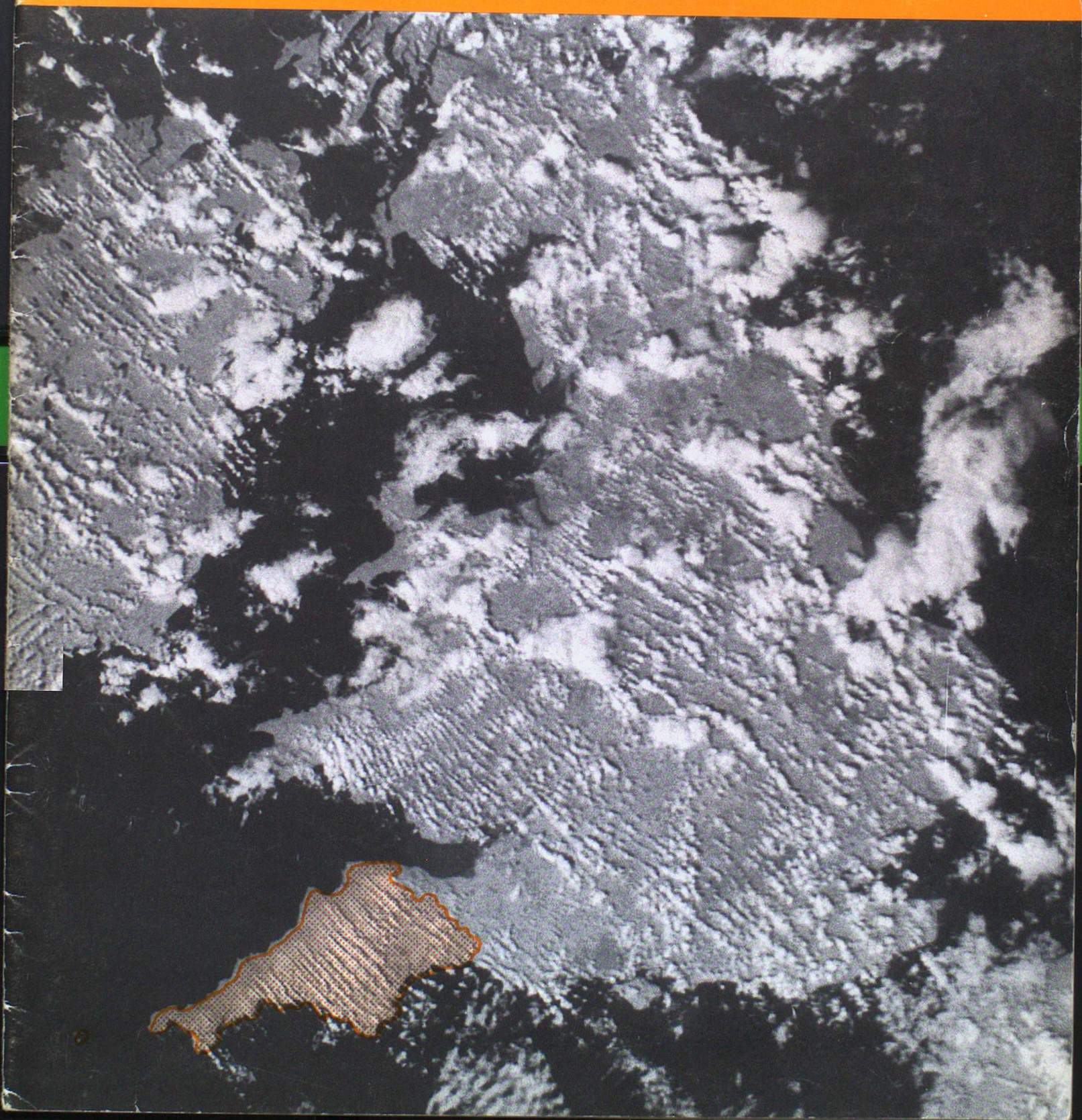
THE CLIMATE OF GREAT BRITAIN

THE SOUTH-WEST PENINSULA AND THE CHANNEL ISLANDS

Climatological Memorandum 139



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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 alignment of the clouds with the surface winds is clearly seen. The south-west Peninsula and the Channel Islands had a day with long sunny periods, between 8 and 11 hours, although there were isolated rain showers. The maximum afternoon temperature was in the range 9 to 13°C.

THE CLIMATE OF GREAT BRITAIN

Climatological Memorandum 139

The South-west Peninsula and The Channel Islands

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 (Advisory Services)

THE AREA

This memorandum describes the main features of the climate of south-west England and the Channel Islands. The area comprises the counties of Devon and Cornwall including the Isles of Scilly together with the Channel Islands.

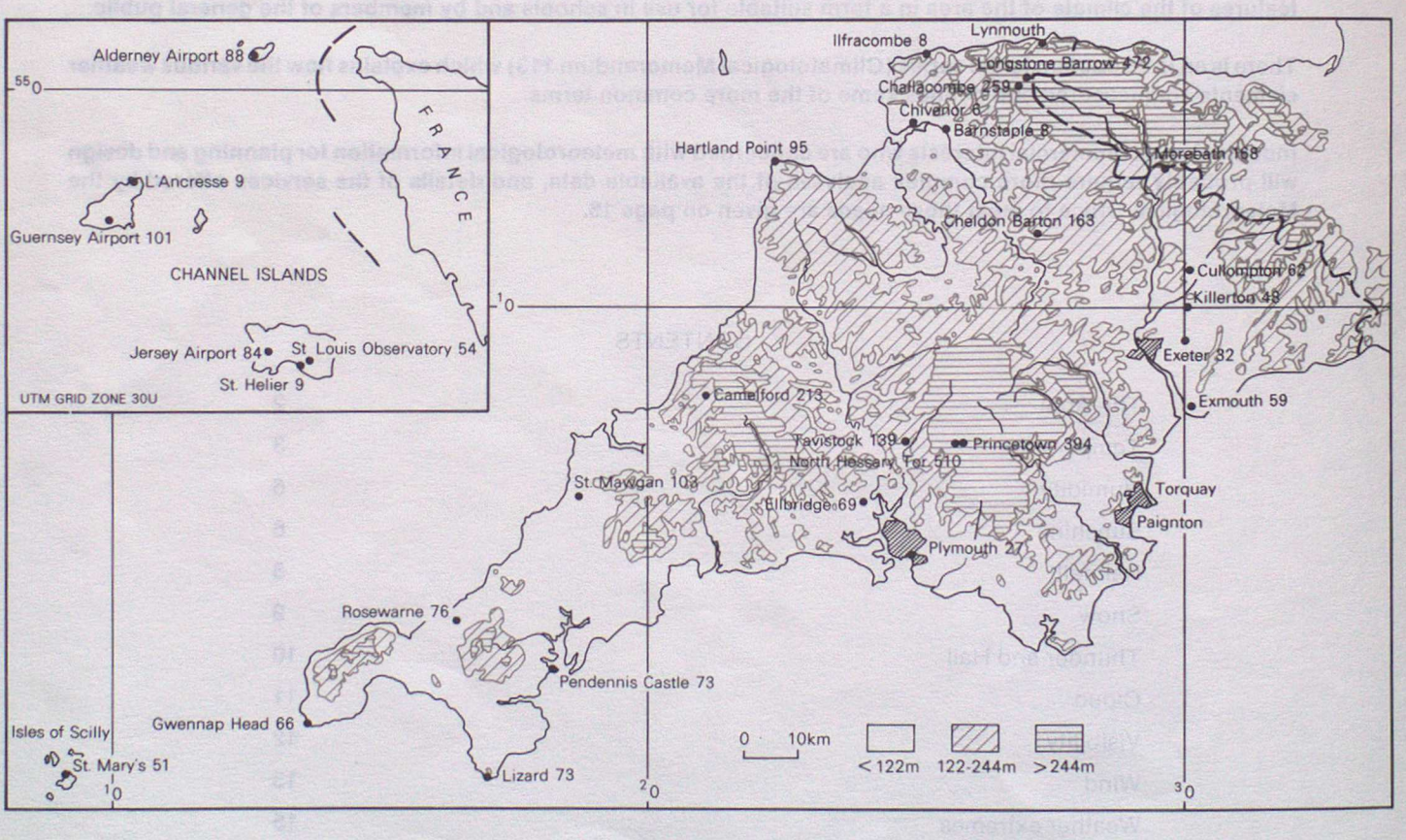
The Channel Islands lie in the Gulf of St. Malo and range in size from Jersey, 116 square kilometres, to numerous tiny islets and points of rock. The islands are blocks of ancient rocks which in the north of Jersey and south of Guernsey descend steeply to the sea in cliffs. The highest point is 140 metres on Jersey, close to the north coast.

Over Devon and Cornwall, apart from outcrops of granite masses, much of the landscape has a marked uniformity. There are a series of old, largely denuded, marine plateaux at varying levels. The plateaux surfaces reach the sea in cliffs, for which the area is famous, and are only infrequently broken by tracts of sand dunes. The plateaux are deeply incised by rivers and streams and many of the lower river valleys have been submerged to form picturesque estuaries such as the Tamar and Dart estuaries. The highland areas coincide with the granite outcrops forming Dartmoor, Bodmin Moor and other smaller moors. The highest points are High Willhays, 621 metres, on Dartmoor and Brown Willy, 419 metres, on Bodmin Moor. In north-east Devon the western edge of Exmoor rises to nearly 500 metres in places. Over half of Cornwall is less than 8 kilometres from the sea and only some of the more central parts of Devon are 30 kilometres or more from the sea and this is a significant factor in the temperature regime of the area.

The Isles of Scilly, which lie 40 kilometres from the Cornish coast, total approximately 18 square kilometres. St. Mary's is the largest island and has a highest point of 51 metres.

The map below shows the topography of the area together with the locations and altitudes of the sites named in the text.

Topography of the South-west Peninsula and Channel Isles with locations and altitudes (in metres) of the stations. Co-ordinates are National Grid references.



TEMPERATURE

The sea plays an important role in the temperature regime of the area. The temperature of the sea changes only very slowly from month to month and the temperature of the adjacent land areas is normally not significantly higher or lower than that of the sea. The Channel Islands and the Isles of Scilly have a mean annual temperature of 11.5 to 12.0°C which is the highest in the British Isles. The coastal and low-lying areas of Devon and Cornwall have an annual mean temperature of about 11°C. Away from the coasts altitude is the main factor affecting temperature with, for example, Princetown at 414 metres on Dartmoor having an annual mean temperature of 8°C. The lowest mean annual temperature at low altitude in the British Isles of around 7°C occurs in the Shetland Isles.

Temperature shows both a seasonal and diurnal variation but due to the modifying influence of the sea the range is less than in most other parts of Britain, though the effect decreases away from the coast. The sea reaches its lowest temperature in late February or early March so that on average February is the coldest month in the area. In this month the mean temperature varies from around 1.5°C inland in Devon to 5°C in the Isles of Scilly. Over the United Kingdom as a whole January is the coldest month with the mean minimum temperature as low as −1.0°C in parts of the Tayside and Grampian regions.

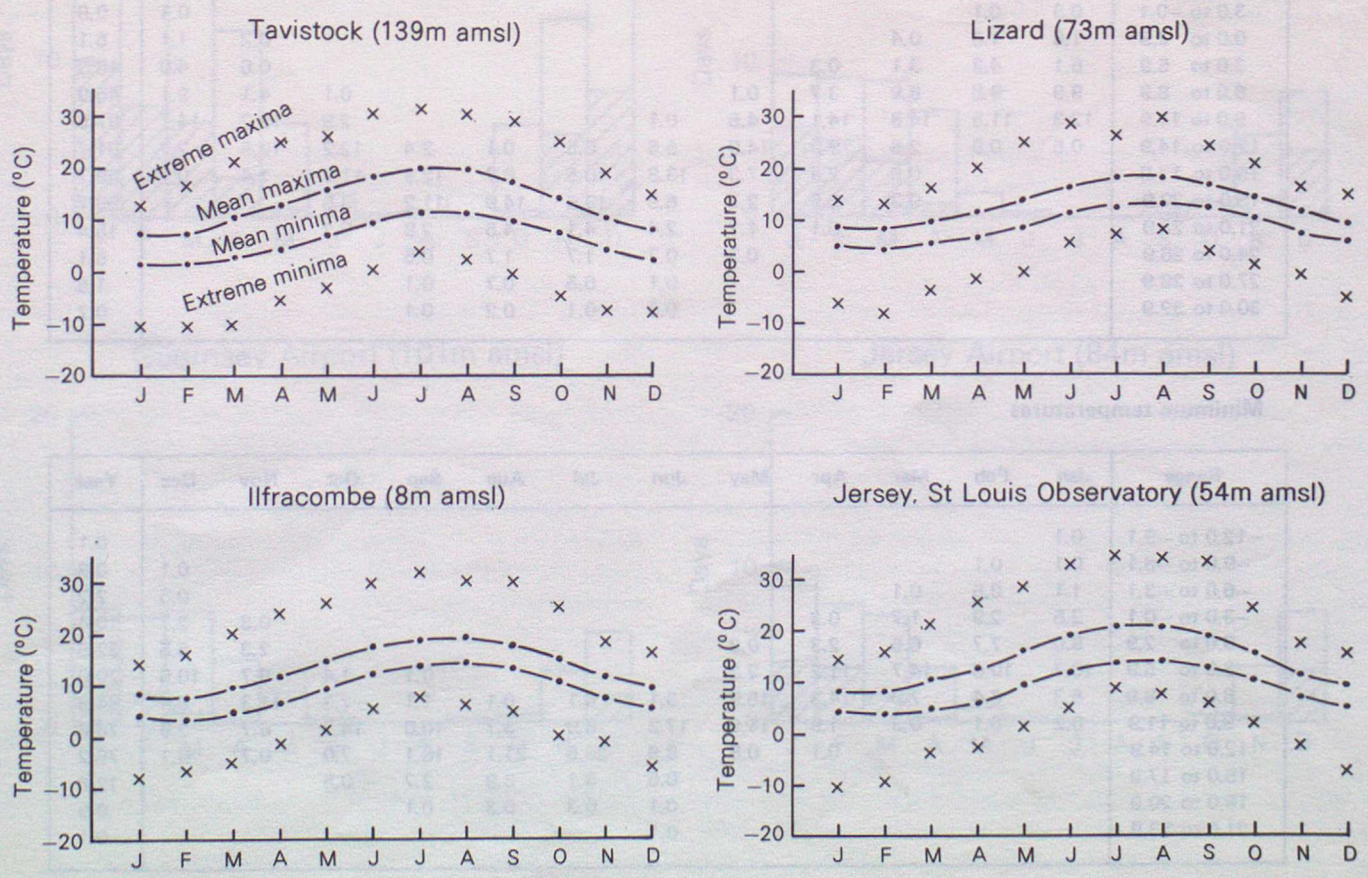
The minimum temperature occurs around sunrise. Extreme minimum temperatures occur in January or February and the lowest known temperature recorded in the area was −16.7°C at Cullompton, Devon, in January 1940. In the Isles of Scilly the lowest temperature recorded this century was −5.0°C which is the 'warmest' lowest temperature observed in the United Kingdom.

July and August are the warmest months in the region with a mean maximum temperature, around 19°C to 21°C. Temperature values around the coasts are generally lower than those recorded inland as the sea is relatively cold compared to the land in these months. The highest mean temperature, of 22.5°C occurs in the London area whilst the lowest of around 15°C occurs in the Shetlands.

The maximum temperature normally occurs two or three hours after mid-day. Extreme maximum temperatures usually occur in July or August and the highest temperature recorded in the area was 35.6°C at St. Helier, Jersey, on 19 August 1932. In Devon and Cornwall the highest was 33.9°C at Ellbridge, Cornwall, in June 1976. The highest temperature recorded in the United Kingdom in recent years was 35.9°C at Cheltenham on 3 July 1976.

The variation of monthly mean maximum and mean minimum temperatures together with the extreme temperatures recorded at four locations in the area is shown in Figure 1. Tavistock has the lowest mean temperature in winter because of its more

Figure 1. Annual variation of maximum and minimum temperatures over the period 1941–70 with extreme temperatures for periods up to 1981



inland situation and St. Louis Observatory, Jersey, has the highest mean temperature during the summer, otherwise there is a marked similarity between the curves of mean values. There is more variation in the extreme values which reflects the differing topography of the locations as well as the period over which the data have been recorded. In the Channel Islands, proximity to France results in a more 'continental' temperature regime.

Table 1 gives the average number of days each month and for the year that maximum and minimum temperatures occurred at Jersey Airport in the temperature ranges specified. The most striking feature of the Table is the wide range of both maximum and minimum temperatures which can occur at any time of the year. From the Table it can be seen, for example, that on about two days every three years the temperature fails to rise above freezing and that on about one day a year the temperature does not fall below 18°C.

Table 2 compares the average number of days with high and low temperatures at four locations in the area. North Hessary Tor has least occasions with high temperatures and most occasions with low temperatures because of its higher altitude and inland location. The modifying influence of the sea is well illustrated by the data for Ilfracombe.

The average number of days each year with air frost in the area varies from 2 in the Isles of Scilly to over 40 inland in Devon and Cornwall. The Channel Islands have 7 to 13 days on average and the coastal areas of Devon and Cornwall from 10 to 25 days. There is a wide range in the average number of days each year with ground frost, with most coastal locations having between 35 and 60 days but at some inland locations this figure rises to over 100 days.

Figure 2 shows the frequency of air frost and ground frost for each month at four locations in the area. The Exeter site is less than 10 miles from the coast but ground frosts can occur at any time of the year.

TABLE 1 Average number of days (1961–80) at Jersey Airport 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
−3.0 to −0.1	0.3	0.1										0.1	0.6
0.0 to 2.9	1.8	1.6	0.4								0.2	1.1	5.1
3.0 to 5.9	6.1	4.3	3.1	0.3							0.6	4.0	18.3
6.0 to 8.9	9.9	9.8	8.9	3.7	0.1					0.1	4.1	9.1	45.9
9.0 to 11.9	12.3	11.5	14.8	14.1	4.5	0.1				2.9	13.2	14.1	87.5
12.0 to 14.9	0.5	0.9	2.6	9.0	14.9	5.5	0.5	0.1	2.4	12.2	10.5	2.7	61.7
15.0 to 17.9			0.9	2.4	7.3	13.8	10.5	8.7	12.8	11.9	1.4	0.1	69.7
18.0 to 20.9			0.3	0.5	2.7	6.9	13.6	14.9	11.2	3.5			53.7
21.0 to 23.9				0.1	1.1	2.4	4.1	4.5	2.9	0.3			15.4
24.0 to 26.9					0.3	0.7	1.7	1.7	0.5				5.1
27.0 to 29.9						0.1	0.5	0.7	0.1				1.5
30.0 to 32.9						0.3	0.1	0.2	0.1				0.7

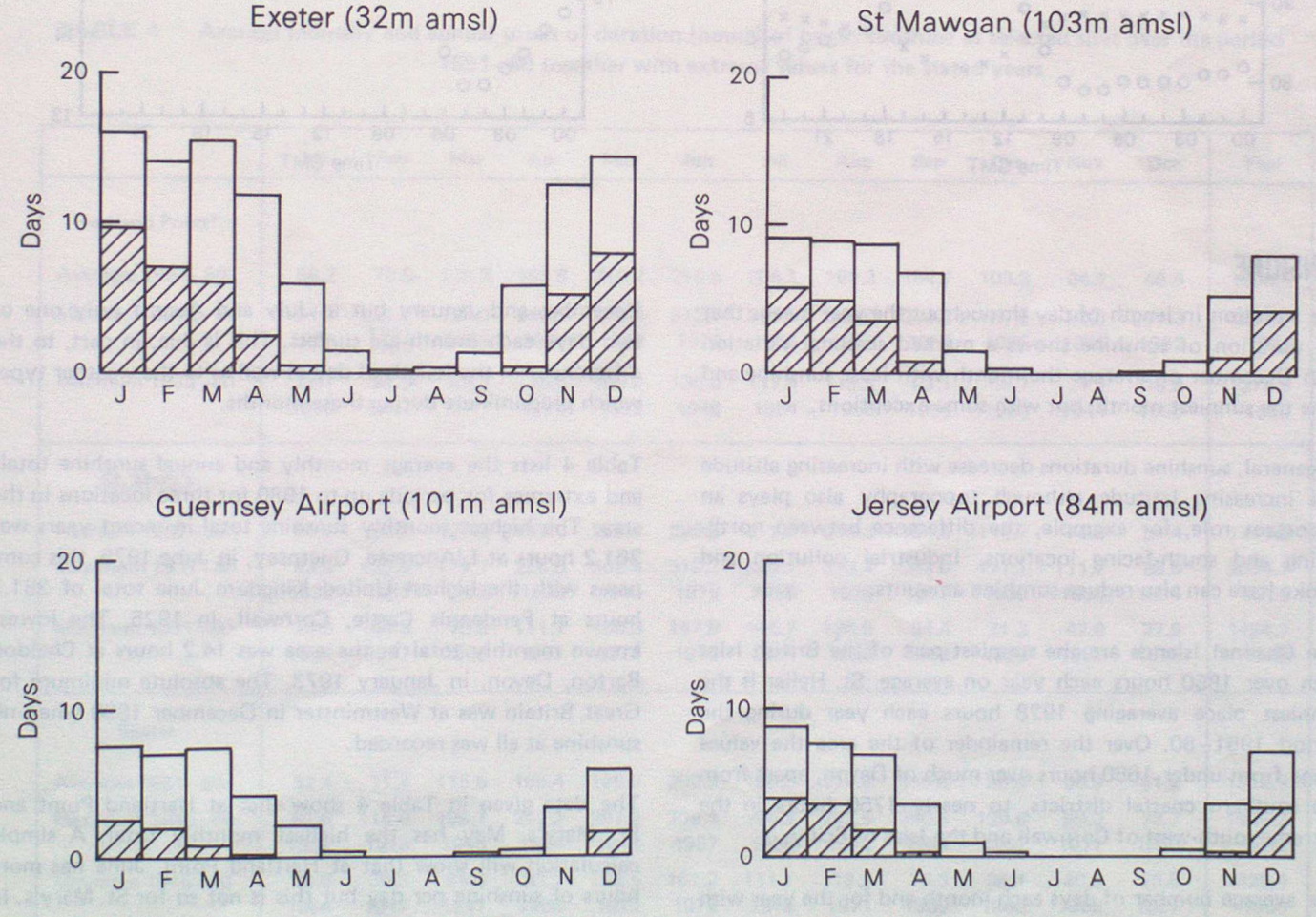
Minimum temperatures

Range	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
−12.0 to −9.1	0.1												0.1
−9.0 to −6.1	0.1	0.1										0.1	0.3
−6.0 to −3.1	1.1	0.5	0.1									0.5	2.2
−3.0 to −0.1	2.5	2.9	1.7	0.3							0.3	2.7	10.4
0.0 to 2.9	8.0	7.7	6.5	2.3	0.3						2.3	5.5	32.5
3.0 to 5.9	10.7	10.6	14.7	11.2	2.3				0.1	1.4	8.7	10.5	70.0
6.0 to 8.9	8.3	6.4	7.9	14.3	15.9	3.1	0.1	0.1	1.1	7.3	11.3	8.9	84.5
9.0 to 11.9	0.2	0.1	0.3	1.9	11.9	17.2	6.9	3.7	10.0	14.7	6.7	2.9	76.6
12.0 to 14.9				0.1	0.8	8.9	20.5	21.1	16.1	7.0	0.7	0.1	75.2
15.0 to 17.9						0.5	3.1	5.9	2.7	0.5			12.6
18.0 to 20.9						0.1	0.3	0.3	0.1				0.9
21.0 to 23.9						0.1							0.1

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

Maximum temperature	25.0 °C or more					30.0 °C or more			
	May	Jun	Jul	Aug	Sep	Jun	Jul	Aug	Sep
Exmouth	0.1	0.9	1.2	0.9		0.1			
North Hessary Tor		0.2	0.2	0.1					
Ilfracombe	0.1	0.3	0.5	0.9					
Jersey A/P	0.1	0.9	1.5	1.8	0.4	0.3	0.1	0.2	0.1
Minimum temperature	**Less than −5.0 °C**					**Less than −10.0 °C**			
	Nov	Dec	Jan	Feb	Mar	Jan			
Exmouth		0.5	1.4	0.3	0.1	0.1			
North Hessary Tor	0.1	1.1	1.5	1.5	0.8	0.1			
Ilfracombe		0.1	0.1		0.1				
Jersey A/P		0.1	0.5	0.1		0.1			

Figure 2. Average number of days with air frost (hatched areas) and ground frost (whole columns) over the period 1961–80



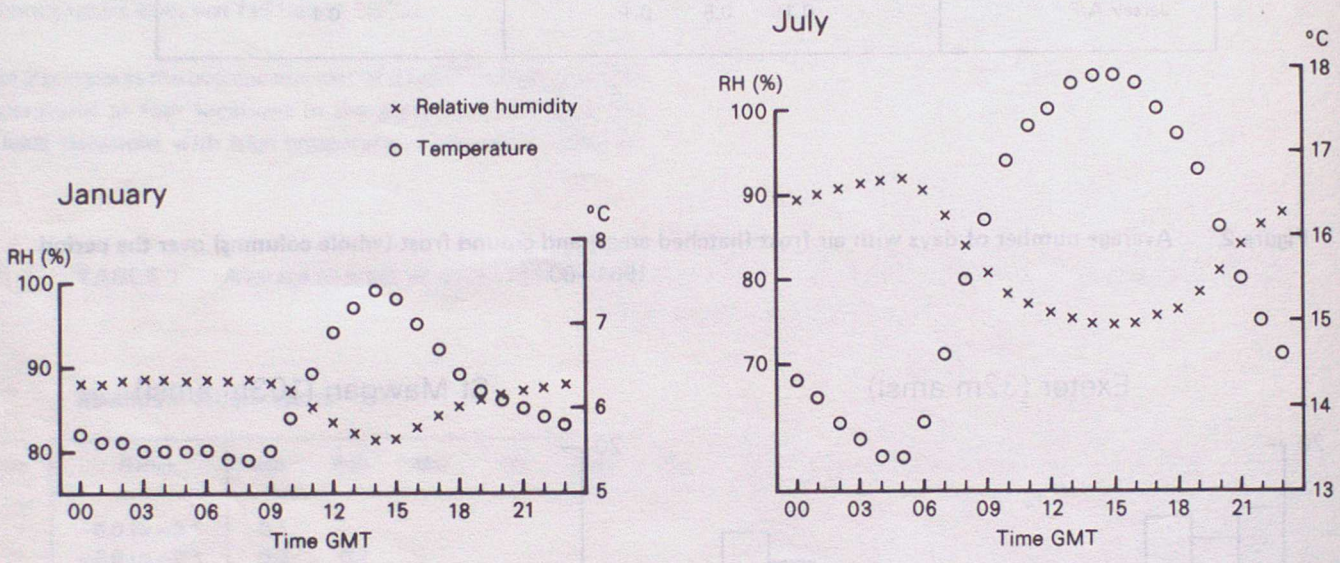
HUMIDITY

Relative humidity is the ratio of the amount of water vapour in the air compared with the maximum amount of water vapour which could be contained by the air at the same temperature, expressed as a percentage. If the amount of water vapour in the atmosphere 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 occurring in winter and at night. This is primarily a reflection of the seasonal and diurnal temperature changes. Relative humidities equal or exceed 95% for around 20 to 30% of the time in the area and humidities of 100% can be reached in fog and during persistent rain, snow or drizzle. Low humidities are less common, for example, at Exeter during the period 1971–80 the relative humidity did not fall below 30%.

The average diurnal variation of relative humidity and temperature at Plymouth for the months of January and July is shown in Figure 3, this illustrates some of the points made in the text.

Figure 3. Average diurnal variation of temperature and relative humidity at Plymouth for January and July over the period 1951–80



SUNSHINE

The variation in length of day throughout the year means that the duration of sunshine shows a marked seasonal variation with December on average the month with least sunshine and June the sunniest month, but with some exceptions.

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.

The Channel Islands are the sunniest part of the British Isles with over 1850 hours each year on average. St. Helier is the sunniest place averaging 1928 hours each year during the period 1951–80. Over the remainder of the area the values range from under 1650 hours over much of Devon, apart from the southern coastal districts, to nearly 1750 hours in the extreme south-west of Cornwall and the Isles of Scilly.

The average number of days each month and for the year with sunshine durations in specified ranges is given for St. Helier and Exeter in Table 3. This shows, for example, that at both locations about one day in three has no sunshine during December and January but in July and August only one or two days each month are sunless. This is due, in part, to the differences in the length of day as well as to the weather types which predominate during these months.

Table 4 lists the average monthly and annual sunshine totals and extremes for periods up to 1980 for three locations in the area. The highest monthly sunshine total in recent years was 361.2 hours at L'Ancresse, Guernsey, in June 1975, this compares with the highest United Kingdom June total of 381.7 hours at Pendennis Castle, Cornwall, in 1925. The lowest known monthly total in the area was 14.2 hours at Cheldon Barton, Devon, in January 1973. The absolute minimum for Great Britain was at Westminster in December 1890 when no sunshine at all was recorded.

The data given in Table 4 show that at Hartland Point and St. Mary's, May has the highest monthly total. A simple calculation will show that at Hartland Point, June has more hours of sunshine per day but this is not so for St. Mary's. In the Isles of Scilly, as in Northern Ireland and parts of western Scotland May is the sunniest month.

TABLE 3 Average number of days of sunshine duration at St. Helier (Jersey) and Exeter during the periods stated

(Frequency of occurrence in each 3-hour band in each month)

St. Helier (1951–80)

Duration (Hours per day)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Nil	9.9	6.6	4.2	2.5	1.5	1.7	1.1	1.2	1.7	3.7	7.6	10.8	52.5
0.1 to 3.0	11.5	8.9	7.7	5.8	4.7	4.0	4.4	4.4	7.1	9.5	11.5	11.6	91.2
3.1 to 6.0	6.3	6.6	6.1	5.0	4.4	4.4	4.7	5.6	5.5	6.9	7.4	6.4	69.3
6.1 to 9.0	3.3	5.8	8.1	6.0	5.7	4.5	5.4	6.7	7.9	8.4	3.5	2.2	67.6
9.1 to 12.0		0.5	4.9	8.1	7.0	5.6	6.8	8.6	7.6	2.1	+		50.8
12.1 or more				2.6	7.7	9.8	8.8	4.6	0.2				33.8

Exeter (1957–80)

Duration (Hours per day)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Nil	11.5	9.0	5.6	3.1	2.3	2.3	1.4	1.8	2.4	5.2	8.5	11.4	64.4
0.1 to 3.0	12.0	9.7	10.0	8.5	7.5	6.7	8.5	9.1	9.4	12.5	11.5	11.9	117.4
3.1 to 6.0	5.0	5.7	6.5	6.6	6.3	5.4	6.2	6.6	7.0	7.5	7.0	5.7	75.9
6.1 to 9.0	2.5	3.6	6.7	6.0	5.4	4.5	6.3	6.1	7.3	5.0	3.0	2.0	58.3
9.1 to 12.0		0.2	2.1	5.3	5.3	4.6	5.0	5.9	3.9	0.7			33.1
12.1 or more				0.6	4.1	6.4	3.6	1.4	+				16.1

+ Sunshine recorded in these bands but for less than 0.05 per cent of the time

TABLE 4 Average monthly and annual totals of duration (hours) of bright sunshine at selected sites over the period 1951–80 together with extreme values for the stated years

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Hartland Point*													
Averages 1951–80	56.2	78.9	130.9	185.6	219.7	218.6	205.1	192.3	154.7	109.3	64.1	46.5	1660.4
Maximum 1938–80	104.3	107.2	190.0	246.3	302.0	312.7	310.2	318.0	239.8	157.6	98.9	71.3	1894.0
	1963	1951 1956	1955	1954	1948	1975	1955	1976	1959	1965	1955	1962	1955
Minimum 1938–80	24.1	33.9	89.6	128.0	165.0	135.8	117.4	116.5	83.1	56.7	24.2	18.2	1375.0
	1939	1947	1947	1940	1973	1948	1954	1958	1956	1968	1944	1955	1958
St. Mary's													
Averages 1951–80	60.4	83.2	128.6	192.5	229.9	220.3	212.7	205.3	164.4	114.7	74.8	54.4	1741.6
Maximum 1931–80	93.0	120.9	179.7	256.5	308.5	310.2	330.1	312.4	243.0	171.1	111.2	86.0	2044.1
	1933	1951	1955	1938	1940	1975	1955	1976	1972	1939	1935	1944	1955
Minimum 1931–80	29.0	44.5	76.9	111.1	150.3	147.8	146.7	136.9	84.4	71.3	42.6	27.6	1484.7
	1966	1947	1969	1937	1973	1972	1954	1958	1956	1963	1968	1975	1958
Exeter													
Averages 1951–80	53.4	71.4	115.6	159.4	195.0	200.9	190.8	174.6	136.9	96.4	66.9	51.2	1512.3
Maximum 1945–80	91.6	116.0	188.7	242.2	287.3	309.4	296.2	293.5	250.5	129.6	99.3	78.7	1939.2
	1952	1949	1948	1954	1948	1957	1955	1976	1959	1962	1971	1946	1949
Minimum 1945–80	26.6	30.3	65.4	83.7	125.5	101.2	111.1	113.2	75.3	36.1	40.6	25.8	1328.4
	1964	1947	1947	1966	1972	1972	1978	1971	1969	1968	1958	1977	1968

* No data Oct 72–Mar 73

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 winter rainfall which 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 annual rainfall over the area. The influence of topography is clearly seen, even over the Channel Islands. Figure 4 shows the monthly variation of rainfall in the area. These are typical of the area with November, December and January the wettest months and April and June the driest months. Over the British Isles generally, December and January are the wettest months and February to April the driest.

Rainfall is extremely variable. Table 5 lists for Plymouth and Princetown, Devon, the highest and lowest monthly totals of rainfall for periods up to 1981 with the 1941–70 averages for comparison.

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

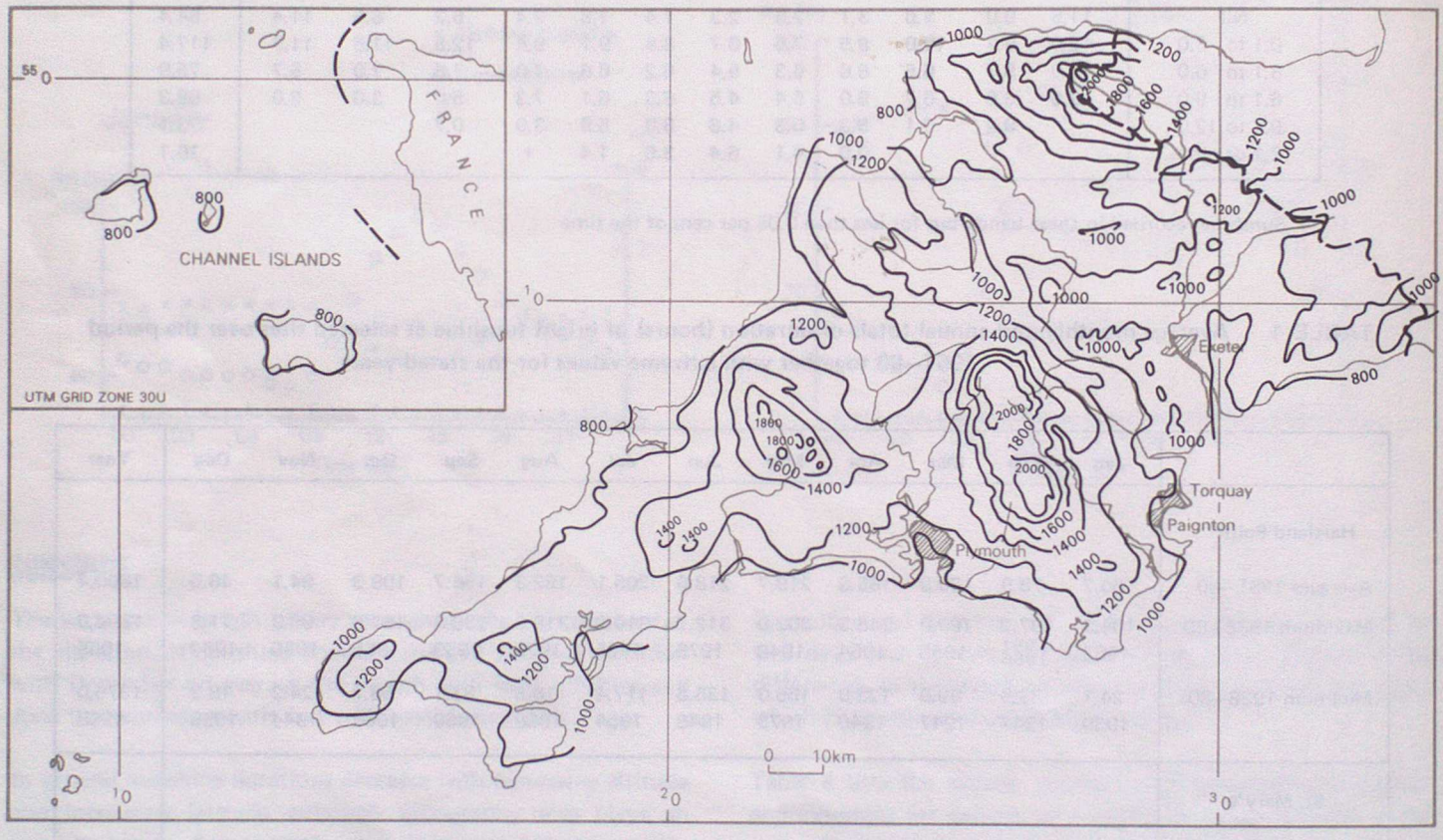


Figure 4. Average monthly rainfall (mm) over the period 1941–70

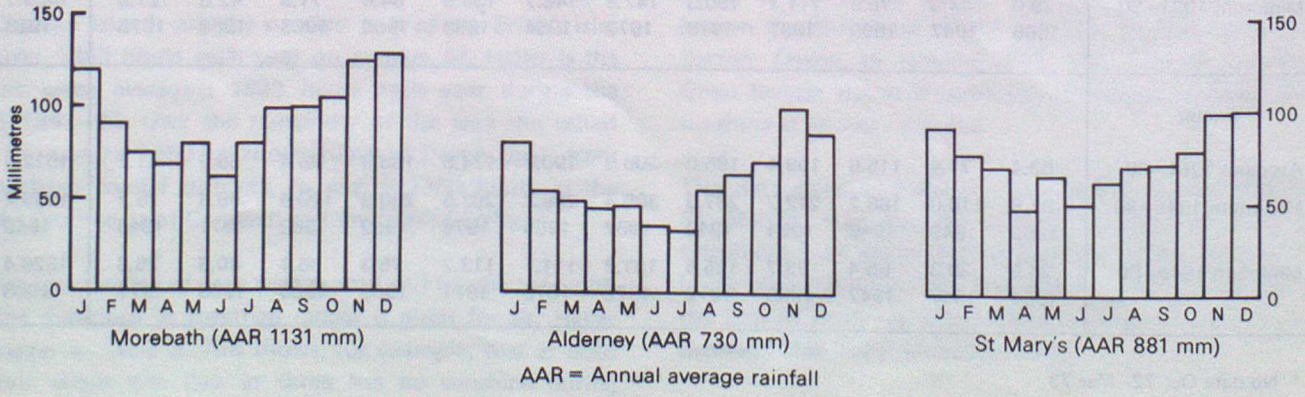


TABLE 5 Average monthly rainfall (mm) at selected sites over the period 1941–70 together with extreme values for periods stated

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Plymouth												
Averages 1941–70	108	75	74	57	68	56	70	85	86	92	109	110
Maximum 1931–81	208.5	204.5	195.7	152.8	127.2	145.2	152.2	159.3	181.3	210.0	226.5	246.4
Minimum 1931–81	19.8	0.5	2.8	4.1	10.2	4.5	6.7	2.4	0.1	6.6	25.1	19.1
Princetown												
Averages 1941–70	211	144	142	117	126	112	138	160	171	173	211	219
Maximum 1964–81	541.9	369.2	446.1	338.2	255.4	295.0	286.1	279.4	400.2	436.6	403.7	506.0
Minimum 1964–81	53.5	3.3	107.5	18.2	31.4	19.9	57.0	24.7	34.6	14.9	145.8	80.1

SNOW

The incidence of sleet and snow in the area is less than in other parts of the British Isles. The occurrence of snow is closely linked with temperature, falls rarely occurring in association with a temperature higher than 4°C. Falls of snow increase with increasing latitude and altitude and are normally confined to the months November to March but a few falls do occur in October and April.

The average number of days each year with sleet or snow falling varies from 10 or less over the low-lying areas to over 20 on Dartmoor. Snowfall amounts are measured as the equivalent water content and are included in the rainfall statistics. As a rough guide 10 centimetres of fresh snow are equivalent to one centimetre of water.

Figure 5 shows the average number of days with sleet or snow falling and the number of days with snow lying at four locations in the area. A day of snow lying is defined as one with snow covering at least half the ground at 0900 GMT.

Snow rarely lies on low ground before December or after March and the average number of days with snow lying in the area varies from 3 or less in the Channel Islands, the Isles of Scilly and low-lying areas of Devon and Cornwall, to over 10 on Dartmoor. Days of snow lying are less than days of snow falling because, in many instances, the temperature of the air and ground remain above freezing point with the result that the snow never lies at all. As a rough guide the number of days of sleet and snow falling and snow lying increases by 5 days for each 100 metre increase in altitude.

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

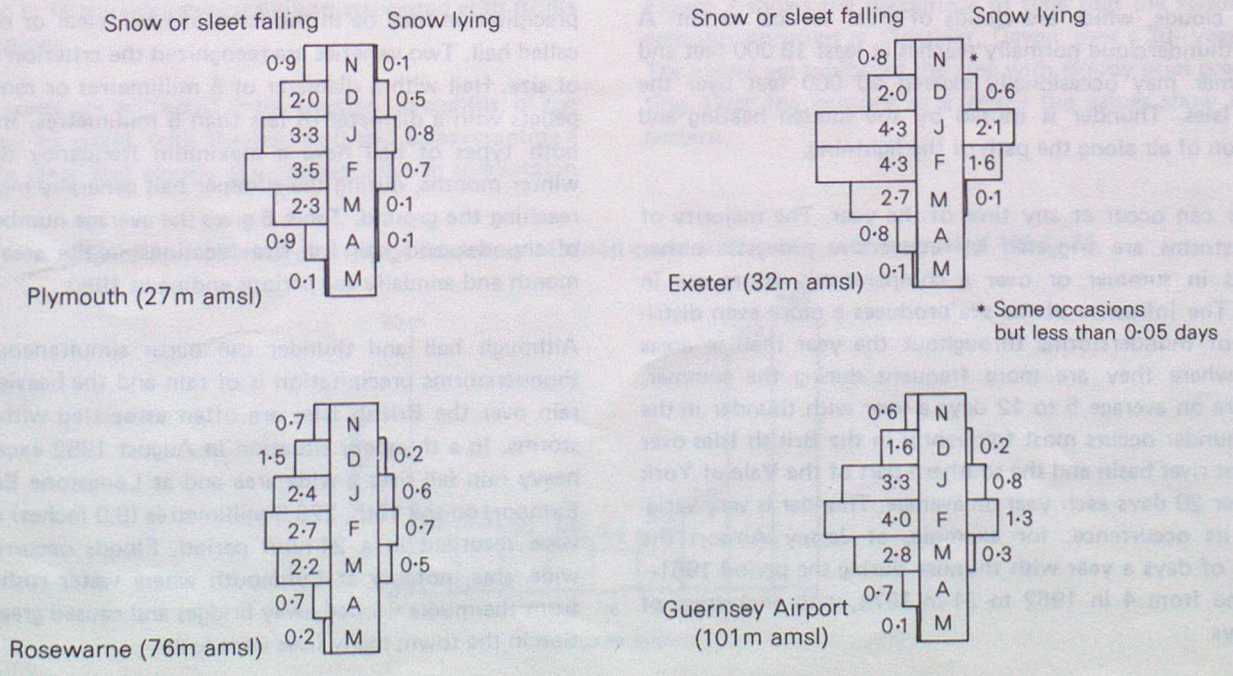
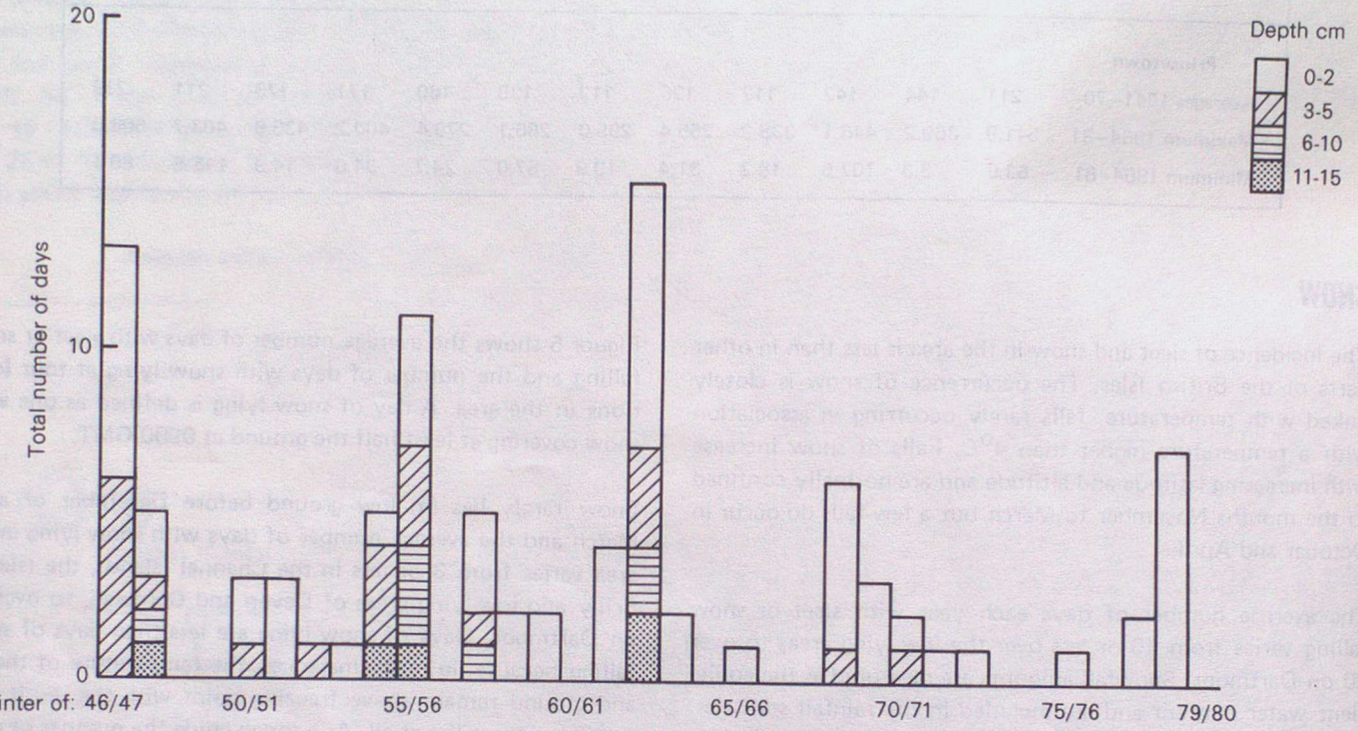


Figure 6 shows the number of days with snow lying in various depths at Plymouth since the winter of 1946/47. The number of days with snow lying in the individual winters has varied from none in 11 winters to a maximum of 15 in 1962/63. As a comparison Balmoral, Grampian, average 60 days with snow lying with individual winters ranging from 14 to 102 days.

The depth of undrifted snow does not often exceed 15 centimetres on level ground at low altitudes but on occasions depths of 30 to 60 centimetres may fall over a wide area. When depths exceed 15 centimetres or so in association with strong winds then serious drifting may occur especially in hilly areas.

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



THUNDER AND HAIL

Thunder and hail are phenomena associated with cumulonimbus clouds, which are clouds of great vertical extent. A typical thundercloud normally reaches at least 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. The majority of thunderstorms are triggered by convective processes either overland in summer or over a comparatively warm sea in winter. The influence of the sea produces a more even distribution of thunderstorms throughout the year than in areas inland where they are more frequent during the summer. There are on average 5 to 12 days a year with thunder in the area. Thunder occurs most frequently in the British Isles over the Trent river basin and the southern part of the Vale of York with over 20 days each year on average. Thunder is very variable in its occurrence, for example, at Jersey Airport the number of days a year with thunder during the period 1961–80 varied from 4 in 1962 to 24 in 1974, with an average of 11.5 days.

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. In this area both types of hail have a maximum frequency during the winter months, during the summer hail generally melts before reaching the ground. Table 6 gives the average number of days of thunder and hail for five locations in the area for each month and annually for periods ending in 1980.

Although hail and thunder can occur simultaneously most thunderstorms precipitation is of rain and the heaviest falls of rain over the British Isles are often associated with thunderstorms. In a thundery situation in August 1952 exceptionally heavy rain fell over a wide area and at Longstone Barrow, on Exmoor, on the 15th, 228.5 millimetres (9.0 inches) of rainfall were recorded in a 24-hour period. Floods occurred over a wide area, notably at Lynmouth where water rushing down from the moors washed away bridges and caused great destruction in the town; many lives were lost.

TABLE 6 Average number of days of thunder and hail over the periods stated

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Jersey A/P (1957–81)													
Thunder	0.9	0.2	0.4	0.3	1.5	1.4	1.3	1.8	1.4	1.4	1.2	0.8	12.5
Hail	3.2	1.8	1.9	1.6	0.5	0.2			0.2	1.4	3.5	2.7	16.9
Ice pellets	1.6	1.0	1.0	0.4	0.1					0.2	0.9	1.3	6.6
Plymouth (1950–81)													
Thunder	0.8	0.4	0.3	0.3	0.7	1.0	1.6	1.1	0.8	0.7	0.5	0.6	8.7
Hail	0.6	0.2	0.5	0.2	0.1	0.1				0.3	0.3	0.3	2.6
Ice pellets	3.0	2.6	2.0	1.5	0.7				0.1	0.5	1.6	1.8	13.7
St. Mary's (1959–81)													
Thunder	0.3	0.5	0.3	0.3	0.4	0.4	0.8	0.5	0.5	0.2	0.1	0.3	4.5
Hail	0.6	0.7	0.6	0.3	0.1					0.1	0.3	0.5	3.1
Ice pellets	1.3	0.9	1.0	0.8	0.1					0.1	0.6	1.1	5.9
Exeter (1957–81)													
Thunder	0.6	0.2	0.3	0.2	1.5	1.4	2.0	1.3	0.8	0.6	0.5	0.4	9.8
Hail	0.5	0.2	0.6	0.3	0.2		0.1			0.1	0.5	0.3	2.8
Ice pellets	2.0	1.8	1.6	1.4	0.7	0.2			0.1	0.6	1.0	1.1	10.4
St. Mawgan (1957–81)													
Thunder	0.6	0.5	0.3	0.3	0.3	0.5	1.3	1.0	0.7	0.6	0.7	1.0	7.7
Hail	2.0	0.8	1.0	0.5	0.2			0.1		0.8	1.1	1.3	7.8
Ice pellets	3.3	2.7	3.2	1.5	0.6	0.1			0.1	1.3	3.1	2.3	18.3

CLOUD

Clouds are collections of very small water droplets, ice or a mixture of both. They are formed mainly as a result of cooling of 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 of time that the various cloud amounts occurred at Chivenor, Devon, over a 20–year period. The values are typical of the area with cloudy skies predominating. Over the country as a whole the values show a similar pattern.

Figure 7. Annual percentage frequency of cloud cover at Chivenor over the period 1957–76

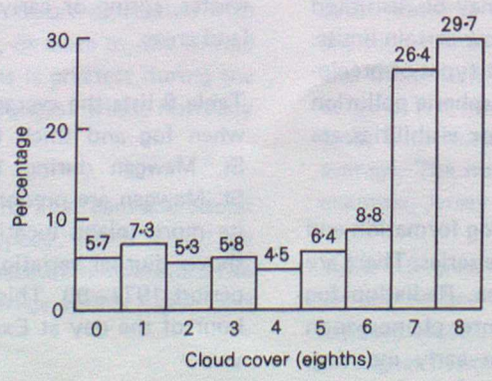


Table 7 gives the percentage of time by month and by year that cloud amounts in the three ranges occurred at Plymouth during 1957–76. Table 8 gives the mean cloud amount at selected hours at St. Mary's for the same period. The data in these tables are representative of the area, being more cloudy in the winter than in the summer and more cloudy by day than by night. At Plymouth June is the least cloudy month by night and by day, which is reflected in the sunshine totals. The data for St. Mary's show a slightly different pattern with there being very little difference between April and May by night and May and June by day, as the least cloudy months.

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Eighths						Daylight hours							
0–2	10.5	13.2	15.8	17.2	17.6	22.4	18.2	17.1	19.5	15.3	13.3	15.3	16.9
3–6	17.7	21.6	25.5	27.9	29.7	28.6	28.1	28.7	29.0	24.8	23.5	19.8	26.3
7–8	71.7	65.1	58.7	54.9	52.7	49.1	53.6	54.2	51.6	59.7	63.2	64.7	57.0
						Hours of darkness							
0–2	20.5	22.9	28.8	34.2	31.2	34.6	33.4	33.8	34.0	28.5	23.4	24.5	28.2
3–6	16.0	16.0	17.3	19.6	23.8	21.8	21.2	21.1	21.1	19.7	19.2	15.7	19.0
7–8	63.5	61.1	53.9	46.1	45.1	43.6	45.4	45.1	44.8	51.9	57.4	59.8	53.0

TABLE 8 Average cloud amount (in eighths) at St. Mary's in selected hours over the period 1957–76

Hour (GMT)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
00	5.8	5.7	5.0	4.2	4.1	4.4	4.6	4.5	4.3	5.0	5.7	5.7	4.9
03	5.9	5.9	5.1	4.5	4.6	4.8	4.9	4.7	4.4	5.0	5.6	5.7	5.1
06	5.9	5.8	5.7	5.5	5.3	5.2	5.5	5.5	5.3	5.4	5.6	5.8	5.5
09	6.3	6.1	5.8	5.5	5.4	5.2	5.6	5.4	5.2	5.6	6.1	6.2	5.7
12	6.2	6.0	5.6	5.3	5.2	5.2	5.4	5.3	5.0	5.5	6.0	6.1	5.6
15	6.4	5.9	5.4	5.1	4.9	5.0	5.2	5.2	4.9	5.6	6.1	6.1	5.5
18	6.2	6.1	5.6	4.9	4.8	4.8	5.1	5.1	5.1	5.7	6.1	6.1	5.5
21	5.7	5.5	5.0	4.5	4.9	5.0	5.1	5.0	4.4	5.0	5.5	5.7	5.1

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.

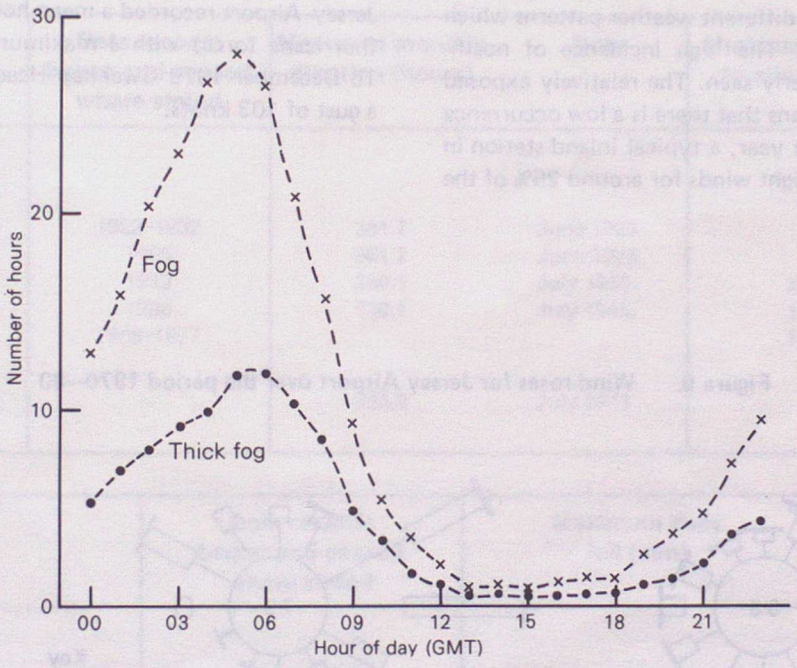
There are a number of factors which effect fog formation and these are discussed in the Introduction to the series. There are two main types of fog which affect the area. Radiation fog which forms overland is predominantly a winter phenomenon occurring generally at night or during the early morning, though it does occasionally persist all day, and sea fog, or advection fog, which is formed by the passage of warm moist air over a relatively cold sea and occurs most frequently in late winter, spring or early summer affecting coasts and adjacent land areas.

Table 9 lists the average number of hours, by month and year, when fog and thick fog occurred at Plymouth, Exeter and St. Mawgan during 1971–80. The fogs at Plymouth and St. Mawgan are predominantly sea fogs. At Exeter, because of its more inland location, both types of fog occur. Figure 8 shows diurnal variation of fog and thick fog at Exeter in the period 1971–80. This shows that 0500 GMT is the foggiest hour of the day at Exeter with an average of 28.1 hours each year.

TABLE 9 Average number of hours each month and the year with visibility of less than 1000 metres (fog) and less than 200 metres (thick fog) at selected sites over the period 1971–80

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Plymouth	<1000m	5.2	9.5	9.4	6.7	10.1	10.1	7.7	11.2	10.4	6.4	8.8	6.2	101.7
	<200m	0.9	1.8	3.2	2.2	3.5	2.0	1.3	2.0	2.5	2.0	3.6	3.0	28.0
St. Mawgan	<1000m	19.4	19.8	21.9	19.2	25.9	33.3	36.7	27.5	20.0	11.3	20.5	11.0	266.5
	<200m	2.8	3.3	2.1	6.3	7.3	8.1	8.9	5.4	3.9	1.1	5.2	1.3	55.7
Exeter	<1000m	16.9	20.8	18.1	12.6	13.4	9.5	10.3	22.8	29.4	41.6	25.1	24.4	244.9
	<200m	8.2	11.0	9.0	4.8	4.1	2.8	2.6	8.0	11.7	20.8	12.3	13.1	108.4

Figure 8. Average annual number of hours of fog (visibility less than 1000 metres) and thick fog (visibility less than 200 metres) at Exeter over the period 1971–80



WIND

The wind direction is that from which the wind blows, given 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 so 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 inland are usually stronger by day than by night because temperature rise causes increased turbulence making average speeds higher and the wind more gusty.

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. The south-west of England and the Isles of Scilly are particularly exposed to the predominant south-westerly winds and the average number of days of gale are higher than in other parts of England. The Isles of Scilly and the extreme south-west of Cornwall have 25 days or more of gale. The number of days decreases north-eastwards and inland, with north-east Devon having 5 days or less of gale on average. The number of days of gale is extremely variable for example, Jersey had 3 days in 1973 but 46 days in 1965.

Table 10 gives the annual percentage frequency of wind in various ranges of speed and direction at St. Mary's. The exposed location of the Isles of Scilly means that wind speeds are higher in other parts of the area.

TABLE 10 Annual percentage frequencies of hourly mean wind speed and direction for St. Mary's 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													2.4
1–3	1	1.1	0.9	0.7	0.7	0.6	0.5	0.5	0.7	0.7	0.8	0.9	0.7	10.1
4–10	2–3	2.8	2.9	2.4	1.8	1.5	1.6	1.8	2.6	2.7	2.4	2.5	2.4	27.4
11–21	4–5	3.1	3.1	2.8	2.9	2.7	2.4	3.7	4.9	5.9	5.4	5.5	4.1	46.5
22–33	6–7	0.5	0.4	0.4	0.4	0.3	0.5	0.9	1.4	1.7	2.2	2.1	1.1	12.1
≥34	≥8	+	+	+	+	+	+	0.1	0.1	0.2	0.4	0.4	0.1	1.3
Total ≥4		6.5	6.4	5.7	5.1	4.6	4.6	6.5	8.9	10.5	10.4	10.4	7.6	87.3

+ = Some occasions but less than 0.05 per cent of the time

The wind–roses in Figure 9 illustrate how the wind varies during the year at Jersey Airport. The differences between the months shown are due to the different weather patterns which predominate at these times. The high incidence of north-easterly winds in April is clearly seen. The relatively exposed position of Jersey Airport means that there is a low occurrence of light winds throughout the year, a typical inland station in central England would have light winds for around 25% of the time.

Some of the strongest winds at low altitude sites in the United Kingdom have been recorded in this area. On 9 October 1964 Jersey Airport recorded a mean hourly wind speed of 68 knots (hurricane force) with a maximum gust of 94 knots, and on 15 December 1979 Gwennap Head, near Lands End, recorded a gust of 103 knots.

Figure 9. Wind-roses for Jersey Airport over the period 1970–80

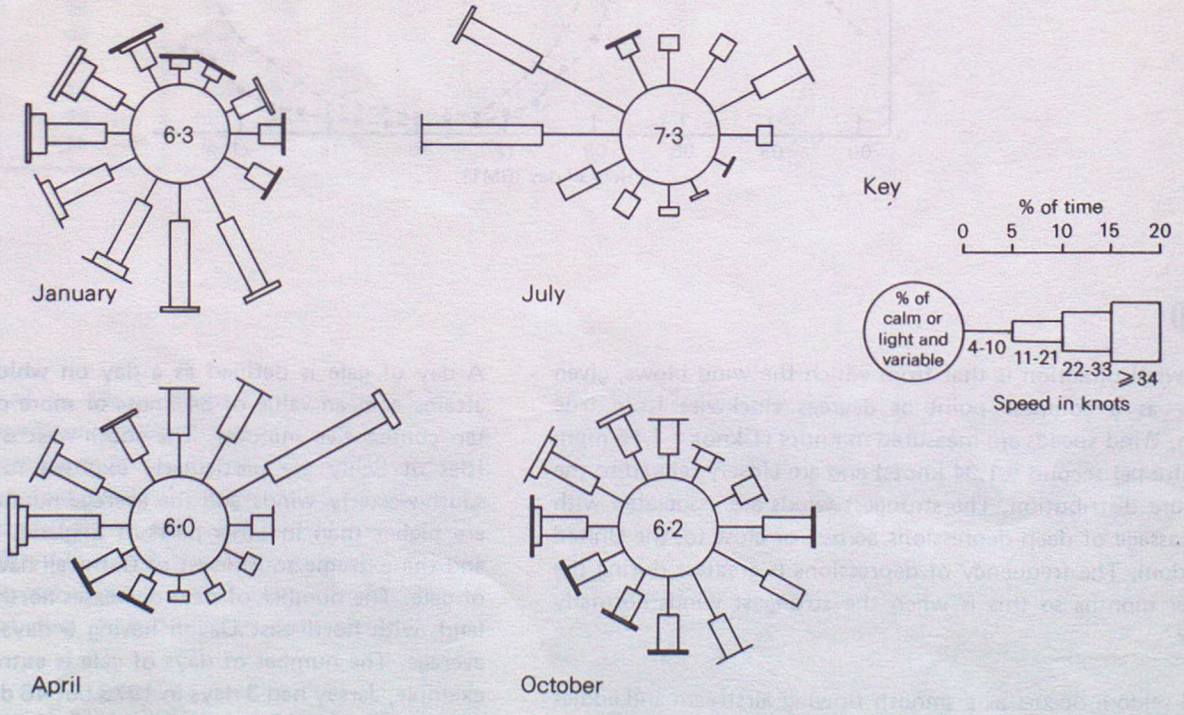


TABLE 11 Weather extremes

TEMPERATURE	Date records began and ceased where stated	Maximum daily temperature (°C)	Date	Minimum daily temperature (°C)	Date
South-west Peninsula and Channel Islands					
St. Helier	1901	35.6	19 August 1932	−8.3	21 February 1948 20 January 1963
St. Louis Obs.	1894–1920 1925–1970	35.1	1 July 1952	−9.9	5 January 1894
Killerton	1907–1945	34.4	12 July 1923	−16.1	21 January 1940
Cullompton	1901–1952	33.3	12 July 1923	−16.7	21 January 1940
Barnstaple	1939–1959	32.2	12 July 1949	−16.1	26 January 1945
United Kingdom					
Raunds Epsom Canterbury	—	36.7	9 August 1911		
Braemar	—			−27.2	11 February 1895 10 January 1982

SUNSHINE	Date records began and ceased where stated	Maximum monthly duration (hours)	Date	Minimum monthly duration (hours)	Date
South-west Peninsula and Channel Islands					
Pendennis Castle	1922–1932	381.7	June 1925		
L'Ancresse	1966	361.2	June 1975		
St. Mary's	1912	330.1	July 1955	27.6	December 1975
Hartland Point	1938	330.1	July 1955	18.2	December 1955
Cheldon Barton	1968–1977			14.2	January 1973
United Kingdom					
Eastbourne	—	383.9	July 1911		
London (Westminster)	—			0	December 1890

RAINFALL	Date records began and ceased where stated	Maximum daily fall (mm)	Date
South-west Peninsula and Channel Islands			
Longstone Barrow	1952	229	15 August 1952
Camelford	1947–1961	203	8 November 1957
Challacombe	1945	193	15 August 1952
Princetown	1924–1961	173	23 November 1946
United Kingdom			
Martinstown (Dorset)	—	279	18 July 1955

WIND	Date records began and ceased where stated	Hourly mean wind speed (knots)	Date	Gust speed (knots)	Date
South-west Peninsula and Channel Islands					
Jersey A/P	1958	68	9 October 1964	94	9 October 1964
St. Mary's	1913–1983	66	15 January 1979	99	15 January 1979
Lizard	1935–1983	66	10 January 1979	91	15 January 1979
Gwennap Head	1972	62	28 January 1978	103	15 January 1979
United Kingdom					
(Low level sites)					
Shoreham-by-Sea	—	72	16 October 1987		
Fraserburgh	—			123	13 February 1989

TABLE 12 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) # Minimum Jan.	Minimum July	Maximum Jan.	Maximum July	Average annual duration of bright sunshine (hours)	Average annual no. of days with* 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 minima (21–09 GMT) and day maxima (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

Aberdeen
Seaforth Centre
Lime Street
Aberdeen AB2 1BJ

Aberdeen (0224) 210571

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) 457753

London
284–286 High Holborn
London WC1V 7HX

01—430 5627

Manchester
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Exchange Street
Stockport SK3 0ER

061—477 1017

Newcastle
7th Floor
Newgate House
Newgate Street
Newcastle-upon-Tyne NE1 5UQ

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:

Belfast International Airport
Belfast
Northern Ireland BT29 4AB

Crumlin (084 94) 22804

Birmingham Airport
Birmingham B26 3QN

021—782 6240

Kirkwall Airport
Kirkwall
Orkney KW15 1TH

Kirkwall (0856) 3802

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

Sullom Voe (0806) 242060

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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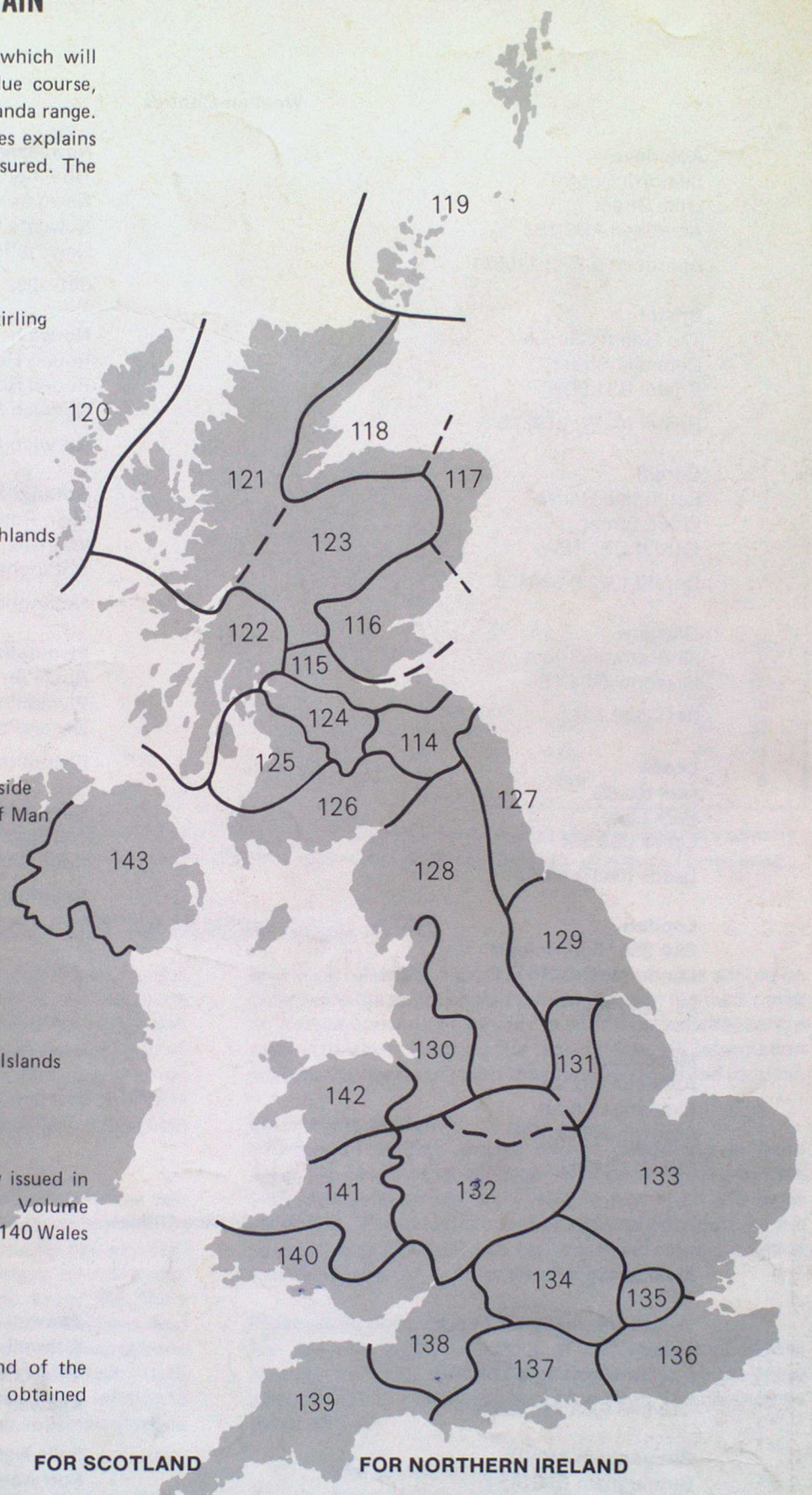
Also available
143 The Climate of Northern Ireland



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
Saughton House
Broomhouse Drive
Edinburgh EH11 3XQ

FOR NORTHERN IRELAND

The Senior Meteorological Officer
Belfast Weather Centre
1 College Square East
Belfast BT1 6BQ

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