**ROYAL OBSERVATORY, HONG KONG**

Technical Note No. 88

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

by

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# 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

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## 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 | Record Period | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Year |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | m | years | mm | mm | mm | mm | mm | mm | mm | mm | mm | mm | mm | mm | mm |
| 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 | AU TAU 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 | CHI MA 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 | HEI LING 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 | KING'S 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 | 46.6 | 125.8 | 201.5 | 233.4 | 261.0 | 289.4 | 207.8 | 107.4 | 31.1 | 18.1 | 1587.6 |
| 97 | MA NAM 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 | 85.8 | 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 | Record Period | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Year |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | m | years | mm | mm | mm | mm | mm | mm | mm | mm | mm | mm | mm | mm | mm |
| 11 | POK FU 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 | QUEEN'S 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 TSAI | KV173864 | 35 | 17 | 22.9 | 46.7 | 68.4 | 158.2 | 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 TAU KOK POLICE STATION | KV129952 | 35 | 30 | 22.8 | 45.0 | 59.1 | 159.3 | 244.3 | 323.4 | 342.2 | 327.8 | 269.6 | 112.0 | 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 PUI 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 | 2127.0 |
| 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 | 130.6 | 247.2 | 300.6 | 232.2 | 286.6 | 221.4 | 110.9 | 33.0 | 16.8 | 1694.5 |
| 55 | STONECUTTERS ISLAND WIRELESS STATION | KV055710 | 10 | 16 | 24.7 | 39.1 | 64.7 | 132.8 | 265.6 | 315.4 | 306.7 | 344.5 | 265.5 | 149.8 | 26.0 | 23.2 | 1958.0 |
| 50 | SZE 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 | TA KWU LING PIG BREEDING CENTRE | KV072943 | 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 | TA KWU LING POLICE STATION | KV065957 | 5 | 30 | 19.7 | 42.6 | 56.0 | 150.7 | 236.8 | 251.4 | 286.3 | 346.6 | 227.9 | 86.8 | 36.0 | 20.0 | 1760.8 |
| 20 | TAI LAM CHUNG RESERVOIR | JV930773 | 45 | 30 | 23.6 | 49.0 | 67.7 | 154.0 | 265.7 | 329.5 | 323.0 | 344.4 | 221.5 | 103.6 | 37.3 | 24.8 | 1943.9 |
| 73 | TAI LAM 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 | TAI LAM COUNTRY PARK COMPT. 5 | JV955797 | 90 | 28 | 25.7 | 51.9 | 73.0 | 168.8 | 283.4 | 342.0 | 337.5 | 344.8 | 222.1 | 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 |
| 90\ | 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 O 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 | TATE'S CAIRN WEATHER RADAR STATION | KV133753 | 575 | 30 | 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 | 15 | 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 SHIU 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

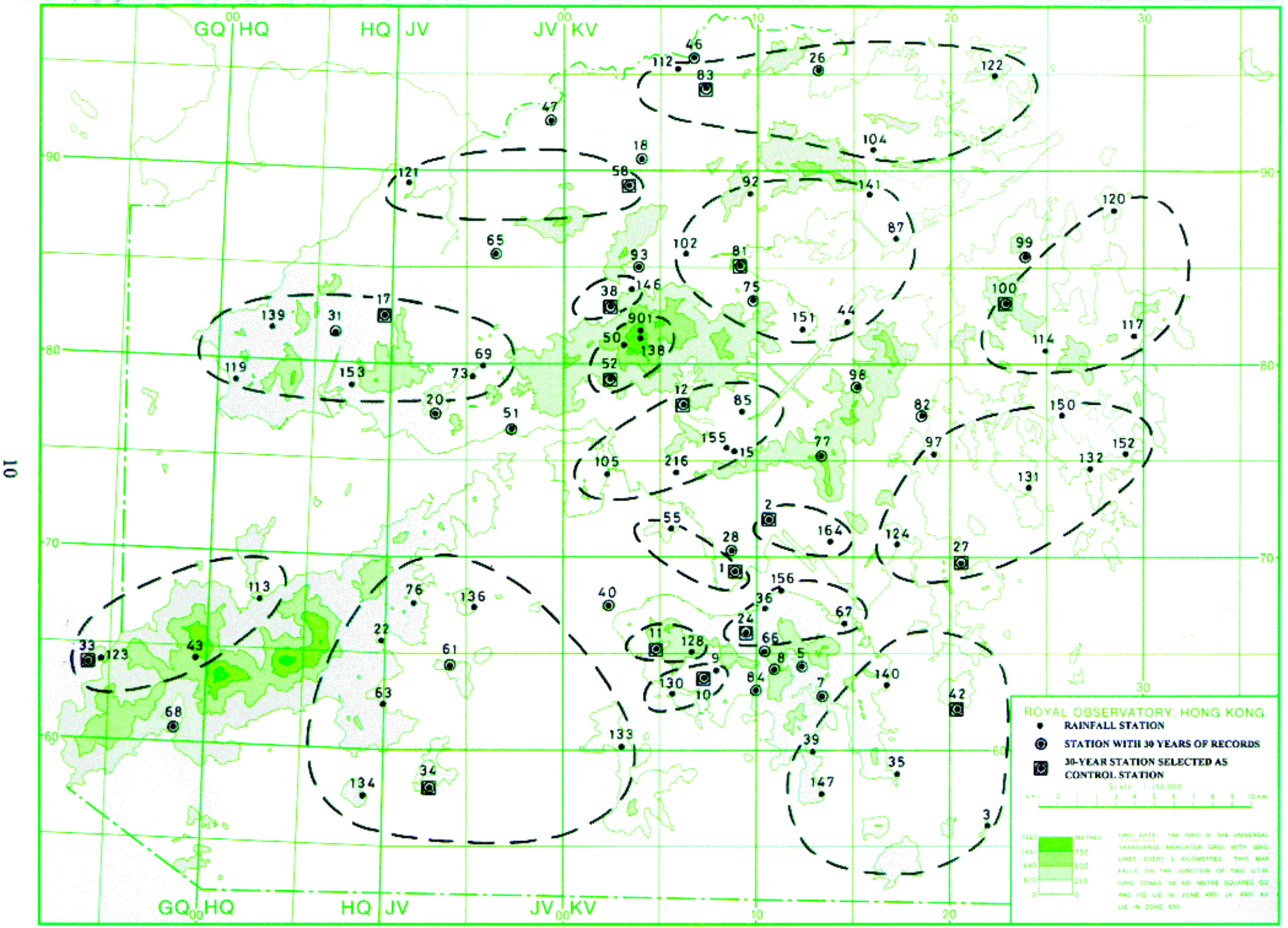



Figure 1. Map showing rainfall stations grouped with the respective control stations

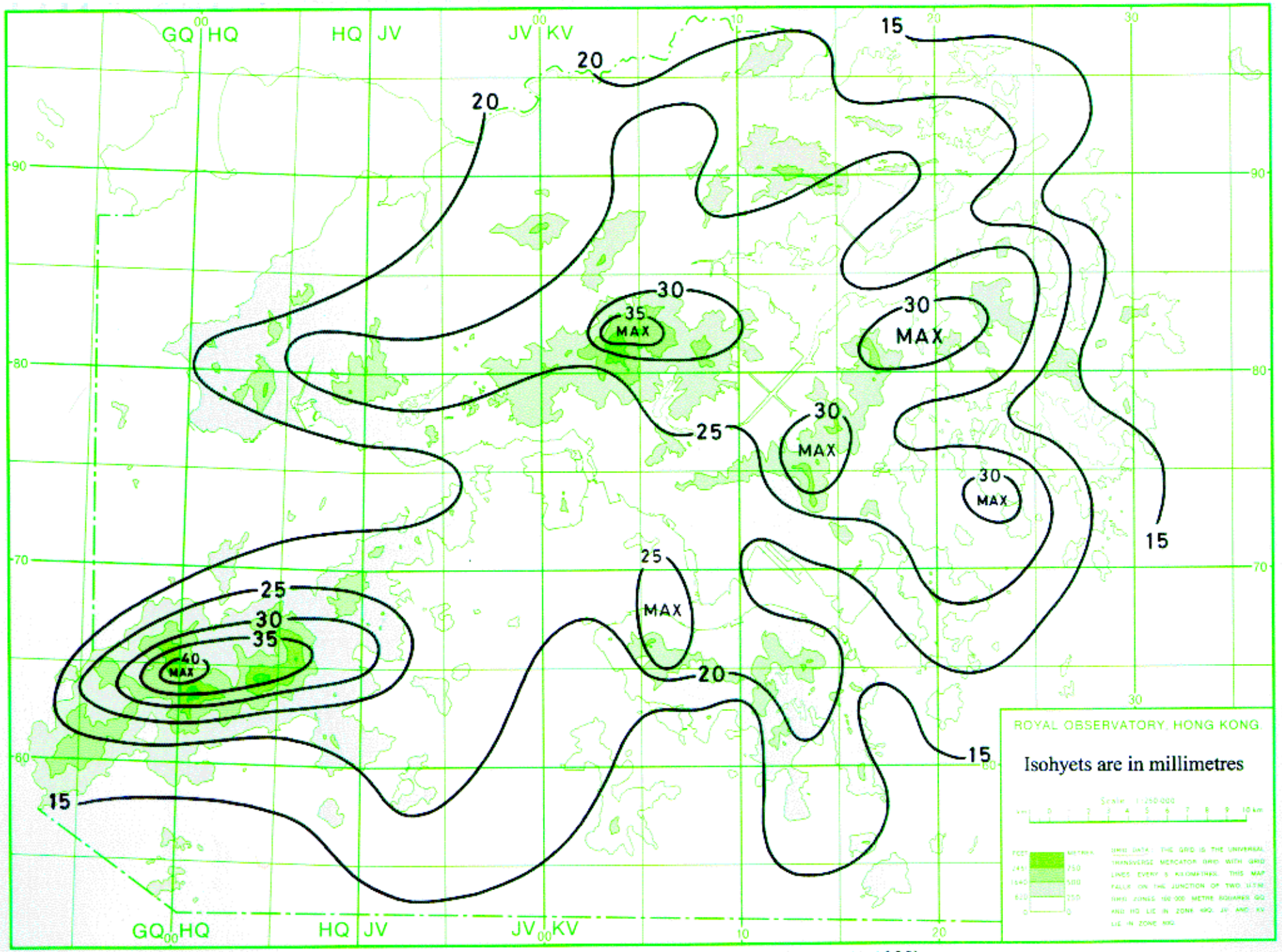



Figure 2. Mean January rainfall distribution map (1961-1990)

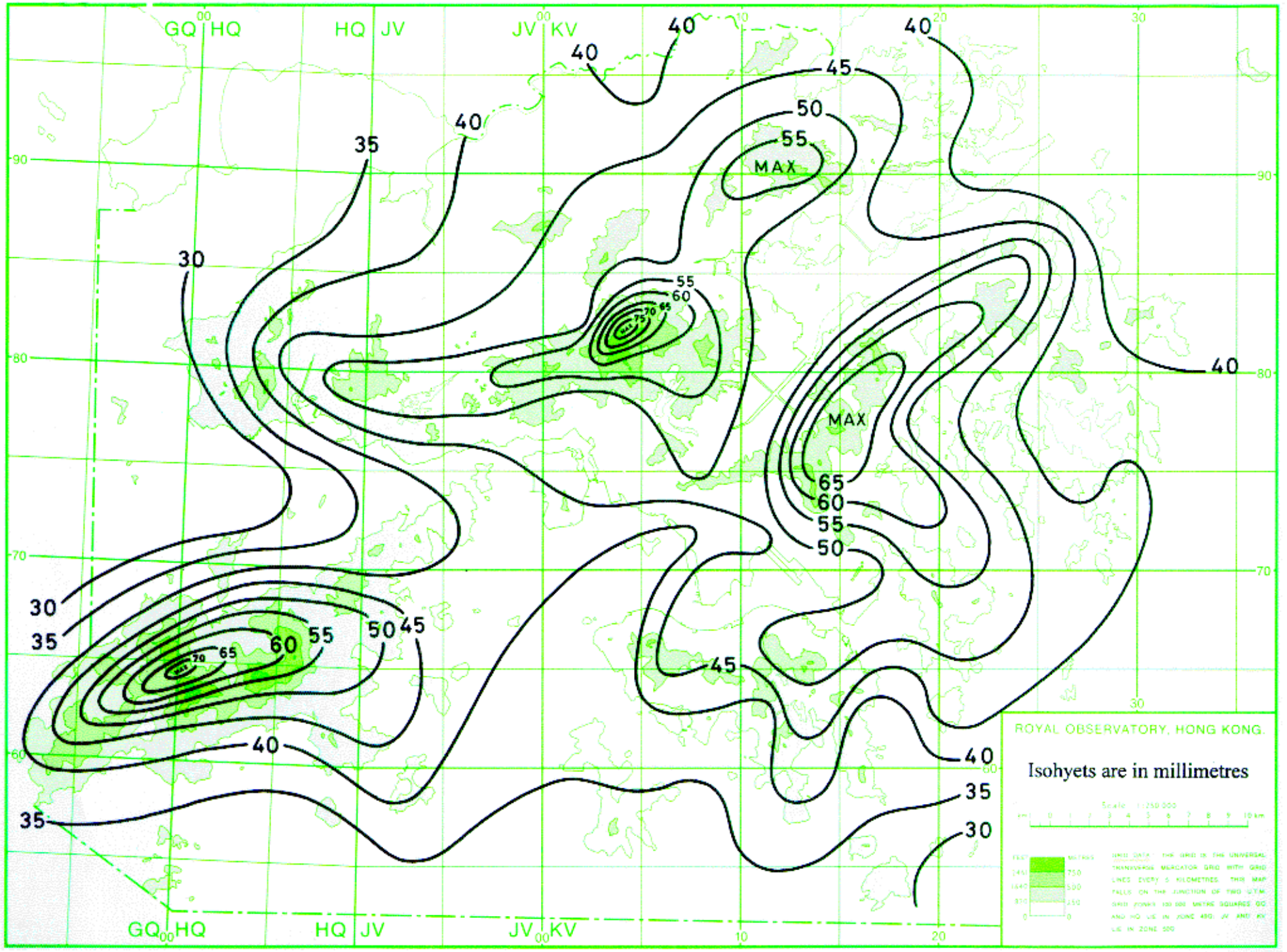



Figure 3. Mean February rainfall distribution map (1961-1990)

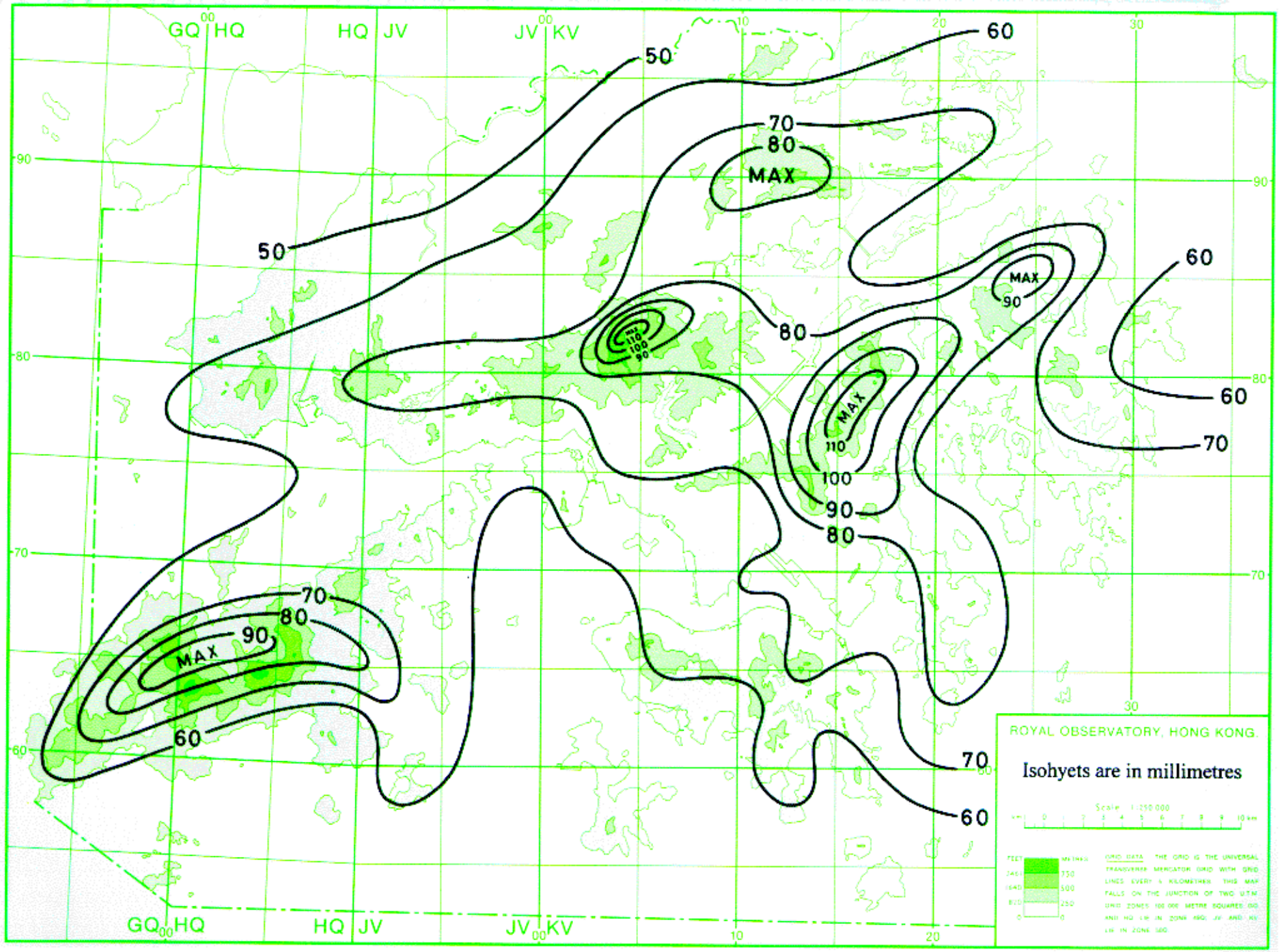



Figure 4. Mean March rainfall distribution map (1961-1990)

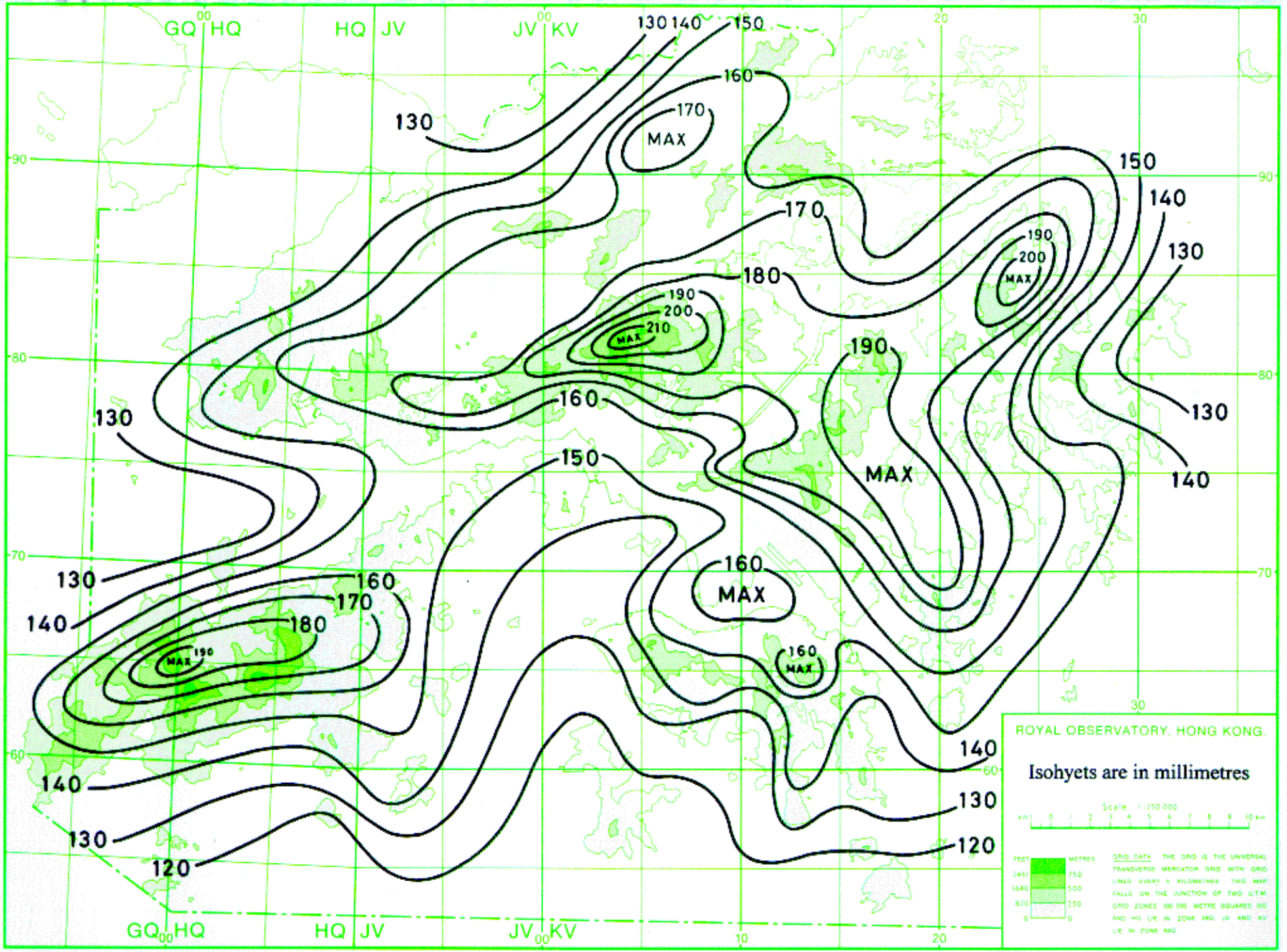



Figure 5. Mean April rainfall distribution map (1961-1990)

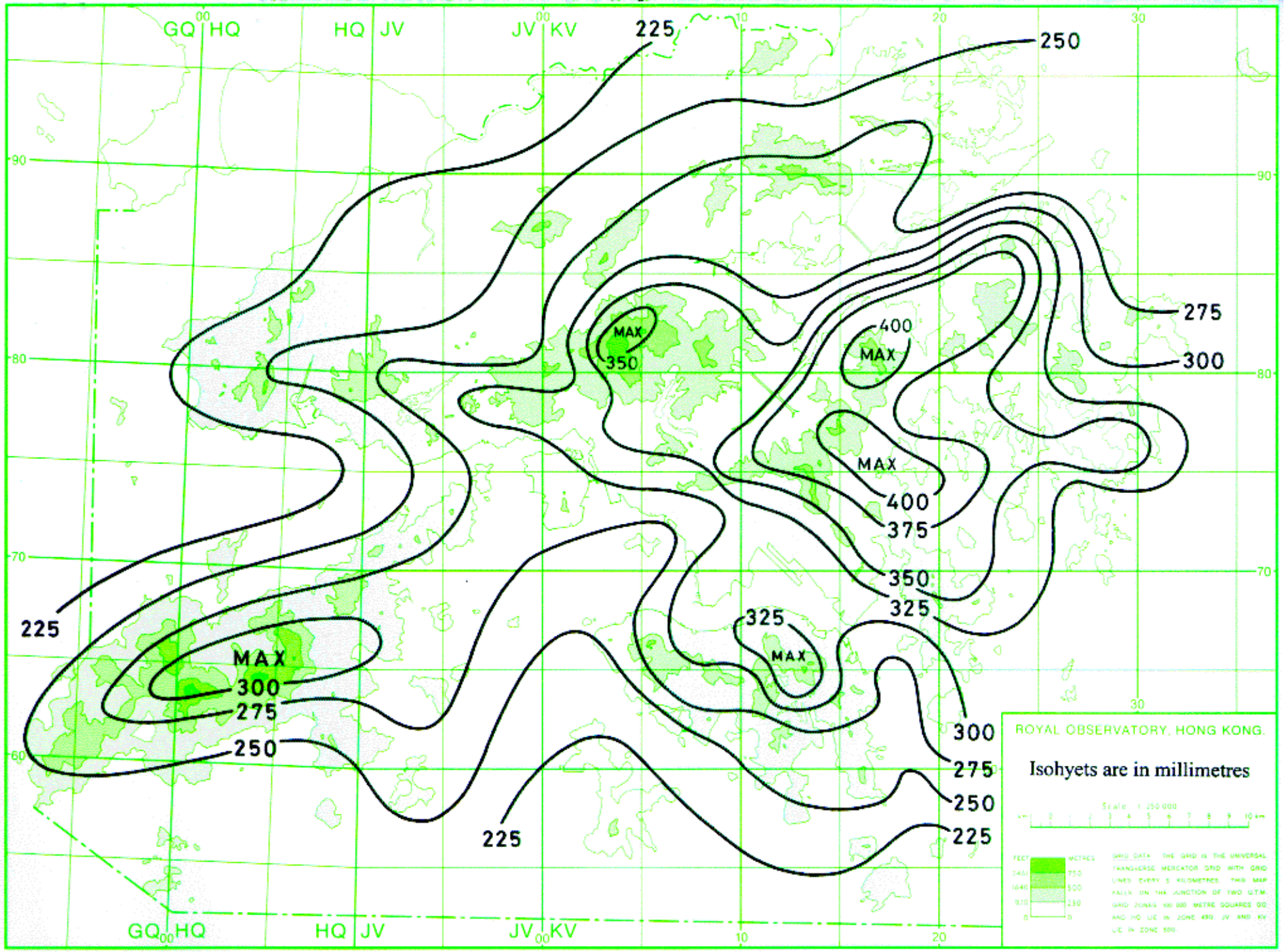



Figure 6. Mean May rainfall distribution map (1961-1990)

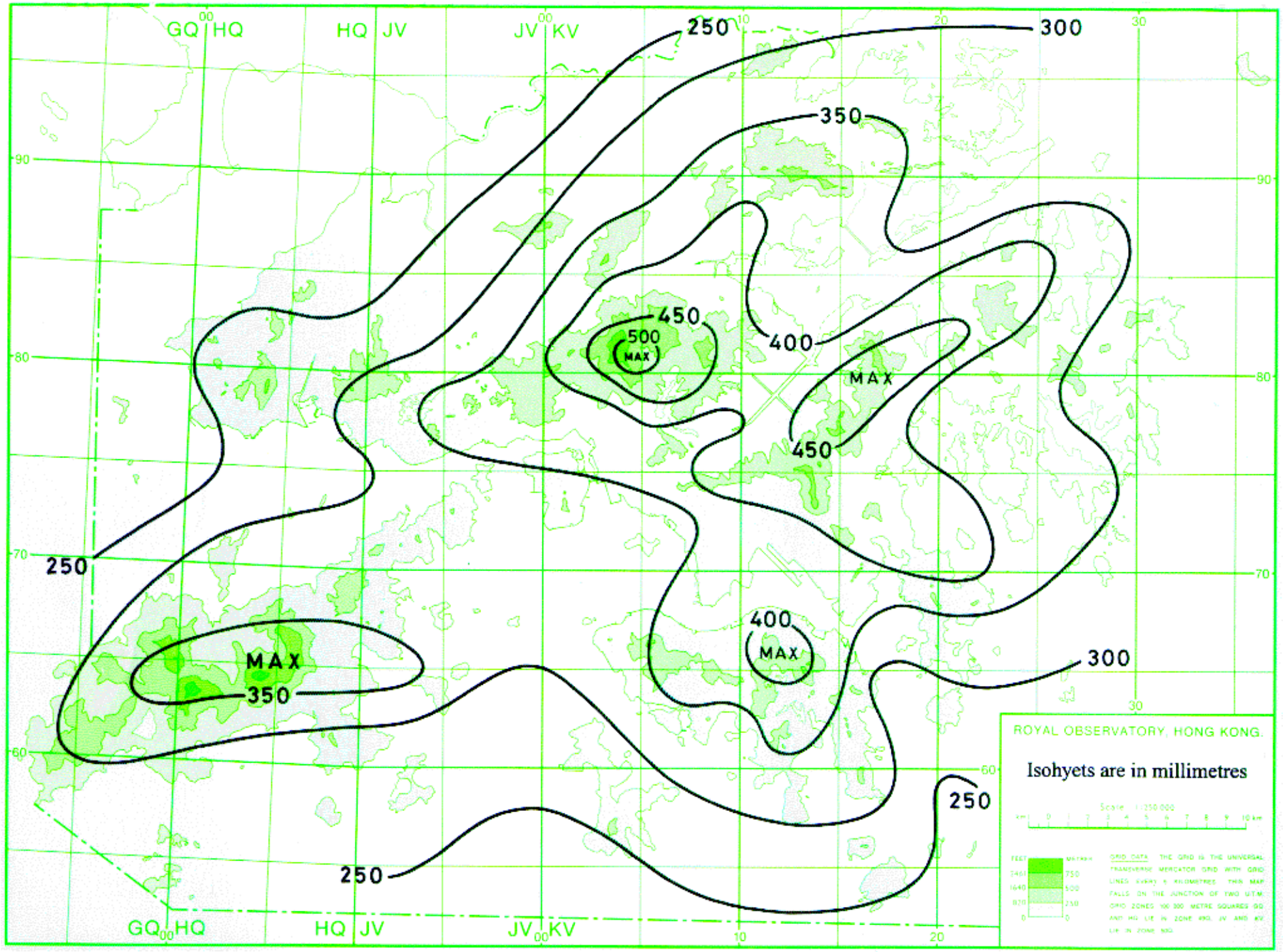



Figure 7. Mean June rainfall distribution map (1961-1990)

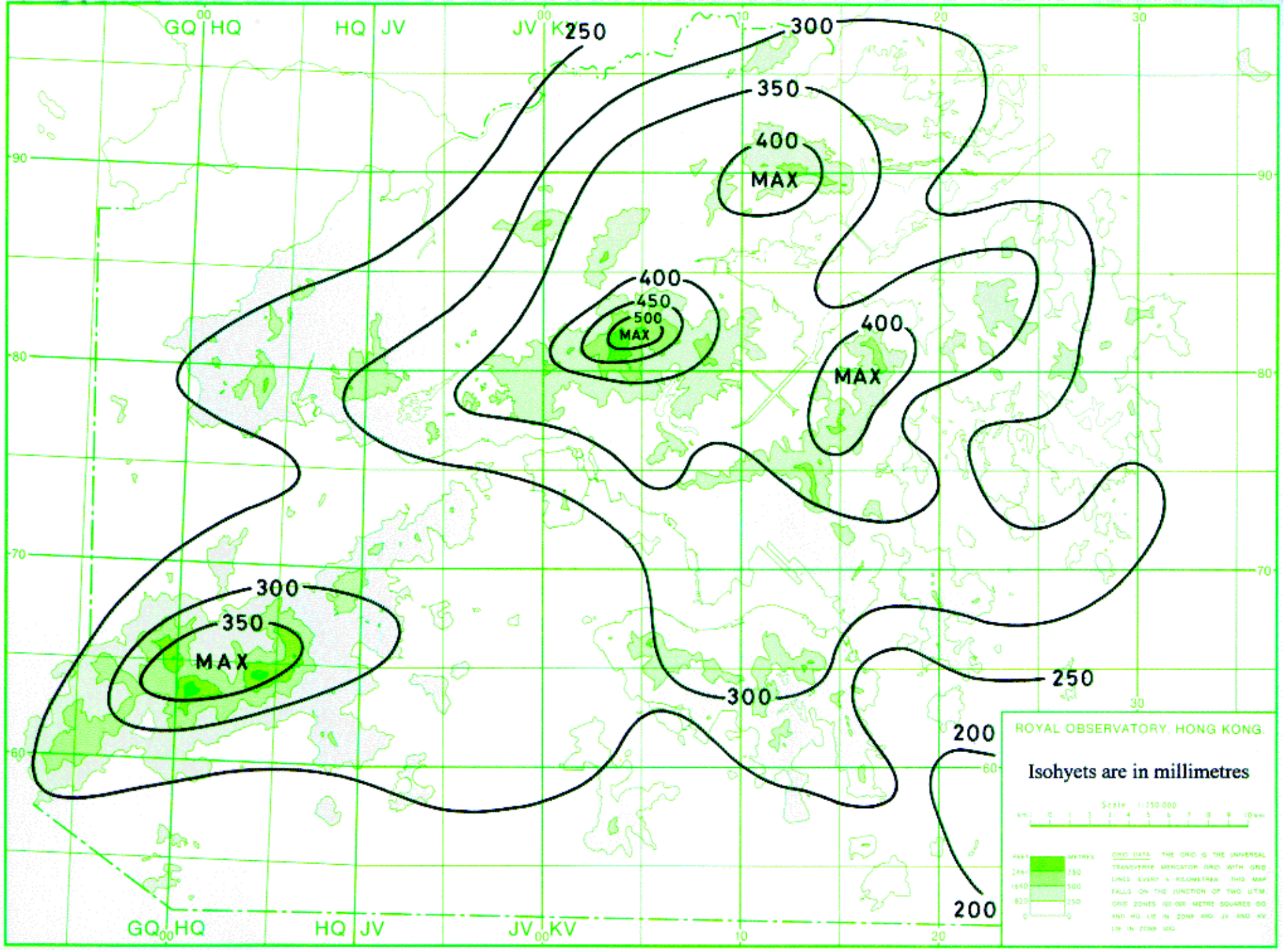



Figure 8. Mean July rainfall distribution map (1961-1990)

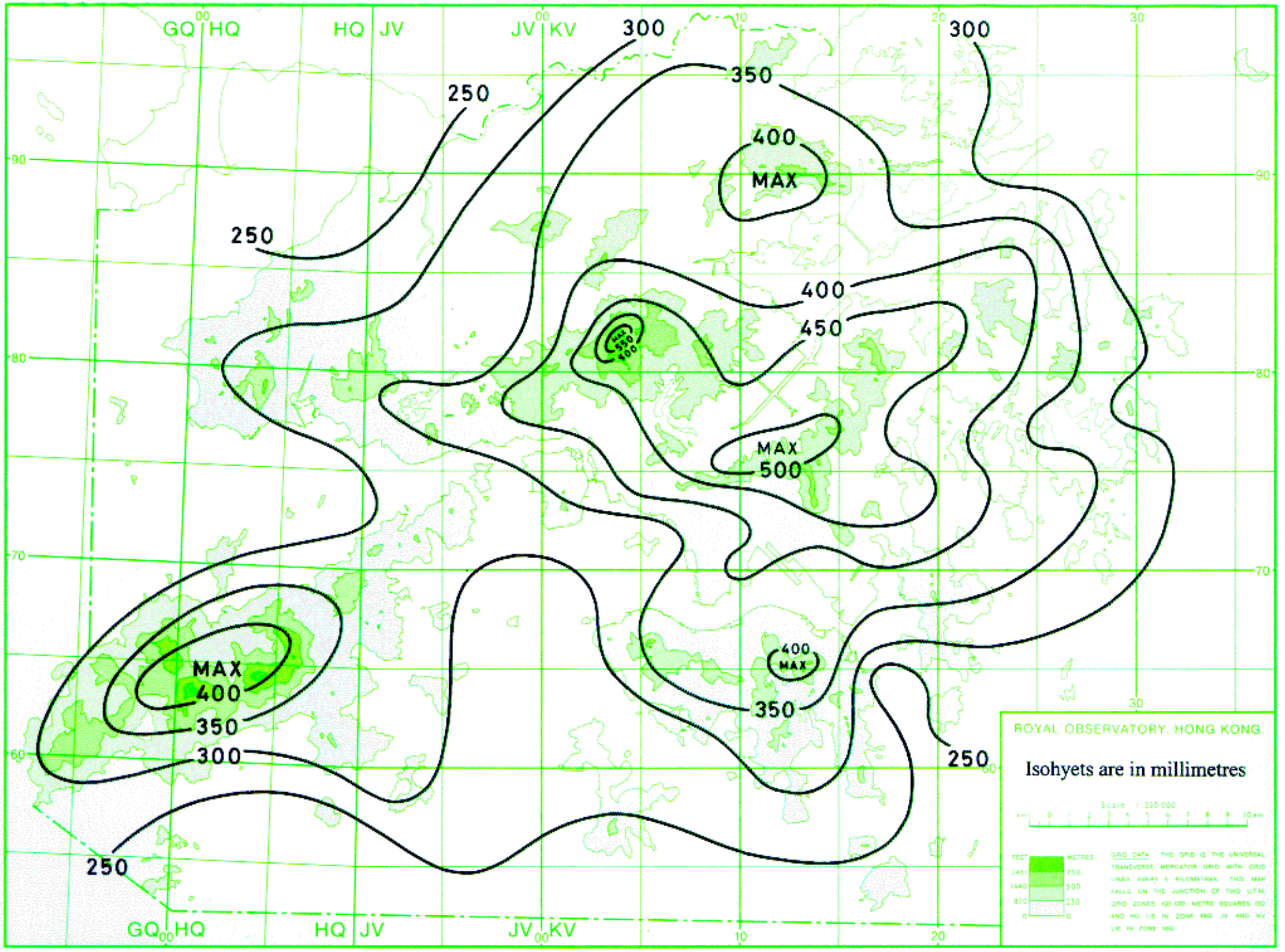



Figure 9. Mean August rainfall distribution map (1961-1990)

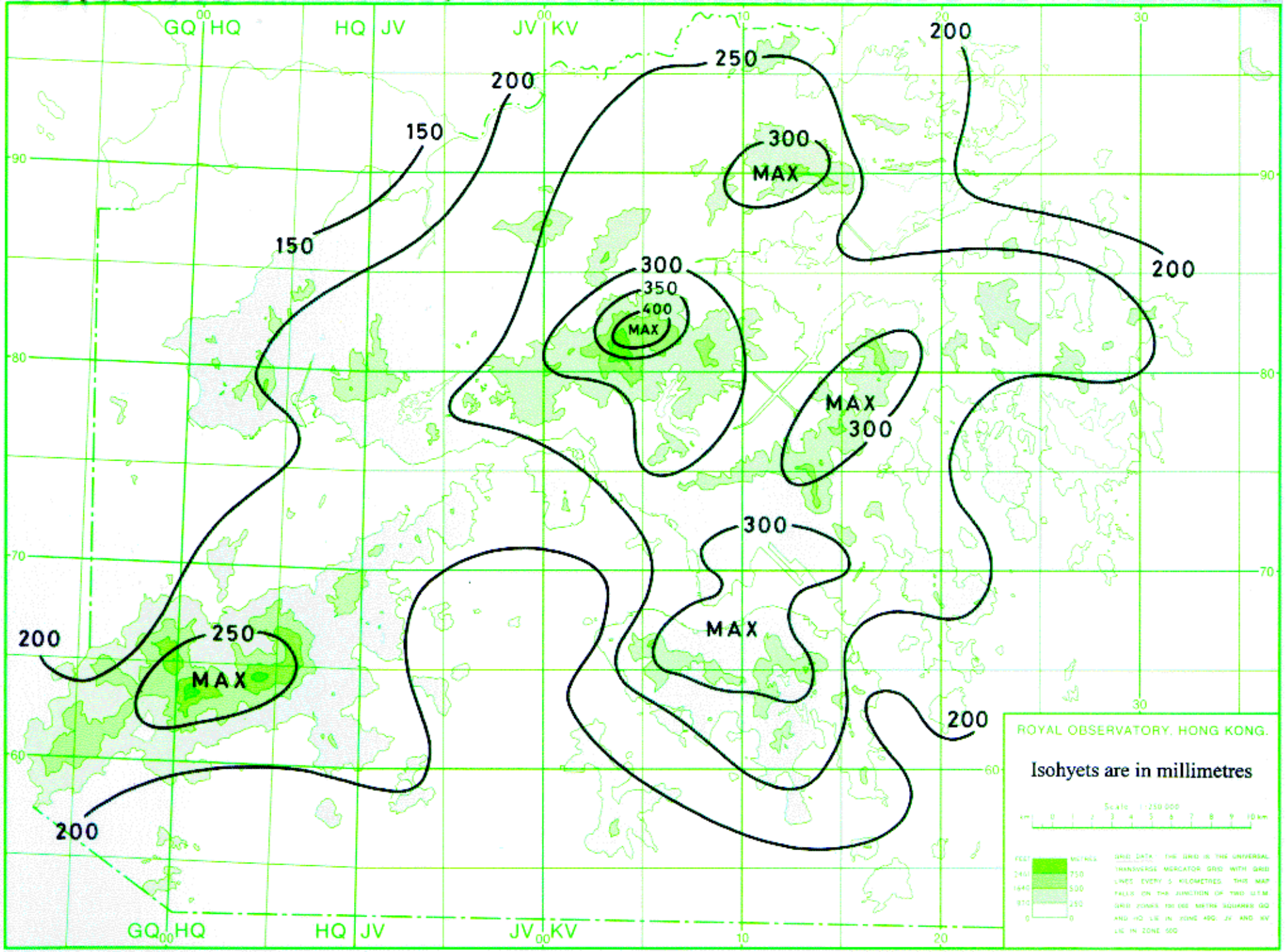



Figure 10. Mean September rainfall distribution map (1961-1990)

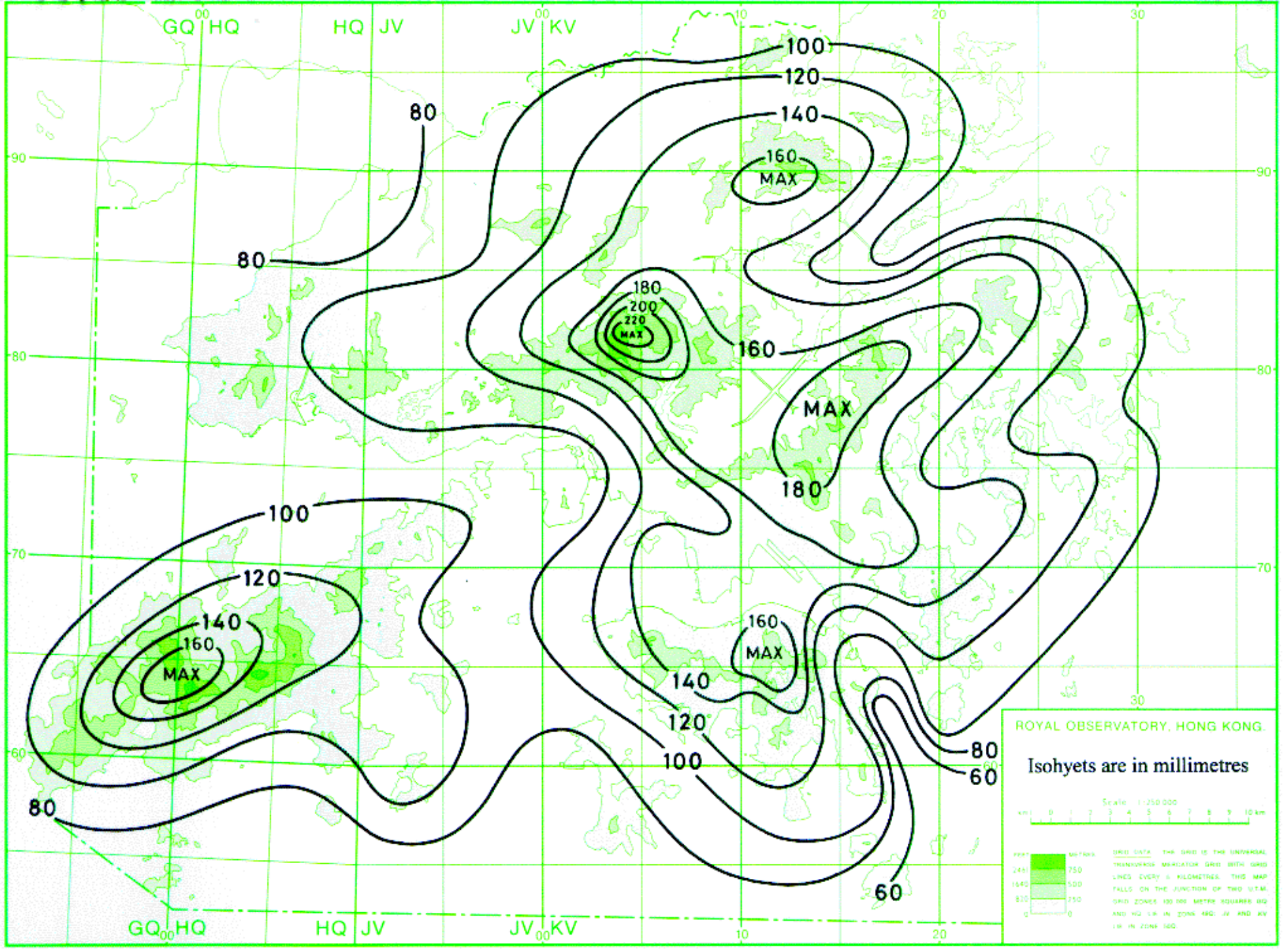



Figure 11. Mean October rainfall distribution map (1961-1990)

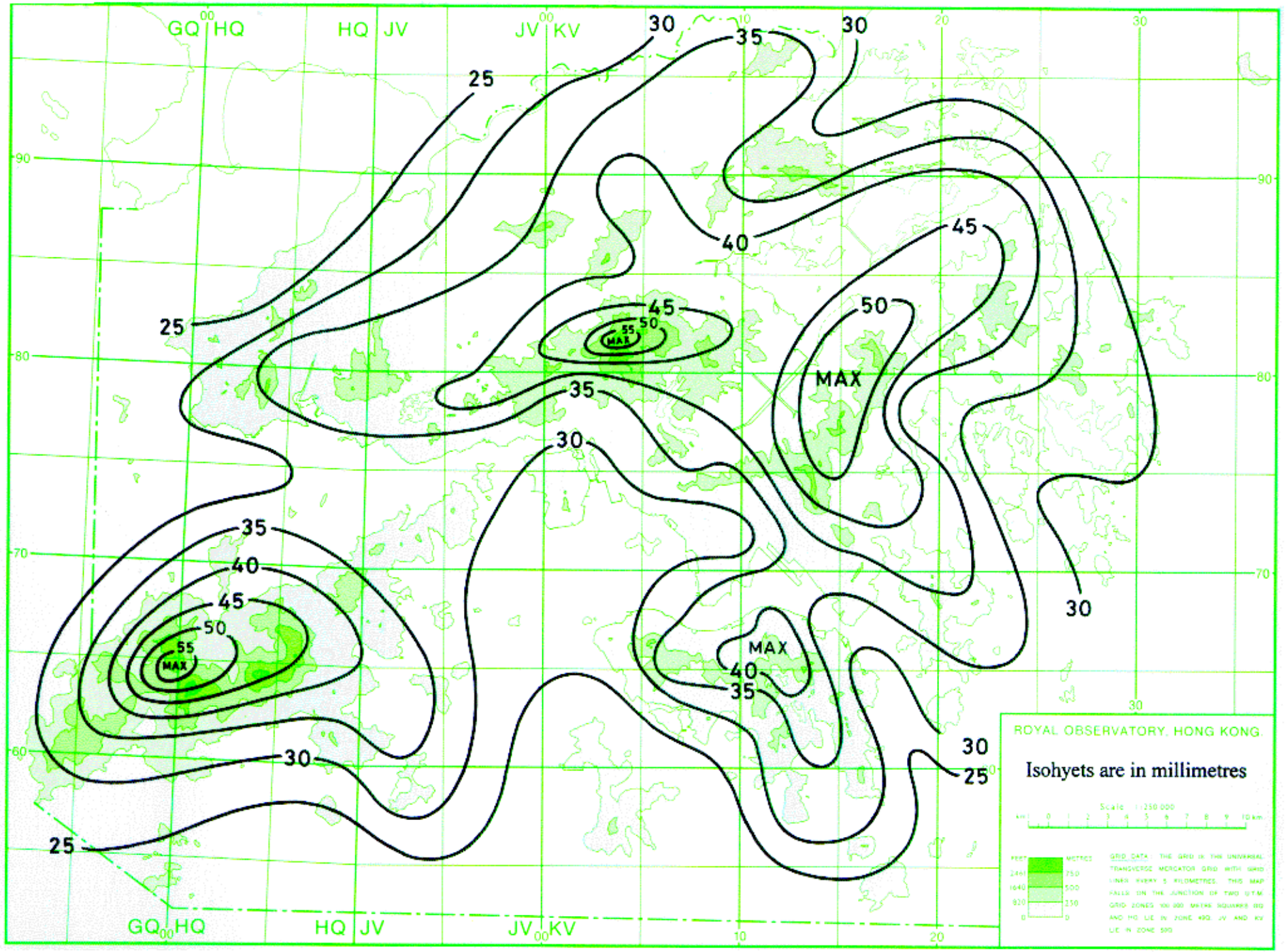



Figure 12. Mean November rainfall distribution map (1961-1990)

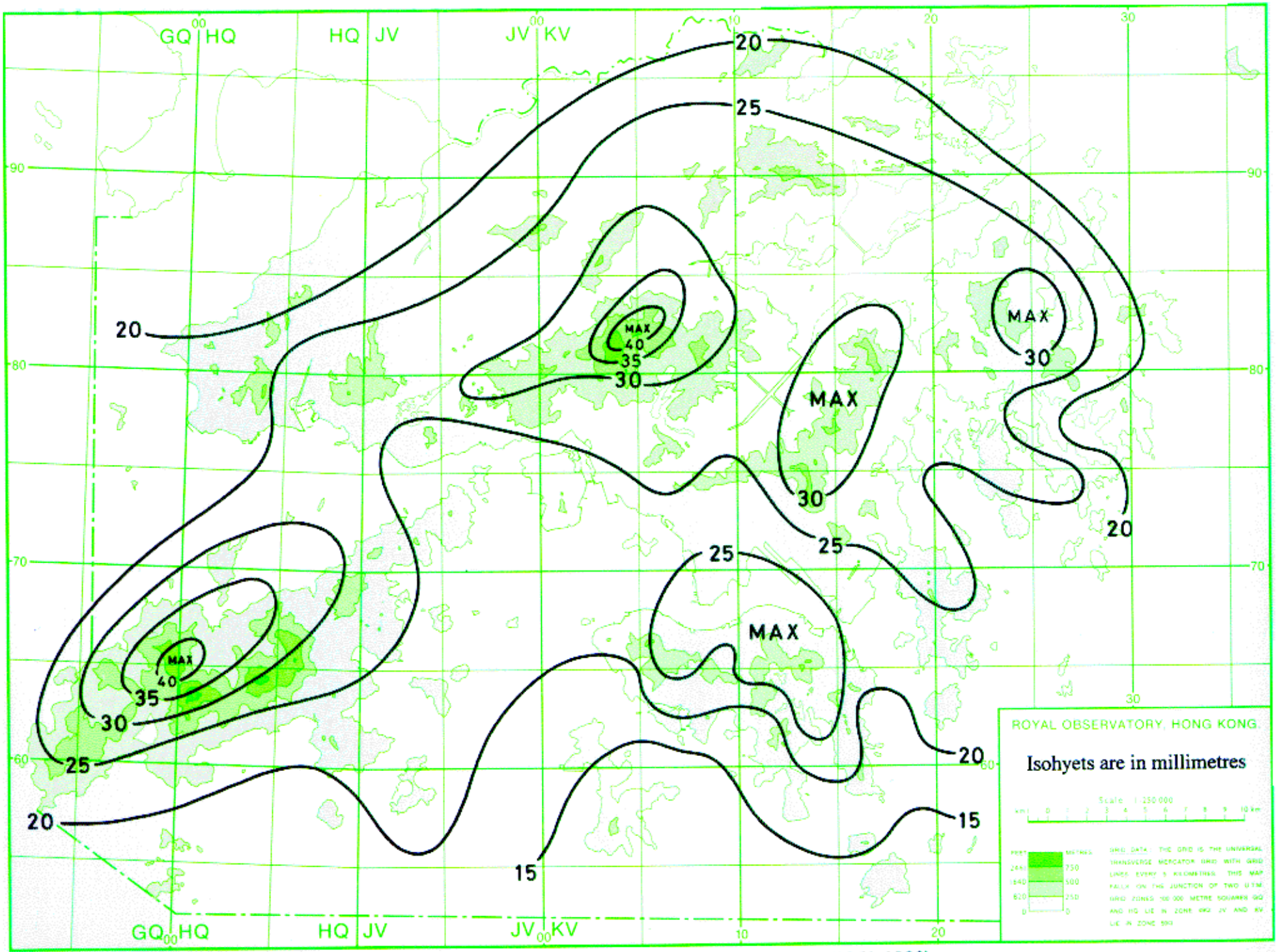



Figure 13. Mean December rainfall distribution map (1961-1990)

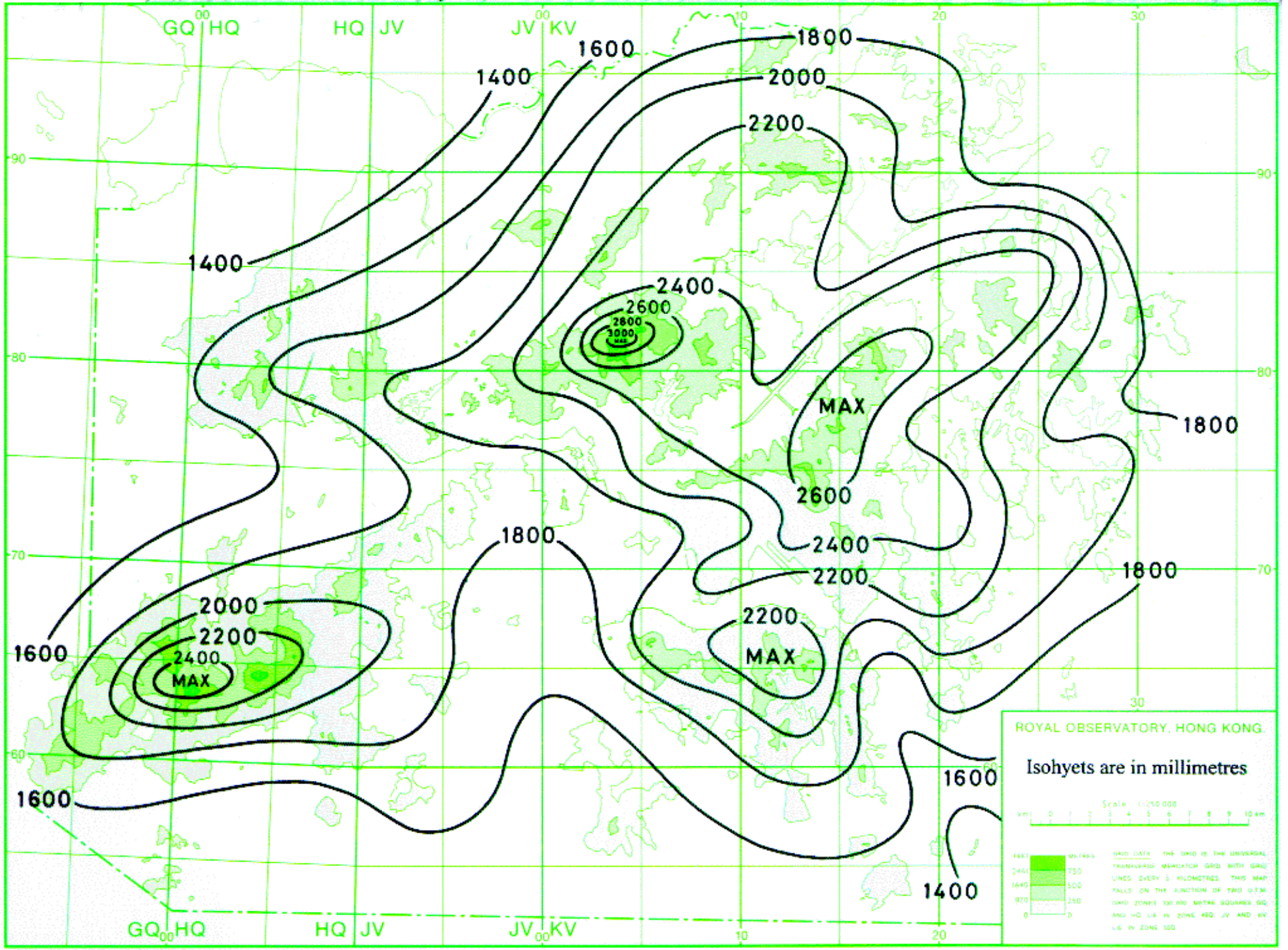



Figure 14. Mean annual rainfall distribution map (1961-1990)

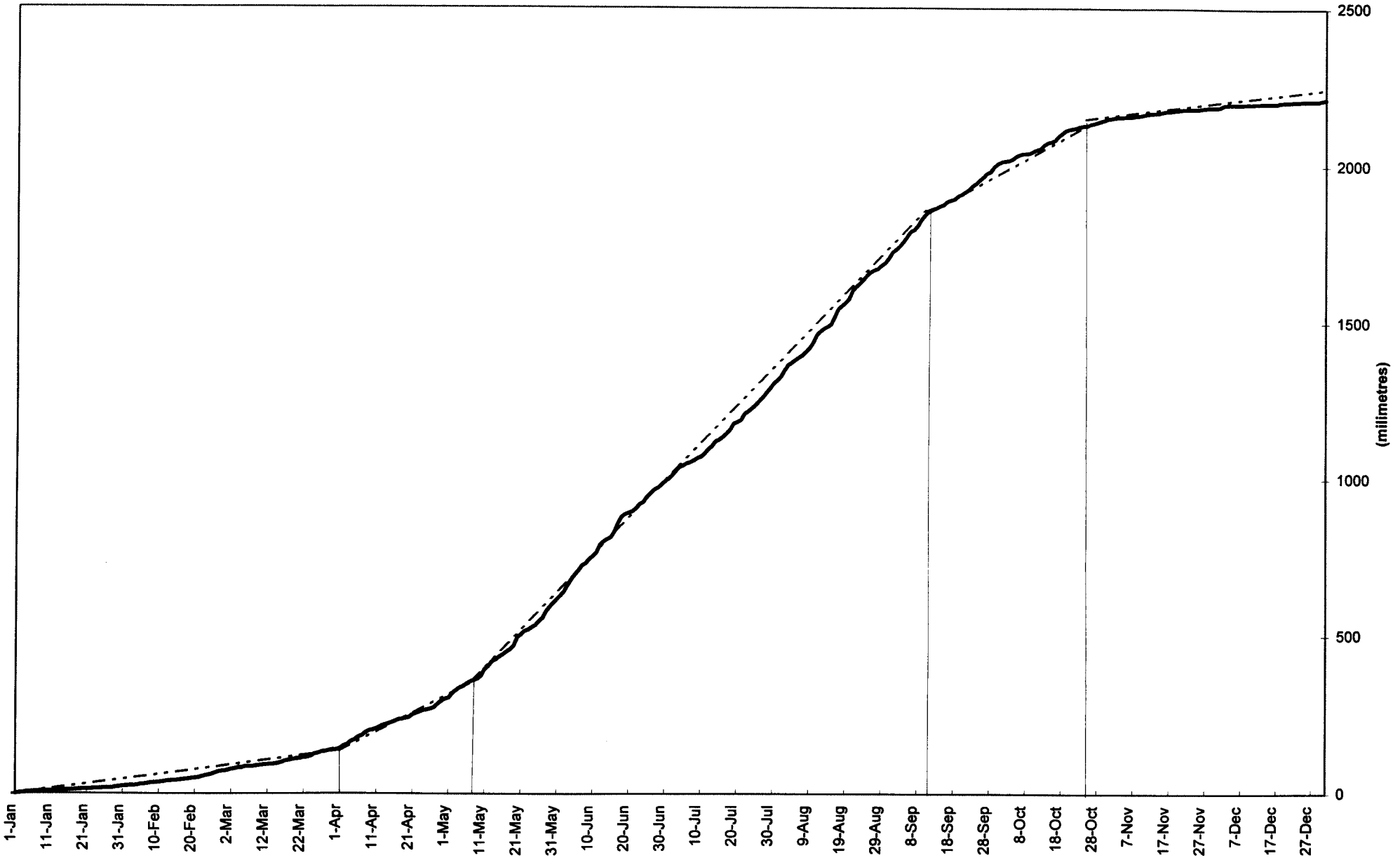



**Figure 15. Accumulated mean daily rainfall for the Royal Observatory**

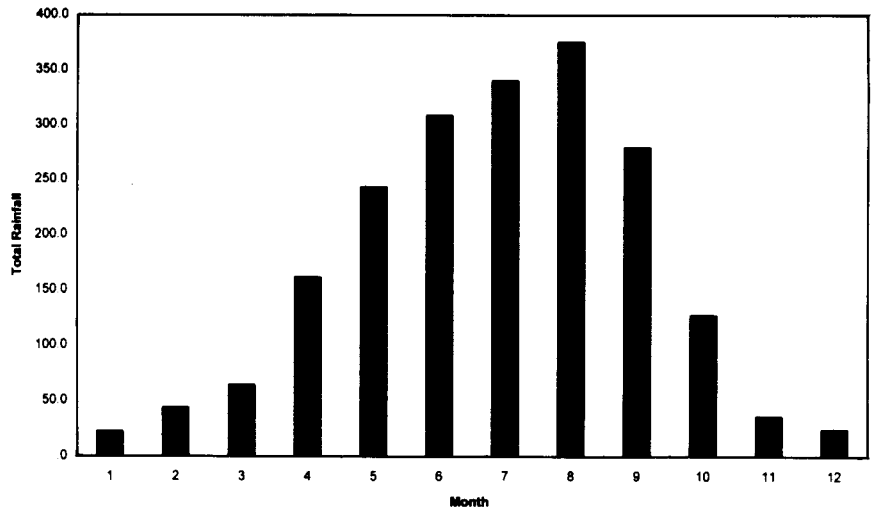



Figure 16. Mean monthly rainfall for Ta Kwu Ling Pig Breeding Centre

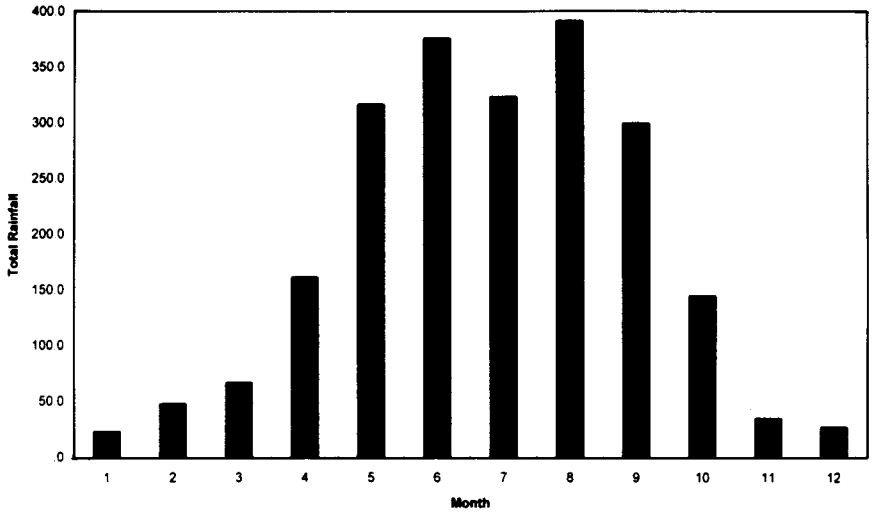



Figure 17. Mean monthly rainfall for the Royal Observatory

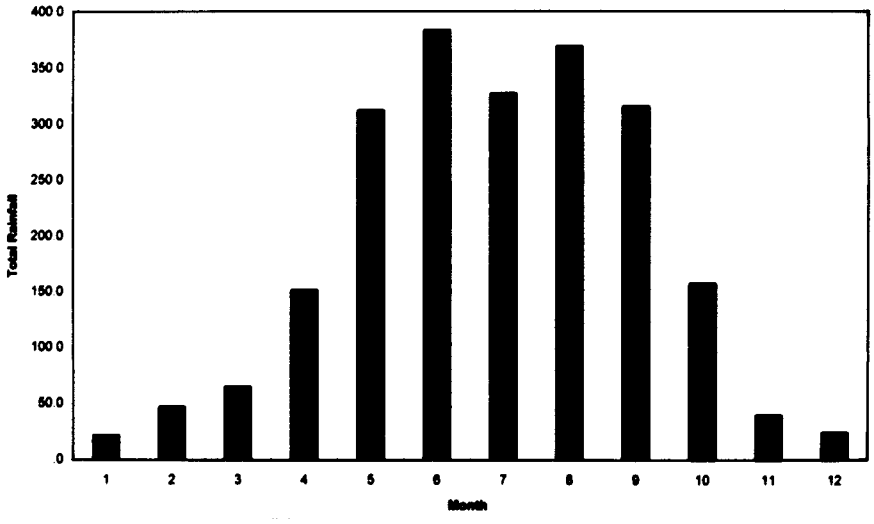



Figure 18. Mean monthly rainfall for Happy Valley Race Course

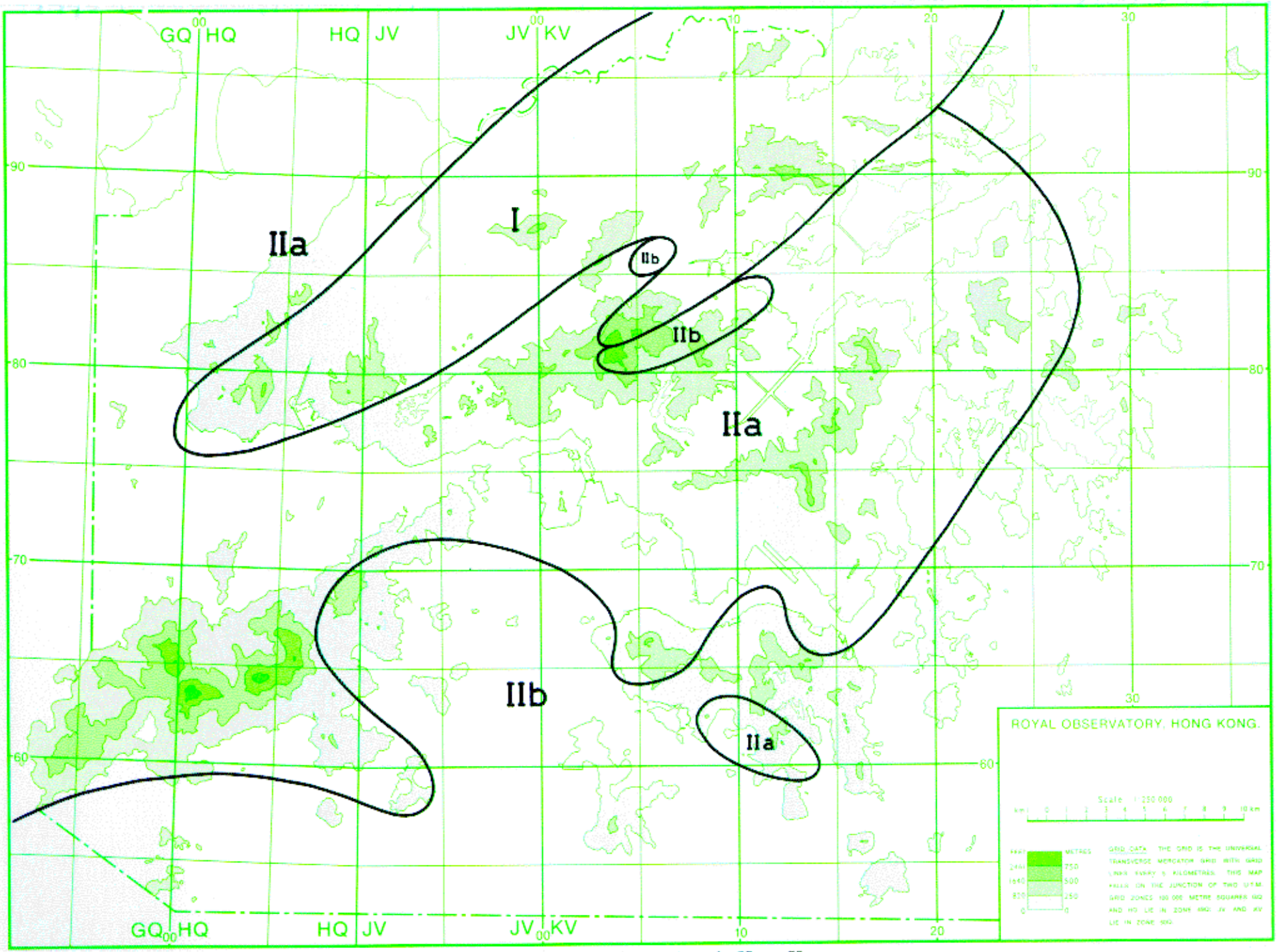



Figure 19. Rainfall regions in Hong Kong

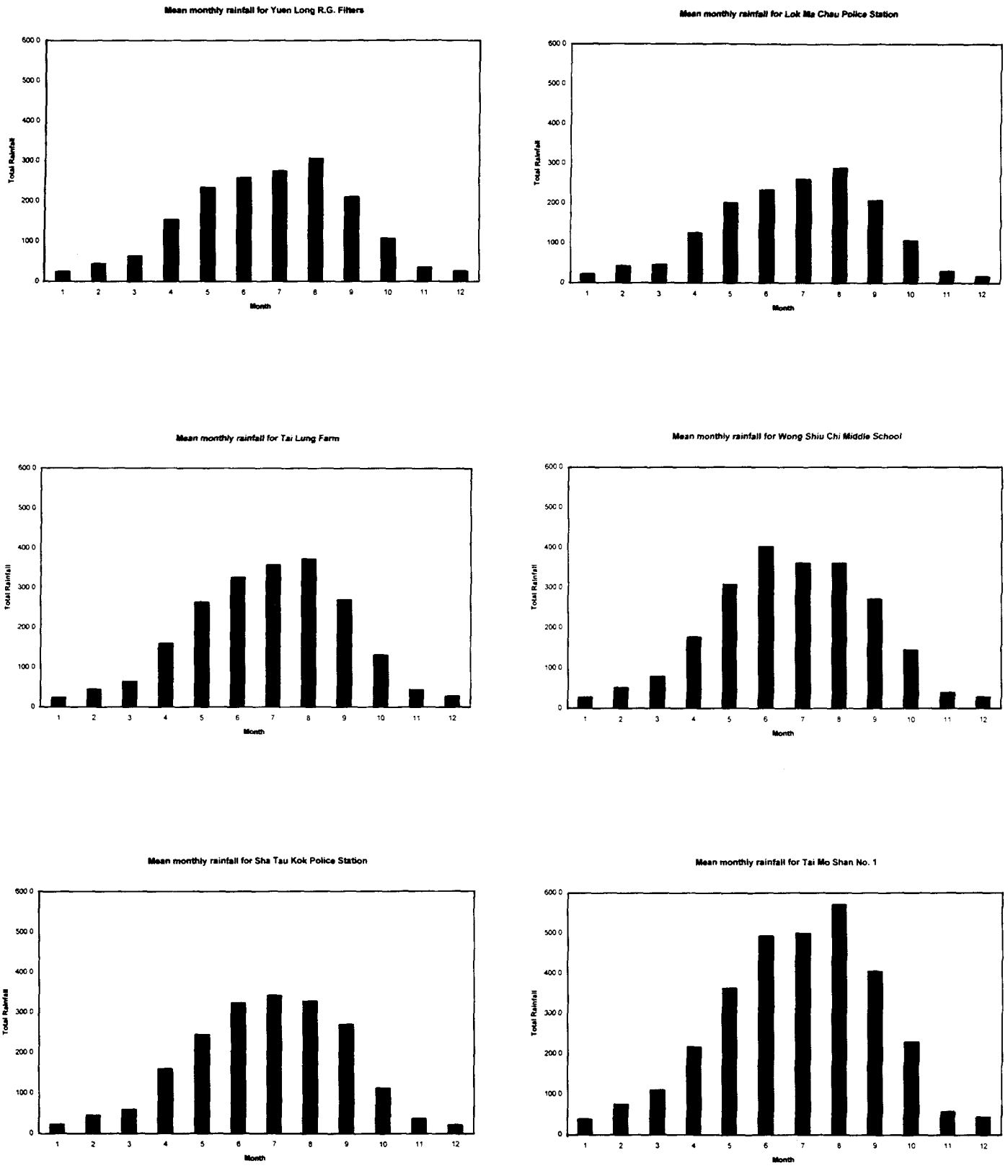
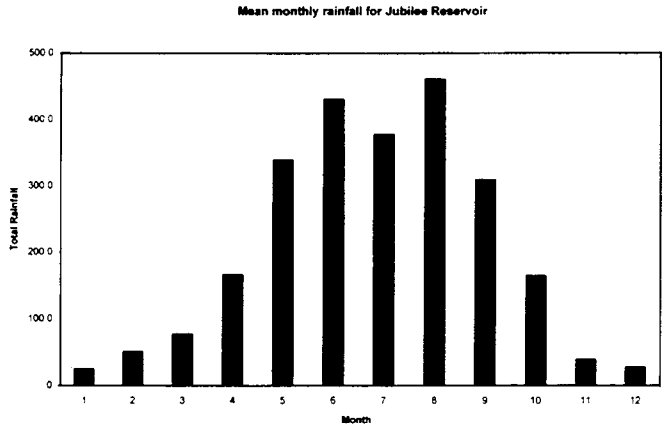
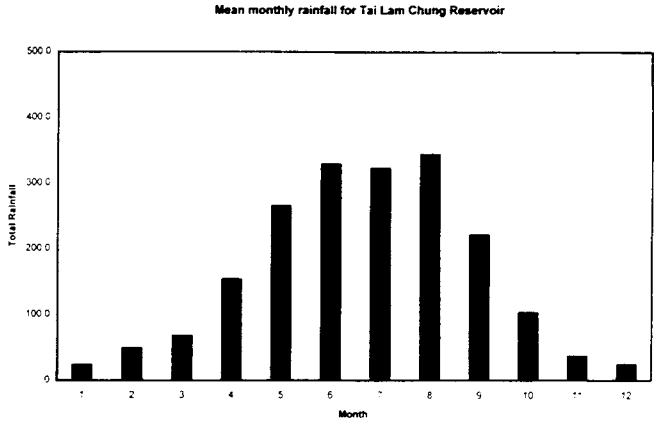
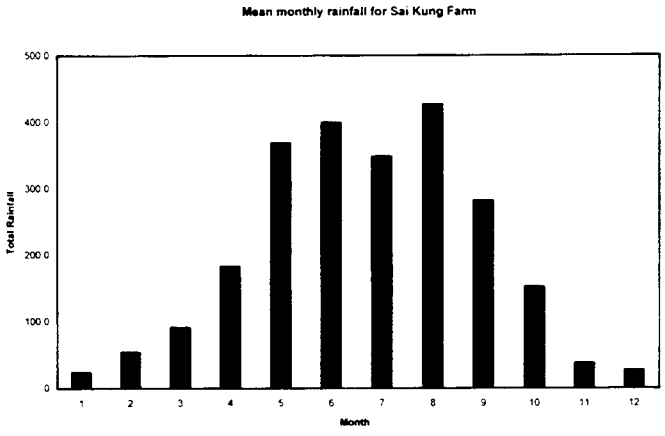
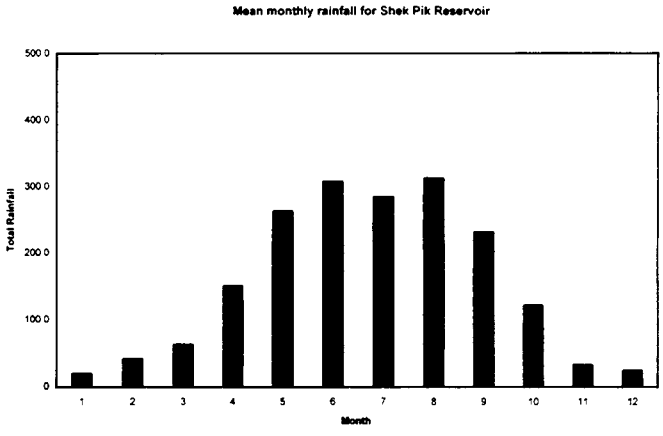


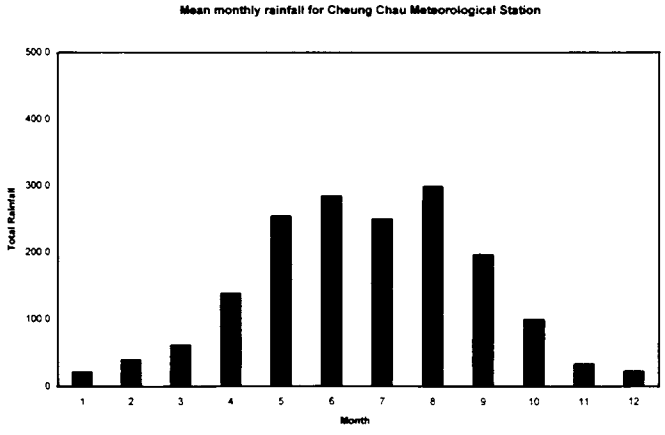

Figure 20. Mean monthly rainfall for selected stations of Type I



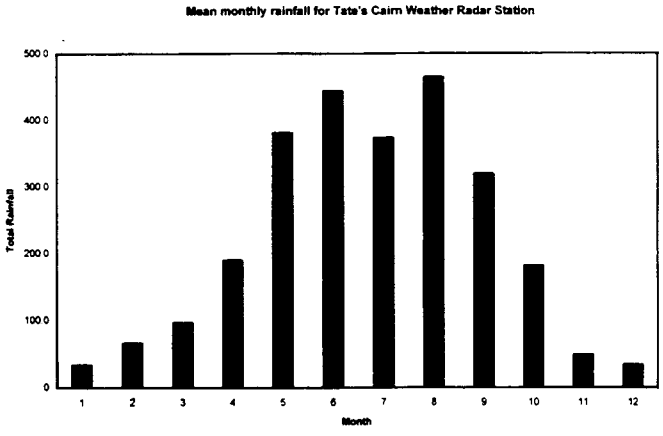
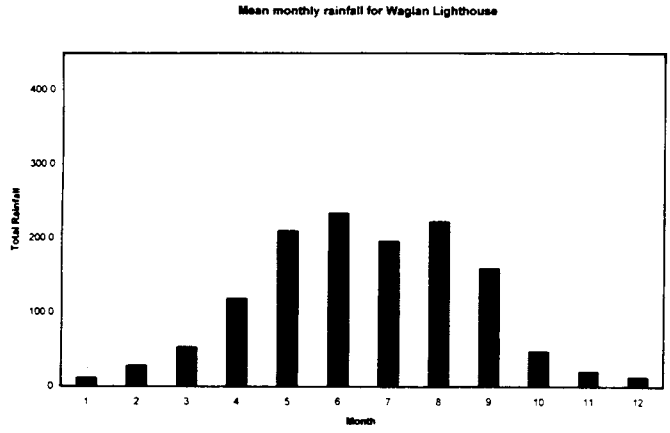
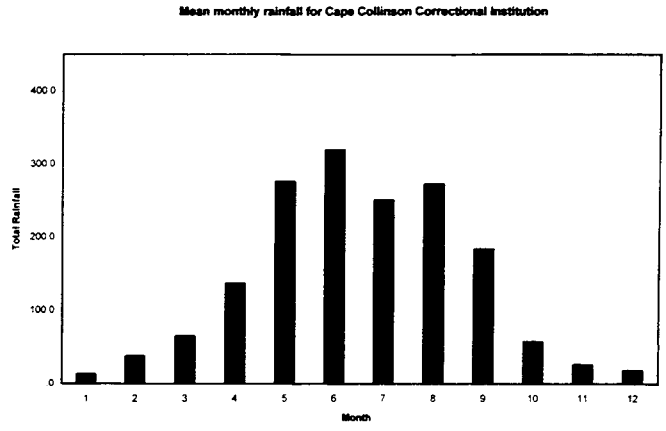
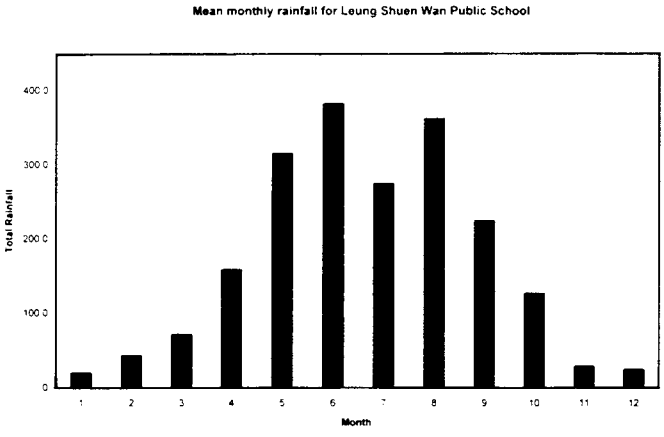
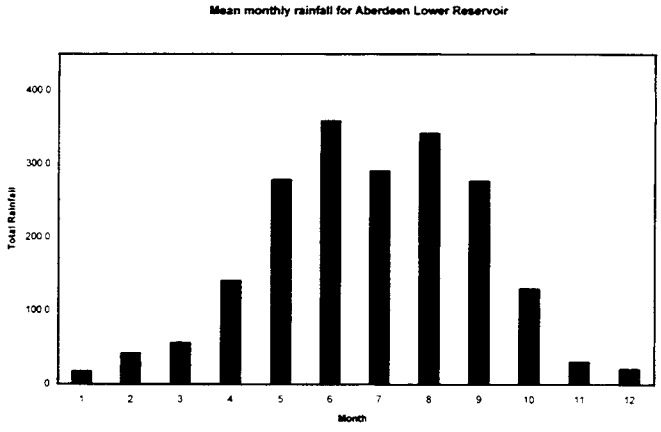



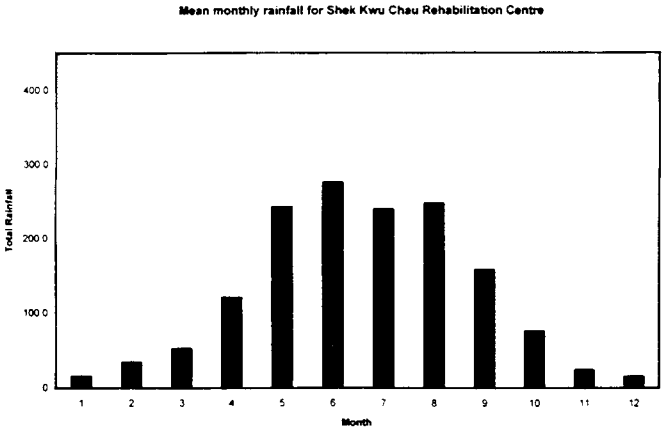

Figure 21. Mean monthly rainfall for selected stations of Type IIa



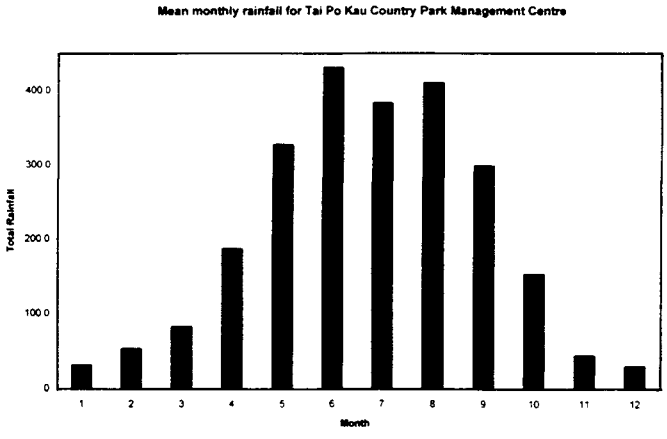




Figure 22. Mean monthly rainfall for selected stations of Type IIb