THE CLIMATE OF GREAT BRITAIN

LONDON

Climatological Memorandum 135

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The front cover shows a view of England and Wales from the satellite Tiros N taken at 1518 GMT on Wednesday 2 April 1980 — photograph by courtesy of the Department of Electrical Engineering and Electronics, University of Dundee.

An anticyclone was positioned to the south-west of the British Isles and a showery north-westerly airstream covered Britain. The cloud 'streets' of cumulus cloud are clearly seen, with larger cumulonimbus clouds in places. The London area enjoyed a day of long sunny periods, over 10 hours, with maximum afternoon temperatures of 13°C. Scattered showers and isolated thunderstorms occurred during the early evening.

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INTRODUCTION

This memorandum is one of a series which will cover the whole of Great Britain and seeks to present the main features of the climate of the area in a form suitable for use in schools and by members of the general public.

There is an Introduction to the series (Climatological Memorandum 113) which explains how the various weather elements are measured and defines some of the more common terms.

Industrial and commercial interests who are concerned with meteorological information for planning and design will probably require more complex analyses of the available data, and details of the services offered by the Meteorological Office to meet those needs are given on page 16.

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Met O 3 (Climatological Services)

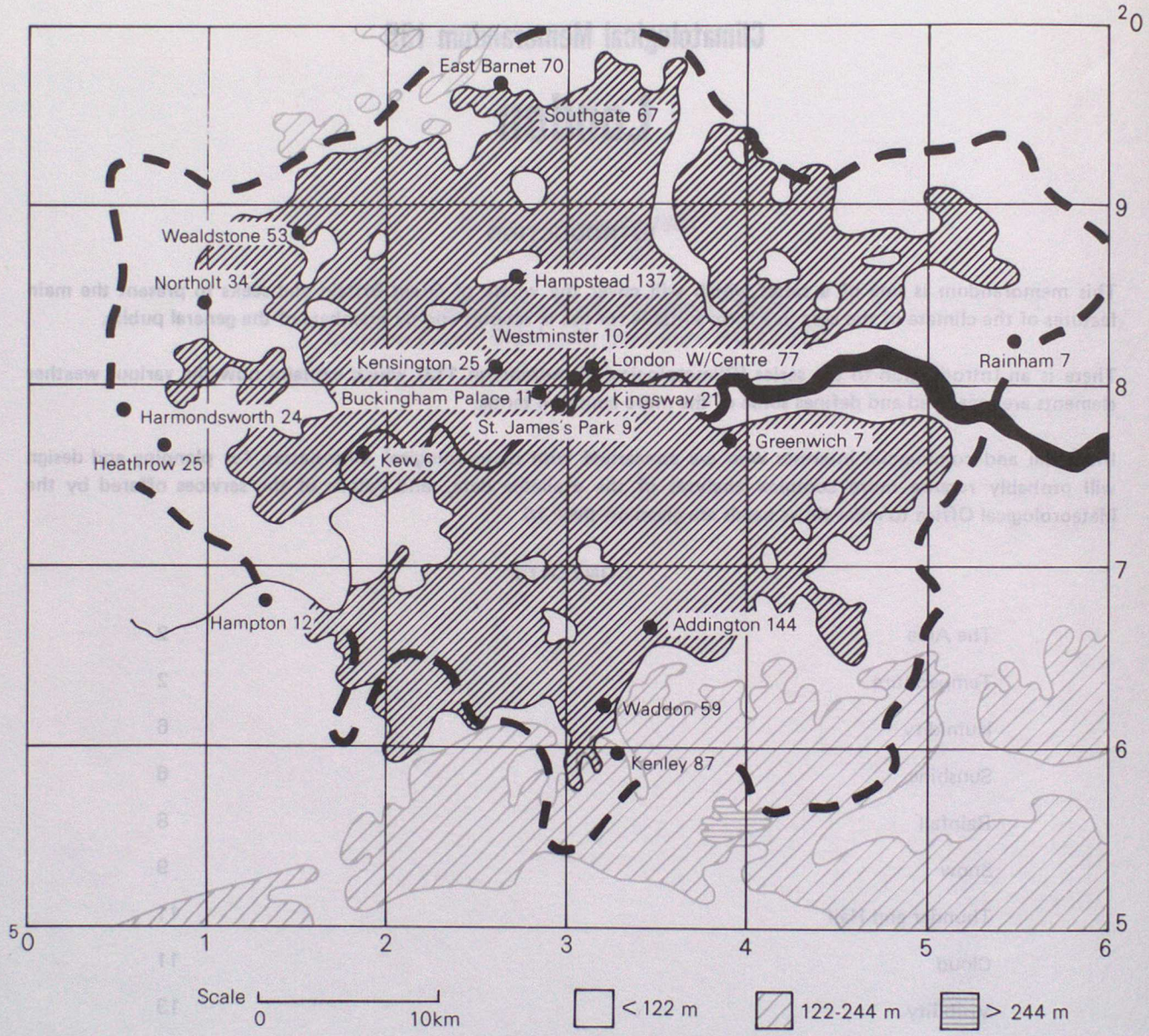
July 1987

THE AREA

This memorandum describes the main features of the climate of Greater London. The area lies in a geological basin between the North Downs and the eastward extension of the Chiltern Hills. Much of the area consists of the flood plain and old terraces of the river Thames, each of which, though varying in elevation, is level in character. Most of the land is well below 122 metres though it does rise to 145 metres in the Addington Hills and to 137 metres at Hampstead. As well as being the capital city of England it contains the Port of London, the chief port, and Heathrow Airport, the main airport in the country. It is a communications centre for road and rail transport. Service industries are the main employers.

The map below shows the topography of the area and the locations, with altitude, mentioned in the text.

Topography of Greater London and locations and altitudes (in metres) of the stations. Co-ordinates are national grid references



TEMPERATURE

The mean annual temperature in the London area varies from about 10°C to 11°C with values being slightly lower in the suburban areas. Over the British Isles the mean annual temperature ranges from about 7°C in the Shetlands to over 11°C in the extreme south-west of England and the Channel Islands.

Temperature shows both a seasonal and a diurnal variation. January is on average the coldest month in the London area with the mean minimum temperature varying from just below 1°C to over 3°C the lower values occurring in the suburban areas. This compares with minus 1°C in parts of Tayside and Grampian to over 5.5°C in the Isles of Scilly. The minimum temperature usually occurs around sunrise. Extreme minimum temperatures normally occur in January although the lowest temperature recorded this century in the London area was −17.4°C at Northolt on 13 December 1981.

July is the warmest month and the highest mean maximum temperature in Great Britain of around 22.5°C occurs in central London; the lowest of around 15°C occurs in the Shetlands. The maximum temperature usually occurs two or three hours after mid-day. Extreme maximum temperatures occur in July or August and the highest temperature recorded in the London area this century was 35.9°C on 9 August 1911 and 19 August 1932, at a number of locations. A temperature of 100°F (37.8°C) was recorded on the same day in 1911 at Greenwich but in a non-standard thermometer screen.

The variation of mean maximum and mean minimum temperatures together with the extreme temperatures recorded at four locations in the region is shown in figure 1. The four pairs of curves are very similar but there is more variation in the extremes which reflects the differing topography of the locations as well as the period over which the data have been recorded.

Figure 1 Annual variation of maximum and minimum temperature over the period 1941–70 with extreme temperatures for the periods stated

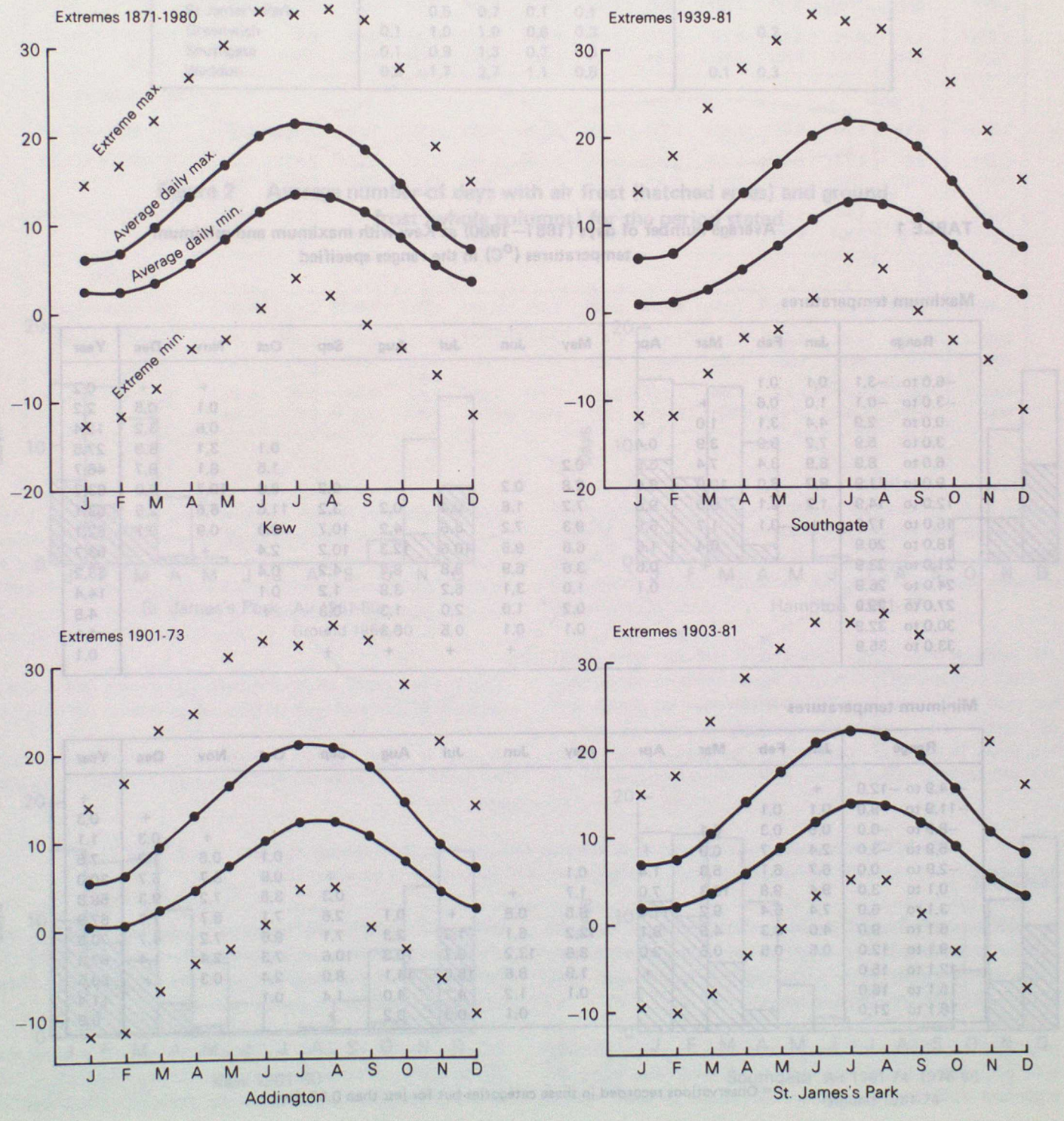


Table 1 gives the average number of days each month of maximum and minimum temperatures at Kew in specified ranges. The most striking feature of the table is the wide range of both maximum and minimum temperatures at any time of year. From the table it can be seen for example that at Kew the temperature reaches or exceeds 30°C on about one day each year, but fails to rise above freezing-point on about five days every two years.

Table 2 compares the average number of days of high and low temperatures at five locations in the London area. St. James's Park has the most occasions of high temperature values and the least occasions of low temperature values because of its central position. Hampstead has the least number of days with high temperatures because of its altitude and Waddon has the most occurrences of low temperatures because of its sheltered location.

The average number of days of air frost in the London area shows a general increase from the centre, 15 to 25 days, to the suburbs with 40 to 50 or more. Ground frosts occur on average on 70 to 95 days but with no obvious pattern, local topography being the most significant factor.

Figure 2 shows the frequency of air frost and ground frost at four locations in the area. This shows that the summer months are free of air frost and virtually free of ground frost as well. There are great variations from year to year in the number of days of frost, for example, in the period 1961–80 the number of days of air frost at the London Weather Centre varied from 2 in 1974 to 53 in 1963.

TABLE 1 **Average number of days (1881–1980) at Kew with maximum and minimum temperatures (°C) in the ranges specified**

Maximum temperatures

Range	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
−6.0 to −3.1	0.1	0.1									+	+	0.2
−3.0 to −0.1	1.0	0.6	+								0.1	0.5	2.2
0.0 to 2.9	4.4	3.1	1.0	+							0.6	3.2	12.4
3.0 to 5.9	7.2	5.9	3.9	0.4						0.1	3.1	6.9	27.5
6.0 to 8.9	8.9	8.4	7.4	3.5	0.2					1.5	8.1	8.7	46.7
9.0 to 11.9	8.2	8.0	10.0	8.6	2.8	0.2			0.2	5.9	10.7	9.0	63.7
12.0 to 14.9	1.2	2.1	6.5	9.8	7.2	1.8	0.4	0.2	3.2	11.6	6.6	2.6	53.1
15.0 to 17.9	+	0.1	1.7	5.5	9.3	7.2	3.5	4.2	10.7	8.9	0.9	0.1	52.1
18.0 to 20.9			0.4	1.6	6.6	9.5	10.6	12.3	10.2	2.4	+		53.7
21.0 to 23.9			+	0.6	3.6	6.9	8.8	8.7	4.2	0.4			33.2
24.0 to 26.9				0.1	1.0	3.1	5.2	3.8	1.2	0.1			14.4
27.0 to 29.9					0.2	1.0	2.0	1.3	0.3	+			4.8
30.0 to 32.9					0.1	0.1	0.5	0.3	+				1.1
33.0 to 35.9						+	+	+	+				0.1

Minimum temperatures

Range	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
−14.9 to −12.0	+												+
−11.9 to −9.0	0.1	0.1										+	0.3
−8.9 to −6.0	0.5	0.3	0.1								+	0.3	1.1
−5.9 to −3.0	2.4	1.7	0.9	+						0.1	0.6	1.9	7.5
−2.9 to 0.0	6.7	6.1	5.3	1.4	0.1				+	0.9	3.7	5.7	30.0
0.1 to 3.0	9.4	9.8	10.3	7.0	1.7	+			0.3	3.5	7.2	9.3	58.8
3.1 ro 6.0	7.4	6.4	9.2	11.5	6.5	0.8	+	0.1	2.6	7.1	8.7	7.7	67.9
6.1 to 9.0	4.0	3.3	4.5	8.1	12.2	6.1	1.3	2.3	7.1	9.6	7.2	4.7	70.5
9.1 to 12.0	0.5	0.5	0.6	2.0	8.6	13.2	9.7	10.3	10.6	7.3	2.4	1.4	67.3
12.1 to 15.0				+	1.9	8.6	15.0	14.1	8.0	2.4	0.3	+	50.5
15.1 to 18.0					0.1	1.2	4.7	4.0	1.4	0.1			11.4
18.1 to 21.0						0.1	0.3	0.2	+				0.5

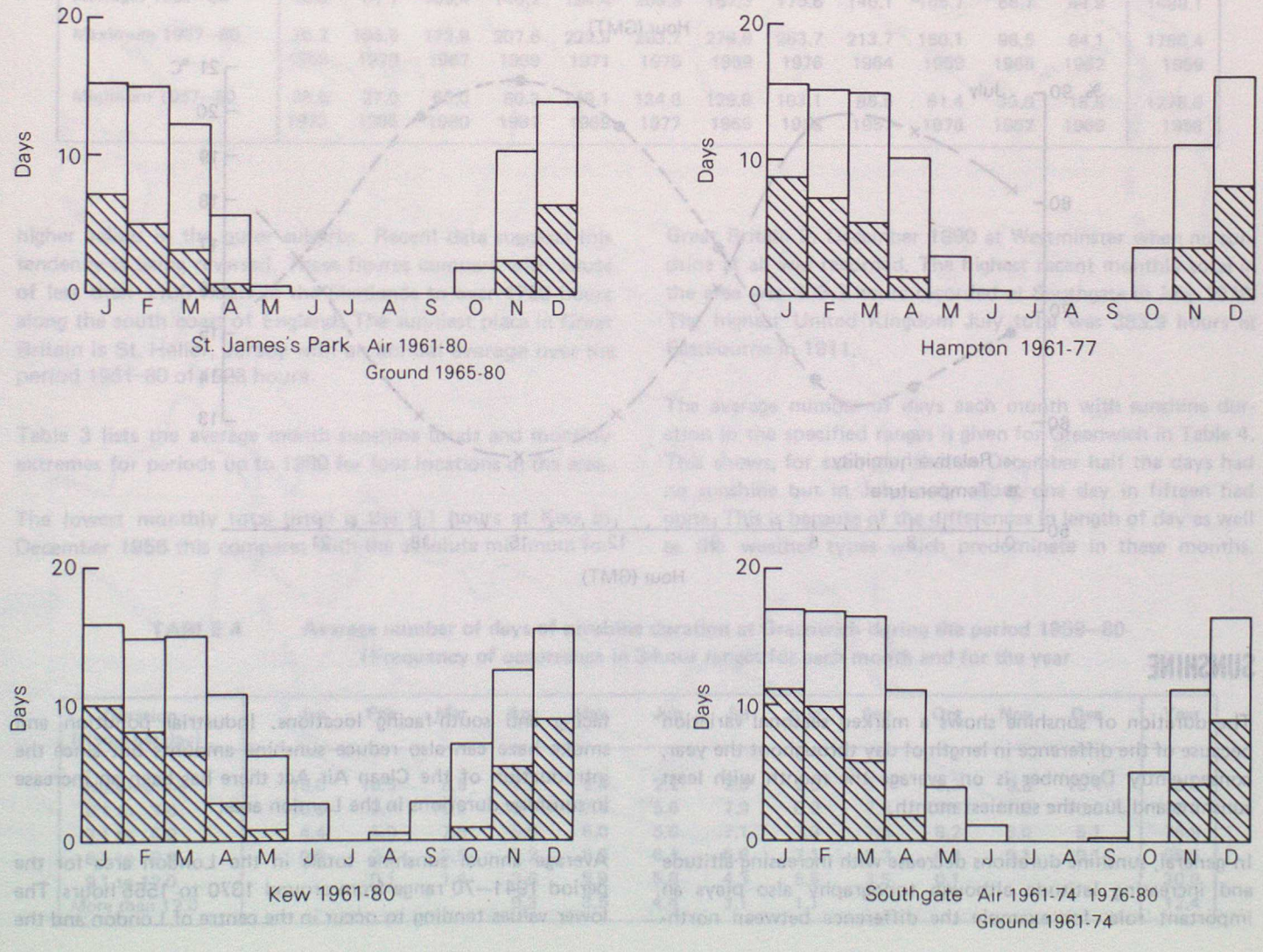
+ = Observations recorded in these categories but for less than 0.05 days

TABLE 2 Average number of days (1961–80) with maximum and minimum temperatures exceeding certain limits at selected sites in the London area

Maximum temperature	25.0 °C or more						30.0 °C or more			
	May	Jun	Jul	Aug	Sep	Oct	Jun	Jul	Aug	Sep
Hampstead	0.6	2.4	4.3	2.8	0.5	0.1	0.3	0.6	0.3	
St James's Park	0.7	3.9	6.3	4.1	0.9		0.5	0.7	0.5	
Greenwich	0.5	3.2	5.5	3.5	0.9	0.1	0.3	0.6	0.3	0.1
Southgate	0.5	2.9	5.3	3.8	0.9		0.4	0.6	0.3	
Waddon	0.5	3.2	4.4	3.6	0.9		0.3	0.5	0.4	

Minimum temperature	Less than −5.0 °C					Less than −10.0 °C	
	Nov	Dec	Jan	Feb	Mar	Dec	Jan
Hampstead		0.9	2.0	0.7	0.4	0.1	0.1
St James's Park		0.5	0.7	0.1	0.1		
Greenwich	0.1	1.0	1.9	0.6	0.3		0.2
Southgate	0.1	0.9	1.3	0.7	0.3		
Waddon	0.5	1.7	2.7	1.1	0.5	0.1	0.3

Figure 2 Average number of days with air frost (hatched areas) and ground frost (whole columns) for the period stated



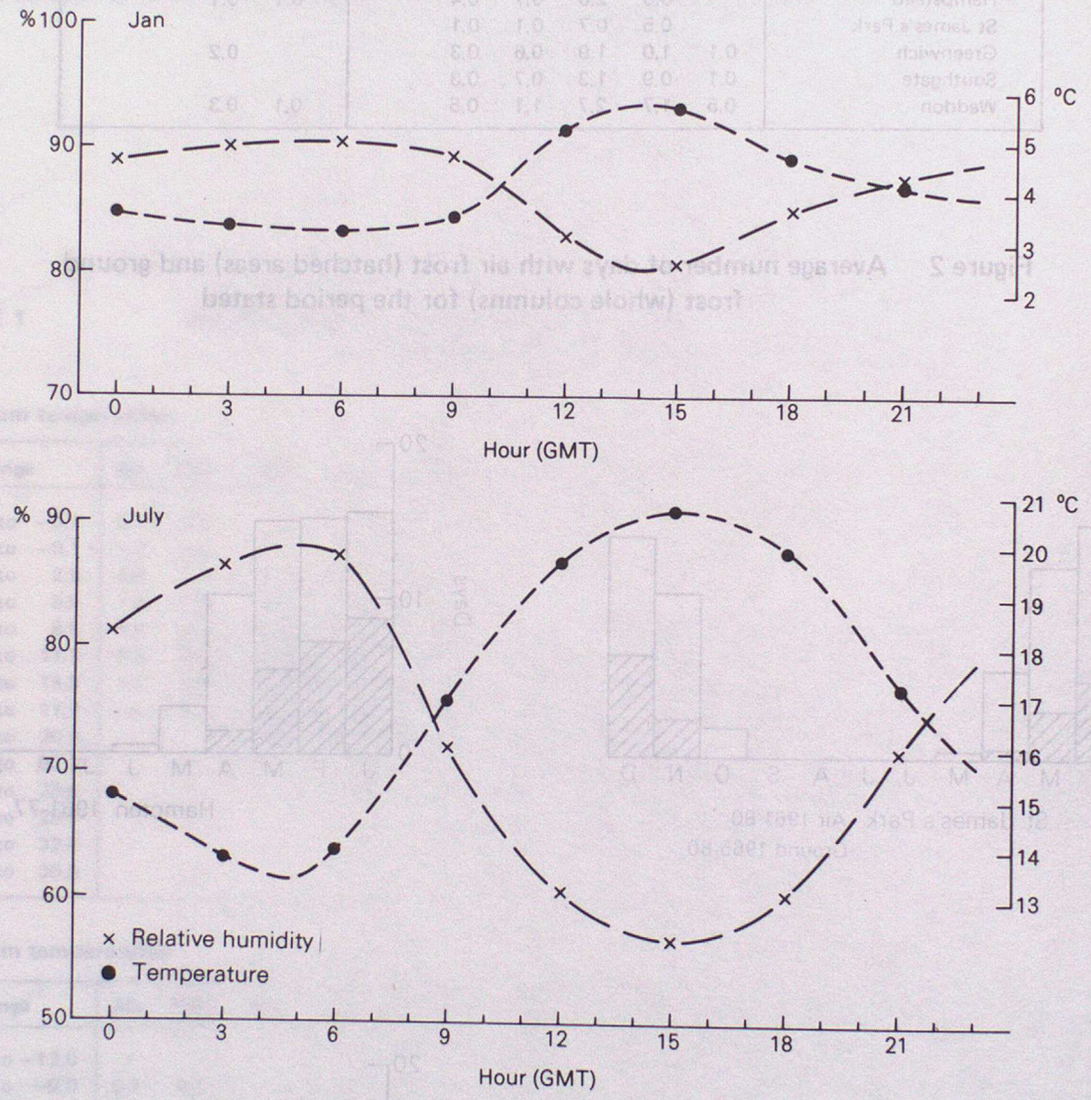
HUMIDITY

Relative humidity is a measure of the amount of water vapour in the air compared with the maximum amount of water vapour contained by the air at that temperature expressed as a percentage. If the amount of water vapour in the air remains constant then as the temperature rises (or falls) the relative humidity decreases (or increases).

Relative humidity averages around 80% over the year with higher values in the winter and at night. In the London area relative humidities exceed 95% for about 15 to 20% of the time and 100% can be reached in fog and during the persistent rain, drizzle or snow. Low relative humidities are less common, although the London Weather Centre recorded a relative humidity of 11% on 28 March 1965.

Figure 3 shows the average diurnal variation of relative humidity and temperature at Heathrow for the months of January and July, this illustrates many of the points made in the text.

Figure 3 Average diurnal variation of temperature and relative humidity at Heathrow for January and July over the period 1961–80



SUNSHINE

The duration of sunshine shows a marked seasonal variation because of the difference in length of day throughout the year, consequently December is on average the month with least sunshine and June the sunniest month.

In general, sunshine durations decrease with increasing altitude and increasing latitude although topography also plays an important role, for example the difference between north-facing and south-facing locations. Industrial pollution and smoke haze can also reduce sunshine amounts but since the introduction of the Clean Air Act there has been an increase in sunshine durations in the London area.

Average annual sunshine totals in the London area for the period 1941–70 range from around 1370 to 1555 hours. The lower values tending to occur in the centre of London and the

TABLE 3 Average monthly and annual totals of duration (hours) of bright sunshine at selected sites over the stated periods together with extreme values

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Greenwich													
Averages 1951–80	36.8	53.7	101.8	136.4	190.9	198.3	182.0	171.0	139.0	98.4	52.7	32.3	1393.5
Maximum 1931–80	54.1	102.1	170.2	209.7	242.9	276.7	279.7	250.6	196.4	142.6	90.9	54.5	1637.7
	1962	1949	1938	1942	1943	1957	1959	1947	1959	1959	1971	1973	1959
Minimum 1931–80	15.5	16.5	52.8	76.9	107.2	126.7	111.0	108.8	61.4	61.8	18.1	11.2	1140.8
	1935	1947	1947	1941	1932	1977	1965	1968	1945	1976	1932	1950	1937
Kew													
Averages 1951–80	50.5	65.1	114.9	152.1	205.6	212.2	198.8	184.6	151.3	108.7	65.9	46.2	1555.8
Maximum 1901–80	82.4	109.6	183.0	239.5	314.6	302.0	333.7	278.5	224.0	159.6	103.3	68.3	1852.3
	1952	1970	1907	1909	1909	1975	1911	1947	1911	1959	1971	1962	1959
Minimum 1901–80	20.4	18.9	59.0	78.9	114.2	104.5	105.1	108.6	63.8	51.6	26.2	9.1	1265.1
	1912	1947	1916	1920	1932	1909	1913	1912	1945	1915	1932	1956	1931
London Weather Centre													
Averages 1958–80	46.0	60.9	108.5	136.5	196.4	207.7	188.4	177.9	149.4	110.0	64.4	44.6	1490.7
Maximum 1958–80	73.3	104.6	173.9	196.9	235.7	287.5	275.0	258.4	211.6	154.8	107.1	63.9	1762.5
	1980	1970	1967	1969	1971	1975	1976	1976	1959	1971	1971	1962	1976
Minimum 1958–80	29.4	30.3	58.7	88.7	142.5	135.9	118.8	110.6	118.5	62.1	31.7	18.8	1213.8
	1964	1966	1960	1961	1962	1958	1962	1958	1969	1976	1962	1969	1958
Heathrow													
Averages 1957–80	48.3	61.7	109.4	140.2	194.4	209.8	187.3	175.6	145.1	105.7	65.7	44.9	1488.1
Maximum 1957–80	76.2	105.5	172.9	207.6	232.9	293.7	276.9	263.7	213.7	150.1	96.5	64.1	1786.4
	1959	1970	1967	1969	1971	1975	1959	1976	1964	1959	1965	1962	1959
Minimum 1957–80	28.0	27.0	65.0	80.3	149.1	134.8	129.9	103.1	88.5	61.4	33.6	18.5	1278.6
	1973	1966	1960	1961	1969	1977	1965	1958	1957	1976	1962	1969	1958

higher values in the outer suburbs. Recent data suggests this tendency is being reversed. These figures compare with values of less than 1100 hours in the Shetlands to over 1750 hours along the south coast of England. The sunniest place in Great Britain is St. Helier, Jersey with an annual average over the period 1951–80 of 1928 hours.

Table 3 lists the average month sunshine totals and monthly extremes for periods up to 1980 for four locations in the area.

The lowest monthly total listed is the 9.1 hours at Kew in December 1956 this compares with the absolute minimum for Great Britain in December 1890 at Westminster when no sunshine at all was recorded. The highest recent monthly total in the area was 303.3 hours recorded at Southgate in July 1976. The highest United Kingdom July total was 383.9 hours at Eastbourne in 1911.

The average number of days each month with sunshine duration in the specified ranges is given for Greenwich in Table 4. This shows, for example, that in December half the days had no sunshine but in July, only about one day in fifteen had none. This is because of the differences in length of day as well as the weather types which predominate in these months.

TABLE 4 Average number of days of sunshine duration at Greenwich during the period 1959–80 (Frequency of occurrence in 3-hour ranges for each month and for the year

Duration (Hours per day)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
No sunshine	15.0	10.5	6.5	3.9	2.4	2.2	2.0	2.5	3.1	5.3	9.8	15.4	78.6
0.1 to 3.0	10.6	9.7	10.2	9.4	7.4	5.6	7.9	6.9	7.8	10.6	11.8	10.3	108.2
3.1 to 6.0	4.4	5.0	7.5	6.6	6.0	5.6	7.1	7.9	7.5	8.2	6.0	5.1	76.8
6.1 to 9.0	0.9	2.9	5.5	6.2	5.8	6.4	6.6	7.1	8.2	6.8	2.1	0.1	58.5
9.1 to 12.0		0.1	1.4	3.6	5.9	5.8	4.3	5.5	3.5	0.1			30.0
More than 12.0				0.3	3.5	4.4	3.1	1.1					12.4

RAINFALL

The distribution of rainfall over the United Kingdom is very much influenced by topography with the largest values occurring over the more mountainous regions and the smallest values in the low-lying regions. In this text rainfall also includes snow, sleet and hail as well as the small amounts from dew, hoar-frost and rime.

The nature of rainfall varies during the year. In summer, rainfall is often of a showery nature, falling over short periods, and is normally more intense than in winter, when rainfall tends to be more frontal in character with falls occurring over longer periods. As a rough guide an average day of steady rain gives 10 to 15 millimetres and a heavy thunderstorm, lasting an hour or so, 25 to 50 millimetres. 25 millimetres of rainfall is equivalent to about 200 tonnes of water on a football pitch.

The map below shows the average rainfall over the London area. Even over a relatively small area, such as this, the influence of topography is clearly seen.

Figure 4 shows the monthly variation of rainfall for six locations in the area. These are typical of the London area with August and November the wettest months and the period February to April the driest. Over the British Isles generally December and January are the wettest months and February to April the driest.

Wide variations in monthly rainfall occur as the data for Heathrow in Table 5 show.

Average annual rainfall (mm) over the period 1941–70.
Co-ordinates are national grid references

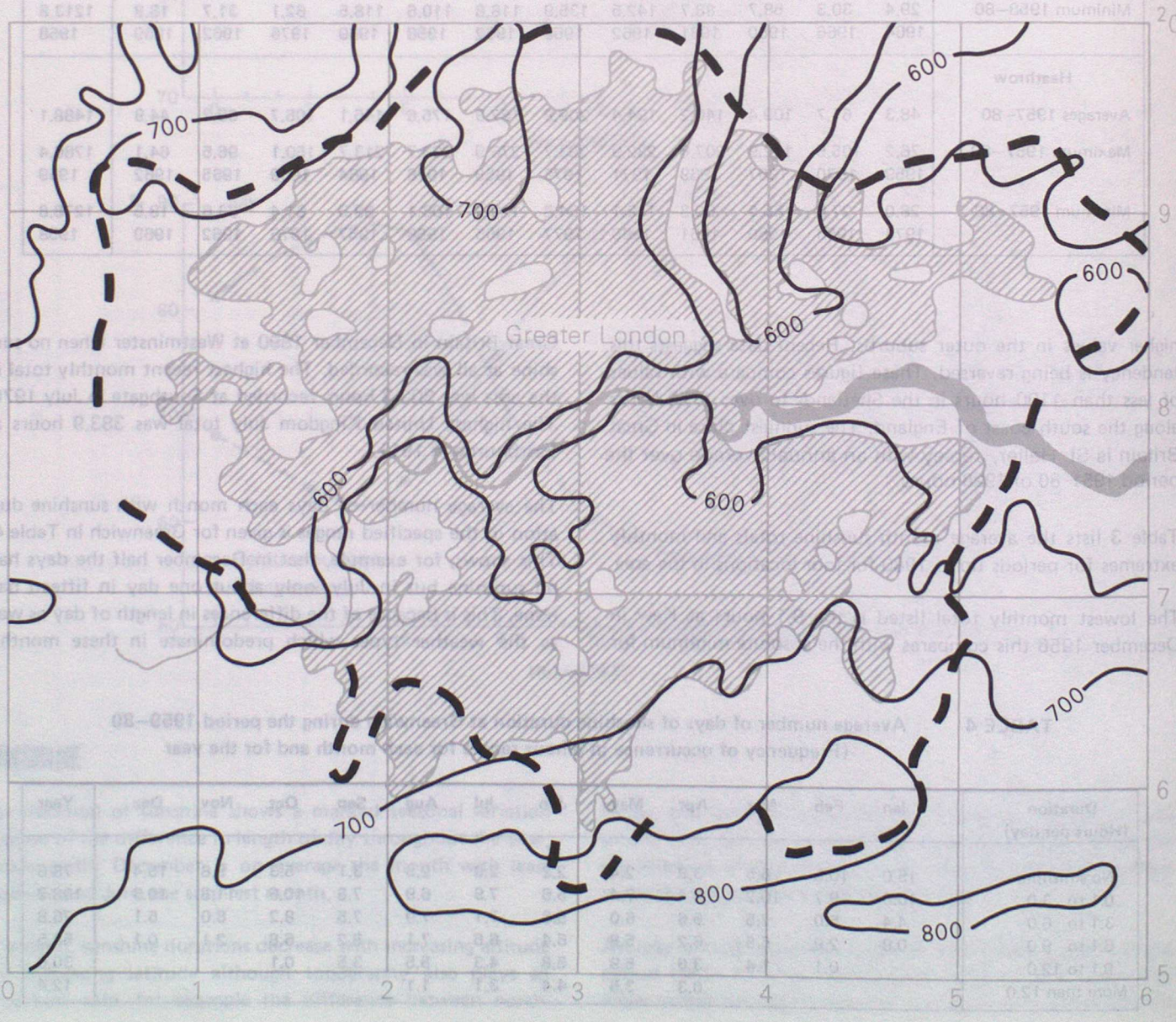


Figure 4 Average monthly rainfall (mm) over the period 1941–70

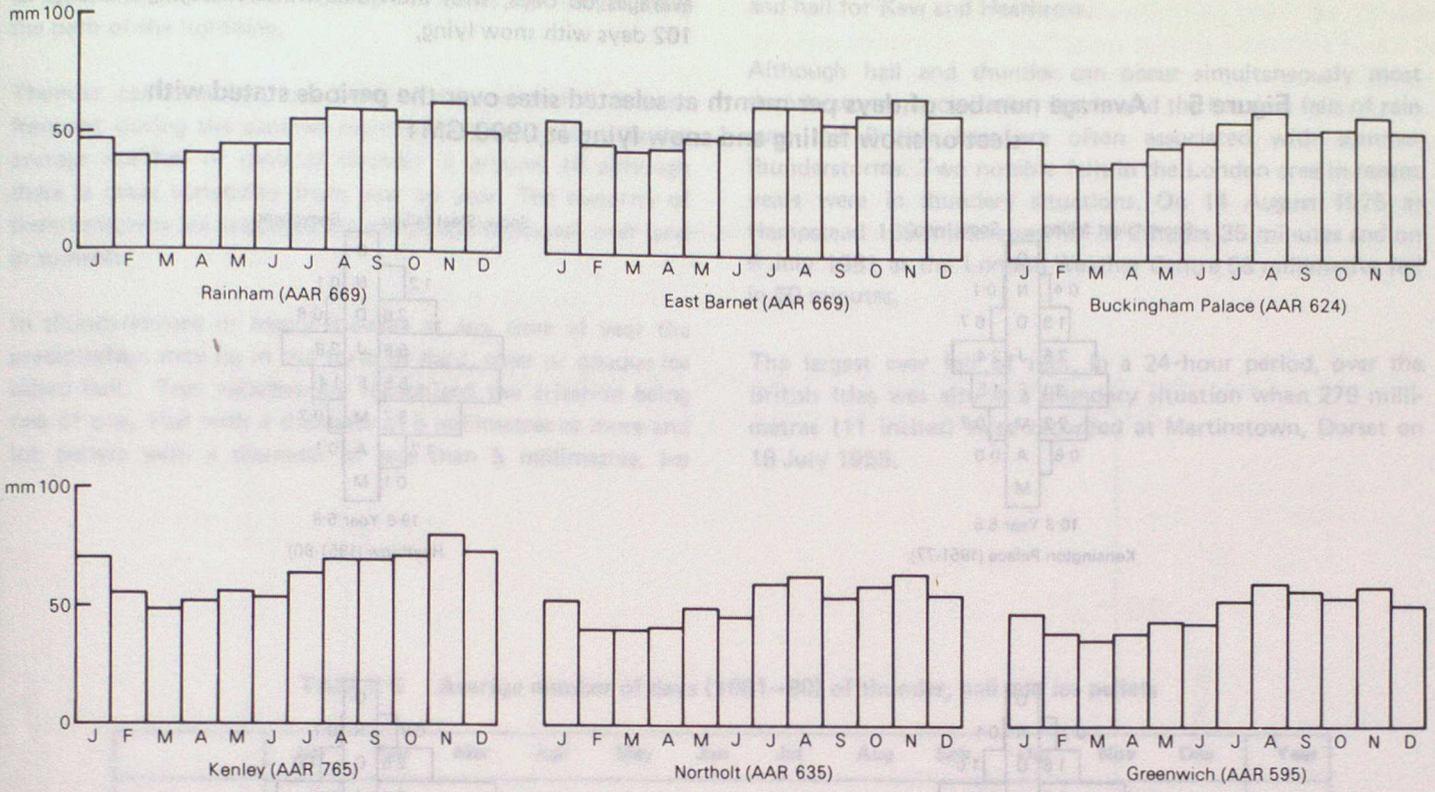


TABLE 5 Average monthly totals of rainfall at Heathrow 1949–81 together with extreme values

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average	48	38	44	41	49	49	53	57	56	58	62	55
Wettest	92.3	121.4	95.1	98.6	103.2	127.7	130.5	150.3	140.0	155.5	151.2	109.0
Driest	12.9	2.3	5.7	5.7	4.2	6.1	7.1	13.3	3.1	1.6	8.3	13.3

SNOW

The occurrence of snow is linked closely with temperature and shows an increase with increasing latitude and altitude. Snow rarely occurs in association with temperatures higher than 4°C. Falls of sleet or snow are normally confined to the months from November to April but a few falls do occur in October and May. In the London area the number of days when sleet or snow falls varies from around 10 to 20 although there are great variations in individual years. Snowfall amounts are measured as the equivalent water content and are included as such in the rainfall statistics. As a rough guide 10 centimetres of fresh snow are equivalent to 1 centimetre of rainfall.

Snow rarely lies on low ground before December or after March. The number of days with snow lying are generally less than the number of days with sleet or snow falling because in many cases when snow is falling the temperature of the air and the ground remain above freezing with the result that the snow never lies at all. There are on average 10 days or less each year with snow lying in the London area.

The number of days with sleet or snow falling and the number of days with snow lying in the London area is shown for four locations in figure 5. A day of snow lying is defined as one with snow covering at least half the ground at 0900 GMT.

Figure 6 shows the number of days with snow lying at various depths at Kew since the winter of 1946/47. This shows that the number of days has varied from nil during four winters to 45 during two winters. As a comparison Balmoral, Grampian, averages 60 days, with individual winters ranging from 14 to 102 days with snow lying,

Figure 5 Average number of days per month at selected sites over the periods stated with sleet or snow falling and snow lying at 0900 GMT

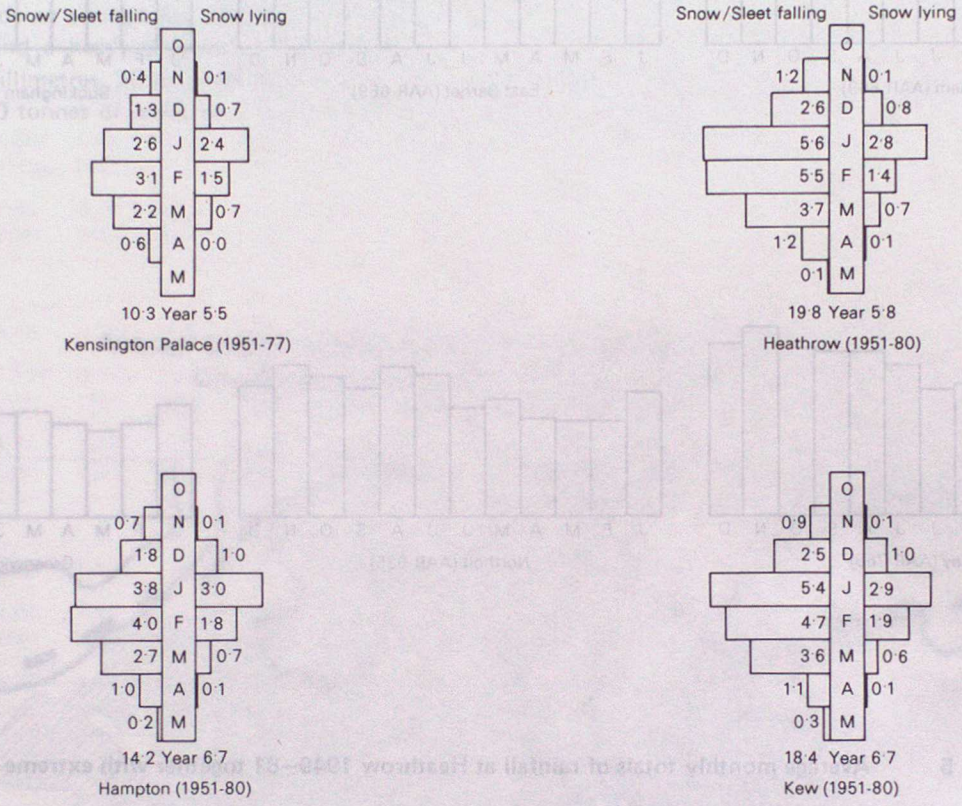
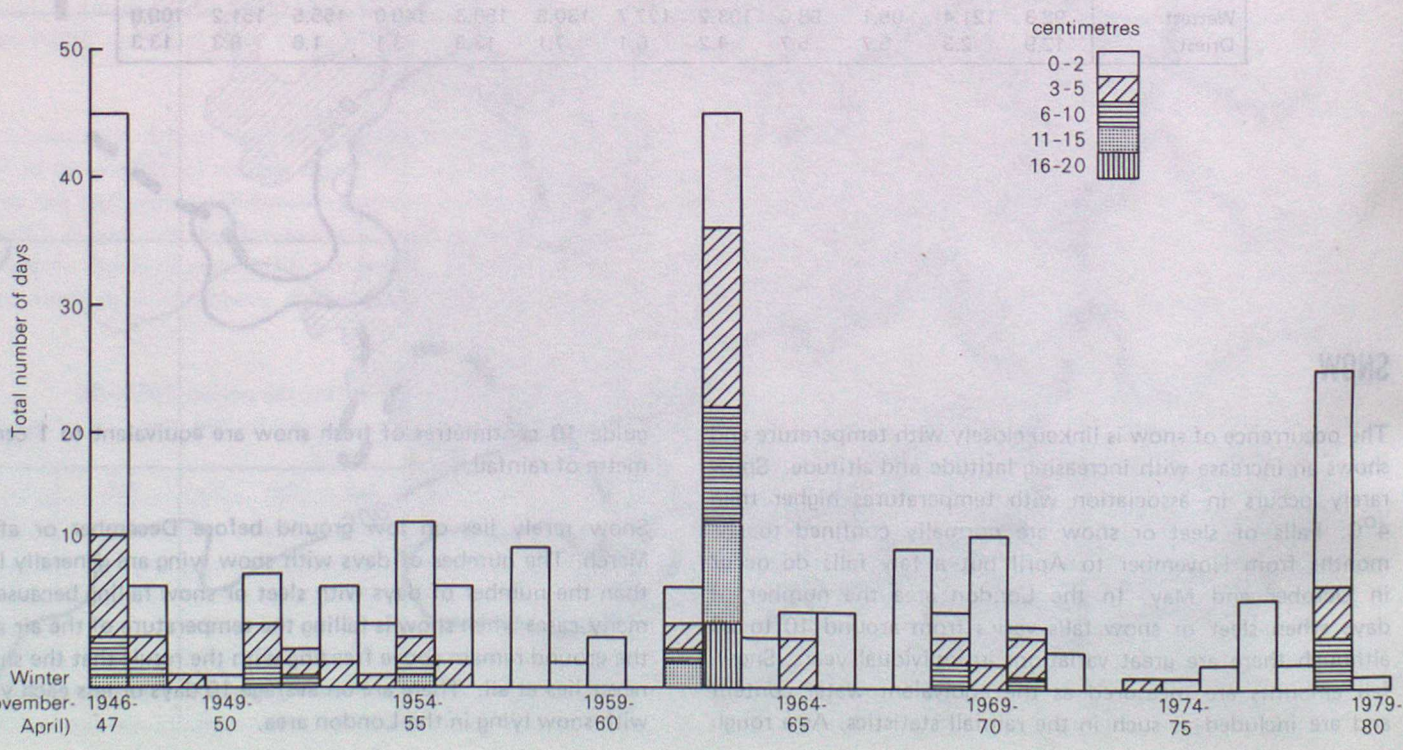


Figure 6 Number of days with total snow depth at 0900 GMT in stated ranges at Kew



THUNDER AND HAIL

Thunder and hail are phenomena associated with cumulonimbus clouds, which are clouds of great vertical extent. A typical thunder-cloud reaches 18 000 feet and in summer may occasionally exceed 40 000 feet over the British Isles. Thunder is caused by the sudden heating and expansion of air along the path of the lightning.

Thunder can occur at any time of the year but it is more frequent during the summer months. In the London area the average number of days of thunder is around 16 although there is great variability from year to year. The majority of thunderstorms are triggered by convective processes over land in summer.

In thunderstorms or heavy showers at any time of year the precipitation may be in the form of hard, clear or opaque ice called hail. Two varieties are recognized the criterion being one of size. Hail with a diameter of 5 millimetres or more and ice pellets with a diameter of less than 5 millimetres. Ice pellets are more frequent during the winter months particularly around coasts. Hail tends to have a spring maximum frequency as it generally melts before reaching the ground in summer. Table 6 gives the average number of days of thunder and hail for Kew and Heathrow.

Although hail and thunder can occur simultaneously most thunderstorm precipitation is rain and the heaviest falls of rain over the British Isles are often associated with summer thunderstorms. Two notable falls in the London area in recent years were in thundery situations. On 14 August 1975 at Hampstead 169 millimetres fell in 2 hours 35 minutes and on 9 July 1981 at the London Weather Centre 58 millimetres fell in 50 minutes.

The largest ever fall of rain, in a 24-hour period, over the British Isles was also in a thundery situation when 279 millimetres (11 inches) were recorded at Martinstown, Dorset on 18 July 1955.

TABLE 6 Average number of days (1961–80) of thunder, hail and ice pellets

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Kew													
Thunder	0.3	0.4	0.8	1.2	2.8	3.0	3.0	3.0	1.7	0.9	0.5	0.4	18.0
Hail	0.1	0.1	0.7	0.4	0.4	0.1	0.2	0.1		0.1	0.1	0.1	2.5
Ice pellets	1.1	1.1	1.0	0.9	0.3	0.2	0.1		0.1	0.1	0.5	0.9	6.2
Heathrow													
Thunder	0.3	0.1	0.7	1.3	2.4	2.3	1.9	2.1	1.1	0.8	0.5	0.4	14.1
Hail	0.1	0.3	0.7	1.1	0.5	0.3	0.1	0.1	0.1	0.1	0.2	0.1	3.7
Ice pellets	1.5	1.3	0.5	0.3	0.1						0.1	0.7	4.5

CLOUD

Clouds are composed of very small water droplets, ice, or a mixture of both. They are formed mainly as a result of cooling of the air caused by ascent in convection, forced lifting over high ground, or in large-scale upward motion associated with fronts and depressions.

Cloud amounts are estimated as the fraction, in eighths, of the sky covered by cloud, with the figures 0 and 8 representing a completely clear and cloudy sky respectively. In this section the ranges 0–2, 3–6 and 7–8 eighths will be used to approximate to clear skies, partly cloudy and cloudy respectively.

Figure 7 shows the percentage frequency for cloud amounts throughout the year at Heathrow. The values are typical of the London area and over the country as a whole the values show a similar pattern.

The percentage frequency by month and by year of cloud in the three ranges at Heathrow for the hours of daylight and darkness, is given in Table 7. These are typical of the area, being more cloudy by day than by night and more cloudy in winter than in summer.

Figure 7 Frequency of total cloud amount at Heathrow for the period 1957–76

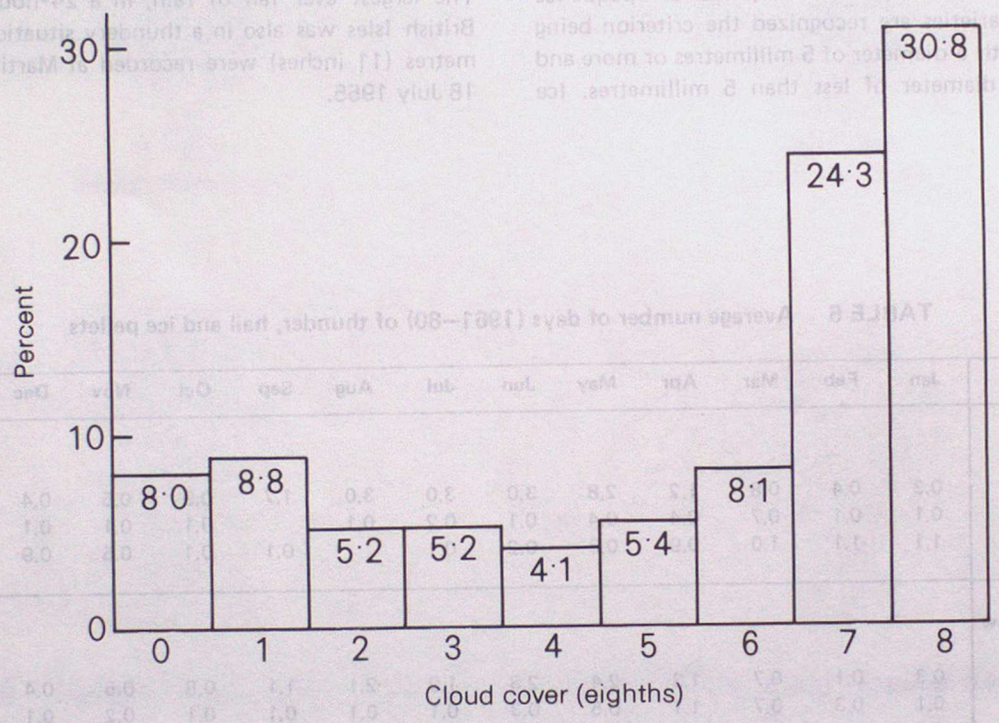


TABLE 7 Percentage frequency of hours with total cloud amount in selected ranges at Heathrow over the period 1957–76

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
						Daylight hours							
Eighths													
0–2	12.7	13.5	16.3	14.5	16.2	22.0	16.9	18.1	18.5	18.1	14.5	15.4	16.8
3–6	16.6	17.7	23.9	28.0	31.7	31.8	31.4	31.2	29.9	23.3	20.6	16.5	26.6
7–8	70.8	68.9	59.8	57.5	52.0	46.2	51.8	50.8	51.4	58.5	64.9	68.2	56.5
						Hours of darkness							
0–2	19.9	22.4	29.6	29.6	32.4	36.8	30.6	34.6	32.9	28.8	25.1	22.7	27.6
3–6	13.2	14.1	16.6	20.3	23.7	24.8	26.6	23.8	22.1	19.6	17.9	14.8	18.8
7–8	67.0	63.5	54.0	50.2	44.0	38.4	42.7	41.6	44.9	51.5	56.9	62.7	53.6

VISIBILITY

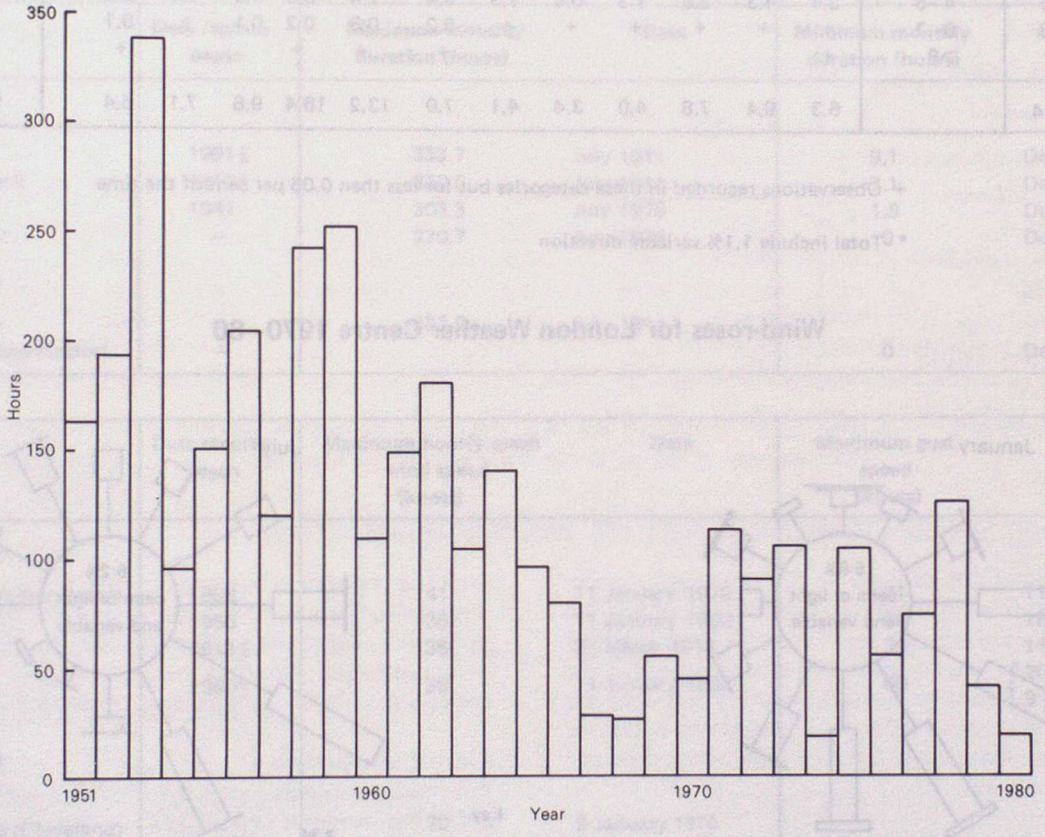
Visibility is defined as the greatest horizontal distance at which an object can be discerned with the naked eye. It is of considerable importance to the community in general because the operation of various types of transport may be disrupted or stopped altogether if the visibility falls below certain limits.

Variations in visibility occur with the different types of precipitation such as rain and snow, as well as atmospheric pollution due to smoke and dust, but the really poor visibilities are mainly due to fog.

Fog is predominantly a winter phenomenon occurring generally at night or during the early morning though it does occasionally persist all day. There are a number of factors which effect fog formation and these are discussed in the Introduction to the series.

Figure 8 gives the number of hours of thick fog, visibility below 200 metres, at Heathrow for the years 1951–80. There is a great variability in the figures ranging from 338 hours in 1953 to 18 hours in 1974 with the average for this period being 118 hours a year. The most notable fog in the London area occurred from the 5th to the 9th of December 1952; at Kingsway it lasted from midnight on the 5th to 1800 hours on the 9th and was thick from 0900 hours on the 6th to 0900 hours on the 8th. Since the introduction of the Clean Air Act the incidence of fog in the London area has decreased significantly, as figure 8 shows.

Figure 8 Number of hours each year of thick fog (visibility < 200 m) at Heathrow over the period 1951–80



WIND

The wind direction is that from which the wind blows either as a compass point or degrees clockwise from true north. Wind speeds are measured in knots, (1 knot = 1.15 mph, 1 metre per second = 1.94 knots) and are closely related to the pressure distribution. The strongest winds are associated with the passage of deep depressions across or close to the United Kingdom. The frequency of depressions is greatest during the winter months this is when the strongest winds normally occur.

Wind seldom occurs as a smooth flowing airstream and eddies give variations both in direction and speed. Winds are normally stronger by day than by night because of the increased turbulence caused by the temperature rise making the wind more gusty and average speeds higher.

A day of gale is defined as a day on which the wind speed attains a mean value of 34 knots or more over any period of ten consecutive minutes. In the London area gales occur infrequently, less than once a year on average. The most notable gale in recent years was on 11 January 1978 when the London Weather Centre recorded an hourly mean wind speed of 41 knots (strong gale) with a maximum gust of 71 knots.

Table 8 gives the percentage annual frequency of wind speeds in Beaufort force ranges against 30 degree directions of wind for the London Weather Centre for the years 1970–80. The distribution is typical of the London area. All the occasions of gale force winds occurred in the months December, January and February, although it cannot be deduced from this table.

The wind-roses for four months are shown to illustrate how the wind varies throughout the year in the area. The predominance of the south-westerly winds is evident as is the high frequency of north-easterly winds in April. The differences between the months are due to the different weather patterns which predominate at these times.

TABLE 8 Annual percentage frequencies of hourly mean wind speed and direction for London Weather Centre 1970–80

Knots	Beaufort force equivalent	30° sectors centred on 360°	030°	060°	090°	120°	150°	180°	210°	240°	270°	300°	330°	All directions
Calm	0													0.8
1–3	1	0.4	0.6	0.6	0.1	0.2	0.4	0.3	0.4	0.4	0.3	0.3	0.3	5.4*
4–10	2–3	3.8	5.0	4.9	2.6	2.7	2.8	3.4	5.5	7.5	5.2	4.5	3.4	51.4
11–21	4–5	2.4	4.3	2.8	1.3	0.8	1.3	3.4	7.4	8.6	4.3	2.7	2.0	41.2
22–33	6–7	+	+	+	+	+	+	0.2	0.3	0.2	0.1	+	0.1	1.2
≥34	≥8	+						+	+	+			+	+
Total ≥4		6.3	9.4	7.8	4.0	3.4	4.1	7.0	13.2	16.4	9.6	7.1	5.4	93.8

\+ Observations recorded in these categories but for less than 0.05 per cent of the time

* Total include 1.1% variable direction

Wind-roses for London Weather Centre 1970–80

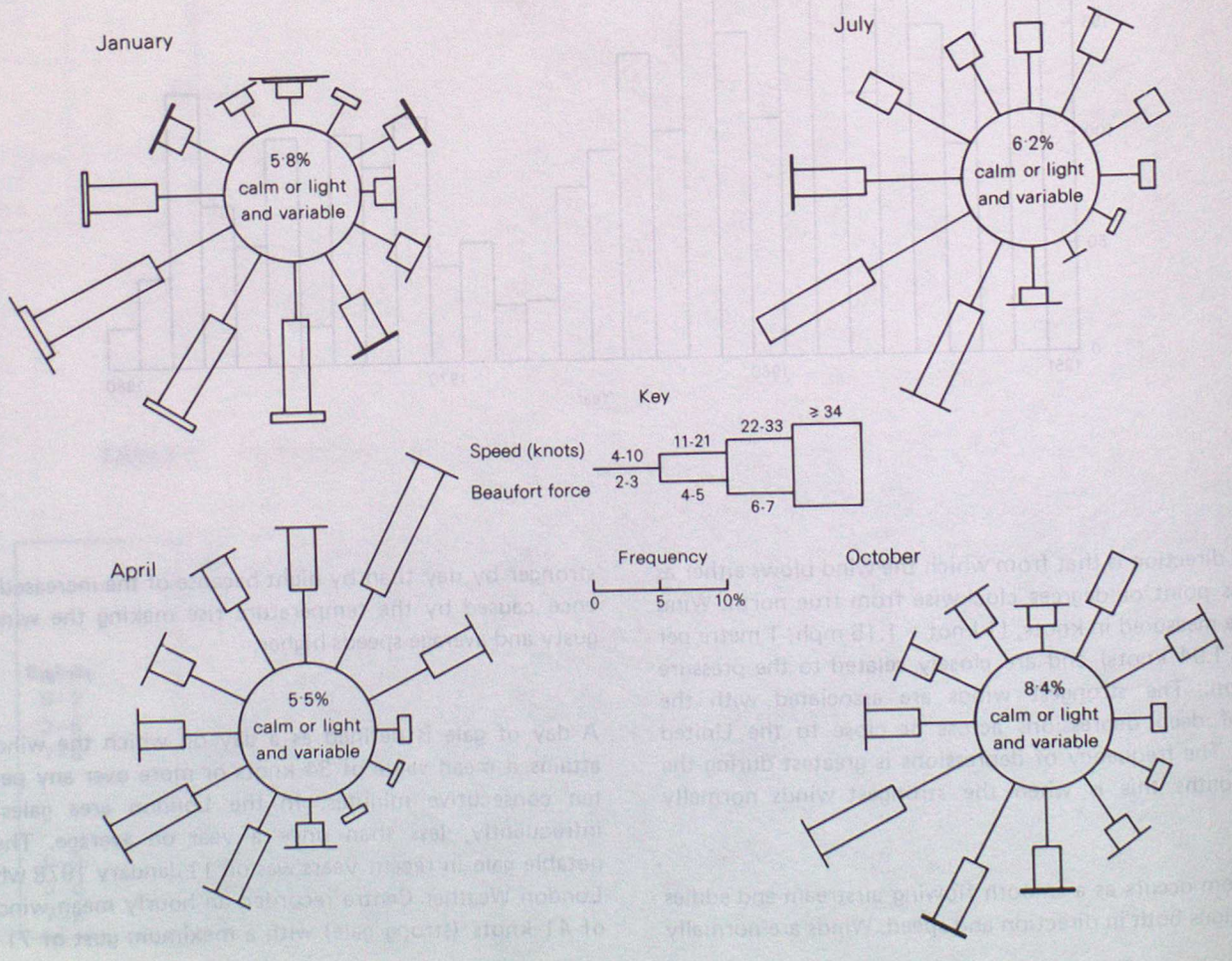


TABLE 9 Weather extremes

TEMPERATURE	Date records began	Maximum daily temperature (°C)	Date	Minimum daily temperature (°C)	Date
Greater London					
Camden Square	1901*	35.9	19 August 1932	−11.4	13 December 1920
Enfield	1911†	35.9	19 August 1932	−12.8	20 January 1940 21 January 1942
Regent's Park	1932‡	35.9	19 August 1932	−11.1	23 January 1963
Greenwich	1841	35.9	9 August 1911	−15.6	4 January 1841
Northolt	1948	34.8	27 June 1976	−17.4	13 December 1981
United Kingdom					
Raunds Epsom Canterbury	–	36.7	9 August 1911		
Braemar	–			−27.2	11 February 1895 10 January 1982

SUNSHINE	Date records began	Maximum monthly duration (hours)	Date	Minimum monthly duration (hours)	Date
Greater London					
Kew	1901§	333.7	July 1911	9.1	December 1956
Regent's Park	1910‡	330.5	July 1911	7.1	December 1934
Southgate	1941	303.3	July 1976	1.8	December 1956
Westminster	–	270.7	July 1934	0	December 1890
United Kingdom					
Eastbourne	–	383.9	July 1911		
London (Westminster)	–			0	December 1890

WIND	Date records began	Maximum hourly mean wind speed (knots)	Date	Maximum gust speed (knots)	Date
Greater London					
London Weather Centre	1965	41	11 January 1978	71	11 January 1978
Heathrow	1960	36	11 January 1962	60	18 November 1963
Kew	1913§	36	23 March 1913	78	11 December 1974
Hampton	1950¶	36	11 January 1962	60	20 December 1959 9 November 1969
United Kingdom (Low-level sites)					
South Gare (Cleveland)	–	70	2 January 1976		
Kirkwall (Orkney)	–			118	7 February 1969

RAINFALL	Date records began	Maximum daily fall (mm)	Date
Greater London			
Hampstead	1910	171	14 August 1975
Kensington	–	118	16 June 1917
Harmondsworth	1951	109	18 July 1956
United Kingdom			
Martinstown (Dorset)	–	279	18 July 1955

Records ceased: *1969 †1965 ‡1970 §1980 ¶1976

TABLE 10 Climatological data for places in the United Kingdom based on the period 1941–70 except where indicated

	Altitude (metres)	Average annual rainfall (mm)	Average daily temperatures (°C) #				Average annual duration of bright sunshine (hours)	Average annual no. of days with*	
			Minimum		Maximum				
			Jan.	July	Jan.	July		Air frost	Snow lying
England									
Abingdon (Oxfordshire)	69	605	0.3	11.6	6.3	21.6	1544	57	13
Acklington (Northumberland)	42	644	0.0	10.3	5.5	17.9	1429	60	20
Birmingham Airport (W. Midlands)	96	679	0.1	11.2	5.7	20.5	1385	62	15
London (Kensington Palace)	25	640	1.7	13.3	6.6	22.2	1384[x]	35	7
Manchester Airport (Gr. Manchester)	75	819	0.5	11.7	5.8	19.6	1334	47	10
Plymouth/Mount Batten (Devon)	27	990	3.1	12.7	8.3	19.0	1678	25	3
Shawbury (Shropshire)	72	670	0.0	11.2	6.0	20.2	1368	63	17
Southsea (Hampshire)	2	702	2.4	13.9	7.1	20.7	1748	25	6
Waddington (Lincolnshire)	68	598	0.1	11.6	5.2	20.3	1503	54	18
Wales									
Cardiff/Wales Airport (S. Glamorgan)	67	947	1.3	11.9	6.6	19.3	1571	36	8
Valley (Gwynedd)	10	871	2.5	12.0	7.5	18.1	1612	27	3
Northern Ireland									
Belfast Airport (Antrim)	68	912	0.6	10.7	6.1	18.1	1281	53	9
Scotland									
Aberdeen Airport (Grampian)	58	872	–0.9	9.6	5.0	17.5	1341	75	30
Balmoral (Grampian)	283	834	–2.8	8.1	3.7	17.4	1120[†]	116	63
Edinburgh Airport (Lothian)	35	677	–0.6	10.3	5.7	18.5	1294	66	14
Lerwick (Shetland)	82	1172	0.6	9.3	5.0	14.0	1067	53	32
Stornoway (Western Isles)	3	1094	1.3	10.1	6.4	15.7	1244	49	11
Glasgow Airport (Strathclyde)	5	991	0.1	10.8	5.8	18.6	1266	58	6

* Based on 1956–70 only.

x For Regents Park.

† For Braemar.

Referring to 24-hour (09–09 GMT) extremes. Adjustments have been made to those stations normally recording night minimum (21–09 GMT) and day maximum (09–21 GMT). See Introduction to the series.

CLIMATOLOGICAL SERVICES AVAILABLE FROM THE METEOROLOGICAL OFFICE

The Meteorological Office collects and archives regular weather reports from a national network of observing stations, consisting of both Meteorological Offices manned by professional staff and co-operating stations operated by interested organizations or individuals. All these data are subjected to close scrutiny before being archived, to ensure consistency of standards, and are then available to meet the needs of the community.

Any undertaking which is at all weather-sensitive can benefit from a prior knowledge of the climate within which it is expected to operate. The building industry can use past weather statistics to estimate likely delays on contracts, architects and civil engineers need to know the likely extremes of weather which a design must withstand, and many industrial processes are dependent on atmospheric conditions for their success. The agricultural industry uses such information for a variety of purposes, many relating to the viability of new crops and the weather-related incidence and spread of pests and diseases.

In addition to special analyses of weather data for these purposes, the Meteorological Office can supply factual statements on weather conditions for legal or insurance purposes.

Enquiries related to aspects of past weather data should be directed to the appropriate address given on the back cover or, if more convenient, initially to your local weather centre (see opposite). Charges for the supply of information depend mainly on the staff time taken to meet the request.

Further information

Information leaflets and brochures describing in more detail the range of specialized services available from the Meteorological Office are available free from the same addresses. These leaflets and brochures also indicate the range of complex analyses that the Meteorological Office can undertake.

Forecasting services

For the day-to-day planning of outdoor work, special weather forecasts and warnings can be arranged to cover specific weather elements at agreed sites. Details may be obtained from:

The Director-General
Meteorological Office (Met O 7)
London Road
Bracknell
Berkshire RG12 2SZ

or from your local weather centre.

WEATHER CENTRES AND PUBLIC SERVICE OFFICES

Weather Centres

Bristol
The Gaunts House
Denmark Street
Bristol BS1 5DH

Bristol (0272) 279272

Cardiff
Southgate House
Wood Street
Cardiff CF1 1EW

Cardiff (0222) 390420

Glasgow
33 Bothwell Street
Glasgow G2 6TS

041—248 7272

Leeds
Oak House
Park Lane
Leeds LS3 1EL

Leeds (0532) 457703

London
284–286 High Holborn
London WC1V 7HX

01—430 5627

Manchester
Exchange Street
Stockport SK3 0ER

061—477 1017

Newcastle
Newgate House
Newgate Street
Newcastle-upon-Tyne NE1 5UQ

Tyneside 091—232 3808

Norwich
Rouen House
Rouen Road
Norwich NR1 1RB

Norwich (0603) 630164

Nottingham
Main Road
Watnall
Nottingham NG16 1HT

Nottingham (0602) 384094

Plymouth
Royal Air Force Mount Batten
Plymouth
Devon PL9 9SH

Plymouth (0752) 493377

Southampton
160 High Street-below-bar
Southampton SO1 0BT

Southampton (0703) 220646

Public Service Offices

Meteorological offices at:

Aberdeen Airport
Aberdeen, Grampian AB2 0DU

Aberdeen (0224) 724986

Belfast (Aldergrove) Airport
Belfast
Northern Ireland BT29 4ABA

Crumlin (084 94) 22804

Birmingham Airport
Birmingham B26 3QN

021—782 6240

Kirkwall Airport
Orkney KW15 1TH

Kirkwall (0856)3802

Sella Ness
Port Admin Area
Craven, Mossbank
Shetland ZE2 9QR

(0806) 242069

THE CLIMATE OF GREAT BRITAIN

This memorandum is one of a series which will cover the whole of Great Britain in due course, published in the Climatological Memoranda range. The Introduction (CM 113) to the series explains how various weather elements are measured. The areas to be covered are:

SCOTLAND

114 Borders Region
115 Edinburgh, Lothian Region and Stirling
116 Fife, Dundee and Perth
117 Aberdeen and Buchan
118 Moray Firth coastal Region
119 Northern Isles
120 Western Isles
121 Skye and the North-west
122 Argyll and the Inner Hebrides
123 The Grampians and Perthshire Highlands
124 Glasgow and the Clyde valley
125 Ayrshire and the Firth of Clyde
126 Dumfries and Galloway Region

ENGLAND

127 North-east England
128 Pennines and Lake District
129 East Yorkshire and North Humberside
130 Lancashire and Cheshire and Isle of Man
131 Trent Valley
132 Midlands
133 East Anglia and Lincolnshire
134 Thames Valley
135 London
136 South-east England
137 South England
138 Somerset and Avon
139 South-west Peninsula and Channel Islands

WALES

140 South Wales
141 Mid Wales
142 North Wales and Anglesey

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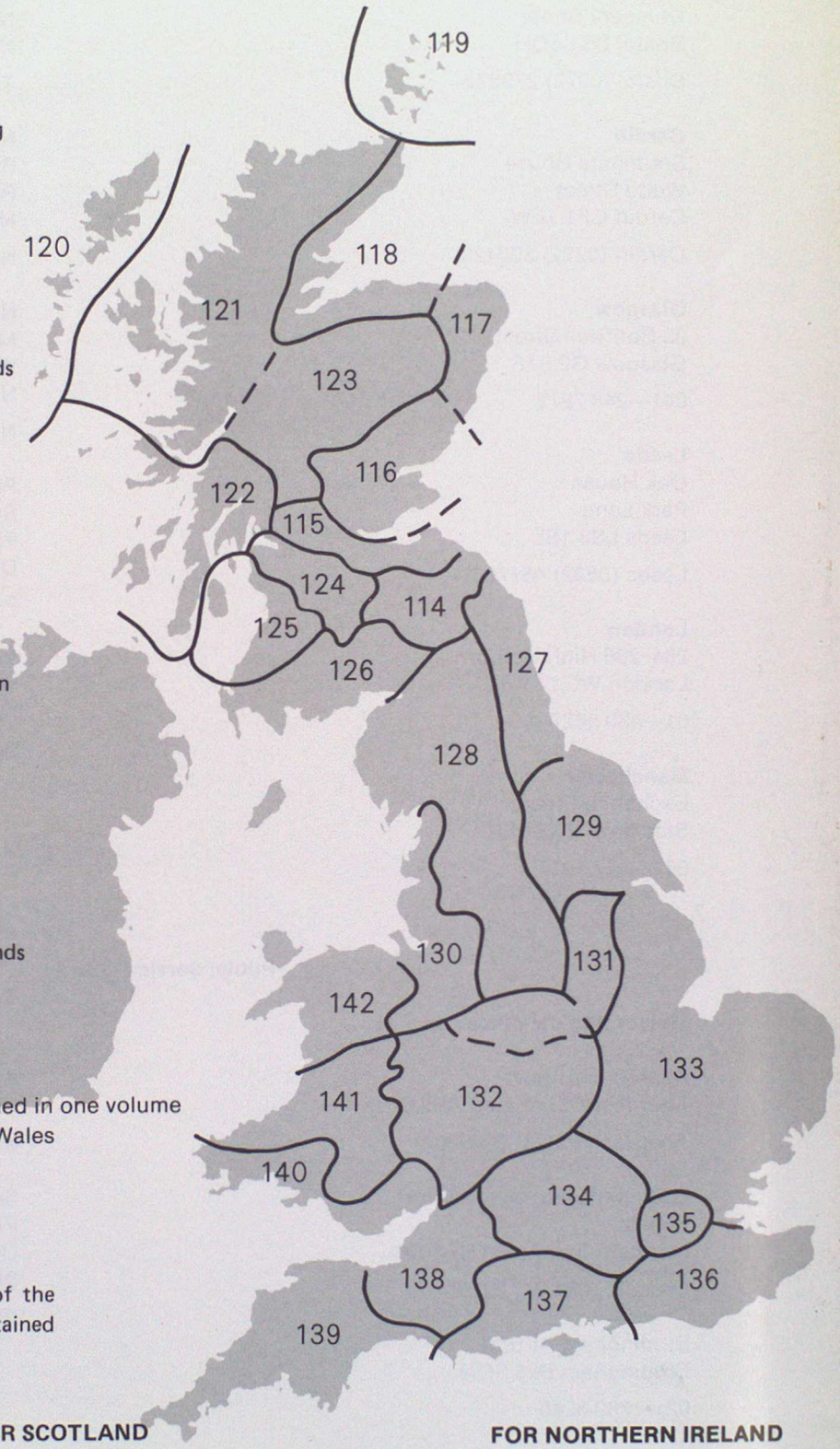

Further details of these memoranda and of the services mentioned on page 16 can be obtained from:

FOR ENGLAND AND WALES

Advisory Services
Meteorological Office (Met O 3b)
London Road
Bracknell
Berkshire RG12 2SZ

FOR SCOTLAND

The Superintendent
Meteorological Office
231 Corstorphine Road
Edinburgh EH12 7BB

FOR NORTHERN IRELAND

The Senior Meteorological Officer
Meteorological Office
Progressive House
1 College Square East
Belfast BT1 6BQ

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