
9	-	-
10	-	-
TOTAL	7	165 h 45 min

DETAILS

Tropical Cyclone	No. of warning bulletins issued	Signal	Hoisted		Lowered	
			Date	Time*	Date	Time*
Tropical Storm Ruth	10	1	18 Jun	1545	19 Jun	1115
Typhoon Betty	11	1	14 Aug	1445	15 Aug	1200
Typhoon Cary	18	1	19 Aug	2300	21 Aug	1200
Typhoon Gerald	12	1	9 Sep	1200	10 Sep	1100
Typhoon Lynn	32	1 3 1	23 Oct 24 Oct 25 Oct	2300 0500 1500	24 Oct 25 Oct 26 Oct	0500 1500 1600

* Hong Kong Time (UTC + 8)

TABLE 4. FREQUENCY AND TOTAL DURATION OF DISPLAY OF TROPICAL CYCLONE WARNING SIGNALS : 1946-1987

Signals / Year	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
1984	6	6	0	0	1	0	0	0	13	280.0
1985	5	4	1	0	0	1	0	0	11	193.6
1986	6	7	0	1	1	0	0	0	15	305.0
1987	6	1	0	0	0	0	0	0	7	165.8
Total Δ	213	194	15	20	55	40	20	12	606	10821.4
Mean Δ	6.7	6.1	0.4	0.5	1.3	1.0	0.5	0.3	14.4	257.7

* Figures in the colurme under Signals No. 1 and No. 3 have different meanings prlor to 1956 and care is required in interpreting these figures. Reference may be made to paragraph 4 on page 40.

+ Gale or Storm Signals, 5, 6, 7 and 8 were renurbered as 8 NN, 8 SW, 8 NE, 8 SE respactively with effect from 1 January 1973.

Δ The total and annual mean valves for the frequancy of display of Stand By Stgnal No. 1 and the Strong Wind Slgnal No. 3 are caloulated for the period 1956-1987. The correeponding values for highar signals and the total dutstion are caloulated for the period 1946-1987.

TABLE 5. NUMBER OF TROPICAL CYCLONES IN HONG KONG'S AREA OF FESPONSIBILITY AND THE NUMBER THAT NECESSITATED THE DISPLAY OF TROPICAL CYCIONE WAFNING SIGNALS IN HONG KONG : 1946-1987

Year	Number in Hong Kong's Area of responsibility	Number necessaitating 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
1984	14	5
1985	15	5
1986	16	4
1987	12	5
Total	691	258
Mean	16.5	6.1

Table 6. DURATION OF DISPLAY OF TROPICAL CYCLONE WARNING SIGNALS IN HONG KONG : 1946 - 1987

Signal	Duration of each occasion			Duration per year		
	Mean	Maximum	Minimum	Mean	Maximum	Minimum
1*	20 h 48 min	124 h 40 min	1 h 20 min	138 h 30 min	273 h 15 min	12 h 40 min
3*	20 35	71 45	1 00	124 47	267 45	23 55
8 NW+	7 15	15 45	1 30	2 39	15 45	0 0
8 SW+	5 31	11 10	2 30	2 42	16 10	0 0
8 NE+	10 33	35 35	2 15	14 10	61 45	0 0
8 SE+	7 37	21 45	0 20	7 26	31 15	0 0
Gale or Storm Signals	16 15	55 17	2 40	26 57	82 25	0 0
9	3 31	6 30	0 25	1 43	11 00	0 0
10	6 03	9 10	2 30	1 46	12 10	0 0

* 1956 - 1987

+ 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.

TABLE 7. CASUALTIES AND DAMAGE CAUSED BY TROPICAL CYCLONES IN HONG KONG : 1937 - 1987

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
1984	27 Aug - 7 Sep	T. Ike	0	0	0	0	0	1
1985	19 - 25 Jun	T. Hal	0	4	2	0	1	13
	1 - 7 Sep	T. Tess	6	1	3	2	0	12
	13 - 22 Oct	T. Dot	0	0	0	0	0	1
1986	3 - 12 Jul	T. Peggy	3	0	3	1	0	26
	9 - 12 Aug	T.D.	0	1	5	0	0	3
	18 Aug - 6 Sep	T. Wayne	0	3	0	3	1	15+
	11 - 19 Oct	T. Ellen	1	2	1	0	0	4
1987	16 - 27 Oct	T. Lynn	0	0	0	0	0	1

N.B. Information compiled from Hong Kong newspapers and from Marine Department's records
* Data unavailable
\+ Struck by lightning.

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

TABLE 8. A SUMMARY OF METEOROLOGICAL OBSERVATIONS RECORDED IN HONG KONG DURING THE PASSAGES OF TROPICAL CYCLONES IN 1987

(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	Chi Ma Wan	Lok On Pai	Quarry Bay	Tai Po Kau	Tamar	Tsim Bei Tsui	Waglan Island
					km	km/h	hPa			hPa	m	m	m	m	m	m	m
T.S. Ruth	Jun	18	2300	SSW	220	WNW 19	992	19	0400	1002.0	-	0.43	0.51	-	0.55	0.46	-
T. Betty	Aug	14	1700	S	740	W 22	928	14	1800	1006.1	-	0.30	0.43	0.78	0.56	0.35	0.33
T. Cary	Aug	21	2100	SW	670	NW 22	960	21	0500	1004.8	-	0.41	0.28	0.49	0.14	0.55	0.09
T. Gerald	Sep	11	0800	NNE	490	WNW 22	1005	9	1600	1000.8	0.43	0.41	0.38	0.83	0.31	0.33	-
T. Lynn	Oct	27	1400	ESE	310	W 19	1002	24	1700	1010.2	-	0.72	0.72	0.87	0.65	0.60	0.56

* Hong Kong Time (UTC + 8)

(b)

Name of tropical cyclone	Month	Maximum 60-min mean wind in points and km/h		Maximum 10-min mean wind in points and km/h		Maximum gust peak speed in km/h with direction in points		Rainfall at the Royal Observatory (mm)				
		Royal Observatory	Waglan Island	Royal Observatory	Waglan Island	Royal Observatory	Waglan Island	(i) 600 km	(ii) 24 hours	(iii) 48 hours	(iv) 72 hours	(i) + (iv)
T.S. Ruth	Jun	E 36	ENE 68	E 40	ENE 70	E 72	ENE 87	50.9	22.0	23.9	24.2	75.1
T. Betty	Aug	ESE 25	E 40	E 27	ENE 47	ESE 51	ENE 63	Outside 600 km				
T. Cary	Aug	E 30	E 40	NNE 31	ENE 41	E 56	E 76	Outside 600 km				
T. Gerald	Sep	WNW 14	NNW 45	N 19	N 51	NW 36	NNW 68	NIL	NIL	0.2	1.9	1.9
T. Lynn	Oct	NW 25	N 76	NW 30	N 76	N 62	N 104	0.1	3.2	59.9	61.4	61.5

N.B. (i) during the period when the tropical cyclone was centred within 600 km of Hong Kong.
(ii) during the 24-hour period after the tropical cyclone moved outside (or dissipated within) the 600 km radius.
(iii) during the 48-hour period after the tropical cyclone moved outside (or dissipated within) the 600 km radius.
(iv) during the 72-hour period after the tropical cyclone moved outside (or dissipated within) the 600 km radius.

TABLE 9. TYPHOONS WHICH REQUIRED THE HOISTING OF THE HURRICANE SIGNAL NO. 10 DURING THE FERIOD 1946-1987

Name of typhoon	Date	Nearest approach to Royal Observatory km	Minimum M.S.L. pressure (hPa)		Maximum 60-min mean winds in points and km/h								Maximum gust peak speed in km/h 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 70	985.7	-	NE -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gloria	22 Sep 1957	SW 55	986.2	984.3	ESE 115	ESE 72	E 113	-	-	-	-	-	E 187	ENE 158	ENE 185	-	-	-	-	-
Mary	9 Jun 1960	WNW 10	974.3	973.8	SSE 96	SSE 92	SSW 112	-	-	-	-	-	SSE 191	SE 164	SSW 194	-	-	-	-	-
Alice	19 May 1961	0	981.6	981.1	ENE 83	E 70	ESE 90	ENE 76	-	-	-	-	E 166	ENE 139	SW 128	ENE 135	-	-	-	-
Wanda	1 Sep 1962	SSW 20	955.1	953.2	N 133	N 108	NW 148	NW 118	SE 189	-	-	-	N 259	N 229	NNW 216	NW 232	ESE 284	-	-	-
Ruby	5 Sep 1964	SW 30	971.0	968.2	E 110	N 118	ENE 148	NE 113	ESE 167	SSE 153	-	-	NNE 227	NW 203	E 230	NNE 216	E 268	S 221	-	-
Dot	13 Oct 1964	E 35	978.9	977.3	NNW 88	N 67	N 117	NNW 96	NNE 157	N 101	-	-	N 175	N 198	N 184	WNW 205	NE 220	NNE 187	-	-
Shirley	21 Aug 1968	0	968.7	968.6	N 68	N 75	NNE 124	SSW 90	NNE 126	SSW 85	-	-	N 133	N 151	NE 209	SSW 167	NNE 203	N 173	-	-
Rose	17 Aug 1971	WSW 20	984.5	982.8	SE 103	SE 122	ESE 140	SE 131	S 148	SSW 137	-	-	ESE 224	ESE 211	ESE 189	SE 194	S 221	S 191	-	-
Elsie	14 Oct 1975	S 50	996.4	996.2	ENE 58	NNW 67	NNE 118	N 106	NE 130	-	NNW 118	N 65	NE 140	N 140	ENE 176	NE 158	NNE 180	-	NE 167	N 121
Hope	2 Aug 1979	NNW 10	961.8	961.6	W 75	W 115	SW 144	SSW 117	NW 115	-	W 108	- 96	W 175	WNW 182	SW 198	WSW 185	WNW 229	-	W 167	- 173
Ellen	9 Sep 1983	SW 45	983.9	983.1	E 92	E 112	ESE 169	ESE 171	E 126	-	S 137	SE 94	E 185	E 203	E 227	SSE 238	ENE 218	-	S 220*	SE 171

* estimated, exceeding upper limit of anemogram.

5. TROPICAL CYCLONE POSITION AND INTENSITY DATA, 1987

Six-hourly position and intensity data are tabulated for the following tropical cyclones in 1987 in the western North Pacific and the South China Sea (i.e. the area between the equator and 45°N, and between l00°E and 180°).

Name of Tropical Cyclone	*Page*
Typhoon Orchid (8701)	48
Tropical Storm Percy (8702)	49
Tropical Storm Ruth (8703)	50
Typhoon Sperry (8704)	51
Typhoon Thelma (8705)	52
Severe Tropical Storm Vernon (8706)	53
Typhoon Wynne (8707)	54
Typhoon Alex (8708)	55
Typhoon Betty (8709)	56
Tropical Depression of 10-l2 August (87 10)	57
Typhoon Cary (8711)	58
Typhoon Dinah (8712)	59
Tropical Depression Ed	60
Typhoon Gerald (8714)	61
Typhoon Freda (8713)	62
Typhoon Holly (8715)	63
Typhoon Ian (8716)	64
Tropical Depression of 25-26 September	65
Tropical Depression June (8718)	66
Typhoon Peke (8717)	67
Typhoon Kelly (8719)	68
Typhoon Lynn (8720)	69
Tropical Storm Maury (8721)	70
Typhoon Nina (8722)	71
Tropical Depression Ogden	72
Typhoon Phyllis (8723)	73

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

SIX-HOURLY POSITION AND INTENSITY DATA OF TYPHOON ORCHID (8701)

Month	Day	Time UTC	Intensity	Estimated minimum central pressure (hPa)	Estimated maximum surface wind (m/s)	Lat. °N	Long. °E
Jan	8	1200	T.D.	1004	13	6.2	150.8
		1800	T.D.	1004	13	6.6	149.9
	9	0000	T.D.	1002	16	7.0	148.9
		0600	T.D.	1000	16	7.4	147.6
		1200	T.S.	997	18	7.8	146.3
		1800	T.S.	994	21	8.3	144.9
	10	0000	T.S.	989	23	8.9	143.4
		0600	S.T.S.	982	25	9.4	141.9
		1200	S.T.S.	975	31	9.7	140.4
		1800	T.	965	36	10.0	139.2
	11	0000	T.	955	43	10.2	138.0
		0600	T.	955	43	10.4	136.9
		1200	T.	965	43	10.7	135.8
		1800	T.	980	39	10.9	134.9
	12	0000	T.	984	33	11.1	134.0
		0600	T.	980	33	11.4	133.3
		1200	T.	975	36	11.7	132.7
		1800	T.	980	33	11.8	132.1
	13	0000	S.T.S.	990	25	11.2	131.6
		0600	T.S.	992	23	10.3	131.1
		1200	T.S.	994	21	9.2	130.7
		1800	T.S.	997	18	8.1	130.4
	14	0000	T.D.	1002	13	7.0	130.0

Dissipated

SIX-HOURLY POSITION AND INTENSITY DATA OF TROPICAL STORM PERCY (8702)

Month	Day	Time UTC	Intensity	Estimated minimum central pressure (hPa)	Estimated maximum surface wind (m/s)	Lat. °N	Long. °E
Apr	10	1200	T.D.	1004	15	8.0	143.8
		1800	T.D.	1004	15	8.6	143.3
	11	0000	T.S.	1003	21	9.3	142.9
		0600	T.S.	1000	21	9.9	142.4
		1200	T.S.	1002	18	10.3	141.8
		1800	T.S.	1002	18	10.7	141.2
	12	0000	T.D.	1006	15	10.9	140.3
		0600	T.D.	1006	15	11.2	139.2
		1200	T.D.	1006	13	11.4	138.3
		1800	T.D.	1006	13	11.5	137.9
	13	0000	T.D.	1006	13	11.6	137.5

Dissipated

SIX-HOURLY POSITION AND INTENSITY DATA OF TROPICAL STORM RUTH (8703)

Month	Day	Time UTC	Intensity	Estimated minimum central pressure (hPa)	Estimated maximum surface wind (m/s)	Lat. °N	Long. °E
Jun	18	0000	T.D.	998	16	18.8	115.2
		0600	T.D.	998	16	19.7	114.4
		1200	T.S.	995	18	20.4	113.6
		1800	T.S.	995	18	20.5	112.7
	19	0000	T.S.	992	21	21.3	111.8
		0600	T.S.	990	23	22.0	110.8
		1200	T.D.	995	16	22.6	109.7
		1800	T.D.	998	13	23.1	108.5
	20	0000	T.D.	1000	13	23.3	107.8

Dissipated

SIX-HOURLY POSITION AND INTENSITY DATA OF TYPHOON SPERRY (8704)

Month	Day	Time UTC	Intensity	Estimated mininum central pressure (hPa)	Estimated maximum surface wind (m/s)	Lat. °N	Long. °E
Jun	27	0000	T.D.	1000	15	12.5	137.4
		0600	T.S.	996	18	12.9	136.9
		1200	T.S.	992	21	13.3	136.4
		1800	T.S.	990	23	13.8	135.9
	28	0000	S.T.S.	985	29	14.4	135.4
		0600	S.T.S.	980	31	14.9	135.0
		1200	S.T.S.	980	31	15.5	134.7
		1800	S.T.S.	980	31	16.1	134.5
	29	0000	T.	975	33	17.1	134.1
		0600	T.	975	33	18.3	133.5
		1200	S.T.S.	980	31	19.6	132.9
		1800	S.T.S.	980	31	20.8	132.2
	30	0000	S.T.S.	982	31	22.0	131.6
		0600	S.T.S.	985	25	23.4	131.4
		1200	S.T.S.	985	25	24.9	131.4
		1800	T.S.	990	21	26.6	131.7
Jul	1	0000	T.S.	990	21	28.2	132.6
		0600	T.S.	990	21	29.8	134.8
		1200	T.S.	990	21	31.0	137.7
		1800	T.S.	990	21	32.0	141.2

Became extratropical

SIX-HOURLY POSITION AND INTENSITY DATA OF TYPHOON THELMA (8705)

Month	Day	Time UTC	Intensity	Estimated minimum central pressure (hPa)	Estimated maximum surface wind (m/s)	Lat. °N	Long. °E
Jul	8	0600	T.D.	1002	13	14.1	147.3
		1200	T.D.	1002	13	14.8	145.7
		1800	T.D.	1000	15	15.4	144.0
	9	0000	T.S.	996	23	16.0	142.4
		0600	T.S.	992	23	16.4	141.0
		1200	S.T.S.	985	25	16.5	139.7
		1800	S.T.S.	980	29	16.6	138.3
	10	0000	T.	975	36	17.0	137.0
		0600	T.	965	41	17.4	135.5
		1200	T.	960	43	17.8	134.0
		1800	T.	950	47	18.0	132.6
	11	0000	T.	940	49	17.8	131.3
		0600	T.	920	54	17.8	130.1
		1200	T.	910	57	18.0	128.9
		1800	T.	918	54	17.6	128.1
	12	0000	T.	920	51	17.7	127.4
		0600	T.	925	51	17.9	127.0
		1200	T.	930	49	18.4	126.6
		1800	T.	940	47	19.1	126.3
	13	0000	T.	950	41	20.1	126.2
		0600	T.	950	41	21.0	126.1
		1200	T.	942	43	22.1	125.6
		1800	T.	945	43	23.5	125.5
	14	0000	T.	945	43	24.8	125.0
		0600	T.	945	43	26.0	124.9
		1200	T.	945	43	27.3	124.9
		1800	T.	945	43	28.4	124.9
	15	0000	T.	950	41	29.8	125.5
		0600	T.	955	39	31.8	126.3
		1200	T.	960	36	34.2	127.1
		1800	S.T.S.	975	31	36.7	128.6
	16	0000	S.T.S.	980	25	40.2	130.6

Dissiptated

SIX-HOURLY POSITION AND INTENSITY DATA OF SEVERE TROPICAL STORM VERNON (8706)

Month	Day	Time UTC	Intensity	Estimated minimum central pressure (hPa)	Estimated maximum surface wind (m/s)	Lat. °N	Long. °E
Jul	16	1800	T.D.	1002	13	12.2	137.5
	17	0000	T.D.	1000	15	12.2	135.0
		0600	T.D.	1000	15	12.3	133.4
		1200	T.D.	1000	15	12.4	131.7
		1800	T.D.	1000	15	12.6	130.1
	18	0000	T.D.	1000	15	13.2	128.6
		0600	T.D.	1000	15	13.7	128.0
		1200	T.S.	992	18	14.2	127.4
		1800	T.S.	992	18	14.8	127.0
	19	0000	S.T.S.	988	25	15.6	126.7
		0600	S.T.S.	985	29	16.7	126.2
		1200	S.T.S.	980	31	18.1	125.3
		1800	S.T.S.	980	31	18.6	124.7
	20	0000	S.T.S.	980	31	19.3	124.2
		0600	S.T.S.	980	31	20.0	123.9
		1200	S.T.S.	985	25	21.2	122.9
		1800	S.T.S.	985	25	22.0	122.4
	21	0000	S.T.S.	985	25	23.0	122.2
		0600	T.S.	990	23	24.7	122.1
		1200	T.S.	995	21	26.0	121.4
		1800	T.D.	998	15	26.9	121.3
	22	0000	T.D.	1000	13	28.7	122.1
		0600	T.D.	1000	11	30.8	123.2

Dissipated

SIX-HOURLY POSITION AND INTENSITY DATA OF TYPHOON WYNNE (8707)

Month	Day	Time UTC	Intensity	Estimated minimum central pressure (hPa)	Estimated maximum surface wind (m/s)	Lat. °N	Long. °E
Jul	22	0000	T.D.	1002	15	8.9	170.1
		0600	T.S.	1000	18	10.0	168.9
		1200	T.S.	1000	18	10.7	167.5
		1800	T.S.	998	21	10.9	165.8
	23	0000	T.S.	995	23	10.8	164.1
		0600	T.S.	995	23	10.7	162.3
		1200	T.S.	995	23	10.9	160.7
		1800	S.T.S.	990	25	11.4	159.2
	24	0000	S.T.S.	985	31	12.0	157.7
		0600	T.	975	33	12.7	156.2
		1200	T.	965	36	13.4	154.7
		1800	T.	955	41	14.2	152.9
	25	0000	T.	945	47	15.0	151.1
		0600	T.	930	51	15.7	149.7
		1200	T.	930	51	16.4	148.3
		1800	T.	925	57	17.1	146.7
	26	0000	T.	922	61	17.8	145.0
		0600	T.	922	61	18.3	143.6
		1200	T.	922	61	19.0	142.0
		1800	T.	922	61	19.5	140.7
	27	0000	T.	925	59	20.0	139.4
		0600	T.	925	59	20.7	138.1
		1200	T.	930	54	21.4	137.0
		1800	T.	930	54	22.1	135.9
	28	0000	T.	925	57	22.9	134.9
		0600	T.	925	57	23.8	134.0
		1200	T.	925	57	24.7	133.3
		1800	T.	930	54	25.7	132.7
	29	0000	T.	940	51	26.7	132.2
		0600	T.	950	47	27.7	132.1
		1200	T.	970	39	29.2	132.4
		1800	S.T.S.	975	31	30.5	133.0
	30	0000	S.T.S.	980	25	31.6	134.3
		0600	S.T.S.	980	25	32.2	135.8
		1200	S.T.S.	980	25	32.3	138.3
		1800	S.T.S.	980	25	32.4	140.8
	31	0000	S.T.S.	980	25	32.3	143.2
		0600	T.S.	985	23	32.4	145.5
		1200	T.S.	985	23	32.5	147.7
		1800	T.S.	985	23	32.9	149.8
Aug	1	0000	T.S.	990	21	33.9	152.2
		0600	T.S.	990	21	34.9	153.1

Became extratropical

SIX-HOURLY POSITION OF INTENSITY DATA OF TYPHOON ALEX (8708)

Month	Day	Time UTC	Intensity	Estimated minimum central pressure (hPa)	Estimated maximum surface wind (m/s)	Lat. °N	Long. °E
Jul	22	1800	T.D.	1004	13	10.3	135.8
	23	0000	T.D.	1000	15	10.4	134.5
		0600	T.S.	995	18	10.6	132.9
		1200	T.S.	995	18	10.7	131.3
		1800	T.S.	995	18	11.3	130.2
	24	0000	T.S.	990	21	12.5	129.5
		0600	T.S.	990	21	14.1	129.0
		1200	T.S.	988	23	15.0	128.1
		1800	S.T.S.	985	25	15.9	127.0
	25	0000	S.T.S.	980	31	16.6	126.3
		0600	S.T.S.	980	31	17.3	125.8
		1200	S.T.S.	980	31	18.9	124.7
		1800	T.	975	33	19.7	123.5
	26	0000	T.	970	36	20.1	122.9
		0600	T.	970	36	21.2	122.5
		1200	T.	970	36	22.1	122.4
		1800	T.	970	36	23.7	122.3
	27	0000	T.	970	36	25.3	121.7
		0600	T.	970	36	26.5	121.0
		1200	T.	975	33	27.8	120.7
		1800	S.T.S.	985	25	29.2	120.5
	28	0000	T.S.	990	23	30.6	120.5
		0600	T.S.	990	23	32.1	120.1
		1200	T.S.	990	23	33.7	120.2
		1800	T.S.	992	21	35.0	121.0
	29	0000	T.S.	992	21	35.6	121.5
		0600	T.D.	994	15	36.5	122.2

Dissipated

SIX-HOURLY POSITION AND INTENSITY DATA OF TYPHOON BETTY (8709)

Month	Day	Time UTC	Intensity	Estimated minimum central pressure (hPa)	Estimated maximum surface wind (m/s)	Lat. °N	Long. °E
Aug	9	0000	T.D.	1000	15	10.3	132.3
		0600	T.S.	992	21	10.5	132.2
		1200	T.S.	992	21	10.7	132.1
		1800	T.S.	990	23	11.0	131.9
	10	0000	S.T.S.	985	29	11.2	131.8
		0600	T.	970	33	11.4	131.6
		1200	T.	955	41	11.8	131.1
		1800	T.	940	47	12.1	130.4
	11	0000	T.	915	51	12.2	129.6
		0600	T.	910	61	12.3	128.8
		1200	T.	900	67	12.2	127.6
		1800	T.	900	67	12.2	126.6
	12	0000	T.	910	65	12.3	125.6
		0600	T.	915	61	12.5	124.5
		1200	T.	925	57	12.9	123.0
		1800	T.	935	49	13.3	121.6
	13	0000	T.	940	47	13.6	120.3
		0600	T.	935	49	14.0	119.1
		1200	T.	935	49	14.4	117.5
		1800	T.	935	49	14.7	116.3
	14	0000	T.	930	51	15.2	115.3
		0600	T.	930	51	15.6	114.0
		1200	T.	925	54	15.7	112.6
		1800	T.	930	51	15.8	111.7
	15	0000	T.	930	51	16.1	111.0
		0600	T.	930	51	16.7	110.0
		1200	T.	935	47	17.1	109.2
		1800	T.	940	41	17.4	108.5
	16	0000	T.	950	39	17.6	107.7
		0600	T.	955	33	17.8	106.7
		1200	S.T.S.	975	29	18.0	105.5
		1800	T.S.	990	21	18.0	104.2
	17	0000	T.S.	994	18	18.0	102.5
		0600	T.D.	996	15	18.6	100.4
		1200	T.D.	996	13	19.1	99.1

Dissipated

SIX-HOURLY POSITION AND INTENSITY DATA OF THE TROPICAL DEPRESSION (8710)

Month	Day	Time UTC	Intensity	Estimated minimum central pressure (hPa)	Estimated maximum surface wind (m/s)	Lat. °N	Long. °E
Aug	10	0000	T.D.	1008	13	26.8	144.1
		0600	T.D.	1008	13	28.3	143.3
		1200	T.D.	1008	13	29.7	142.6
		1800	T.D.	1008	13	31.2	141.8
	11	0000	T.D.	1008	13	32.6	141.1
		0600	T.D.	1008	13	33.5	140.8
		1200	T.D.	1008	13	34.5	140.7
		1800	T.D.	1008	13	35.3	141.1
	12	0000	T.D.	1006	15	36.2	142.0
		0600	T.D.	1006	15	36.9	143.1
		1200	T.D.	1008	13	37.3	144.6
		1800	T.D.	1008	13	37.5	146.0

Dissipated

SIX-HOURLY POSITION AND INTENSITY DATA OF TYPHOON CARY (8711)

Month	Day	Time UTC	Intensity	Estimated minimum central pressure (hPa)	Estimated maximum surface wind (m/s)	Lat. °N	Long. °E
Aug	12	1800	T.D.	1000	15	11.9	135.3
	13	0000	T.S.	998	18	13.6	134.4
		0600	T.S.	998	18	14.4	133.0
		1200	T.S.	996	21	14.9	132.0
		1800	T.S.	994	23	15.4	131.2
	14	0000	T.S.	994	23	15.8	130.3
		0600	S.T.S.	992	25	16.1	129.5
		1200	S.T.S.	992	25	16.2	128.7
		1800	S.T.S.	990	29	16.1	128.2
	15	0000	S.T.S.	990	29	16.0	127.7
		0600	S.T.S.	990	29	16.3	127.1
		1200	S.T.S.	990	29	16.5	126.5
		1800	S.T.S.	985	31	16.6	126.2
	16	0000	S.T.S.	985	31	16.7	126.0
		0600	S.T.S.	985	31	16.9	125.4
		1200	S.T.S.	985	31	17.0	124.8
		1800	T.	980	33	17.0	124.2
	17	0000	T.	975	36	16.4	123.8
		0600	T.	965	39	16.3	123.5
		1200	T.	965	39	16.2	123.0
		1800	T.	965	39	16.3	122.5
	18	0000	T.	975	33	16.1	121.5
		0600	S.T.S.	980	31	15.7	120.5
		1200	S.T.S.	980	31	15.4	119.4
		1800	S.T.S.	980	31	15.1	118.6
	19	0000	T.	975	33	15.2	117.7
		0600	T.	965	39	15.4	117.0
		1200	T.	960	43	15.5	116.2
		1800	T.	965	41	15.6	115.2
	20	0000	T.	965	39	15.7	114.3
		0600	T.	965	39	15.8	113.7
		1200	T.	965	39	15.9	113.0
		1800	T.	965	39	15.9	112.5
	21	0000	T.	965	39	16.2	111.9
		0600	T.	960	41	16.7	111.2
		1200	T.	960	41	17.3	110.4
		1800	T.	965	39	18.0	109.4
	22	0000	T.	965	39	18.4	107.8
		0600	T.	970	36	18.4	106.8
		1200	T.	970	36	18.7	105.8
		1800	S.T.S.	980	29	19.0	104.5
	23	0000	T.S.	994	18	19.3	103.0
		0600	T.D.	996	15	19.5	102.0

Dissipated

SIX-HOURLY POSITION AND INTENSITY DATA OF TYPHOON DINAH (8712)

Month	Day	Time UTC	Intensity	Estimated minimum central pressure (hPa)	Estimated maximum surface wind (m/s)	Lat. °N	Long. °E
Aug	21	0000	T.D.	1004	13	12.4	151.4
		0600	T.D.	1004	13	12.2	150.3
		1200	T.D.	1002	15	12.0	149.1
		1800	T.D.	1002	15	11.8	147.5
	22	0000	T.S.	998	18	11.6	145.7
		0600	T.S.	998	18	11.4	144.3
		1200	T.S.	994	21	11.3	143.0
		1800	T.S.	990	23	11.2	141.9
	23	0000	T.S.	990	23	11.2	140.8
		0600	S.T.S.	985	25	11.3	139.7
		1200	S.T.S.	985	25	11.5	138.7
		1800	S.T.S.	980	29	11.9	137.7
	24	0000	S.T.S.	980	29	12.6	136.9
		0600	S.T.S.	975	31	13.5	135.8
		1200	T.	970	33	14.1	134.7
		1800	T.	965	36	14.7	133.7
	25	0000	T.	960	41	15.3	132.8
		0600	T.	950	47	16.0	131.9
		1200	T.	940	51	16.8	131.1
		1800	T.	925	57	17.3	130.7
	26	0000	T.	915	61	18.0	130.4
		0600	T.	915	61	18.5	130.2
		1200	T.	915	61	19.0	129.9
		1800	T.	915	61	19.5	129.5
	27	0000	T.	915	61	20.0	129.1
		0600	T.	915	61	20.2	128.7
		1200	T.	920	57	20.5	128.3
		1800	T.	930	51	20.8	128.0
	28	0000	T.	930	51	21.0	127.6
		0600	T.	930	51	21.2	127.3
		1200	T.	930	51	21.5	127.0
		1800	T.	935	47	22.1	126.7
	29	0000	T.	935	47	23.0	126.6
		0600	T.	935	47	23.9	126.2
		1200	T.	935	47	24.9	126.2
		1800	T.	935	47	26.5	126.1
	30	0000	T.	935	47	28.0	126.1
		0600	T.	935	47	29.8	126.6
		1200	T.	940	43	31.9	127.4
		1800	T.	945	41	34.3	129.1
	31	0000	T.	950	39	37.0	131.3
		0600	T.	960	36	39.6	133.6

Became extratropical

SIX-HOURLY POSITION AND INTENSITY DATA OF THE TROPICAL DEPRESSION ED (I)

Month	Day	Time UTC	Intensity	Estimated minimum central pressure (hPa)	Estimated maximum surface wind (m/s)	Lat. °N	Long. °E
Aug	21	1200	T.D.	1004	13	9.1	162.8
		1800	T.D.	1004	13	9.6	161.6
	22	0000	T.D.	1004	13	10.0	160.5
		0600	T.D.	1004	13	10.4	159.6
		1200	T.D.	1004	13	10.8	158.8
		1800	T.D.	1004	13	11.4	157.6
	23	0000	T.D.	1004	13	12.2	156.5

Dissipated

THE TROPICAL DEPRESSION ED (II)

Aug	24	1200	T.D.	1006	13	13.7	154.4
		1800	T.D.	1006	13	14.1	153.9
	25	0000	T.D.	1006	13	14.4	153.3
		0600	T.D.	1006	13	14.7	152.7
		1200	T.D.	1006	13	15.0	152.0
		1800	T.D.	1006	13	15.1	151.7
	26	0000	T.D.	1006	13	15.2	151.2
		0600	T.D.	1006	13	15.3	150.7
		1200	T.D.	1006	13	15.4	150.2
		1800	T.D.	1004	15	15.5	149.2
	27	0000	T.D.	1004	15	15.9	148.3
		0600	T.D.	1006	13	16.4	147.4
		1200	T.D.	1006	13	16.8	146.5

Dissipated

SIX-HOURLY POSITION AND INTENSITY DATA OF TYPHOON GERALD (8714)

Month	Day	Time UTC	Intensity	Estimated minimum central pressure (hPa)	Estimated maximum surface wind (m/s)	Lat. °N	Long. °E
Sep	4	1200	T.D.	1000	15	15.7	127.3
		1800	T.D.	1000	15	16.2	127.2
	5	0000	T.D.	1000	15	16.7	127.1
		0600	T.S.	998	18	16.9	127.0
		1200	T.S.	995	21	17.2	126.8
		1800	T.S.	995	21	17.4	126.7
	6	0000	T.S.	990	23	17.6	126.5
		0600	S.T.S.	985	25	17.8	126.4
		1200	S.T.S.	980	29	17.9	126.4
		1800	S.T.S.	980	29	18.0	126.3
	7	0000	S.T.S.	980	29	18.2	126.1
		0600	S.T.S.	975	31	18.5	125.9
		1200	T.	970	33	18.8	125.7
		1800	T.	967	36	19.2	125.3
	8	0000	T.	964	39	19.8	124.8
		0600	T.	960	41	20.2	124.0
		1200	T.	955	43	20.5	123.3
		1800	T.	950	47	20.7	122.6
	9	0000	T.	950	47	20.9	121.9
		0600	T.	950	47	21.4	121.3
		1200	T.	950	47	21.8	120.6
		1800	T.	955	43	22.4	120.0
	10	0000	T.	955	43	23.3	119.5
		0600	T.	970	33	24.2	119.1
		1200	S.T.S.	980	29	24.8	118.7
		1800	T.S.	995	21	25.6	117.9
	11	0000	T.D.	1005	13	26.2	116.5

Dissipated

SIX-HOURLY POSITION AND INTENSITY DATA OF TYPHOON FREDA (8713)

Month	Day	Time UTC	Intensity	Estimated minimum central pressure (hPa)	Estimated maximum surface wind (m/s)	Lat. °N	Long. °E
Sep	5	0000	T.D.	1002	13	12.6	143.5
		0600	T.D.	1000	15	13.5	142.5
		1200	T.D.	1000	15	14.4	141.5
		1800	T.D.	1000	15	14.5	141.2
	6	0000	T.S.	996	21	14.7	141.0
		0600	T.S.	994	23	14.6	140.8
		1200	S.T.S.	990	25	14.8	141.1
		1800	S.T.S.	985	29	15.0	141.3
	7	0000	S.T.S.	985	29	15.2	141.3
		0600	S.T.S.	985	29	15.4	141.2
		1200	S.T.S.	980	31	15.5	141.2
		1800	T.	975	33	15.6	141.1
	8	0000	T.	970	36	15.7	141.0
		0600	T.	965	39	15.9	140.8
		1200	T.	955	43	16.1	140.4
		1800	T.	955	43	16.4	139.8
	9	0000	T.	950	47	16.6	139.2
		0600	T.	940	51	16.7	138.6
		1200	T.	930	57	16.8	138.1
		1800	T.	925	59	16.9	137.6
	10	0000	T.	920	61	17.0	137.3
		0600	T.	920	61	17.2	137.2
		1200	T.	925	59	17.3	137.0
		1800	T.	930	57	17.4	136.9
	11	0000	T.	935	51	17.6	136.9
		0600	T.	940	49	18.0	137.1
		1200	T.	945	47	18.3	137.4
		1800	T.	945	47	18.5	137.6
	12	0000	T.	950	41	18.8	138.0
		0600	T.	950	41	19.2	138.4
		1200	T.	950	41	19.7	138.8
		1800	T.	950	41	20.3	139.1
	13	0000	T.	950	41	20.9	139.3
		0600	T.	950	41	21.4	139.5
		1200	T.	950	41	22.0	139.7
		1800	T.	950	41	22.7	139.8
	14	0000	T.	950	41	23.2	140.0
		0600	T.	955	39	24.0	140.1
		1200	T.	955	39	24.9	140.2
		1800	T.	960	36	25.8	140.1
	15	0000	T.	965	33	26.6	140.0
		0600	T.	965	33	27.5	140.0
		1200	S.T.S.	970	31	28.4	140.0
		1800	S.T.S.	970	31	29.4	140.2
	16	0000	S.T.S.	970	29	30.3	140.6
		0600	S.T.S.	970	29	30.9	141.0
		1200	S.T.S.	975	25	31.5	141.4
		1800	S.T.S.	975	25	32.1	142.0
	17	0000	S.T.S.	975	25	32.6	142.6
		0600	S.T.S.	975	25	33.4	144.4
		1200	S.T.S.	975	25	34.2	146.2

Became extratropical

SIX-HOURLY POSITION AND INTENSITY DATA OF TYPHOON HOLLY (8715)

Month	Day	Time UTC	Intensity	Estimated minimum central pressure (hPa)	Estimated maximum surface wind (m/s)	Lat. °N	Long. °E
Sep	5	0600	T.D.	1004	13	12.0	169.4
		1200	T.D.	1002	15	12.2	168.4
		1800	T.S.	1000	18	12.3	167.4
	6	0000	T.S.	996	21	12.4	166.5
		0600	T.S.	992	23	12.6	165.6
		1200	S.T.S.	985	29	12.9	164.6
		1800	S.T.S.	980	31	13.2	163.7
	7	0000	T.	970	36	13.7	162.8
		0600	T.	960	41	14.2	162.1
		1200	T.	950	49	14.7	161.3
		1800	T.	945	49	15.2	160.6
	8	0000	T.	940	51	15.8	159.8
		0600	T.	935	54	16.4	159.1
		1200	T.	930	57	17.0	158.3
		1800	T.	925	59	17.4	157.6
	9	0000	T.	920	61	17.7	156.7
		0600	T.	915	65	17.9	156.2
		1200	T.	905	67	18.3	155.7
		1800	T.	905	67	18.8	155.5
	10	0000	T.	905	67	19.4	155.4
		0600	T.	910	65	20.0	155.4
		1200	T.	915	61	20.6	155.5
		1800	T.	920	59	21.3	155.8
	11	0000	T.	925	57	22.1	155.9
		0600	T.	930	54	23.1	156.0
		1200	T.	935	51	24.2	155.9
		1800	T.	940	49	25.0	155.5
	12	0000	T.	945	47	25.6	155.2
		0600	T.	950	43	26.0	155.0
		1200	T.	950	43	26.4	155.0
		1800	T.	955	41	26.7	155.1
	13	0000	T.	960	39	26.9	155.4
		0600	T.	960	39	27.0	156.3
		1200	T.	965	36	27.1	157.3
		1800	T.	970	33	27.6	158.1
	14	0000	S.T.S.	975	31	28.0	158.4
		0600	S.T.S.	980	29	28.4	158.7
		1200	T.S.	985	23	28.8	158.8
		1800	T.S.	985	23	29.0	158.8
	15	0000	T.S.	985	23	29.2	158.8
		0600	T.S.	985	23	29.4	158.8
		1200	T.S.	985	23	29.7	158.7
		1800	T.S.	985	23	29.9	158.5
	16	0000	T.S.	988	21	30.2	158.3
		0600	T.S.	988	21	30.5	158.2
		1200	T.S.	988	21	30.8	158.1
		1800	T.S.	988	21	31.2	158.2
	17	0000	T.S.	990	18	32.2	159.0
		0600	T.S.	990	18	33.2	159.7
		1200	T.D.	992	15	34.3	160.0

Dissipated

SIX-HOURLY POSITION AND INTENSITY DATA OF TYPHOON IAN (8716)

Month	Day	Time UTC	Intensity	Estimated minimum central pressure (hPa)	Estimated maximum surface wind (m/s)	Lat. °N	Long. °E
Sep	23	0000	T.D.	1006	13	15.7	146.5
		0600	T.D.	1006	13	15.9	146.4
		1200	T.D.	1006	13	16.1	146.3
		1800	T.D.	1002	15	16.3	146.1
	24	0000	T.S.	1000	18	16.5	146.0
		0600	T.S.	996	21	17.1	145.3
		1200	T.S.	994	23	17.6	144.6
		1800	S.T.S.	990	25	17.9	144.0
	25	0000	T.	980	33	18.2	143.5
		0600	T.	970	39	18.7	142.7
		1200	T.	955	47	19.3	142.1
		1800	T.	955	47	19.8	141.5
	26	0000	T.	955	47	20.5	140.9
		0600	T.	955	47	21.3	140.3
		1200	T.	955	47	22.0	139.8
		1800	T.	960	43	22.7	139.1
	27	0000	T.	960	43	23.0	138.6
		0600	T.	960	43	23.2	138.1
		1200	T.	965	39	23.4	137.9
		1800	T.	965	39	23.5	137.9
	28	0000	T.	965	39	23.5	138.0
		0600	T.	970	36	23.5	138.1
		1200	T.	970	36	23.5	138.2
		1800	T.	970	36	23.5	138.3
	29	0000	T.	970	36	23.6	138.3
		0600	T.	970	36	23.8	137.7
		1200	T.	975	33	24.0	137.4
		1800	S.T.S.	980	31	23.8	136.8
	30	0000	S.T.S.	980	31	24.0	137.1
		0600	S.T.S.	980	31	24.2	137.1
		1200	S.T.S.	980	31	24.7	137.1
		1800	S.T.S.	985	29	25.4	137.4
Oct	1	0000	S.T.S.	985	29	26.0	138.1
		0600	S.T.S.	985	29	26.8	138.5
		1200	S.T.S.	987	25	27.5	139.3
		1800	S.T.S.	987	25	27.7	140.2
	2	0000	T.S.	990	23	28.7	141.5
		0600	T.S.	990	23	29.6	142.8
		1200	T.S.	990	23	30.3	144.3
		1800	T.S.	990	23	31.2	146.2
	3	0000	T.S.	990	23	32.1	148.1
		0600	T.S.	990	23	33.1	150.5
		1200	T.S.	990	23	34.1	152.8

Became extratropical

SIX-HOURLY POSITION AND INTENSITY DATA OF THE TROPICAL DEPRESSION OF 25-26 SEPTEMBER 1987

Month	Day	Time UTC	Intensity	Estimated minimum central pressure (hPa)	Estimated maximum surface wind (m/s)	Lat. °N	Long. °E
Sep	25	0000	T.D.	1006	13	18.0	161.0
		0600	T.D.	1006	13	16.7	159.2
		1200	T.D.	1006	13	16.0	157.1
		1800	T.D.	1006	13	15.7	156.0
	26	0000	T.D.	1006	13	15.5	155.0

Dissipated

SIX-HOURLY POSITION AND INTENSITY DATA OF THE TROPICAL DEPRESSION JUNE (8718)

Month	Day	Time UTC	Intensity	Estimated minimum central pressure (hPa)	Estimated maximum surface wind (m/s)	Lat. °N	Long. °E
Sep	28	0000	T.D.	1004	13	17.6	158.2
		0600	T.D.	1004	13	19.4	158.8
		1200	T.D.	1004	13	21.3	158.6
		1800	T.D.	1004	13	22.4	157.1
	29	0000	T.D.	1002	15	23.6	155.6
		0600	T.D.	1002	15	24.9	155.0
		1200	T.D.	1002	15	26.1	154.2
		1800	T.D.	1002	15	27.9	152.0
	30	0000	T.D.	1000	15	28.0	149.2
		0600	T.D.	1000	15	27.8	148.4
		1200	T.D.	1000	15	28.4	148.4
		1800	T.D.	1000	15	29.0	148.7
Oct	1	0000	T.D.	1000	15	29.9	149.2
		0600	T.D.	1002	13	30.7	149.7

Dissipated

SIX-HOURLY POSITION AND INTENSITY DATA OF TYPHOON PEKE (8717)

Month	Day	Time UTC	Intensity	Estimated minimum central pressure (hPa)	Estimated maximum surface wind (m/s)	Lat. °N	Long. °E
Sep	28	1200	T.	955	39	24.5	179.5
		1800	T.	955	39	24.9	178.5
	29	0000	T.	955	39	25.2	177.4
		0600	T.	955	39	25.7	176.1
		1200	T.	955	39	26.3	174.5
		1800	T.	955	39	27.3	173.2
	30	0000	T.	955	39	28.3	171.9
		0600	T.	955	39	29.4	170.8
		1200	T.	960	36	30.3	169.9
		1800	T.	965	33	31.1	169.3
	1	0000	T.	965	33	31.8	169.2
		0600	T.	965	33	31.9	169.3
		1200	S.T.S.	970	31	31.9	169.5
		1800	S.T.S.	975	29	31.7	169.9
	2	0000	S.T.S.	980	25	31.1	170.2
		0600	S.T.S.	980	25	30.4	170.8
		1200	T.S.	985	23	29.9	171.7
		1800	T.S.	990	21	29.2	172.7
	3	0000	T.S.	990	21	28.4	173.5
		0600	T.S.	992	18	28.0	173.9
		1200	T.S.	992	18	27.6	174.4
		1800	T.S.	992	18	27.2	174.9
	4	0000	T.D.	994	15	27.0	175.4

Dissipated

SIX-HOURLY POSITION AND INTENSITY DATA OF TYPHOON KELLY (8719)

Month	Day	Time UTC	Intensity	Estimated minimum central pressure (hPa)	Estimated maximum surface wind (m/s)	Lat. °N	Long. °E
Oct	10	0000	T.D.	1000	15	13.5	138.0
		0600	T.D.	1000	15	14.0	138.0
		1200	T.D.	1000	15	14.4	138.0
		1800	T.S.	995	21	14.8	138.0
	11	0000	T.S.	995	21	15.2	138.0
		0600	T.S.	992	23	15.6	137.8
		1200	S.T.S.	990	25	15.9	137.6
		1800	S.T.S.	985	29	16.2	137.1
	12	0000	S.T.S.	980	31	16.5	137.1
		0600	S.T.S.	980	31	17.0	137.1
		1200	T.	975	33	17.4	137.1
		1800	T.	970	36	17.9	137.0
	13	0000	T.	965	39	18.4	136.7
		0600	T.	965	39	18.9	136.3
		1200	T.	965	39	19.5	136.0
		1800	T.	965	39	20.2	135.7
	14	0000	T.	965	39	21.3	135.2
		0600	T.	965	39	22.5	134.4
		1200	T.	965	39	23.3	133.7
		1800	T.	960	41	24.1	133.0
	15	0000	T.	955	43	24.8	132.3
		0600	T.	955	43	25.7	131.9
		1200	T.	955	43	26.5	131.7
		1800	T.	955	43	27.7	131.8
	16	0000	T.	955	43	29.0	132.6
		0600	T.	960	41	30.6	133.1
		1200	T.	965	39	32.3	133.3
		1800	S.T.S.	975	31	34.3	134.7
	17	0000	S.T.S.	985	25	36.8	136.6

Became extratropical

SIX-HOURLY POSITION AND INTENSITY DATA OF TYPHOON LYNN (8720)

Month	Day	Time UTC	Intensity	Estimated minimum central pressure (hPa)	Estimated maximum surface wind (m/s)	Lat. °N	Long. °E
Oct	16	0000	T.D.	1004	13	13.5	156.9
		0600	T.D.	1002	15	13.5	155.7
		1200	T.D.	1002	15	13.5	154.5
		1800	T.S.	1000	18	13.5	153.3
	17	0000	T.S.	995	21	13.5	152.0
		0600	T.S.	995	21	13.5	150.7
		1200	T.S.	990	23	13.5	149.5
		1800	S.T.S.	985	25	13.6	148.3
	18	0000	S.T.S.	980	29	13.8	147.4
		0600	S.T.S.	975	31	14.3	146.6
		1200	T.	970	33	14.7	145.9
		1800	T.	970	33	15.1	145.2
	19	0000	T.	965	36	15.6	144.5
		0600	T.	960	41	16.1	143.6
		1200	T.	950	47	16.6	142.7
		1800	T.	945	49	17.0	142.0
	20	0000	T.	935	54	17.3	141.2
		0600	T.	925	59	17.8	140.0
		1200	T.	925	59	17.9	139.0
		1800	T.	925	59	17.9	138.0
	21	0000	T.	930	57	17.9	137.1
		0600	T.	930	57	18.2	135.8
		1200	T.	930	57	18.5	134.0
		1800	T.	935	54	18.7	132.6
	22	0000	T.	940	51	18.2	130.7
		0600	T.	945	49	18.0	129.3
		1200	T.	945	49	18.3	127.9
		1800	T.	945	49	18.1	126.4
	23	0000	T.	950	47	18.3	124.9
		0600	T.	950	47	18.8	123.6
		1200	T.	950	47	18.9	122.3
		1800	T.	955	43	19.0	121.4
	24	0000	T.	960	41	19.3	121.0
		0600	T.	965	39	19.6	120.5
		1200	T.	965	39	19.9	120.0
		1800	T.	970	36	20.1	119.7
	25	0000	T.	975	33	20.3	119.4
		0600	S.T.S.	980	31	20.7	119.1
		1200	S.T.S.	985	29	21.2	119.3
		1800	S.T.S.	990	25	21.2	119.1
	26	0000	S.T.S.	990	25	21.2	119.0
		0600	T.S.	995	23	21.2	119.0
		1200	T.S.	995	23	21.3	119.0
		1800	T.S.	998	21	21.0	118.8
	27	0000	T.S.	1000	18	21.1	118.0
		0600	T.D.	1002	15	21.1	116.9

Dissipated

SIX-HOURLY POSITION AND INTENSITY DATA OF THE TROPICAL DEPRESSION MAURY I (8721)

Month	Day	Time UTC	Intensity	Estimated minimum central pressure (hPa)	Estimated maximum surface wind (m/s)	Lat. °N	Long. °E
Nov	10	1800	T.D.	1004	13	13.6	135.3
	11	0000	T.D.	1004	16	14.3	134.6
		0600	T.D.	1004	16	14.5	134.1
		1200	T.D.	1004	16	14.8	133.5
		1800	T.D.	1004	16	14.9	132.9
	12	0000	T.D.	1004	13	15.0	132.3

Dissipated

TROPICAL STORM MAURY II (8721)

Nov	12	1800	T.D.	1004	13	13.8	128.9
	13	0000	T.D.	1004	13	13.7	128.1
		0600	T.D.	1002	16	13.7	127.5
		1200	T.D.	1000	16	13.6	127.0
		1800	T.D.	1000	16	13.5	126.5
	14	0000	T.D.	1000	16	13.3	126.0
		0600	T.D.	1002	16	13.1	125.3
		1200	T.D.	1002	16	12.9	124.5
		1800	T.D.	1002	16	12.8	123.7
	15	0000	T.D.	1004	16	12.8	122.7
		0600	T.D.	1004	16	12.8	121.7
		1200	T.D.	1004	16	12.8	120.7
		1800	T.D.	1004	16	12.8	119.7
	16	0000	T.D.	1002	16	12.8	118.7
		0600	T.D.	1000	16	12.8	117.6
		1200	T.D.	1000	16	12.9	116.0
		1800	T.S.	998	18	13.3	114.7
	17	0000	T.S.	998	18	13.6	113.5
		0600	T.S.	996	21	13.5	112.9
		1200	T.S.	996	21	13.1	112.5
		1800	T.S.	998	18	13.0	112.1
	18	0000	T.S.	998	18	12.9	111.8
		0600	T.S.	998	18	12.8	111.5
		1200	T.S.	998	18	12.8	111.1
		1800	T.D.	1000	16	12.9	110.7
	19	0000	T.D.	1002	13	13.0	110.1
		0600	T.D.	1004	13	13.1	109.1

Dissipated

SIX-HOURLY POSITION AND INTENSITY DATA OF TYPHOON NINA (8722)

Month	Day	Time UTC	Intensity	Estimated minimum central pressure (hPa)	Estimated maximum surface wind (m/s)	Lat. °N	Long. °E
Nov	19	1200	T.D.	1000	15	3.4	159.2
		1800	T.D.	1000	15	4.3	158.1
	20	0000	T.S.	995	18	5.3	156.3
		0600	T.S.	995	18	6.0	154.5
		1200	T.S.	990	21	6.7	152.8
		1800	T.S.	990	23	7.4	151.3
	21	0000	S.T.S.	985	26	8.1	149.8
		0600	S.T.S.	985	26	8.8	147.9
		1200	S.T.S.	985	26	9.3	145.7
		1800	S.T.S.	980	28	9.5	143.8
	22	0000	S.T.S.	975	31	9.7	142.2
		0600	S.T.S.	975	31	10.5	140.8
		1200	T.	970	33	11.0	139.3
		1800	T.	965	36	11.3	137.7
	23	0000	T.	960	41	11.2	136.2
		0600	T.	960	41	10.9	134.7
		1200	T.	960	41	11.1	133.6
		1800	T.	960	41	11.3	132.6
	24	0000	T.	960	41	11.5	131.6
		0600	T.	960	41	11.7	130.6
		1200	T.	955	43	12.0	129.6
		1800	T.	950	46	12.3	128.6
	25	0000	T.	935	51	12.6	127.5
		0600	T.	915	61	12.9	126.1
		1200	T.	910	61	13.1	124.5
		1800	T.	940	49	13.4	122.6
	26	0000	T.	950	46	13.6	120.8
		0600	T.	950	46	13.9	119.2
		1200	T.	950	46	14.5	117.7
		1800	T.	950	46	15.1	116.2
	27	0000	T.	950	46	15.9	114.8
		0600	T.	950	46	16.6	113.8
		1200	T.	950	46	17.5	113.0
		1800	T.	945	49	18.5	112.7
	28	0000	T.	945	49	19.2	112.7
		0600	T.	955	43	19.9	113.1
		1200	S.T.S.	975	26	20.2	114.1
		1800	T.S.	990	21	20.3	115.0

Dissipated

SIX-HOURLY POSITION AND INTENSITY DATA OF THE TROPICAL DEPRESSION OGDEN

Month	Day	Time UTC	Intensity	Estimated minimum central pressure (hPa)	Estimated maximum surface wind (m/s)	Lat. °N	Long. °E
Nov	24	0000	T.D.	1002	13	12.0	111.7
		0600	T.D.	999	16	12.2	111.1
		1200	T.D.	999	16	12.3	110.6
		1800	T.D.	998	16	12.3	110.1
	25	0000	T.D.	1000	13	12.4	109.6
		0600	T.D.	1003	13	12.4	109.1

Dissipated

SIX-HOURLY POSITION AND INTENSITY DATA OF
TYPHOON PHYLLIS (8723)

Month	Day	Time UTC	Intensity	Estimated minimum central pressure (hPa)	Estimated maximum surface wind (m/s)	Lat. °N	Long. °E
Dec	10	1800	T.D.	1002	13	7.0	146.3
	11	0000	T.D.	1002	13	8.0	144.5
		0600	T.D.	1002	13	8.9	143.2
		1200	T.D.	1002	13	9.6	142.4
		1800	T.D.	1002	13	10.3	141.7
	12	0000	T.D.	1000	16	11.1	141.1
		0600	T.D.	1000	16	12.0	140.6
		1200	T.D.	1000	16	12.8	140.4
		1800	T.S.	998	18	13.5	140.3
	13	0000	T.S.	998	18	13.9	140.2
		0600	T.S.	998	18	14.0	140.0
		1200	T.S.	998	18	13.4	139.7
		1800	T.D.	1000	16	12.9	138.5
	14	0000	T.D.	1000	16	12.6	137.1
		0600	T.D.	1000	16	12.4	135.7
		1200	T.S.	995	18	12.3	134.1
		1800	T.S.	990	23	11.8	132.4
	15	0000	S.T.S.	985	28	11.5	130.7
		0600	S.T.S.	980	31	11.4	129.0
		1200	T.	975	33	11.5	127.4
		1800	T.	970	36	11.5	126.1
	16	0000	T.	965	41	11.8	125.0
		0600	T.	975	36	12.1	124.0
		1200	T.	975	33	12.3	123.5
		1800	T.	975	33	12.6	123.0
	17	0000	T.	970	36	12.8	122.4
		0600	T.	970	36	12.8	121.7
		1200	T.	975	33	12.8	120.7
		1800	S.T.S.	980	31	12.5	119.8
	18	0000	S.T.S.	980	25	11.6	119.1
		0600	S.T.S.	980	25	11.7	118.1
		1200	S.T.S.	980	25	12.0	117.3
		1800	S.T.S.	980	25	12.3	116.5
	19	0000	S.T.S.	980	25	12.7	115.7
		0600	T.S.	985	23	13.0	115.0
		1200	T.S.	990	21	13.0	114.3
		1800	T.D.	1000	16	12.5	113.5

Dissipated