ROYAL OBSERVATORY, HONG KONG

CLIMATOLOGICAL NOTE NO. 6

A NOTE ON THE DIURNAL VARIATION OF METEOROLOGICAL ELEMENTS

BY

P. PETERSON

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TABLES

1. INTRODUCTION

A knowledge of the normal diurnal variation of the meteorological elements is particularly important to forecasters in the Tropics both for analysis and for forecasting. Although the diurnal variations in Hong Kong are well documented (Peacock 1952 and Cheng 1973), the variations in neighbouring cities have received less attention at the Royal Observatory.

Since synoptic charts are generally only analysed every three hours it is sufficient for many purposes to know the normal diurnal variation at the standard three-hour intervals.

Computer tapes of 3-hourly SYNOP messages are available since 1974 and the R.O. Computer Division have printed out the 5-year means of all the main meteorological elements at 0000, 0300, 0600, 0900, 1200, 1500, 1800 and 2100 GMT for 50 selected stations.

When 10 years of data are available it may be worthwhile to compute similar tables for more stations and print anomaly charts with the computer. As the present printout consists of 100 pages, only a brief summary is included in this note. The list of selected station is in Table 1. The highest and lowest values of the 3-hourly mean values of the meteorological elements are listed in Tables 2 - 10 together with the synoptic hour and the month in which they occur.

Many of the results do little more than confirm what forecasters already know but some are unexpected and therefore interesting.

2. THE DIURNAL VARIATION OF PRESSURE

According to Haurwitz (1955), the semidiurnal pressure wave is partly gravitational and partly thermal. The amplitude varies with the seasons and has a maximum in March and a minimum in July in the northern hemisphere but because it is forced by the heating of ozone in the upper stratosphere (Wallace 1975) its phase does not shift very much. The maxima appear everywhere at around 10 a.m. and 10 p.m. local time with minima around 4 a.m. and 4 p.m. (see Fig. 1). The amplitude is greatest just north of the equator and decreases to zero at both poles. The diurnal variation cannot be analysed from three-hourly GMT synoptic reports because of the variation of local time with longitude.

On three-hourly synoptic charts Hong Kong and Guangzhou have maxima at 0300 GMT and minima at 0900 GMT but because Guangzhou is further west the apparent range there is greater: 3.7 mbar at Guangzhou compared with 3.0 mbar in Hong Kong. Shanghai's apparent range is only 2.1 mbar because the extremes occur nearly midway between synoptic hours.

Briar and Simpson (1969) found that in Jakarta and Wake Island a small increase in cloudiness and rainfall associated with rising pressure and the decrease associated with falling pressure can be correlated with the amplitude of the gravitational S_2 wave.

3. THE DIURNAL VARIATION OF TEMPERATURE

This is very important when estimating the intensity of cold fronts.

Guangzhou's range of 6.0°C in winter and 5.2°C in summer is nearly double Hong Kong's 3.7°C and 3.2°C, or Macau's 3.9°C and 3.3°C.

Beijing's large range of 8.8°C in January and 6.5°C in July is probably typical of continental Asia. Tainan's range of 9.4°C in January and 5.9°C in July is unexpectedly large and is probably due to the Fohn effect of E or NE winds blowing down the lee side of the mountains, which face the afternoon sun, causing high temperatures on fine January afternoons (ref. 13).

Manila's diurnal range 6.8°C in January and 5.8°C in July is also large. Unlike most of the other cities, Haikou has a larger amplitude (5.8°C) in July than in January (2.9°C).

All the mountain stations such as Quixian Shan, Jiuxian Shan, Kuocang Shan and Nanyue have much smaller diurnal ranges of temperature than nearby low level stations.

Another anomaly is that Okinawa's maximum occurs at 0300 GMT whereas all the other stations including Tokyo have their maxima at 0600 GMT or 0900 GMT. This may be associated with Okinawa's rainfall maximum at 0600 GMT. The three westernmost stations Kunming, Vientiane and Bangkok have extremely large temperature ranges (11.4°C, 10.8° and 10.0°C) in January.

4. THE DIURNAL VARIATION OF WINDSPEED

In summer nearly all stations have afternoon (0600 GMT) maxima and early morning (2100 GMT) minima. However, in winter, stations along the south coast of China, Hong Kong, Macau, Shangchuandao, Dongshadao and Xishadao all have windspeed maxima at 0300 GMT. This morning wind maximum in January can be explained as nocturnal cooling causing a rise in pressure overland and hence reinforcing the winter monsoon, but Shantou and Shanwei have afternoon maxima. Manila has its wind maximum at 0900 GMT. Xishadao's mean windspeeds of 13.2 knots at 0300 GMT in January, 14.4 knots at 0600 GMT in November and 12.7 knots at 0000 GMT in July are rather higher than expected. Some island stations such as Bach Longvi (18.8 knots), Shangchuandao (15.2 knots), Magong (17.0 knots) and Lanyu (22.4 knots) have very high mean winds in January. The mountain stations in China mostly have their strongest winds from the SW even in winter and they are not particularly strong.

5. THE DIURNAL VARIATION OF MIST & FOG

In the computer program Mist and Fog were taken as a present weather report of 10, 11, 12, 28 and 40 - 49 which includes fog in the past hour.

All stations have a morning maximum and the most significant feature is the very frequent occurrence of mist/fog in Beijing, 32.2% at 2100 GMT, Shanghai, 49.2% at 2100 GMT and Tainan, 49.9% at 0000 GMG (annual averages).

It is at first surprising that in March, Macau reported 28.8% mist/fog compared with R.O.'s 2.9%, and Guangzhou's 19.7%, however this is probably due to differences in definition. Hong Kong does not report mist unless the visibility is less than 5 km whereas other stations do. Mist/fog seem to be worst in the winter months in some Chinese stations: e.g. Beijing's 28% in November, Shanghai's 29.5% in December, Tainan's 28.7% in December and Haikou's 20.7% in January. Jiuxian Shan (1645 m) reports mist 55.1% at 0000 GMT in June when it must often be in cloud.

Tokyo has two maxima 24.3% at 2100 GMT in July and 23.9% at 2100 GMT in October.

6. THE DIURNAL VARIATION OF CLOUD AMOUNT

Macau consistently has more cloud than Hong Kong. Hong Kong, Guangzhou, Macau, Tokyo, Beijing, Shantou, Shangchuandao, Haikou and Nanshadao have morning maxima whereas Okinawa, Shanghai and Taibei have afternoon maxima. Dongshadao and Manila have evening maxima.

Dongshadao is remarkably cloudy in December with 6.8 oktas coverage.

7. THE PERCENTAGE FREQUENCY OF PRECIPITATION

In the computer program the occurrence of precipitation was defined as a present weather report of 14 - 17, 19 - 23, 25 - 27, 29 and 50 - 99. This includes thunderstorms, precipitation in sight, in the past hour or not reaching the ground.

Hong Kong shows a maximum frequency of 33.1% at 0000 GMT in June and a minimum of 5.3% at 0000 GMT in November. There is an early morning maximum of 10.1% at 2100 GMT in November.

Baguio and Bangkok have very pronounced afternoon maxima in all months and also the highest frequencies of precipitation - 68.1% and 61.4% in August and September respectively.

Considering their high levels of cloudiness the island stations Dongshadao and Magong have remarkably low rainfall frequencies - (7.2% and 7.1% overall) and tend to have nocturnal maxima.

The diurnal variation maps show that while the morning maximum is confined to the coastal areas in July the morning maximum is much more widespread in January.

The annual variations also show considerable variety. Okinawa and Xishadao have most rain in December, Taibei in November but Tainan in June, Haikou in September, Dongshadao in October! While Yap is wettest in May and Palau in January.

8. THE DIURNAL VARIATION OF RAINFALL AT THE ROYAL OBSERVATORY

An 86-year computer printout (1884 - 1976), Table 13, shows some anomalies in the diurnal variation of Hong Kong rainfall. April and November have maxima at 7 p.m. in April and at 3 p.m. in November. December and January have more nocturnal rain with maxima around 4 a.m. while there is a persistent double maximum with peaks around 5 or 6 a.m. and again at 9 a.m. in the summer months. Which of the two maxima predominates depends on the month and period analysed. The diurnal variation is most pronounced (ratio 3.1 to 1) in June and smallest (ratio 1.8 to 1) in February and November.

Table 12 shows that post-war thunderstorms peak around 5 a.m. possibly because darkness and less noise make them easier to observe than at 9 a.m., but on days with rainfall over 100 mm (Table 14) the rainfall peak was around 9 a.m. It may be significant that Wallace (1975) found that thunderstorms tended to reach their peak frequency earlier than rainfall in those parts of the USA that have nocturnal maxima.

Note that in most months minimum rainfall in Hong Kong occurs in the evening around 7 p.m. and not in the afternoon.

9. THEORIES ABOUT THE DIURNAL VARIATION OF RAINFALL

There are a number of mechanisms for the diurnal variation of rainfall but none of them alone seems to be capable of explaining all the observed facts.

The simplest explanation is that on summer nights the air over the Pearl river estuary is warmer and more humid than that over the land on either side of it. Land breezes and katabatic winds therefore converge on the estuary causing nocturnal showers. These showers tend to drift over Hong Kong in the early morning when the upper winds have a westerly component. Table 11 shows that Hong Kong's morning maximum is much less pronounced when upper winds have an easterly component. Neumann (1951) showed that inlets and bays in the Mediterranean have a pronounced maximum of nocturnal thunderstorms due to the convergence of land breezes. A similar explanation can be applied to coastal stations such as Shantou and Shanwei if the air over the sea to the south of them is warm and humid and the upper winds have a southerly component. It is significant that Bell (1969) found that Hong Kong's highest rainfall occur with a trough about 100 km to the south of the coast.

However this simple reasoning does not explain the morning maximum over Dongshadao, or the anomalous afternoon maximum in Hong Kong in April. It also does not explain the double maximum 6 a.m. and 9 a.m. in June in Hong Kong.

Ramage (1952) suggested that the summer (SW) monsoon is the main cause of the morning maximum. He argues that after midnight, when the turbulent effects of afternoon heating have died down, there is increased low level advection of warm air channelled between the surface and the upper limit of the monsoon circulation. A similar mechanism is described by Blackadar (1957) in the midwestern United States where a southwesterly jet at 850 mbar is weaker than the calculated gradient wind in daytime but becomes supragradient at night.

Gray (1970) showed that deep cumulus convection over the open sea has a pronounced morning maximum and explained it by the radiation differences between cloud and cloud free areas. In cloud free areas there is considerable nocturnal cooling throughout the troposphere resulting in subsidence. In cloud clusters with a thick cirrus shields there is more nocturnal cooling at cirrus levels but much less in the troposphere. This means that in the troposphere the clear areas subside and that convection is therefore enhanced in the cloud clusters at night and maximum rainfall occurs a few hours later in the morning - the lag depending on the size of the cloud cluster.

He showed that as a cloud cluster develops into a tropical cyclone frictionally induced convergence (CISK) gradually becomes more significant than radiation effects and the morning maximum becomes less pronounced. This is borne out by his observation that fully developed tropical cyclones have a very much weaker morning maximum than cloud clusters.

Bleeker (1951) suggested another mechanism to explain the large scale nocturnal maximum of precipitation over the plains of the USA. The air over the higher ground is shallower and therefore nocturnal cooling causes the isobaric surfaces to sink less over the hills than over the plains. This results in air at high levels flowing towards the plains at night. This causes rising surface pressure at the edges of the plains which results in low level convergence into the plains.

10. THE EFFECT OF WIND DIRECTION ON DIURNAL VARIATION OF RAINFALL IN HONG KONG

The Royal Observatory Computer Division made printouts for the summer months of all morning and afternoon rainfall amounts and the corresponding 0000 GMT upper-winds at the standard levels over Hong Kong. Inspection of the data showed that the 900-mbar winds showed the greatest variation. At the 700 mbar- and 500 mbar-levels winds tend to be nearly always southwesterly in summer while at the lower standard levels, wind data were less representative due to friction and local topographical effects. Partly due to the inclusion of data collected during tropical cyclones there was a close correlation between 900-mbar windspeed and rainfall amount. Twelve-hour rainfall averaged 22.7 mm with 900 mbar SW'-lies $\geqslant$ 20 knots in June. The analysis in Table 11 also shows a weak afternoon maximum with SE or NE winds in June and a strong morning maximum with SW winds in all three summer months.

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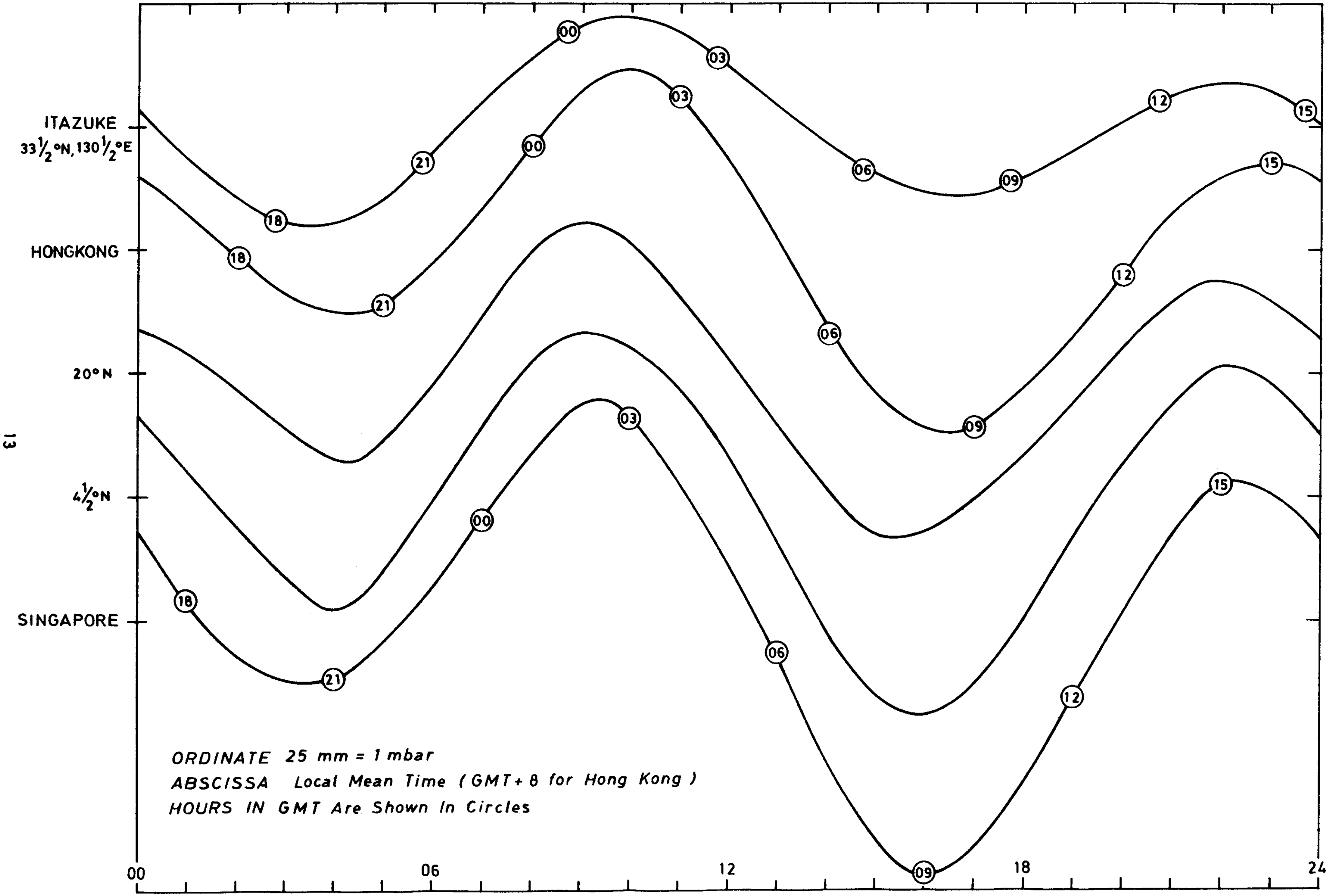

Figure 1. Diurnal variation of pressure

TABLE 1. LIST OF STATIONS

		ELEVATION	POSITION	
45005	HONG KONG	33 m	22° 18'N	114° 10'E
45011	MACAU	59 m	22° 12'N	113° 32'E
47108	SEOUL	87 m	37° 34'N	126° 58'E
47662	TOKYO	36 m	35° 41'N	139° 46'E
47827	KAGOSHIMA	5 m	31° 34'N	130° 33'E
47927	MIYAKOJIMA	41 m	24° 47'N	125° 17'E
47936	NAHA	36 m	26° 14'N	127° 41'E
48455	BANGKOK	20 m	13° 44'N	100° 34'E
48694	SINGAPORE AIRPORT	32 m	01° 22'N	103° 55'E
48820	HA NOI (HANOI)	6 m	21° 01'N	105° 48'E
48839	BACH LONGVI	60 m	20° 08'N	107° 43'E
48855	DANANG (TOURANE)	7 m	16° 02'N	108° 11'E
48900	HO CHI MINH VILLE (SAIGON)	19 m	10° 49'N	106° 40'E
48940	VIENTIANE	170 m	17° 57'N	102° 31'E
54511	BEIJING (PEKING)	32 m	39° 48'N	116° 28'E
56778	KUNMING (KUN MING)	1892 m	25° 01'N	102° 41'E
57494	WUHAN (HAN KOU)	23 m	30° 38'N	114° 04'E
57679	CHANGSHA (CHANG SHA)	44 m	28° 12'N	113° 04'E
57776	NANYUE (HENG SHAN)	1268 m	27° 15'N	112° 45'E
58238	NANJING (NANKING)	13 m	32° 00'N	118° 48'E
58367	SHANGHAI	5 m	31° 10'N	121° 26'E
58457	HANGZHOU (HANG CHOU)	43 m	30° 14'N	120° 10'E
58506	LU SHAN	1166 m	29° 35'N	115° 59'E
58653	KUOCANG SHAN (KUAHTSANG SHAN)	1371 m	28° 49'N	120° 55'E
58666	DACHENDAO (TA CHEN TAO)	206 m	28° 27'N	121° 53'E
58726	QUIXIAN SHAN (WOUISHIAN)	1409 m	27° 57'N	117° 50'E
58847	FUZHOU (FU CHOU)	85 m	26° 05'N	119° 17'E
58931	JIUXIAN SHAN (DEIYUNSHIAN)	1645 m	25° 43'N	118° 06'E
58969	TAIBEI (TAIPEI)	7 m	25° 04'N	121° 32'E

TABLE 1. (Cont'd.)

		ELEVATION	POSITION	
59087	FOGANG (FO KANG)	68 m	23° 52'N	113° 32'E
59134	XIAMEN (AMOY)	63 m	24° 27'N	118° 04'E
59287	GUANGZHOU (CANTON)	7 m	23° 08'N	113° 19'E
59316	SHANTOU (SWATOW)	3 m	23° 24'N	116° 41'E
59345	MAGONG (MAKUNG)	22 m	23° 31'N	119° 34'E
59358	TAINAN (TAI NAN)	14 m	23° 00'N	120° 13'E
59431	NANNING	73 m	22° 49'N	108° 21'E
59493	BAO'AN (PAO AN)	18 m	22° 33'N	114° 06'E
59501	SHANWEI (SHAN WEI)	7 m	22° 47'N	115° 22'E
59567	LANYU	325 m	22° 02'N	121° 33'E
59673	SHANGCHUANDAO (ST. JOHN'S ISLAND)	18 m	21° 44'N	112° 46'E
59758	HAIKOU (HAI KOU)	15 m	20° 02'N	110° 21'E
59792	DONGSHADAO (PRATAS ISLAND)	6 m	20° 40'N	116° 43'E
59948	YAXIAN (YULIN)	5 m	18° 14'N	109° 31'E
59981	XISHADO (PARACEL ISLAND)	6 m	16° 50'N	112° 20'E
59997	NANSHADAO (NANSHA ISLAND)	5 m	10° 23'N	114° 22'E
91408	PALAU	33 m	07° 20'N	134° 29'E
91413	YAP	17 m	09° 29'N	138° 05'E
98135	BASCO	11 m	20° 27'N	121° 58'E
98328	BAGUIO	1501 m	16° 25'N	120° 36'E
98429	MANILA INTERNATIONAL AIRPORT	15 m	14° 31'N	121° 00'E

TABLE 2. HIGHEST FREQUENCY OF PRECIPITATION

		%	GMT	Month
45005	HONG KONG	33.1	0000	JUN
45011	MACAU	36.6	0000	JUN
47108	SEOUL	28.2	0000	JUL
47662	TOKYO	33.6	2100	JUN
47827	KAGOSHIMA	39.5	1500	JUN
47927	MIYAKOJIMA	36.7	0900	NOV
47936	NAHA	31.5	0600	JUN
48455	BANGKOK	61.4	0900	SEP
48694	SINGAPORE AIRPORT	55.2	0600	NOV
48820	HA NOI	47.4	1800	MAR
48839	BACH LONGVI	32.2	0000	SEP
48855	DANANG	35.5	0900	NOV
48900	HO CHI MINH VILLE	53.7	0900	AUG
48940	VIENTIANE	39.1	0900	AUG
54511	BEIJING	29.1	1200	JUL
56778	KUNMING	48.3	0900	JUL
57494	WUHAN	25.3	0000	MAY
57679	CHANGSHA	42.9	0000	MAR
57776	NANYUE	46.5	2100	MAR
58238	NANJING	28.0	0900	JUL
58367	SHANGHAI	30.4	1200	JUN
58457	HANGZHOU	37.2	0900	JUN
58506	LU SHAN	38.1	0000	JUN
58653	KUOCANG SHAN	41.0	0900	JUN
58666	DACHENDAO	35.3	0000	MAY

		%	GMT	Month
58726	QUIXIAN SHAN	61.4	0900	JUN
58847	FUZHOU	52.7	1200	JUN
58931	JIUXIAN SHAN	57.5	0900	AUG
58969	TAIBEI	40.0	2100	JAN
59087	FOGANG	50.0	0600	JUN
59134	XIAMEN	44.2	1200	JUN
59287	GUANGZHOU	43.4	0900	JUN
59316	SHANTOU	42.8	0600	JUN
59345	MAGONG	17.4	0600	JUN
59358	TAINAN	27.5	0900	JUN
59431	NANNING	44.1	0900	JUL
59493	BAO'AN	43.1	0000	JUN
59501	SHANWEI	43.2	0000	JUN
59567	LANYU	33.7	1200	FEB
59673	SHANGCHUANDAO	37.0	0000	JUN
59758	HAIKOU	59.7	0900	JUN
59792	DONGSHADAO	16.0	2100	SEP
59948	YAXIAN	49.7	0900	SEP
59981	XISHADAO	33.1	0000	DEC
59997	NANSHADAO	32.7	1200	SEP
91408	PALAU	43.7	0000	JAN
91413	YAP	44.2	0600	NOV
98135	BASCO	55.4	0900	NOV
98328	BAGUIO	68.1	0900	AUG
98429	MANILA INTERNATIONAL AIRPORT	44.5	0900	AUG

TABLE 3. LOWEST FREQUENCY OF PRECIPITATION

		%	GMT	Month			%	GMT	Month
45005	HONG KONG	5.3	0000	NOV	58726	QUIXIAN SHAN	9.8	2100	JUL
45011	MACAU	5.4	0300, 1500	NOV	58847	FUZHOU	6.8	0000	JUL
47108	SEOUL	4.1	0900 1200	JAN DEC	58931	JIUXIAN SHAN	(8.2)	0000	JUL
47662	TOKYO	2.7	1800	JAN	58969	TAIBEI	4.1	0000	JUL
47827	KAGOSHIMA	13.5	1500	AUG	59087	FOGANG	6.2	0900	NOV
47927	MIYAKOJIMA	12.3	0300	APR	59134	XIAMEN	6.1	0300	NOV
47936	NAHA	12.0	1500	SEP	59287	GUANGZHOU	2.4	1500	NOV
48455	BANGKOK	0.0	1500	DEC	59316	SHANTOU	7.4	0600	NOV
48694	SINGAPORE AIRPORT	1.7	1500	MAR	59345	MAGONG	0.7	0900	JAN
48820	HA NOI	3.4	1500	JUL	59358	TAINAN	0.9	1500	FEB
48839	BACH LONGVI	(2.1)	0900	JUN	59431	NANNING	10.0	1200, 1500	NOV
48855	DANANG	0.0	0000	MAY	59493	BAO'AN	8.8	0900	NOV
48900	HO CHI MINH VILLE	0.0	0300, 0600, 1200, 1500, 1800	FEB	59501	SHANWEI	7.4	1500	NOV
					59567	LANYU	7.6	0600	JUL
48940	VIENTIANE	0.0	0600 0000, 0090	JAN & FEB DEC	59673	SHANGCHUANDAO	4.8	0300	NOV
54511	BEIJING	0.7	0900	JAN	59758	HAIKOU	4.5	1500	MAY
56778	KUNMING	2.0	0900	DEC	59792	DONGSHADAO	0.8	1800	MAR
57494	WUHAN	6.8	1500	JUL	59948	YAXIAN	2.1	2100	FEB
57679	CHANGSHA	7.8	1800	JUL & AUG	59981	XISHADAO	0.7	0600	MAR
57776	NANYUE	8.0	2100	AUG	59997	NANSHADAO	0.0	0300	MAR
58238	NANJING	9.7	1500	AUG	91408	PALAU	13.2	1200	MAR
58367	SHANGHAI	4.2	1500	AUG	91413	YAP	13.7	1200	FEB
58457	HANGZHOU	11.0	0000	AUG	98135	BASCO	9.1	1500	APR
58506	LU SHAN	(12.5)	1800	AUG	98328	BAGUIO	0.0	1800 0300	JAN MAR
58653	KUOCANG SHAN	8.3	2100	JUL	98429	MANILA INTERNA- TIONAL AIRPORT	0.0	1500 2100	FEB & MAR MAR & APR
58666	DACHENDAO	8.3	0300	JUN					

TABLE 4. HIGHEST FREQUENCY OF CLOUD AMOUNT

Station	Name	Amount in oktas	Time GMT	Month
45005	HONG KONG	6.7	0000	MAR
45011	MACAU	7.2	0000	MAR
47108	SEOUL	6.5	0300	JUL
47662	TOKYO	7.0	0000, 2100	JUN
47827	KAGOSHIMA	6.6	0300, 2100	JUN
47927	MIYAKOJIMA	6.3	0600, 0900 0900, 1200	JUN NOV
47936	NAHA	6.9	0300	JUN
48455	BANGKOK	7.6	1200	AUG
48694	SINGAPORE AIRPORT	7.2	0600, 0900	NOV
48820	HA NOI	7.8	0000	MAR
48839	BACH LONGVI	7.3	0300	JAN
48855	DANANG	7.1	1200	AUG
48900	HO CHI MINH VILLE	6.8	1200 1200	JUN JUL
48940	VIENTIANE	6.9	0000	AUG
54511	BEIJING	5.9	0000	JUL
56778	KUNMING	6.9	0000 0300	JUN JUL
57494	WUHAN	6.1	0900	MAY
57679	CHANGSHA	6.7	0000, 0600 0000	MAY JUN
57776	NANYUE	7.3	0600	JUN
58238	NANJING	5.9	0600	MAY
58367	SHANGHAI	6.5	0000, 0300 0900	JUN
58457	HANGZHOU	6.7	2100 0300	MAY JUN
58506	LU SHAN	6.9	0600	MAY
58653	KUOCANG SHAN	7.2	0900	JUN
58666	DACHENDAO	7.4	2100	JUN

Station	Name	Amount in oktas	Time G.M.T.	Month
58726	QUIXIAN SHAN	7.4	0600	JUN
58847	FUZHOU	7.2	2100	MAY
58931	JIUXIAN SHAN	7.6	0300, 1800	JUN
58969	TAIBEI	6.8	0900	JUN
59087	FOGANG	7.2	0000	APR
59134	XIAMEN	6.9	0000, 0300 1200	JUN
59287	GUANGZHOU	7.0	0000 0300	APR MAY
59316	SHANTOU	7.0	2100	MAY
59345	MAGONG	6.3	0000, 0600 0000	JAN JUN
59358	TAINAN	6.6	0900	JUN
59431	NANNING	7.2	0000	MAR
59493	BAO'AN	6.8	0300, 0600 0900	JUN
59501	SHANWEI	7.1	2100	JUN
59567	LANYU	6.9	0300	JAN
59673	SHANGCHUANDAO	6.8	0000, 0300 0000 0000	MAR APR JUN
59758	HAIKOU	6.7	0900	AUG
59792	DONGSHADAO	7.0	1200	DEC
59948	YAXIAN	6.8	0000	JUN
59981	XISHADAO	6.3	0600	AUG
59997	NANSHADAO	6.6	0000	JUL
91408	PALAU	7.5	0600	AUG
91413	YAP	7.3	0600	SEP
98135	BASCO	7.1	0900	AUG
98328	BAGUIO	7.9	0900	AUG
98429	MANILA INTERNATIONAL AIRPORT	7.3	0900	SEP

TABLE 5. LOWEST FREQUENCY OF CLOUD AMOUNT

Station	Name	Amount in oktas	Time GMT	Month
45005	HONG KONG	3.6	0900	NOV
45011	MACAU	3.9	0600 - 1500	NOV
47108	SEOUL	2.1	1500	JAN
47662	TOKYO	2.6	1500	JAN
47827	KAGOSHIMA	3.3	1500	NOV
47927	MIYAKOJIMA	3.7	1800 1800	SEP JUL
47936	NAHA	5.1	2100 2100	AUG OCT
48455	BANGKOK	4.9	2100	DEC
48694	SINGAPORE AIRPORT	5.4	1800	MAR
48820	HA NOI	3.3	1200	DEC
48839	BACH LONGVI	3.7	1500	DEC
48855	DANANG	3.9	0600	MAR
48900	HO CHI MINH VILLE	2.7	1500	MAR
48940	VIENTIANE	1.9	0900	MAR
54511	BEIJING	1.5	1500	JAN
56778	KUNMING	1.4	1500	MAR
57494	WUHAN	3.1	1500, 2100	AUG
57679	CHANGSHA	3.5	1800	AUG
57776	NANYUE	4.3	1800	JUL
58238	NANJING	3.5	1500 1500	AUG NOV
58367	SHANGHAI	3.2	1800	AUG
58457	HANGZHOU	3.5	1500	AUG
58506	LU SHAN	4.2	2100	SEP
58653	KUOCANG SHAN	4.6	0300	FEB
58666	DACHENDAO	3.7	1500	OCT

Station	Name	Amount in oktas	Time GMT	Month
58726	QUIXIAN SHAN	4.2	1800	AUG
58847	FUZHOU	3.7	1800	JUL
58931	JIUXIAN SHAN	4.8	0000	JAN
58969	TAIBEI	3.8	1500, 1800	AUG
59087	FOGANG	3.3	1200	NOV
59134	XIAMEN	3.9	1500	NOV
59287	GUANGZHOU	2.8	1500	DEC
59316	SHANTOU	4.0	0300	NOV
59345	MAGONG	4.0	1800 1800, 2100	JUL SEP
59358	TAINAN	3.2	0600	JAN
59431	NANNING	3.7	1500	SEP
59493	BAO'AN	3.5	1200	NOV
59501	SHANWEI	4.0	0300	NOV
59567	LANYU	4.2	1500	AUG
59673	SHANGCHUANDAO	3.5	1200	NOV
59758	HAIKOU	4.3	1500	DEC
59792	DONGSHADAO	4.3	1800, 2100	JUL
59948	YAXIAN	4.7	1500 1200, 1500, 1800	APR MAR
59981	XISHADAO	1.9	1500	APR
59997	NANSHADAO	2.6	1500	APR
91408	PALAU	5.6	1200	APR
91413	YAP	5.6	1200	MAY
98135	BASCO	4.2	1800	APR
98328	BAGUIO	3.0	1800	JAN
98429	MANILA INTERNATIONAL AIRPORT	2.0	1500	MAR

TABLE 6. HIGHEST MEAN WIND SPEEDS

		Knots	GMT	Month			Knots	GMT	Month
45005	HONG KONG	7.5	0600	JUL	58726	QUIXIAN SHAN	14.5	1800	AUG
45011	MACAU	9.6	0300	OCT	58847	FUZHOU	12.3	0900	JUL
47108	SEOUL	9.0	0600	APR	58931	JIUXIAN SHAN	19.9	2100	JUN
47662	TOKYO	8.8	0600 0900	APR	58969	TAIBEI	12.2	0600	OCT
47827	KAGOSHIMA	8.6	0600	JUL	59087	FOGANG	6.8	0300	NOV
47927	MIYAKOJIMA	14.0	0300	NOV	59134	XIAMEN	9.8	0900	OCT
47936	NAHA	11.9	0600	NOV	59287	GUANGZHOU	6.0	0900	JUL
48455	BANGKOK	7.7	0900	MAR	59316	SHANTOU	7.7	0600	OCT
48694	SINGAPORE AIRPORT	8.7	0300	JAN	59345	MAGONG	18.5	0600	NOV
48820	HA NOI	5.9	0900	APR	59358	TAINAN	8.1	0600	APR
48839	BACH LONGVI	22.0	0300	NOV	59431	NANNING	6.4	0900	MAR
48855	DANANG	6.2	0600	MAY	59493	BAO'AN	6.4	0600	JUL
48900	HO CHI MINH VILLE	7.3	0600	AUG	59501	SHANWEI	10.3	0600	JUL
					59567	LANYU	26.7	0300	NOV
48940	VIENTIANE	6.3	0300	OCT	59673	SHANGCHUANDAO	16.7	0300	NOV
54511	BEIJING	10.1	0900	MAR	59758	HAIKOU	9.2	0600	NOV
56778	KUNMING	13.4	0600	MAR	59792	DONGSHADAO	17.9	0000	NOV
57494	WUHAN	8.4	0600	JUL	59948	YAXIAN	10.4	0600	NOV
57679	CHANGSHA	9.2	0900	JUL	59981	XISHADAO	14.4	0600	NOV
57776	NANYUE	19.7	1800	JUL	59997	NANSHADAO	11.8	1500	SEP
58238	NANJING	9.3	0600	APR	91408	PALAU	9.9	0600	MAR
58367	SHANGHAI	8.9	0600	AUG	91413	YAP	10.9	0600	MAR
58457	HANGZHOU	8.9	0900	AUG	98135	BASCO	13.5	0600	DEC
58506	LU SHAN	14.0	1200	OCT	98328	BAGUIO	5.6	0600	JUL
58653	KUOCANG SHAN	17.3	1800	FEB	98429	MANILA INTERNATIONAL AIRPORT	14.0	0600	APR
58666	DACHENDAO	21.9	1200	NOV					

TABLE 7. LOWEST MEAN WIND SPEEDS

		Knots	GMT	Month
45005	HONG KONG	3.6	1800 1500	MAY JUL
45011	MACAU	5.1	0000	JAN
47108	SEOUL	2.6	2100	JUN
47662	TOKYO	4.0	2100	DEC
47827	KAGOSHIMA	3.6	2100	MAY
47927	MIYAKOJIMA	6.4	1800 1500, 1800	MAY SEP
47936	NAHA	5.8	2100	SEP
48455	BANGKOK	0.3	1800	OCT
48694	SINGAPORE AIRPORT	0.7	1800	MAY, OCT
48820	HA NOI	1.7	1800	AUG
48839	BACH LONGVI	9.2	1500	AUG
48855	DANANG	0.4	1800	APR
48900	HO CHI MINH VILLE	0.8	0000	SEP
48940	VIENTIANE	1.4	0000	DEC
54511	BEIJING	1.9	2100	SEP
56778	KUNMING	1.3	2100	DEC
57494	WUHAN	2.9	1800	AUG
57679	CHANGSHA	4.0	2100	MAY
57776	NANYUE	7.0	0600	SEP
58238	NANJING	3.5	2100	JUN, SEP
58367	SHANGHAI	3.5	2100	SEP
58457	HANGZHOU	3.6	1800	SEP
58506	LU SHAN	7.3	0600	DEC
58653	KUOCANG SHAN	8.1	0600	JUN
58666	DACHENDAO	13.2	1500	MAY

		Knots	GMT	Month
58726	QUIXIAN SHAN	3.8	0300	SEP
58847	FUZHOU	2.4	0000	JUN
58931	JIUXIAN SHAN	8.7	0300 0600	JUL SEP
58969	TAIBEI	1.9	2100	JUN
59087	FOGANG	1.7	2100	AUG
59134	XIAMEN	3.6	2100	MAY
59287	GUANGZHOU	1.6	2100	AUG
59316	SHANTOU	1.8	2100	JUL
59345	MAGONG	3.8	2100	JUL
59358	TAINAN	2.4	1800	JUL
59431	NANNING	1.2	1800	NOV
59493	BAO'AN	1.4	1800	JUL
59501	SHANWEI	4.2	1800	SEP
59567	LANYU	13.1	1500	AUG
59673	SHANGCHUANDAO	6.0	1800	MAY
59758	HAIKOU	2.6	2100	AUG
59792	DONGSHADAO	6.3	2100	APR, MAY
59948	YAXIAN	3.1	1500	JUL
59981	XISHADAO	6.9	1800	MAR
59997	NANSHADAO	4.6	0000	APR
91408	PALAU	4.3	1200	JUN
91413	YAP	3.8	1200	JUL
98135	BASCO	5.5	2100	JUL
98328	BAGUIO	2.3	1200	APR
98429	MANILA INTERNATIONAL AIRPORT	0.9	2100	JAN

TABLE 8. HIGHEST PERCENTAGE FREQUENCY OF MIST OR FOG

		%	Hour GMT	Month			%	Hour GMT	Month
45005	HONG KONG	5.9	0000	MAR	58726	QUIXIAN SHAN	23.5	1200	SEP
45011	MACAU	39.7	0000	MAR	58847	FUZHOU	25.0	0000	JUL
47108	SEOUL	79.9	0000	JAN	58931	JIUXIAN SHAN	55.1	0000	JUN
47662	TOKYO	24.3	2100	JUL	58969	TAIBEI	39.2	1800	APR
47827	KAGOSHIMA	3.3	2100	JUL	59087	FOGANG	37.8	2100	AUG
47927	MIYAKOJIMA	2.6	0000, 0300	MAR	59134	XIAMEN	18.0	0000	APR
47936	NAHA	2.6	0000	AUG	59287	GUANGZHOU	32.2	0000	MAR
48455	BANGKOK	95.0	0000	JAN	59316	SHANTOU	36.8	0000	DEC
48694	SINGAPORE AIRPORT	70.5	0000	MAR	59345	MAGONG	16.1	0000	MAR
48820	HA NOI	56.3	0000	DEC	59358	TAINAN	74.7	0000	MAR
48839	BACH LONGVI	54.2	0300	APR	59431	NANNING	51.0	0000	DEC
48855	DANANG	31.8	0000	MAR	59493	BAO'AN	16.3	2100	SEP
48900	HO CHI MINH VILLE	54.1	0000	JAN	59501	SHANWEI	13.3	0000	MAR
					59567	LANYU	6.8	1500	MAR
48940	VIENTIANE	95.0	0000	MAR	59673	SHANGCHUANDAO	14.2	0000	MAR
54511	BEIJING	57.5	2100	JUL	59758	HAIKOU	47.1	0000	JAN
56778	KUNMING	32.0	0000	DEC	59792	DONGSHADAO	4.2	2100	APR
57494	WUHAN	72.1	0000	JAN	59948	YAXIAN	1.3	1200 2100	MAY AUG
57679	CHANGSHA	67.3	0000	NOV	59981	XISHADAO	4.0	2100	OCT
57776	NANYUE	36.7	2100	AUG	59997	NANSHADAO	4.5	1800	SEP
58238	NANJING	50.0	0000	DEC	91408	PALAU	1.7	0000	MAR
58367	SHANGHAI	64.1	2100	JUN	91413	YAP	1.0	1200	JUL
58457	HANGZHOU	51.7	0000	SEP	98135	BASCO	2.1	1500	SEP, OCT
58506	LU SHAN	20.5	0300	MAY	98328	BAGUIO	68.3	0600	NOV
58653	KUOCANG SHAN	49.6	1200	AUG, SEP	98429	MANILA INTERNATIONAL AIRPORT	1.4	0000	AUG, SEP, NOV
58666	DACHENDAO	47.7	1800	JUL				1200	SEP

TABLE 9. HIGHEST AND LOWEST VALUES OF 3-HOURLY TEMPERATURES IN JANUARY

Station	Name	Highest °C	Hour GMT	Lowest °C	Hour GMT	Station	Name	Highest °C	Hour GMT	Lowest °C	Hour GMT
45005	HONG KONG	17.7	0600	14.0	2100	58726	QUIXIAN SHAN	3.6	0600	0.7	0000
45011	MACAU	16.1	0600	12.2	0000	58847	FUZHOU	13.1	0600	8.4	2100 0000
47108	SEOUL	0.0	0600	-6.2	2100	58931	JIUXIAN SHAN	7.1	0600	3.4	2100
47662	TOKYO	8.2	0600	1.6	2100	58969	TAIBEI	17.3	0600	13.3	2100
47827	KAGOSHIMA	10.5	0600	3.7	2100	59087	FOGANG	14.8	0900	8.1	0000
47927	MIYAKOJIMA	18.3	0300 0600	16.1	1800 2100	59134	XIAMEN	15.7	0600	10.6	0000
47936	NAHA	17.2	0300	14.7	2100	59287	GUANGZHOU	16.5	0600 0900	10.5	2100 0000
48455	BANGKOK	31.0	0900	21.0	0000	59316	SHANTOU	16.0	0600	10.9	0000
48694	SINGAPORE AIRPORT	28.8	0600	23.3	2100 0000	59345	MAGONG	17.5	0600	14.4	2100
48820	HA NOI	17.7	0900	14.1	1800*	59358	TAINAN	22.8	0600	13.4	2100
48839	BACH LONGVI	17.0	0600	N.A.	-	59431	NANNING	15.0	0600 0900	9.7	0000
48855	DANANG	23.1	0600	N.A.	-	59493	BAO'AN	18.1	0600	10.9	0000
48900	HO CHI MINH VILLE	30.4	0900	22.4	0000*	59501	SHANWEI	17.5	0600	12.1	2100
						59567	LANYU	19.0	0600	17.3	1800*
48940	VIENTIANE	27.8	0900	17.0	0000*	59673	SHANGCHUANDAO	16.2	0600	12.9	0000
54511	BEIJING	0.9	0600	-7.9	0000	59758	HAIKOU	18.7	0600	15.8	0000
56778	KUNMING	13.7	0900	2.3	0000	59792	DONGSHADAO	21.6	0300 0600	20.1	0000
57494	WUHAN	6.7	0600	0.4	0000	59948	YAXIAN	24.6	0600	18.9	2100 0000
57679	CHANGSHA	7.3	0900	2.4	0000	59981	XISHADAO	24.6	0600	22.1	2100
57776	NANYUE	1.6	0600	-1.3	2100	59997	NANSHADAO	29.3	0600	25.6	1800*
58238	NANJING	5.4	0600	-0.3	2100	91408	PALAU	N.A.	-	N.A.	-
58367	SHANGHAI	6.5	0600	1.4	2100	91413	YAP	N.A.	-	N.A.	-
58457	HANGZHOU	6.1	0600	1.9	0000	98135	BASCO	23.3	0600	21.3	2100 0000
58506	LU SHAN	1.5	0600	-1.8	0000	98328	BAGUIO	21.2	0600	14.3	2100
58653	KUOCANG SHAN	0.3	0600	-2.0	2100	98429	MANILA INTERNATIONAL AIRPORT	29.1	0600	22.3	2100
58666	DACHENDAO	6.4	0600	4.8	2100						

* No data for 2100 GMT.

TABLE 10. HIGHEST AND LOWEST VALUES OF 3-HOURLY TEMPERATURES IN JULY

Station	Name	Highest °C	Hour GMT	Lowest °C	Hour GMT
45005	HONG KONG	30.3	0600	27.1	2100
45011	MACAU	30.1	0600	26.8	2100
47108	SEOUL	28.0	0600	22.4	2100
47662	TOKYO	28.1	0600	23.3	1800 2100
47827	KAGOSHIMA	30.2	0600	24.8	2100
47927	MIYAKOJIMA	29.7	0600	25.9	2100
47936	NAHA	29.1	0300	26.0	2100
48455	BANGKOK	31.7	0600	25.8	0000
48694	SINGAPORE AIRPORT	28.9	0600	24.8	2100
48820	HA NOI	31.6	0900	26.2	2100
48839	BACH LONGVI	30.1	0600	27.9	1800
48855	DANANG	33.3	0600	26.1	1800
48900	HO CHI MINH VILLE	30.4	0600	25.5	0000
48940	VIENTIANE	N.A.	-	N.A.	-
54511	BEIJING	28.7	0600	22.2	2100
56778	KUNMING	22.4	0900	17.5	2100
57494	WUHAN	31.8	0600	25.9	2100
57679	CHANGSHA	32.6	0600	25.8	2100
57776	NANYUE	23.3	0600	20.3	2100
58238	NANJING	30.7	0600	25.2	2100
58367	SHANGHAI	30.2	0600	25.1	2100
58457	HANGZHOU	31.8	0600	25.4	2100
58506	LU SHAN	24.4	0600	21.0	2100
58653	KUOCANG SHAN	22.9	0600	19.1	2100
58666	DACHENDAO	26.4	0600	24.2	2100
58726	QUIXIAN SHAN	22.8	0600	20.0	2100
58847	FUZHOU	33.2	0600	25.5	2100
58931	JIUXIAN SHAN	22.4	0600	17.2	2100
58969	TAIBEI	31.7	0300 0600	25.1	2100
59087	FOGANG	31.3	0600	25.3	2100
59134	XIAMEN	31.7	0600	25.9	2100
59287	GUANGZHOU	31.1	0600	25.9	2100
59316	SHANTOU	30.3	0600	26.1	2100
59345	MAGONG	30.6	0600	26.0	2100
59358	TAINAN	32.0	0600	26.1	2100
59431	NANNING	31.1	0600	25.8	2100
59493	BAO'AN	30.5	0600	25.4	2100
59501	SHANWEI	29.5	0600	26.0	2100
59567	LANYU	27.6	0600	25.1	2100
59673	SHANGCHUANDAO	30.0	0600	27.2	2100
59758	HAIKOU	31.6	0600	25.8	2100
59792	DONGSHADAO	30.4	0600	27.4	2100
59948	YAXIAN	30.6	0600	26.2	2100
59981	XISHADAO	30.3	0600	28.0	2100
59997	NANSHADAO	30.5	0600	26.4	2100
91408	PALAU	N.A.	-	N.A.	-
91413	YAP	N.A.	-	N.A.	-
98135	BASCO	30.6	0600	26.6	2100
98328	BAGUIO	21.7	0600	16.6	2100
98429	MANILA INTERNATIONAL AIRPORT	30.3	0600	24.5	2100

TABLE 11. DIURNAL VARIATION OF RO RAINFALL
WITH DIFFERENT 900-mbar WINDS

900-mbar winds		Number of occasions with				Average 12-hour Rainfall mm	
		AM max	PM max	No rain	AM=PM	AM	PM
May	SW ⩾ 20 knots	30	19	9	0	14.3	10.4
	SW 10-19 knots	80	24	41	1	7.4	3.3
	SE ⩾ 20 knots	13	7	0	0	13.5	5.7
	SE 10-19 knots	59	24	31	0	5.1	1.9
	NE ⩾ 20 knots	1	0	4	1	1.0	3.7
	NE 10-19 knots	6	1	7	0	0.8	0.03
June	SW ⩾ 20 knots	48	20	7	1	22.7	10.7
	SW 10-19 knots	93	44	38	2	5.9	3.3
	SE ⩾ 20 knots	22	22	1	0	7.4	9.7
	SE 10-19 knots	40	29	14	0	3.4	3.2
	NE ⩾ 20 knots	5	4	4	0	2.5	6.5
	NE 10-19 knots	2	4	7	0	0.8	4.4
July	SW ⩾ 20 knots	24	10	4	0	17.2	7.5
	SW 10-19 knots	91	31	68	0	3.5	2.6
	SE ⩾ 20 knots	37	14	2	0	17.4	10.3
	SE 10-19 knots	52	11	15	0	6.0	1.9
	NE ⩾ 20 knots	2	10	0	1	10.5	22.7
	NE 10-19 knots	2	7	3	0	5.9	20.2
3 months combined	SW ⩾ 20 knots	102	49	20	1	18.6	9.9
	SW 10-19 knots	264	99	147	3	5.4	3.0
	SE ⩾ 20 knots	72	43	3	0	12.9	9.3
	SE 10-19 knots	151	66	60	0	4.8	1.8
	NE ⩾ 20 knots	8	14	8	2	4.3	12.6
	NE 10-19 knots	10	12	17	0	2.4	7.7

TABLE 12. DIURNAL VARIATION OF THUNDERSTORMS IN HONG Kong (1947 - 1976)

Mean No. of ⚡* Hours / Month	00H to 01H	01H to 02H	02H to 03H	03H to 04H	04H to 05H	05H to 06H	06H to 07H	07H to 08H	08H to 09H	09H to 10H	10H to 11H	11H to 12H	12H to 13H	13H to 14H	14H to 15H	15H to 16H	16H to 17H	17H to 18H	18H to 19H	19H to 20H	20H to 21H	21H to 22H	22H to 23H	23H to 24H	Total	Mean Number of Thunderstorm Days†
January	-	0.03	-	0.03	-	0.03	-	-	-	-	-	-	-	-	0.03	0.03	-	-	-	-	-	-	-	-	0.15	0.20
February	-	0.03	-	0.03	-	-	-	-	-	0.03	0.03	0.07	-	0.03	-	-	0.03	-	-	-	-	-	0.03	-	0.28	0.23
March	0.03	0.20	0.20	0.10	0.20	0.20	0.10	0.13	0.13	0.07	0.20	0.17	0.20	0.13	0.17	0.20	0.27	0.17	0.17	0.17	0.10	0.03	0.07	0.07	3.48	1.20
April	0.33	0.37	0.43	0.47	0.43	0.30	0.30	0.40	0.43	0.43	0.50	0.43	0.40	0.50	0.43	0.47	0.57	0.50	0.67	0.67	0.53	0.60	0.27	0.33	10.76	3.30
May	0.80	1.07	1.13	1.27	1.30	1.07	1.27	0.93	0.93	1.03	1.07	1.10	0.87	1.13	0.83	0.83	0.73	0.83	0.90	0.63	0.70	0.50	0.53	0.67	22.12	5.37
June	0.53	0.67	0.53	0.93	1.13	1.03	0.97	1.13	1.07	1.03	0.93	0.83	0.80	0.67	0.57	0.60	0.77	0.50	0.57	0.77	0.83	0.67	0.33	0.37	18.23	6.27
July	0.33	0.27	0.57	0.67	0.73	0.77	0.63	0.37	0.70	0.70	0.63	0.77	0.60	0.57	0.50	0.37	0.47	0.37	0.33	0.27	0.37	0.40	0.33	0.37	12.09	5.00
August	0.50	0.60	0.90	0.80	0.77	0.70	0.70	0.60	0.67	0.87	1.03	1.13	0.90	0.63	0.93	0.77	0.67	0.57	0.43	0.57	0.47	0.40	0.33	0.57	16.51	6.40
September	0.33	0.43	0.53	0.50	0.47	0.47	0.43	0.13	0.20	0.33	0.13	0.33	0.20	0.27	0.43	0.37	0.23	0.27	0.27	0.37	0.40	0.47	0.47	0.23	8.26	3.50
October	0.03	0.07	0.10	-	0.10	0.10	0.03	0.03	0.03	0.03	0.07	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	-	-	0.03	-	0.89	0.70
November	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.03	-	0.03	-	-	0.07	0.03	0.03	-	-	0.19	0.13
December	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	2.88	3.74	4.39	4.80	5.13	4.67	4.43	3.72	4.16	4.52	4.59	4.86	4.00	3.96	3.95	3.67	3.80	3.24	3.37	3.55	3.43	3.10	2.39	2.61	92.96	32.30

* Thunderstorm Hour - a clock hour during which thunder(s) is heard

† Thunderstorm Day - a calendar day during which thunder(s) is heard

TABLE 13. DIURNAL VARIATION OF ROYAL OBSERVATORY RAINFALL PERIOD 1884-1976

	1	2	3	4	5	6	7	8	9	10	11	12	RATIO MAX/MIN
JAN	.0441	.0458	.0588	.0616	.0403	.0390	.0535	.0476	.0384	.0424	.0383	.0367	2.1
FEB	.0685	.0744	.0776	.0635	.0713	.0651	.0763	.0700	.0830	.0649	.0646	.0572	1.8
MAR	.0776	.0933	.0805	.0697	.0790	.1330	.0911	.0809	.0800	.0656	.0797	.1141	2.0
APR	.1724	.1510	.1760	.1362	.1926	.1383	.1191	.1923	.1973	.1938	.1872	.2150	2.2
MAY	.3485	.4118	.3965	.5098	.5242	.4916	.4779	.4891	.5450	.5364	.5204	.4552	2.6
JUN	.4158	.4557	.5264	.6716	.8000	.9406	.8459	.8715	.8980	.8193	.6912	.6875	3.1
JUL	.4004	.4647	.5239	.5498	.6085	.5948	.5771	.6931	.8018	.7689	.6517	.5625	3.0
AUG	.4549	.5156	.5434	.5201	.6044	.6152	.6875	.7675	.7432	.6014	.6039	.6914	2.4
SEP	.4770	.4581	.4377	.5107	.5076	.5133	.4891	.4522	.4912	.4424	.4849	.3878	2.4
OCT	.1836	.1615	.1811	.2011	.2275	.2206	.1645	.1613	.1738	.1376	.1668	.1443	2.5
NOV	.0595	.0450	.0509	.0588	.0645	.0442	.0468	.0472	.0551	.0538	.0526	.0474	1.8
DEC	.0324	.0292	.0431	.0510	.0356	.0394	.0378	.0362	.0373	.0376	.0285	.0267	2.0

	13	14	15	16	17	18	19	20	21	22	23	24
JAN	.0406	.0289	.0354	.0427	.0367	.0329	.0370	.0342	.0369	.0340	.0474	.0450
FEB	.0723	.0585	.0537	.0623	.0567	.0655	.0592	.0456	.0595	.0651	.0625	.0711
MAR	.0853	.1230	.1154	.1005	.1048	.1039	.0674	.0728	.0760	.0794	.0910	.0752
APR	.2419	.2209	.2360	.2181	.1966	.1958	.2638	.1868	.2276	.2075	.1387	.1365
MAY	.4617	.4196	.3602	.3573	.3248	.2596	.2853	.2312	.2063	.2160	.2517	.2698
JUN	.5411	.5060	.5190	.4626	.3834	.3462	.3054	.4114	.4052	.3923	.3862	.3722
JUL	.5998	.4989	.4081	.4193	.3230	.2670	.2939	.2678	.3654	.2926	.3301	.3855
AUG	.6724	.5521	.4614	.3994	.3466	.3359	.3677	.3724	.3645	.3519	.3227	.4353
SEP	.3775	.3762	.2675	.3073	.2451	.2888	.2168	.2903	.2860	.3230	.3430	.3643
OCT	.1308	.1089	.1284	.1187	.1065	.1003	.0917	.1135	.1311	.1096	.1287	.1623
NOV	.0502	.0652	.0802	.0710	.0585	.0520	.0598	.0705	.0572	.0554	.0520	.0561
DEC	.0362	.0467	.0461	.0422	.0373	.0254	.0287	.0255	.0364	.0391	.0329	.0339

N.B. Maximum hourly mean values are underlined.

TABLE 14. DIURNAL VARIATION OF ROYAL OBSERVATORY RAINFALL
FOR DAYS WITH TOTAL ≥ 100 mm PERIOD 1884-1976

	1	2	3	4	5	6	7	8	9	10	11	12	No. of Days
JAN	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	-
FEB	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	-
MAR	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	-
APR	3.7538	3.6077	3.9308	5.4385	9.5461	4.4077	1.9538	11.1846	4.8615	2.7000	9.8769	<u>13.7615</u>	13
MAY	6.0923	8.0871	11.1333	<u>13.2948</u>	11.8128	10.0102	8.0179	8.6102	8.5359	10.0282	11.5871	7.1615	39
JUN	2.8052	5.2793	6.2845	8.9414	11.2586	11.1586	12.5827	11.3792	<u>14.2775</u>	11.6293	8.8758	9.4172	58
JUL	4.3489	6.0955	6.7222	8.9844	6.4067	6.5511	8.3489	9.1422	<u>11.8444</u>	9.4488	9.4911	7.8711	45
AUG	5.8711	5.0788	6.9654	5.7019	4.3885	6.7057	<u>11.7192</u>	10.8846	10.1442	7.3327	5.9423	5.9307	52
SEP	7.7325	7.2725	5.1050	5.9925	8.3375	8.7700	8.8550	7.1250	<u>9.0400</u>	7.3125	8.0250	5.5200	40
OCT	7.6562	7.9000	8.5062	9.9312	<u>12.6063</u>	7.6062	4.1687	5.5562	10.0437	6.9937	6.4250	6.9375	16
NOV	1.7750	3.4000	5.4250	15.3250	<u>18.1500</u>	4.4250	6.3500	1.8250	3.3250	5.9000	11.0000	3.1750	5
DEC	.7000	.7000	.8000	4.0000	9.5000	4.7000	2.2000	6.2000	9.6000	7.7000	10.3000	11.1000	1

	13	14	15	16	17	18	19	20	21	22	23	24
JAN	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000
FEB	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000
MAR	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000
APR	10.8308	3.3308	3.4923	1.4154	1.1462	7.6462	7.9308	3.0231	4.3615	8.0692	3.2077	.7385
MAY	8.7795	6.6564	4.9667	4.7461	3.6462	2.3872	3.8077	3.7846	3.2179	1.7026	.9231	2.6513
JUN	4.8689	4.0707	4.0310	5.0672	4.1052	4.1069	3.0397	5.2120	4.5879	4.4138	4.8638	4.2724
JUL	7.5755	7.3533	6.9800	5.7489	4.1600	3.0533	2.3533	2.1444	2.9556	2.5422	3.2711	2.6267
AUG	7.5846	4.6808	4.8231	4.0135	3.8077	3.8058	4.3327	4.8385	5.6981	6.5058	4.7769	7.0827
SEP	6.2325	7.5650	5.2150	5.2225	4.1750	4.7375	4.6575	3.6750	4.1300	3.4675	2.0500	2.6950
OCT	5.9937	4.1875	3.8875	5.8250	5.6937	5.5562	4.1875	5.8062	7.7250	6.6250	7.3000	7.0812
NOV	4.8500	5.8000	10.4250	6.3250	5.2750	2.2250	2.9750	2.5000	.9750	.2000	.1250	.2000
DEC	21.5000	26.6000	<u>27.9000</u>	26.1000	4.4000	2.6000	.7000	.0000	.0000	.0000	.0000	.0000

N.B. Maximum hourly mean values are underlines.