

ROYAL OBSERVATORY, HONG KONG

Technical Note No. 88

**30-YEAR MEAN RAINFALL IN HONG KONG
1961-1990**

by

M.C. NG

and

K.P. WONG

COPYRIGHT RESERVED

Published August 1996

Prepared by

Royal Observatory
134A Nathan Road
Kowloon
Hong Kong

This publication is prepared and disseminated in the interest of promoting information exchange. The findings, conclusions and views contained herein are those of the authors and not necessarily those of the Royal Observatory or the Government of Hong Kong.

The Government of Hong Kong (including its servants and agents) makes no warranty, statement or representation, express or implied, with respect to the accuracy, completeness, or usefulness of the information contained herein, and in so far as permitted by law, shall not have any legal liability (including liability for negligence) for any loss, damage, or injury (including death) which may result, whether directly or indirectly, from the supply or use of such information.

Permission to produce any part of this publication should be obtained through the Royal Observatory.

551.582.2:551.577.21(512.317)

CONTENTS

	page
TABLES	iii
FIGURES	iv
1. INTRODUCTION	1
2. DATA	
(a) Rain-gauges	2
(b) Rainfall-observing practices at outstations	2
3. METHOD OF ANALYSIS	
(a) Estimation of missing records	3
(b) Adjustment of mean values from different lengths of records to the common period of 1961-1990	3
4. RESULTS AND DISCUSSIONS	
(a) Spatial distribution of rainfall	4
(b) Seasonal distribution of rainfall	4
(c) Rainfall regions in Hong Kong	5
ACKNOWLEDGEMENT	6
REFERENCES	7

TABLES

page

1. 30-year mean monthly and annual rainfall at stations
in Hong Kong 1961-1990

8-9

FIGURES

	page
1. Map showing rainfall stations grouped with the respective control stations	10
2. Mean January rainfall distribution map	11
3. Mean February rainfall distribution map	12
4. Mean March rainfall distribution map	13
5. Mean April rainfall distribution map	14
6. Mean May rainfall distribution map	15
7. Mean June rainfall distribution map	16
8. Mean July rainfall distribution map	17
9. Mean August rainfall distribution map	18
10. Mean September rainfall distribution map	19
11. Mean October rainfall distribution map	20
12. Mean November rainfall distribution map	21
13. Mean December rainfall distribution map	22
14. Mean annual rainfall distribution map	23
15. Accumulated mean daily rainfall for the Royal Observatory	24
16. Mean monthly rainfall for Ta Kwu Ling Pig Breeding Centre	25
17. Mean monthly rainfall for the Royal Observatory	25
18. Mean monthly rainfall for Happy Valley Race Course	25
19. Rainfall regions in Hong Kong	26

FIGURES (con't)

	page
20. Mean monthly rainfall for selected stations of Type I	27
21. Mean monthly rainfall for selected stations of Type IIa	28
22. Mean monthly rainfall for selected stations of Type IIb	29

1. INTRODUCTION

Climatological standard normals are defined as “averages of climatological data computed for consecutive periods of 30 years” (World Meteorological Organization (WMO) Technical Regulations). The following periods have been recommended by WMO to facilitate international comparison : 1 January 1901 to 31 December 1930, 1 January 1931 to 31 December 1960 and 1 January 1961 to 31 December 1990.

Tables of Climatological Standard Normals (CLINO), a widely demanded reference publication of climatological data, have been prepared using the periods of 30 years as specified above. It is recommended by the Commission for Hydrology, WMO to follow this practice when analyzing medium to long range series of rainfall data for the sake of uniformity with other climatological data and products.

In Hong Kong, there had been only very few rainfall stations until 1952 when about 30 stations were set up. The number of stations then steadily increased to about 120 in 1982. This made 1953-1982 the earliest 30-year period available for a detailed analysis of the mean rainfall in Hong Kong (Kwan and Lee 1984).

This Note therefore intends to update the previous work by Kwan and Lee to cover the standard reference period 1961-1990.

2. DATA

(a) Rain-gauges

Daily rainfall from ordinary rain-gauges and monthly rainfall from monthly gauges were mostly used. For stations equipped with both ordinary and autographic rain-gauges, data from ordinary gauges were used in preference to those from autographic records because records from autographic gauges were disrupted from time to time due to mechanical faults in the gauges. However, at the following two stations where only autographic gauges were installed, data extracted from autographic charts were used.

Aberdeen Lower Reservoir (Station 10)
Tai Lam Country Park Comp. 16 (Station 73)

Siphoning losses inherent in autographic gauges were discussed by Cheng and Kwok (1966). These losses were not taken into account because they amounted to only 2% of the rainfall recorded for an intensity of 100 mm/h over a duration of 15 minutes and this intensity is very infrequent. The return period for this rainfall intensity is estimated to be about 2 years (Lam and Leung 1994).

Monthly rainfall data from automatic tipping-bucket rain-gauges were sometimes used in the estimation of missing records.

(b) Rainfall-observing practices at outstations

It was observed that the maximum frequency of rainfall in Hong Kong occurred in the morning and the minimum in the afternoon (Bell and Chin 1968). Hence during the standard normal period of 1961-1990, the observing period of 24-hour rainfall was made daily at 3 p.m. Hong Kong Time at most outstations. Daily rainfall thus referred to the 24-hour rainfall total ending at 3 p.m. on that day.

3. METHOD OF ANALYSIS

(a) Estimation of missing records

To fill in missing data over a period of one or a few days, the corresponding rainfall amount from a nearby, topographically similar station was substituted (McKay 1970). Missing monthly data were estimated by one of the following two methods :

(i) inference, if possible, from the distribution map for the month, taking into account the mean distribution (Kwan and Lee 1984); or

(ii) substitution of monthly values from a nearby, topographically similar station, also taking into account the mean distribution.

The available data periods of some stations were also extended by merging the records from nearby topographically similar stations.

(b) Adjustment of mean values from different lengths of records to the common period of 1961-1990

A number of “control” stations with full and reliable records from 1961 to 1990 was selected for the adjustment of mean rainfall at stations with less than 30 years of data. These stations are shown in Figure 1. Control stations were chosen based on the following considerations : the amount of missing data at these stations was minimal and the consistency in data from these stations had been confirmed during the routine analysis of monthly distribution of rainfall in the 30-year period. The data for stations with less than 30 years of data were adjusted with data from nearby control stations of topographically similar locations. The following formula was adopted (Wiesner 1970) :

$$N_{a,30} = \frac{N_{a,y}}{N_{c,y}} \cdot N_{c,30}$$

where

- | | |
|------------|--|
| a | stands for the station of interest, |
| c | stands for the control station, |
| $N_{a,30}$ | is the estimated 30-year monthly mean of the station, |
| $N_{c,30}$ | is the 30-year monthly mean of the control station, |
| $N_{a,y}$ | is the available y-year monthly mean at the station, and |
| $N_{c,y}$ | is the corresponding y-year monthly mean at the control station. |

The use of the above formula in the analysis was supported by a high correlation coefficient (greater than 0.95) between the observed annual precipitation for the stations considered (McKay 1970).

The computed mean monthly and annual rainfall figures are presented in Table 1. The monthly and annual spatial distributions of rainfall in Hong Kong are given in Figures 2 to 14.

4. RESULTS AND DISCUSSIONS

(a) Spatial distribution of rainfall

The total annual rainfall in Hong Kong ranges from below 1 400 millimetres in the northwest and southeast to over 3 100 millimetres at Tai Mo Shan. The Royal Observatory, situated near the centre of the territory, receives 2 214.3 millimetres of rainfall in a year, very close to the mean of these two extremes. Considering the whole territory, the mean rainfall from all stations is about 1 900 millimetres.

The pattern of rainfall distribution is very similar to that found in previous analyses (Kwan and Lee 1984, Peterson 1964) in that generally more rainfall is recorded over higher grounds than the lowland.

(b) Seasonal distribution of rainfall

Rain in Hong Kong is mainly contributed by monsoon troughs and tropical cyclones. Other contributors include heat thunderstorms, upper-air disturbances, easterly waves and frontal systems.

Monsoon troughs are most active in May and June. Records show that they brought the heaviest downpours in Hong Kong, like those in June 1966 and in May 1992.

Tropical cyclones contribute about one third of the annual total rainfall. They affect Hong Kong mostly from May to October each year. In July to September, more than half of the rainfall is brought by tropical cyclones. The monthly mean tropical cyclone rainfall (1961-1990) is tabulated below for reference. Tropical cyclone rainfall is defined as the total rainfall recorded at the Royal Observatory from the time when a tropical cyclone was centred within 600 km of Hong Kong to 72 hours after the tropical cyclone has dissipated or moved outside 600 km of Hong Kong (Royal Observatory 1995).

Monthly mean tropical cyclone rainfall in millimetres (1961-1990)												
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0.0	0.0	0.0	1.0	36.6	47.4	175.4	196.9	176.3	89.5	11.3	6.6	741.0

In Figure 15, the plotting of accumulated rainfall based on Royal Observatory mean daily rainfall data (1961-1990) shows that the year can be roughly segmented into four seasons according to the rate of rainfall accumulation.

In the first season from late October to March, the slope is rather flat and corresponds to the dry season when Hong Kong comes under the influence of the continental anticyclone.

The second season starts from April until early May and the slope is moderate. This corresponds to the spring transition.

From then until early September, the third season, the slope is steep when Hong Kong comes under the influence of monsoon troughs and tropical cyclones.

From mid September until late October, the fourth season, the slope moderates. This corresponds to the autumn transition.

Taking Royal Observatory as representative of Hong Kong, we may define the rainy season as beginning from mid May and ending in mid September.

The months with heaviest rain are June, July and August. The average total rainfall collected in these three months is about half of the annual total. About three quarters of the annual rainfall is collected during the months from May to September.

(c) Rainfall regions in Hong Kong

Figures 16-18 show the monthly rainfall amounts recorded in different areas of Hong Kong. The distribution of rainfall during the year at Ta Kwu Ling indicates a single peak in August. On the other hand, both the Royal Observatory and Happy Valley show double peaks in June and August, but the Royal Observatory distribution shows more rainfall in August while the Happy Valley distribution has it in June.

Although Hong Kong is quite a small place, we can divide the whole territory into different rainfall regions according to the mode of occurrence of maximum monthly rainfall amounts represented by the above three stations. Figure 19 shows this division into Types I, IIa and IIb.

Most areas in Hong Kong exhibit a double-peak rainfall distribution, like that at the Royal Observatory and Happy Valley, with maxima in June and August. It may be due to the fact that in July, the subtropical ridge over the Pacific often extends westwards bringing a fine spell to Hong Kong resulting in a temporary decrease in rainfall (Cheng 1978). However, more detailed analysis shows that in a belt running southwest-northeastwards across the northern part of the New Territories, the distribution exhibits a single peak (Type I). Most stations in this belt have their maximum in August and they receive relatively less rain in June than other parts of the territory. Individual stations have their maximum rainfall in June or July but they do not have two peaks in their rainfall distribution like the majority of stations in Hong Kong. The reason for this is not clear and the underlying factors would require further studies.

For areas with double peaks in June and August, a further division can be made according to whether the higher peak occurs in June or in August. The central part of the Hong Kong territory, including the Royal Observatory, has a higher peak in August (Type IIa). The eastern part of the territory, most of Hong Kong Island and the eastern part of Lantau, on the other hand, have their higher peaks in June (Type IIb).

Histograms of the above three types of rainfall distribution at selected stations are presented in Figures 20-22 to illustrate the variation among different regions in greater detail.

ACKNOWLEDGEMENT

The authors would like to thank Mr. W.K. Kwan for his valuable comments on reviewing this note.

REFERENCES

1. Bell, G.J. and P.C. Chin 1968 The Probable Maximum Rainfall in Hong Kong, Royal Observatory Technical Memoir No. 10
2. Cheng, S. 1978 Dry Spells during Mid-summer over South China, Royal Observatory Technical Note No. 44
3. Cheng, S. and W.H. Kwok 1966 A Statistical Study of Heavy Rainfall in Hong Kong 1947-65, Royal Observatory Technical Note No. 24
4. Kwan, W.K. and B.Y. Lee 1984 30-Year Mean Rainfall in Hong Kong 1953-1982, Royal Observatory Technical Note No. 70
5. Lam, C.C. and Y.K. Leung 1994 Extreme Rainfall Statistics and Design Rainstorm Profiles at Selected Locations in Hong Kong, Royal Observatory Technical Note No. 86
6. McKay, G.A. 1970 Handbook on the Principles of Hydrology, Section II, Ed. D.M. Gray, Water Information Centre
7. Peterson, P. 1964 The Rainfall of Hong Kong, Royal Observatory Technical Note No. 17
8. Royal Observatory 1995 Tropical Cyclones in 1994
9. Wiesner, C.J. 1970 Hydrometeorology, Chapman and Hall Ltd., London
10. World Meteorological Organization 1979 Technical Regulations, WMO - No.49

TABLE 1. 30-YEAR MEAN MONTHLY AND ANNUAL RAINFALL AT STATIONS IN HONG KONG 1961-1990

No.	Location	Map Ref.	Height m	Record Period years	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
10	ABERDEEN LOWER RESERVOIR	KV072638	85	30	18.4	42.8	57.1	141.0	278.9	359.0	290.7	342.3	277.0	130.4	31.6	21.7	1990.9
9	ABERDEEN UPPER RESERVOIR	KV075641	120	24	19.0	44.1	57.4	140.5	285.1	367.5	308.0	362.5	289.5	140.7	34.4	23.0	2071.7
2	AIRPORT METEOROLOGICAL OFFICE	KV104719	5	30	20.7	42.5	64.5	153.4	312.8	380.9	331.6	399.9	304.3	141.0	29.4	21.0	2202.0
130	AP LEI CHAU POWER STATION	KV055629	5	24	15.0	39.7	55.8	132.9	248.9	314.4	249.4	296.3	244.6	111.0	25.5	19.7	1753.2
65	AUTAU POND FISH FARM	JV963858	5	30	22.4	41.7	60.1	159.3	240.4	276.5	284.5	325.0	218.2	96.9	32.7	22.4	1780.1
15	BEACON HILL	KV087752	150	17	24.1	47.4	70.2	177.9	366.9	432.0	331.4	503.6	280.4	161.5	31.0	23.2	2449.6
140	CAPE COLLINSON CORRECTIONAL INSTITUTION	KV167632	40	22	13.4	37.8	64.9	137.2	276.7	320.1	251.4	273.1	184.0	57.5	25.9	18.6	1660.6
35	CAPE D'AGUILAR	KV169588	50	29	16.7	36.8	57.3	135.4	257.0	303.2	265.9	288.4	226.4	102.7	31.0	19.2	1740.0
31	CASTLE PEAK FARM	HQ057815	10	30	26.1	46.8	64.2	162.1	251.2	272.5	290.0	312.0	214.5	100.0	38.8	25.5	1803.7
34	CHEUNG CHAU METEOROLOGICAL STATION	JV932583	70	30	22.0	40.0	61.7	138.4	254.2	284.3	250.1	298.9	197.0	100.3	34.0	23.2	1704.1
100	CHEUNG SHEUNG	KV228831	300	30	29.9	59.8	88.6	196.8	385.5	427.1	365.1	427.5	286.3	156.7	44.6	28.9	2496.8
92	CHEUNG UK	KV098886	170	15	24.3	57.1	84.8	162.1	284.1	392.9	419.4	403.6	302.4	161.0	31.8	28.0	2351.5
119	CHI HANG SCHOOL	HQ004792	5	27	17.7	27.8	65.1	153.6	238.1	255.5	257.8	264.4	173.5	93.0	33.7	22.1	1602.3
63	CHIMA WAN COUNTRY PARK MANAGEMENT CENTRE	HQ090619	45	18	23.4	45.8	54.2	148.1	255.4	305.3	271.0	328.4	224.6	114.8	35.2	21.0	1827.2
151	CHINESE UNIVERSITY OF HONG KONG	KV122818	25	23	22.4	46.4	80.1	184.3	320.0	394.5	364.5	409.3	284.8	151.9	44.4	27.6	2330.2
52	CHUEN LUNG COUNTRY PARK MANAGEMENT CENTRE	KV023791	330	30	21.5	48.6	72.4	160.5	303.1	401.1	373.5	424.8	290.0	126.9	33.0	27.6	2283.0
104	CHUNG MEI	KV158910	20	24	24.4	49.5	75.6	159.1	288.7	354.7	364.1	372.8	242.0	143.4	32.3	25.9	2132.5
84	DEEP WATER BAY ROYAL HONG KONG GOLF CLUB	KV098630	5	30	13.9	38.9	54.8	127.4	275.0	341.7	291.3	345.6	294.1	138.8	31.6	20.1	1973.2
76	DIANA FARM	JV916676	225	28	27.3	51.2	75.2	173.2	295.6	347.4	320.0	334.7	222.6	119.1	37.4	27.9	2031.6
18	FANLING POLICE CADET TRAINING SCHOOL	KV037910	20	30	26.7	45.1	67.4	170.1	256.2	323.1	360.5	385.4	284.2	136.1	39.8	27.1	2121.7
156	GOVERNMENT LABORATORY	KV106678	15	27	19.5	47.2	62.4	166.3	313.8	383.9	307.5	375.2	303.1	149.2	41.4	27.3	2196.8
40	GREEN ISLAND LIGHTHOUSE	KV023674	75	30	20.0	36.6	52.7	131.2	252.7	311.9	268.2	295.2	188.9	118.1	27.1	21.4	1724.0
24	HAPPY VALLEY RACE COURSE	KV092659	35	30	21.7	47.1	65.0	151.6	312.3	383.6	327.5	369.4	316.2	157.8	40.2	24.8	2217.2
124	HAVEN OF HOPE HOSPITAL	KV172705	25	26	24.4	49.5	77.3	175.4	362.4	400.1	328.9	408.2	296.3	161.5	40.1	24.7	2348.8
61	HEILING CHAU ADDICTION TREATMENT CENTRE	JV940643	10	30	22.9	44.8	64.1	149.1	286.4	349.4	268.9	311.9	198.3	107.1	37.4	22.8	1863.1
152	HIGH ISLAND EAST	KV290753	125	16	18.2	45.7	72.6	152.7	365.5	349.8	306.9	343.3	221.1	113.7	32.5	20.3	2042.3
150	HIGH ISLAND WEST	KV257773	85	18	18.2	42.6	71.4	148.9	341.5	364.4	299.4	325.5	212.6	117.0	33.3	20.3	1995.1
12	JUBILEE RESERVOIR	KV061779	200	30	25.4	51.1	77.2	166.3	339.5	430.8	377.8	461.3	309.5	164.8	39.3	28.0	2471.0
146	KADOORIE EXPERIMENTAL & EXTENSION FARM	KV034838	305	24	25.8	52.1	66.7	170.9	300.4	402.1	400.2	407.3	306.9	144.5	43.6	34.8	2355.3
122	KAT O FISHERIES RESEARCH SUB-STATION	KV222949	10	26	18.5	38.2	66.7	152.6	263.5	315.2	297.5	301.8	189.9	90.9	27.8	17.6	1780.2
131	KAU SAI FISHERMEN'S CHILDREN SCHOOL	KV239734	10	16	30.5	49.4	73.3	167.8	340.0	387.6	267.6	381.0	232.7	140.0	30.5	24.5	2124.9
120	KING LAM SCHOOL	KV281876	10	27	13.1	36.4	69.2	167.3	252.7	351.0	271.0	290.6	185.3	81.4	28.0	17.6	1763.6
28	KINGS PARK METEOROLOGICAL STATION	KV085703	65	30	23.7	47.3	68.2	160.4	313.9	377.6	326.5	395.2	304.5	145.3	34.1	27.0	2223.7
133	LAMMA POLICE STATION	KV026602	40	23	17.5	36.9	52.5	115.2	216.4	270.6	251.2	267.9	194.6	71.2	22.4	15.0	1531.4
132	LEUNG SHUEN WAN PUBLIC SCHOOL	KV271744	10	21	20.6	43.5	71.8	158.6	315.6	382.4	274.7	362.6	224.8	126.8	29.4	25.1	2035.9
112	LING YING PUBLIC SCHOOL	KV057953	10	27	18.3	39.2	54.8	141.2	232.1	270.7	295.9	349.1	258.3	102.8	31.6	23.2	1817.2
47	LOK MA CHAU POLICE STATION	JV993925	50	30	22.5	43.0	66.6	125.8	201.5	233.4	261.0	289.4	207.8	107.4	31.1	18.1	1587.6
97	MANAM WAT	KV189754	10	16	26.9	60.7	80.8	194.8	416.6	418.1	355.2	450.5	266.7	147.6	45.1	25.2	2488.2
44	MA ON SHAN ST. JOSEPH'S PRIMARY SCHOOL	KV147823	10	27	28.6	49.4	80.8	181.1	390.8	395.7	394.7	463.5	286.0	152.0	51.8	31.2	2505.6
66	MARYMOUNT SECONDARY SCHOOL	KV102649	95	30	21.5	44.9	65.6	142.8	296.4	390.9	310.8	383.0	319.9	167.4	41.6	28.8	2213.6
98	MUI TSZ LAM	KV152788	130	30	28.6	66.9	112.2	191.5	397.0	450.1	418.8	482.7	306.1	188.0	50.2	33.0	2725.1
22	MUI WO EXTENSION OFFICE	HQ088652	50	23	33.5	51.2	83.7	172.7	300.4	367.7	321.8	339.9	232.1	118.5	39.7	27.6	2088.8
164	NGAU TAU KOK SERVICE RESERVOIR	KV139710	80	22	23.6	48.1	74.1	157.2	320.5	374.2	319.5	383.1	312.7	154.8	38.8	23.6	2230.2
43	NGONG PING TEA FARM	GQ994644	440	17	41.2	70.0	97.1	192.0	319.4	375.1	360.4	439.3	275.5	169.5	58.0	43.7	2441.2
139	NIM WAN	HQ024818	15	20	21.7	37.2	56.0	143.7	230.4	280.3	268.7	299.6	189.0	189.0	26.7	20.1	1659.2
99	PAK SHA O	KV243856	60	30	29.1	59.3	90.9	202.7	379.3	446.5	367.9	447.5	264.7	145.8	44.2	29.8	2507.7
128	PEAK POLICE STATION	KV065650	400	25	26.1	46.8	67.7	145.5	290.5	366.1	304.6	366.3	300.0	147.1	39.0	27.1	2126.8
136	PENG CHAU PUMPING STATION	JV952672	5	24	23.3	42.2	65.9	149.3	279.6	323.6	274.7	299.6	198.1	92.9	32.8	23.2	1805.2

Note: Map Ref. - Universal Transverse Mercator Grid

Height - Height above Mean Sea Level

TABLE 1. (Cont'd)

No.	Location	Map Ref.	Height m	Record Period years	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
11	POK LAM RESERVOIR	KV046652	175	30	18.2	39.4	55.8	130.4	273.2	338.7	293.2	343.0	261.3	125.5	26.7	19.9	1925.3
36	QUEENS COLLEGE	KV103668	15	29	21.5	48.9	61.6	156.7	327.1	397.7	317.3	361.4	316.6	163.4	35.0	27.5	2234.7
1	ROYAL OBSERVATORY	KV086692	30	30	23.4	48.0	66.9	161.5	316.7	376.0	323.5	391.4	299.7	144.8	35.1	27.3	2214.3
82	SAI KUNG FARM	KV183773	45	30	24.6	54.5	91.3	182.9	369.2	399.8	348.5	426.5	281.8	151.8	38.2	27.5	2396.6
87	SAM MUN TAI	KV173864	35	17	22.9	46.7	68.4	138.2	277.6	359.6	320.4	361.4	248.6	101.1	40.4	27.6	2032.9
27	SAM YUK MIDDLE SCHOOL	KV202696	105	30	26.2	54.9	85.6	194.4	361.6	398.8	321.7	379.1	293.8	142.0	42.1	25.9	2326.1
51	SAN MIGUEL BREWERY	JV971766	5	30	22.3	45.4	63.7	155.4	293.0	357.4	321.6	365.2	241.8	98.5	30.6	24.4	2019.3
26	SHA TAI KOK POLICE STATION	KV129952	35	30	22.8	45.0	59.1	159.3	244.3	323.4	342.2	327.8	269.6	112.7	37.2	21.7	1964.4
85	SHA TIN PUBLIC PRIMARY SCHOOL	KV090773	20	17	25.5	48.7	71.7	170.6	335.7	390.0	380.8	457.4	296.6	167.8	40.9	28.5	2414.2
155	SHA TIN TREATMENT WORKS	KV082756	30	18	24.3	52.7	76.6	152.7	313.1	404.5	330.8	459.2	295.8	161.4	36.6	27.4	2335.1
38	SHEK KONG VILLAGE	KV024827	185	30	25.7	48.8	72.1	174.6	308.4	407.5	403.8	431.3	320.4	155.1	48.1	32.6	2428.4
134	SHEK KWU CHAU REHABILITATION CENTRE	HQ079575	75	24	16.1	34.7	52.7	121.0	243.0	276.0	240.0	248.2	158.6	76.3	24.9	16.1	1507.6
216	SHEK LEI PU SERVICE RESERVOIR	KV057744	125	29	21.7	47.7	69.6	154.7	309.8	387.2	361.4	440.4	296.3	131.2	33.3	25.9	2279.2
68	SHEK PIK RESERVOIR	GQ981607	5	30	20.1	41.6	63.3	150.9	263.3	308.2	285.0	313.5	232.0	121.7	33.3	24.8	1857.7
93	SHUI WO	KV039851	90	30	27.7	53.9	73.0	173.5	302.7	401.0	390.4	425.6	299.4	156.6	40.1	30.9	2374.8
121	SHUNG YEE PUBLIC PRIMARY SCHOOL	JV915892	15	26	16.8	36.1	46.9	135.6	219.6	227.4	208.1	235.9	142.0	71.6	24.2	15.7	1379.9
67	ST. MARK'S SCHOOL	KV143663	25	29	22.1	52.5	73.8	150.8	306.6	384.4	315.6	384.5	267.0	109.1	32.6	28.0	1888.2
39	ST. STEPHEN'S COLLEGE	KV128595	30	28	18.2	42.9	65.3	143.4	266.8	327.1	261.7	329.2	262.4	119.4	32.4	19.4	1888.2
147	STANLEY SATELLITE EARTH STATION	KV133575	120	24	18.5	38.9	57.8	132.8	265.6	315.4	306.7	344.5	265.5	149.8	26.0	23.2	1958.0
55	STONECUTTERS ISLAND WIRELESS STATION	KV055710	10	16	24.7	39.1	64.7	150.7	236.8	251.4	286.3	346.6	279.3	127.0	36.0	24.3	2024.9
50	SIZE LOK YUEN	KV031808	640	17	28.4	64.8	90.3	208.1	365.9	468.2	492.1	519.2	332.4	164.2	54.9	34.7	2823.2
83	TAI KWULING PING BREEDING CENTRE	KV065957	15	30	22.5	43.5	64.1	161.1	243.0	308.5	340.1	375.5	279.3	127.0	36.0	24.3	2024.9
46	TAI KWULING POLICE STATION	KV065957	5	30	19.7	42.6	56.0	150.7	236.8	251.4	286.3	346.6	279.3	127.0	36.0	24.3	2024.9
20	TAILAM CHUNG RESERVOIR	JV930773	45	30	23.6	49.0	67.7	154.0	265.7	339.3	323.0	344.4	221.5	103.6	37.3	24.8	1943.9
73	TAILAM COUNTRY PARK COMPT. 16	JV952791	75	29	26.0	53.0	76.8	170.7	294.1	358.8	344.1	367.3	248.1	111.4	40.8	29.6	2120.7
69	TAILAM COUNTRY PARK COMPT. 5	JV955797	90	28	25.7	51.9	73.0	168.8	283.4	342.0	337.5	344.8	223.1	110.9	38.8	28.4	2027.3
58	TAI LUNG FARM	KV032893	35	30	24.7	45.3	65.1	160.2	263.9	326.8	358.2	373.0	270.4	131.8	44.9	29.0	2093.3
141	TAI MEI TUK PUMPING STATION	KV157886	10	22	26.4	45.5	75.0	160.3	292.7	376.1	367.6	377.3	250.5	127.2	41.0	26.1	2165.7
901	TAI MO SHAN NO. 1	KV036818	830	24	39.2	75.3	110.6	217.4	363.4	493.5	500.2	571.9	405.8	230.2	57.8	44.7	3110.0
138	TAI MO SHAN NO. 2	KV037814	950	23	29.5	59.0	86.4	193.9	336.7	510.6	467.9	475.2	362.3	196.1	41.6	35.0	2794.2
33	TAI ON NAVY COAST WATCH STATION	GQ938642	90	30	18.9	40.1	57.6	150.9	241.0	271.7	235.8	271.8	201.3	107.0	31.7	26.2	1654.0
123	TAI O PUBLIC PRIMARY SCHOOL	GQ942643	10	26	23.6	42.3	55.3	153.4	257.9	296.2	250.7	304.3	175.6	112.4	33.8	28.4	1733.9
75	TAI PO KAU COUNTRY PARK MANAGEMENT CENTRE	KV096833	130	30	31.7	53.5	82.8	187.0	327.7	431.4	383.5	410.8	299.0	153.3	44.5	30.4	2435.6
102	TAI PO TAU TREATMENT WORKS	KV063858	105	27	27.9	47.4	75.3	164.0	288.0	385.4	375.4	384.8	290.0	150.2	42.4	33.2	2264.0
5	TAI TAM RESERVOIR	KV123642	155	30	22.1	49.1	69.7	158.3	340.9	399.4	324.9	397.5	334.9	163.1	41.5	27.4	2328.8
7	TAI TAM TUK RESERVOIR	KV134627	55	30	21.8	46.6	61.3	143.6	298.5	367.8	272.6	347.6	288.5	136.0	38.8	27.1	2050.2
77	TATES CAIRN WEATHER RADAR STATION	KV133753	575	15	34.0	66.1	96.3	189.4	381.0	444.0	373.6	464.8	319.5	181.4	49.0	34.0	2633.1
42	TATHONG POINT LIGHTHOUSE	KV202619	30	30	17.8	44.8	78.4	150.4	289.3	292.0	238.0	285.8	218.6	107.8	30.4	23.3	1776.6
114	TSAK YUE WU	KV249807	45	24	20.9	45.0	70.1	145.8	326.8	367.2	310.3	384.7	263.8	127.7	38.1	30.4	2130.8
105	TSING YI DEVELOPMENT SITE OFFICE	KV021743	25	22	22.1	47.0	69.1	148.8	297.7	343.0	302.7	372.8	245.3	84.4	29.3	23.7	1985.9
153	TUEN MUN NEW TOWN C.R.E. OFFICE	HQ067787	5	16	24.5	49.3	68.8	159.0	241.2	293.7	297.3	341.7	219.1	96.4	37.8	26.7	1855.5
113	TUNG CHUNG EXTENSION OFFICE	HQ025674	10	27	28.7	56.3	72.7	174.9	278.5	327.8	314.6	364.3	230.8	129.7	45.9	35.8	2060.0
3	WAGLAN LIGHTHOUSE	KV217557	50	29	11.9	28.0	52.9	118.1	209.9	233.6	195.7	222.4	159.1	47.3	20.6	13.1	1312.6
8	WONG NAI CHUNG RESERVOIR	KV106641	240	30	16.0	39.3	56.9	135.2	294.7	362.7	304.5	360.1	296.2	123.1	31.8	22.1	2042.6
81	WONG SHU CHI MIDDLE SCHOOL	KV086851	25	30	28.0	51.8	79.8	177.2	308.6	403.0	361.7	362.2	272.4	145.5	40.8	29.9	2260.9
17	YUEN LONG R.G. FILTERS	HQ082825	90	30	24.6	43.6	62.9	153.8	233.8	258.2	274.6	306.9	210.8	107.6	35.8	26.2	1738.8
117	YUK YING PRIMARY SCHOOL	KV293815	25	15	12.1	40.3	58.1	125.5	307.0	335.2	260.3	330.6	261.2	106.0	32.5	23.3	1892.1

Note: Map Ref. - Universal Transverse Mercator Grid

Height - Height above Mean Sea Level

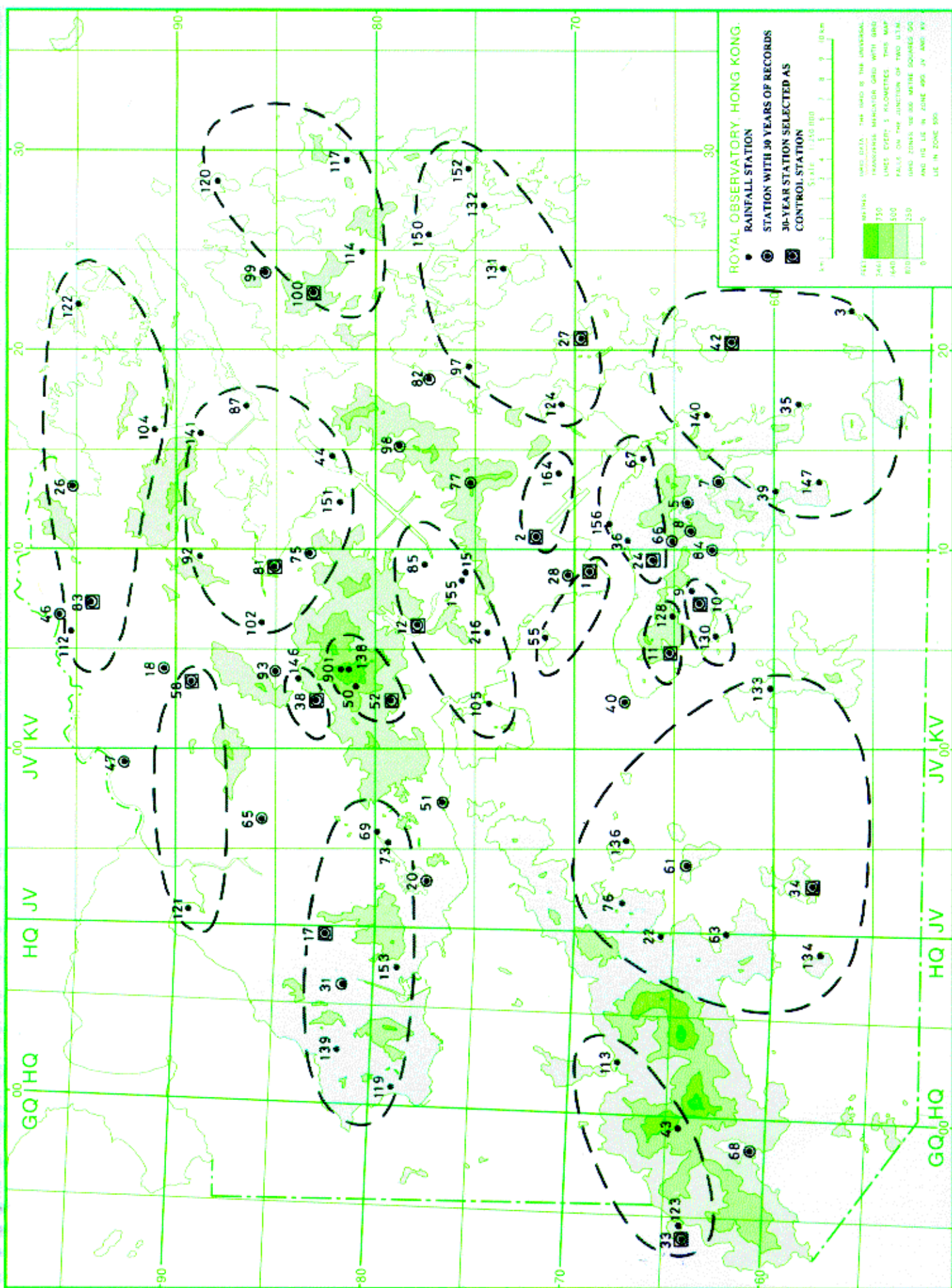
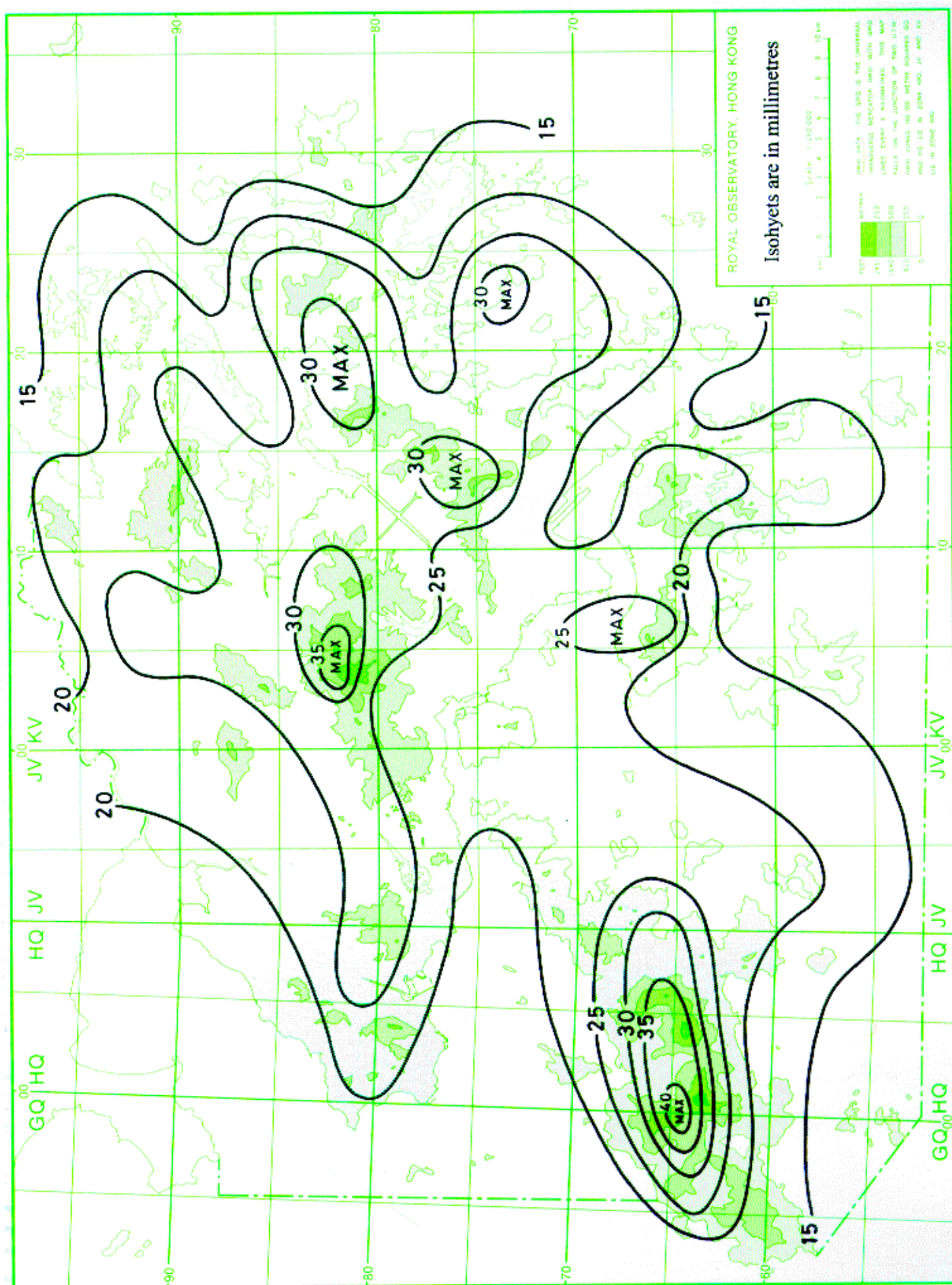
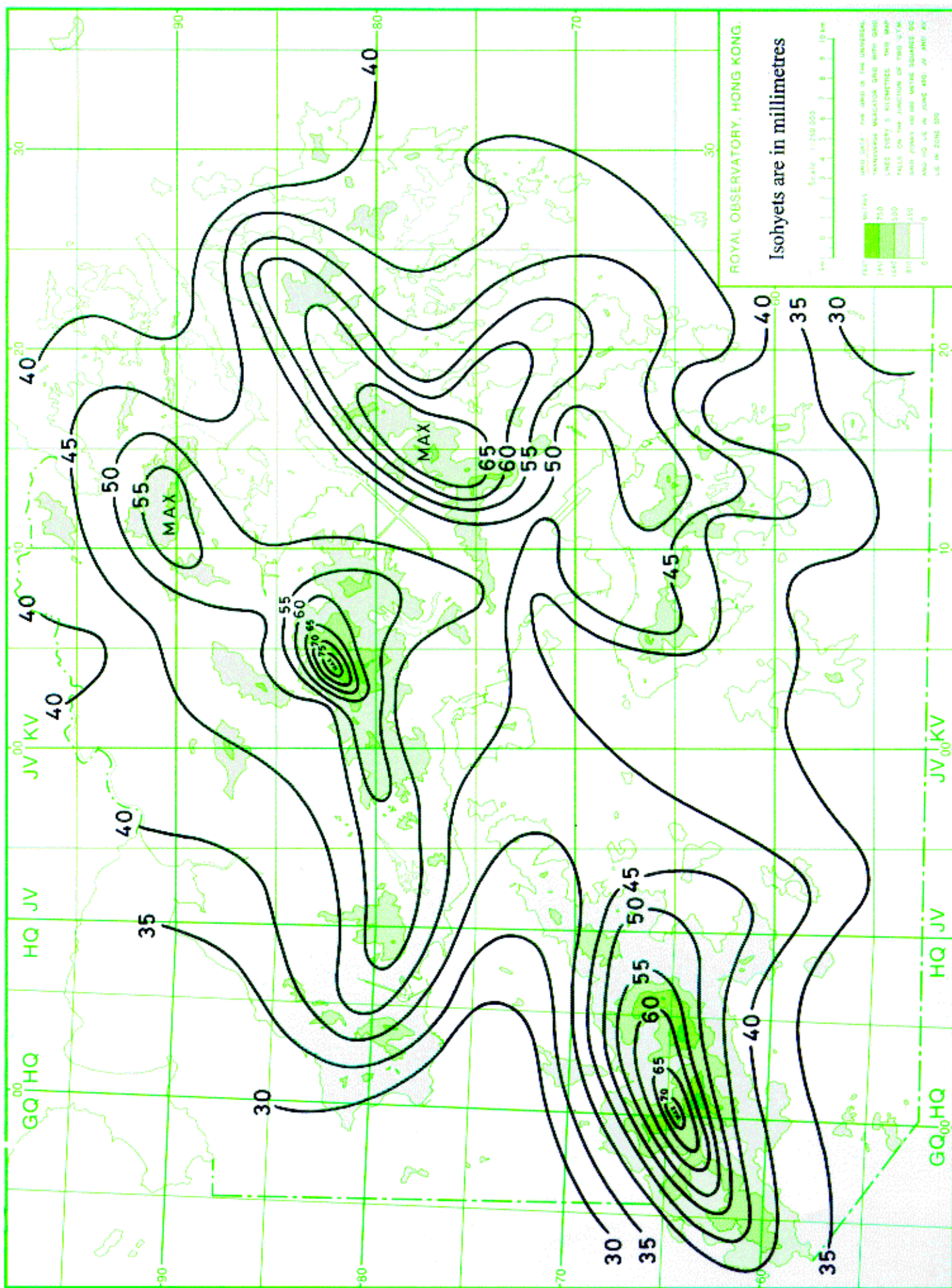


Figure 1. Map showing rainfall stations grouped with the respective control stations







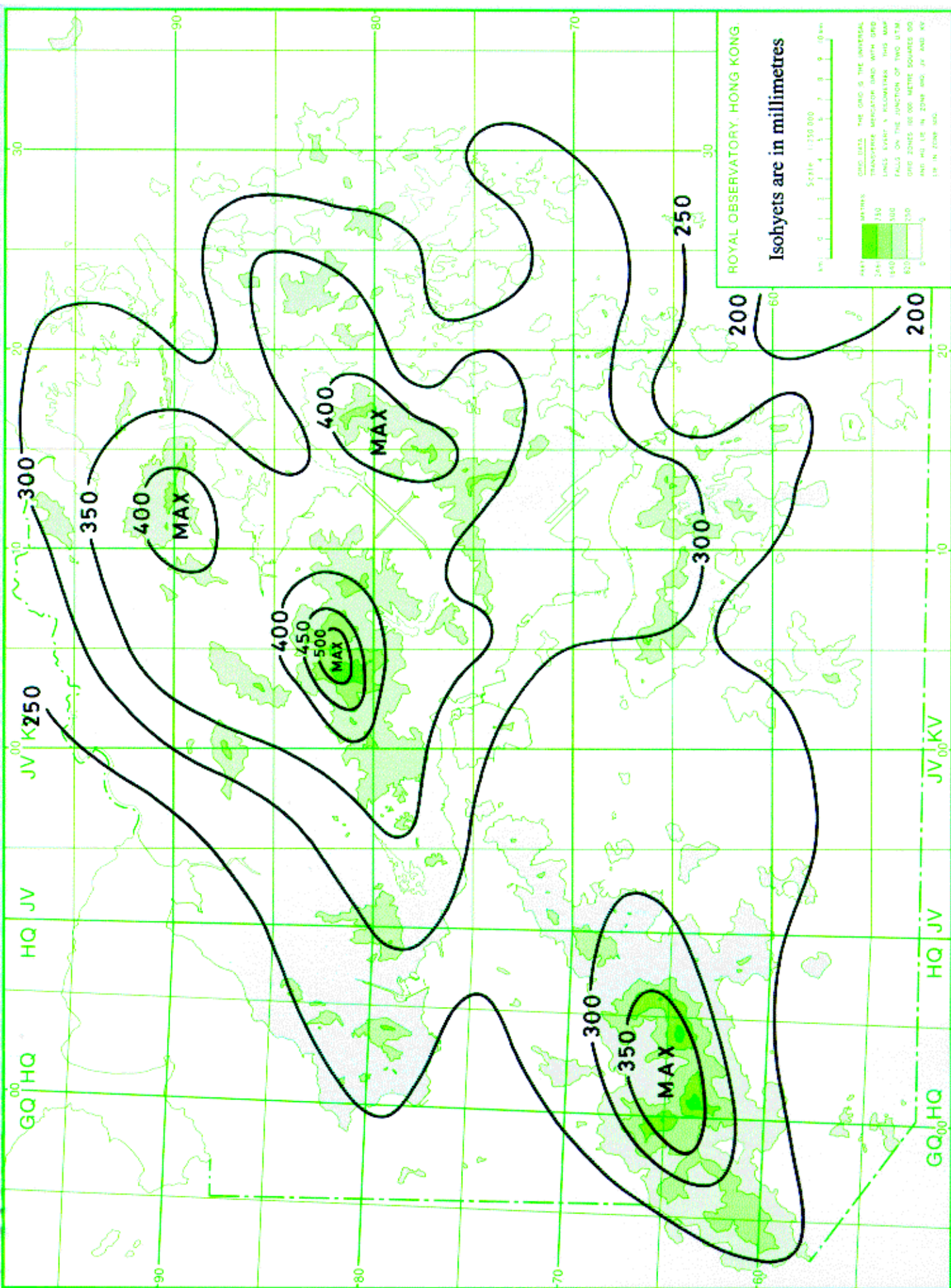


Figure 8. Mean July rainfall distribution map (1961-1990)

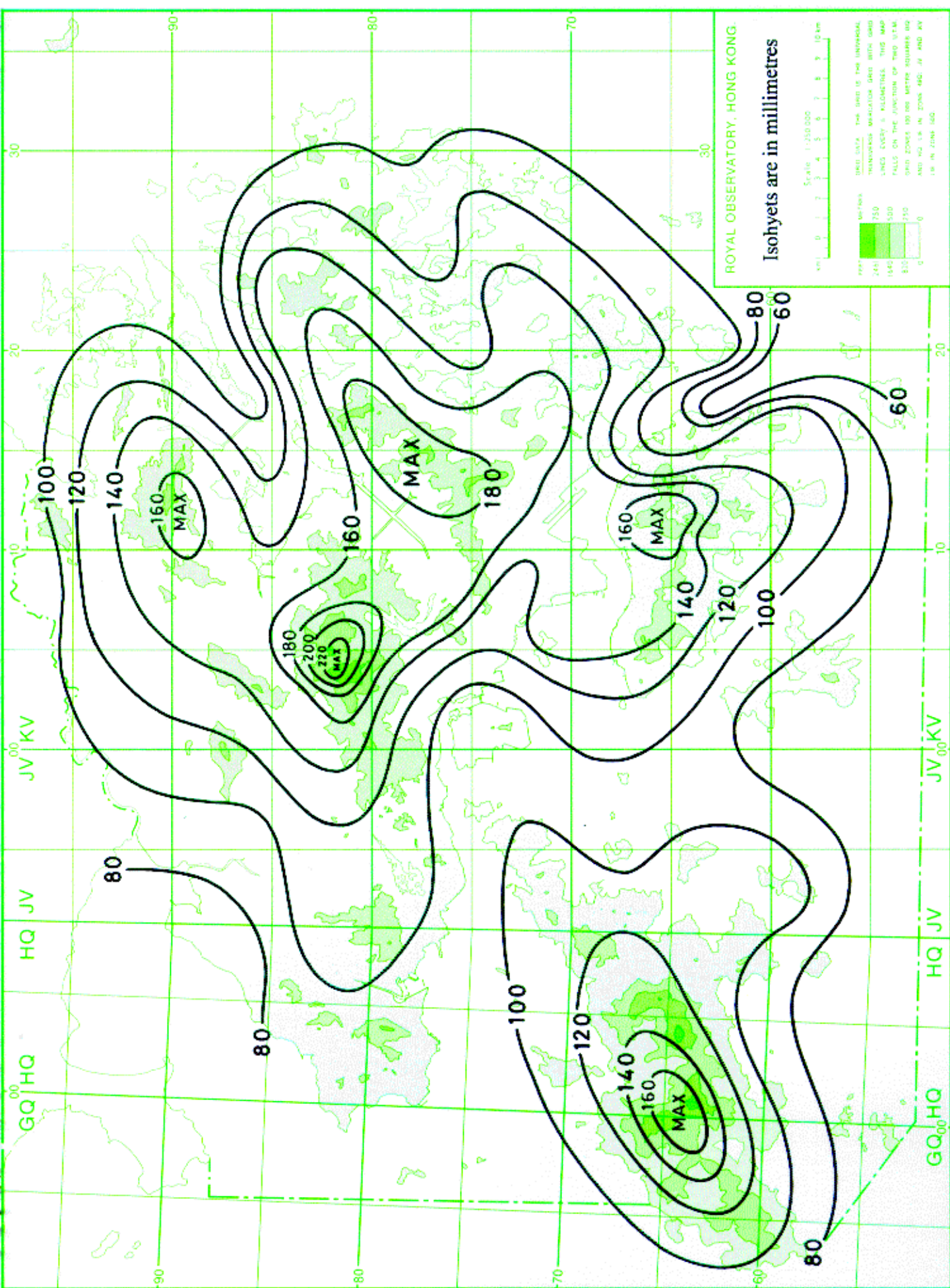


Figure 11. Mean October rainfall distribution map (1961-1990)

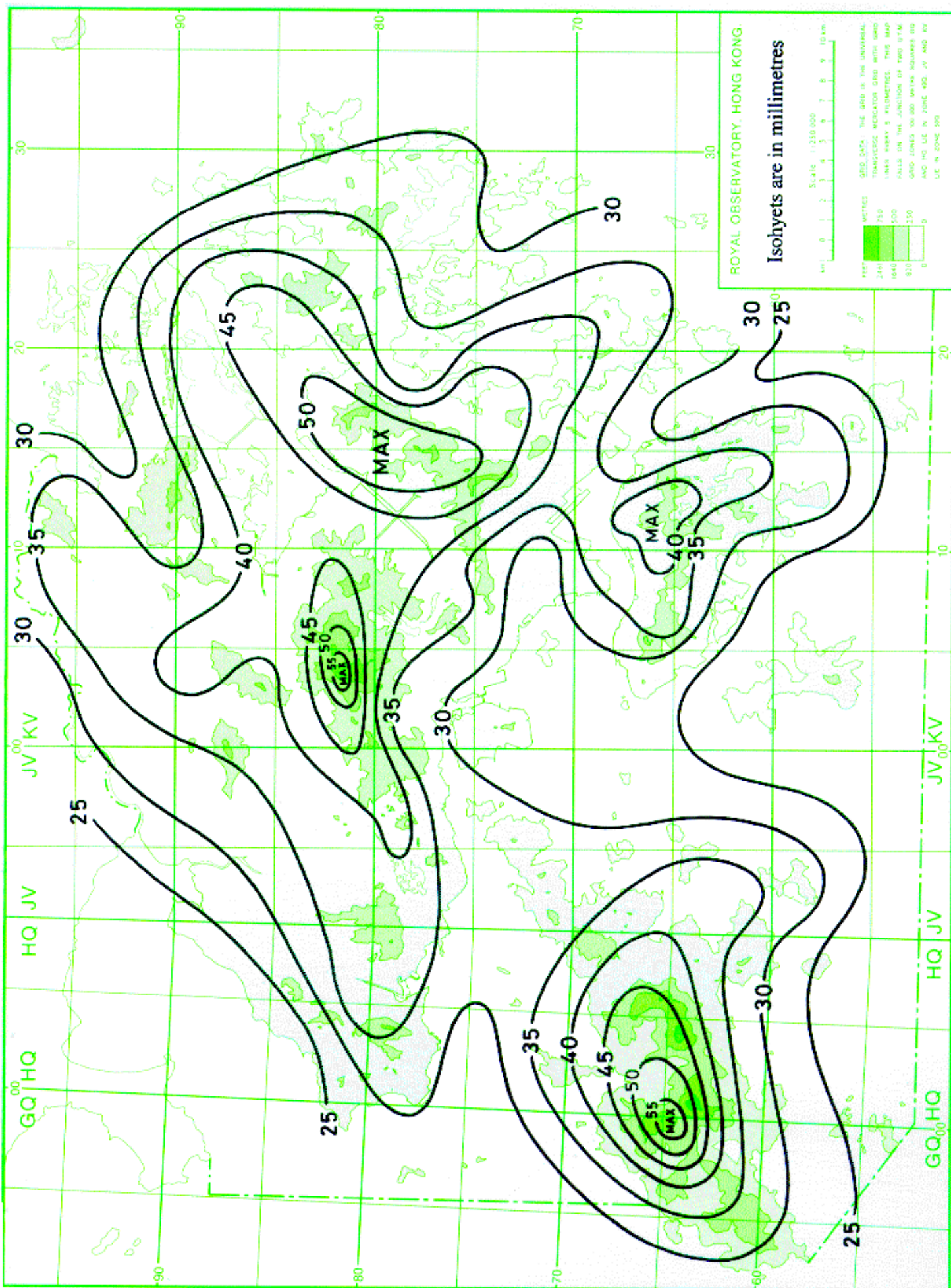


Figure 12. Mean November rainfall distribution map (1961-1990)

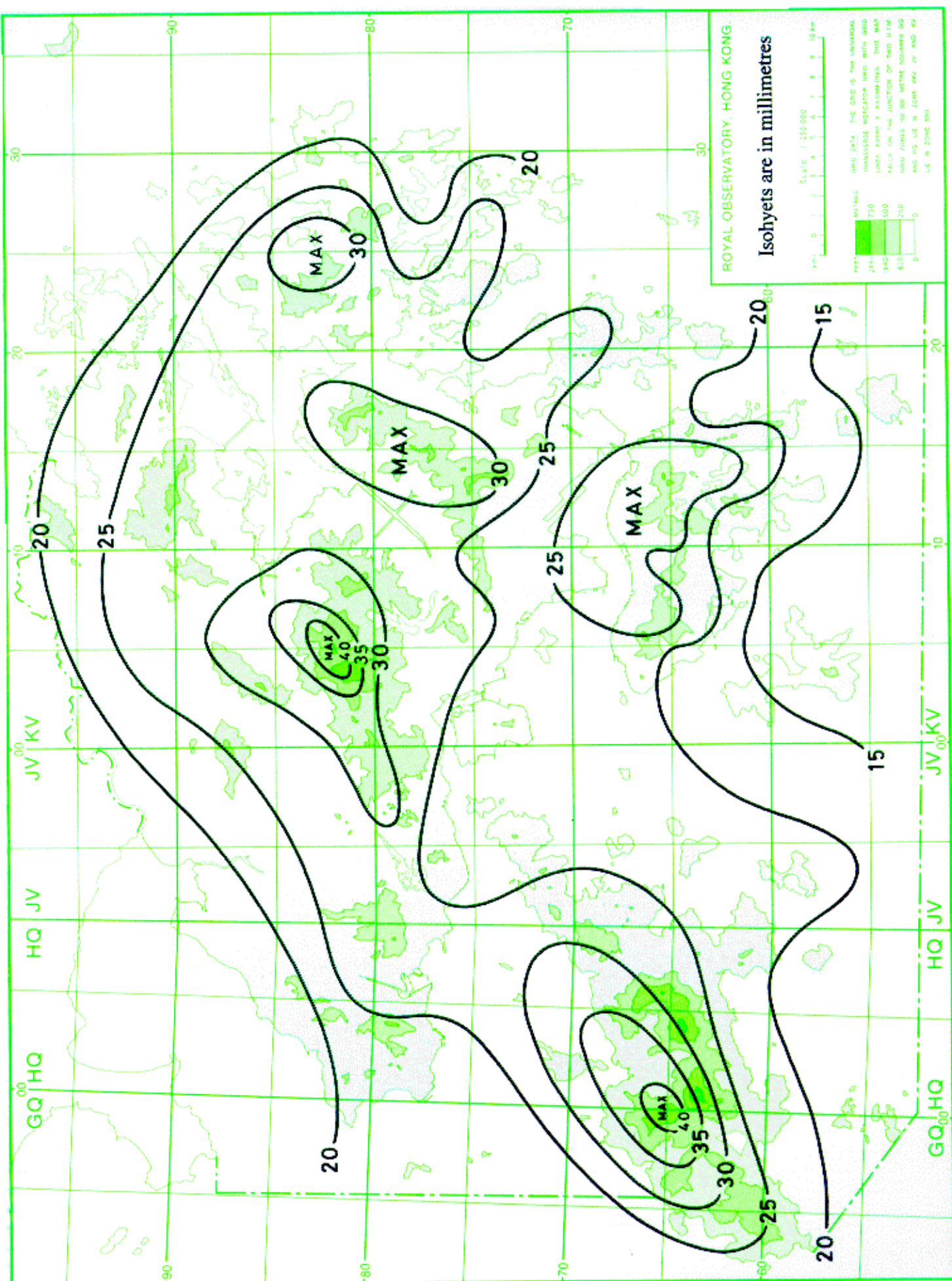


Figure 13. Mean December rainfall distribution map (1961-1990)

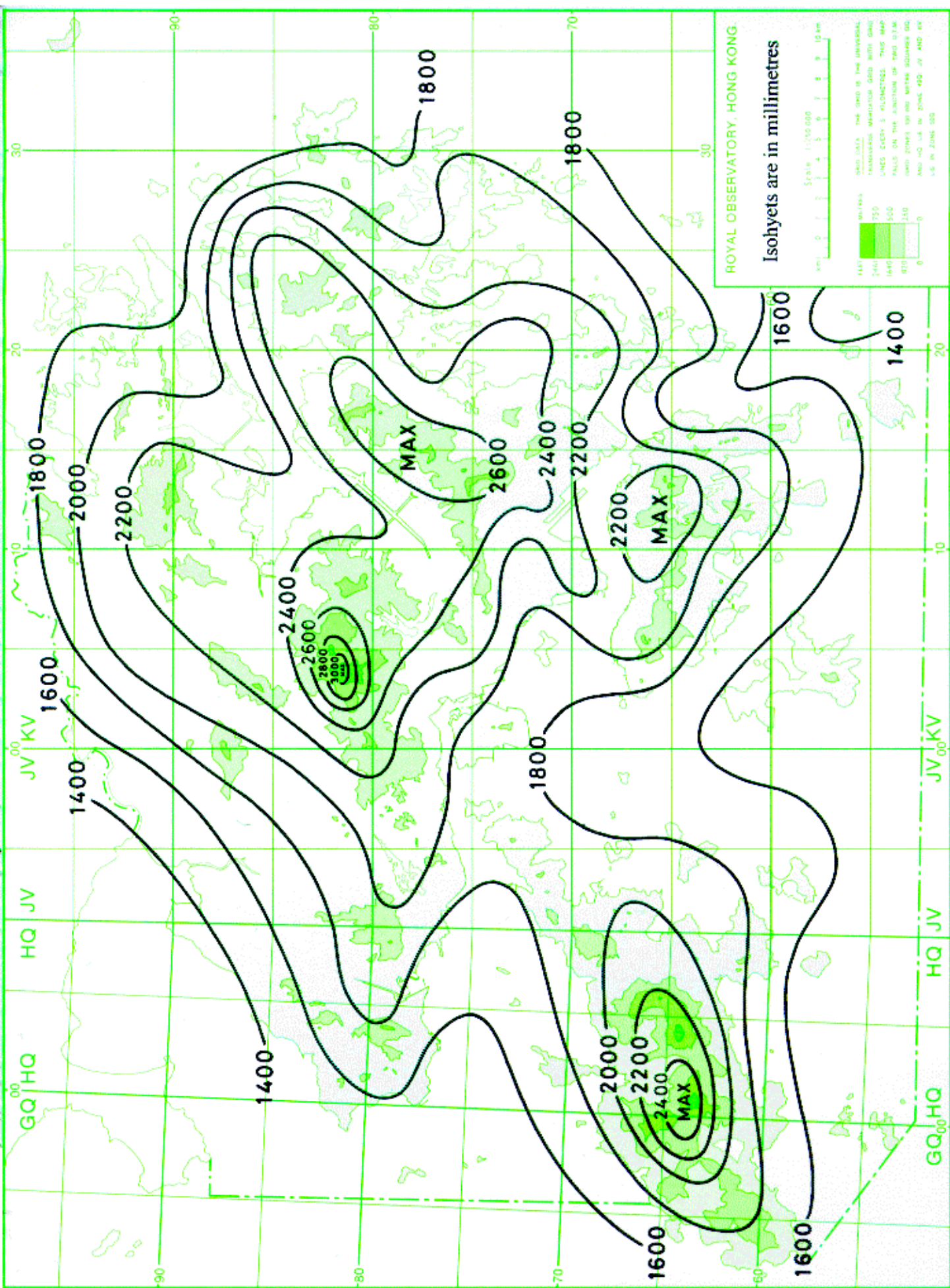


Figure 14. Mean annual rainfall distribution map (1961-1990)

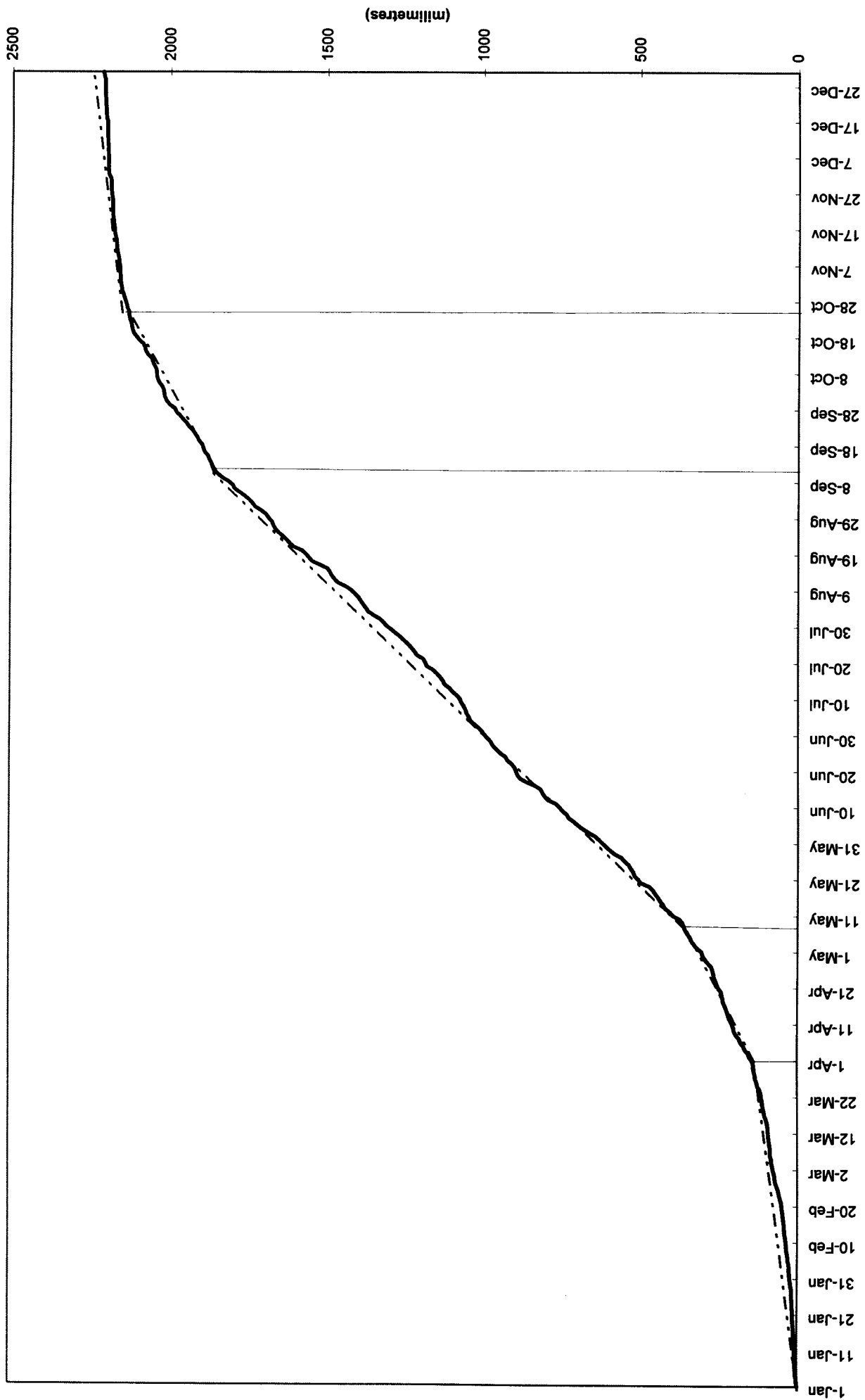


Figure 15. Accumulated mean daily rainfall for the Royal Observatory

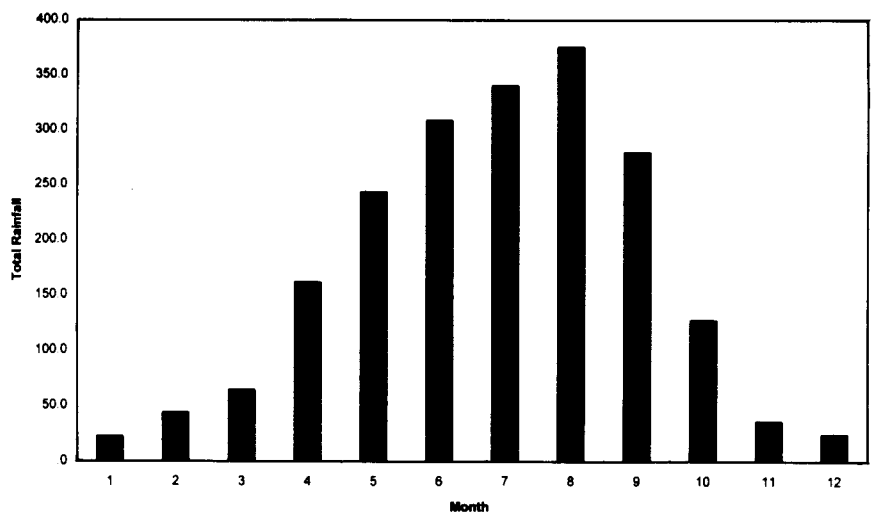


Figure 16. Mean monthly rainfall for Ta Kwu Ling Pig Breeding Centre

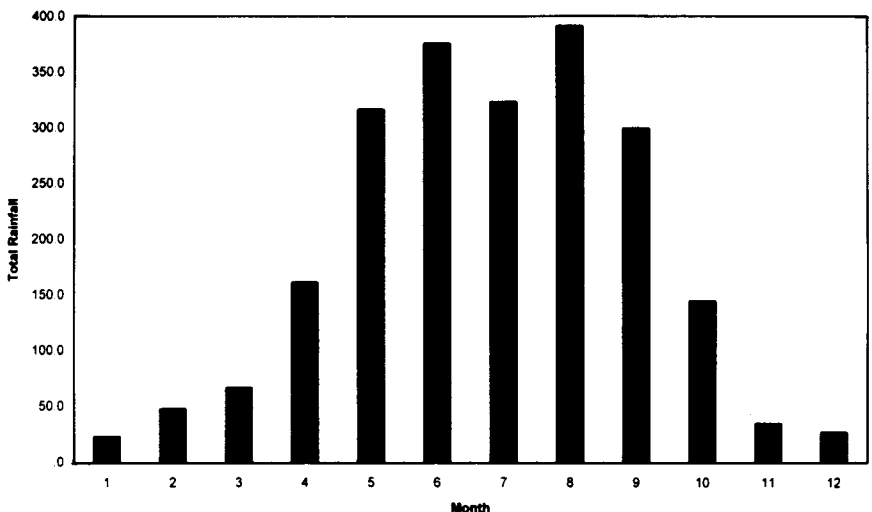


Figure 17. Mean monthly rainfall for the Royal Observatory

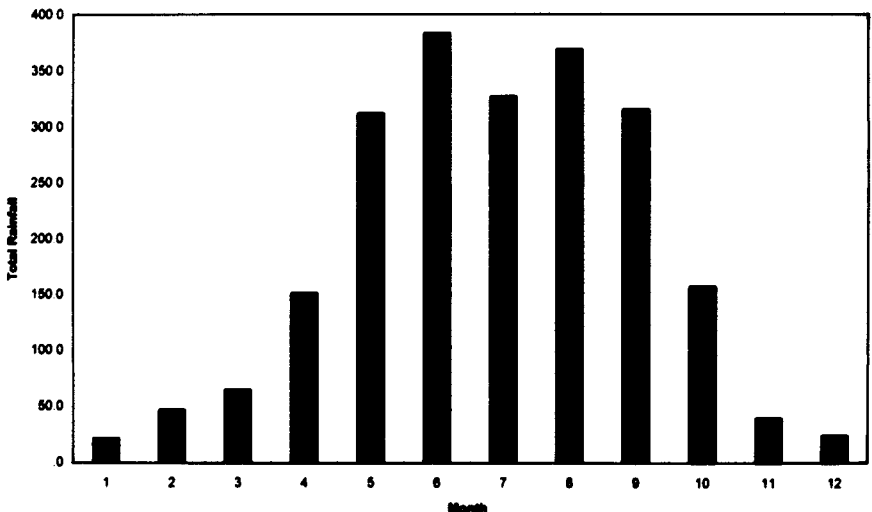
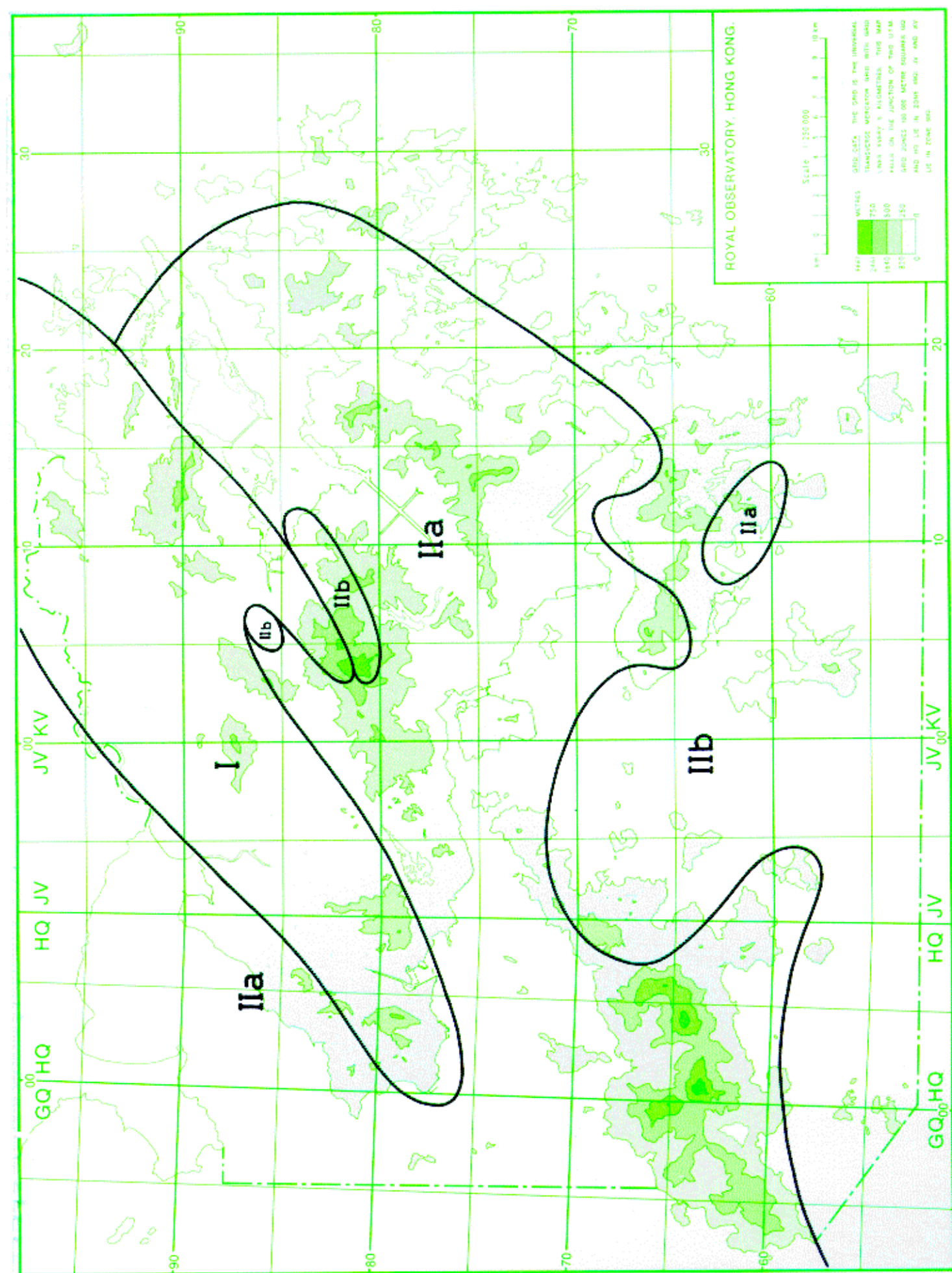


Figure 18. Mean monthly rainfall for Happy Valley Race Course



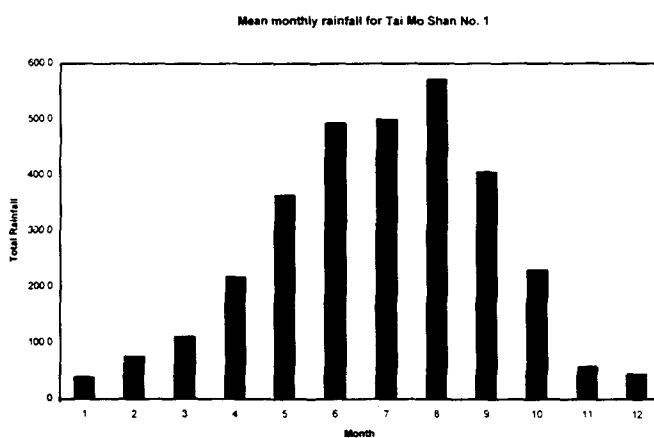
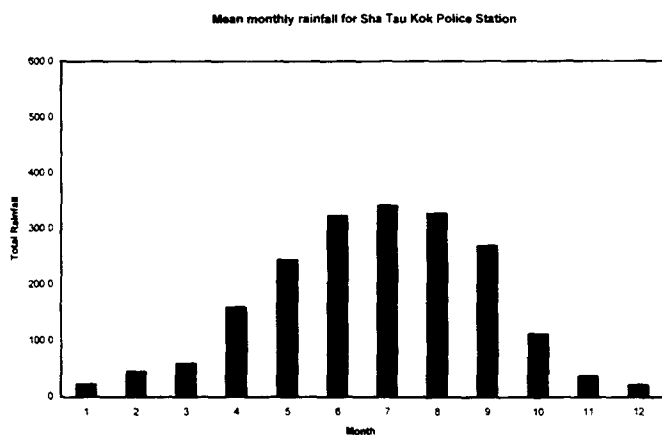
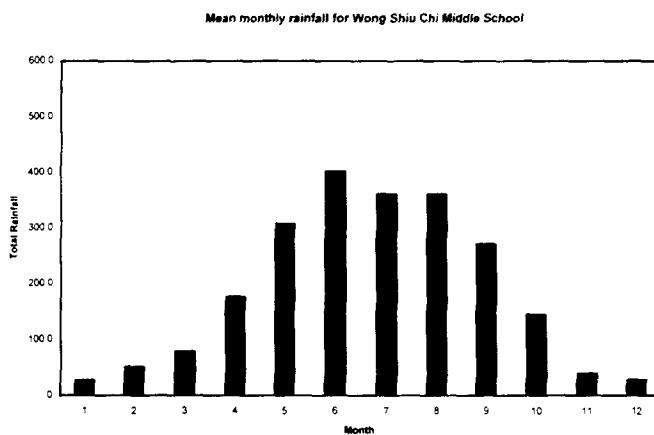
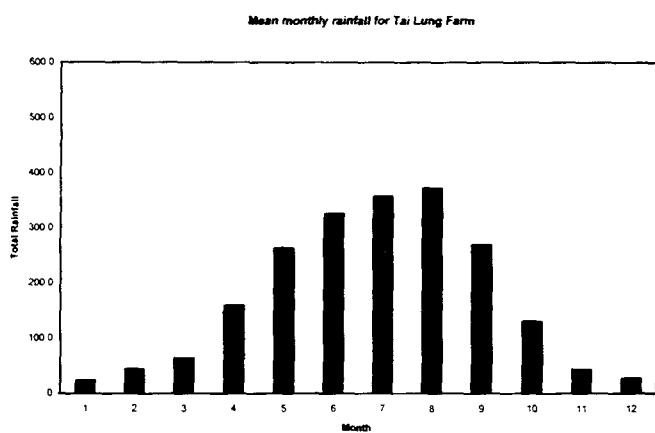
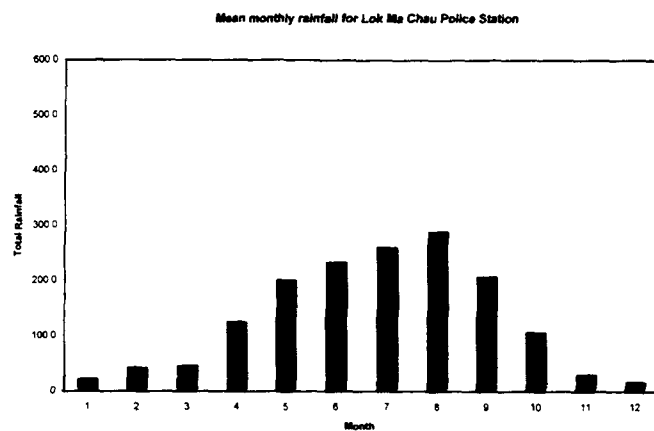
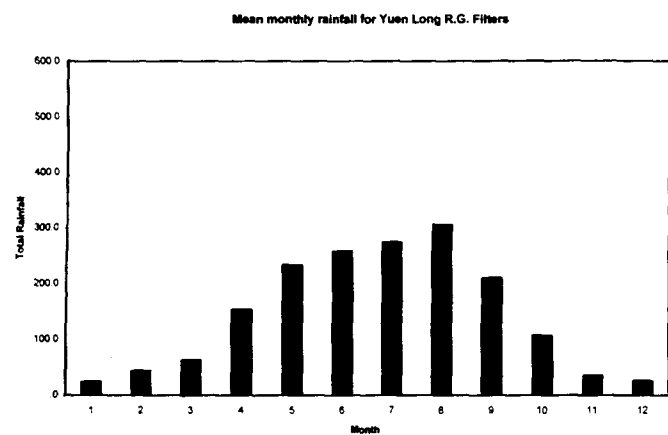


Figure 20. Mean monthly rainfall for selected stations of Type I

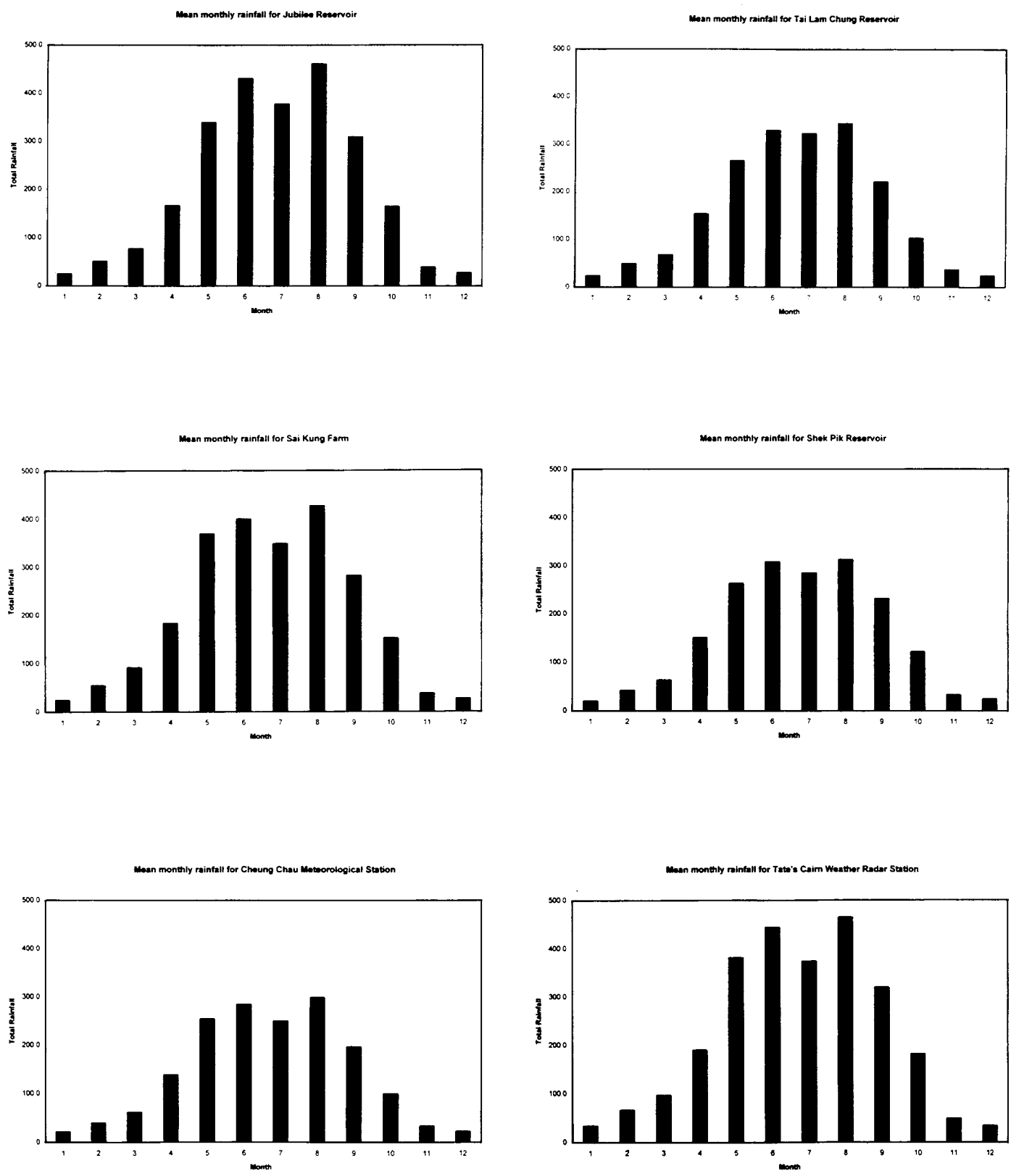


Figure 21. Mean monthly rainfall for selected stations of Type IIa

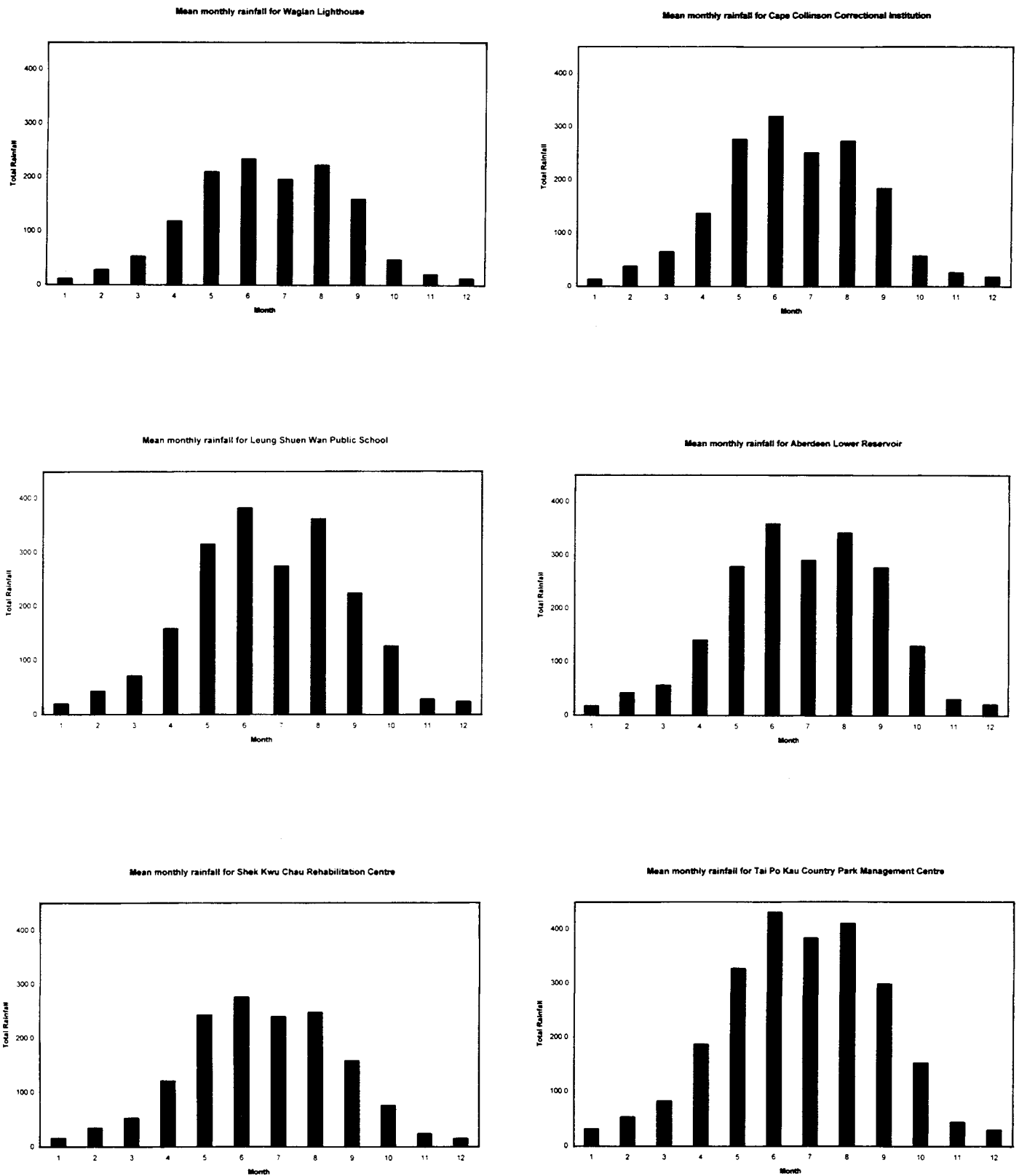


Figure 22. Mean monthly rainfall for selected stations of Type IIb