

Fact sheet No. 4 – Climate of the United Kingdom

Causes of the weather in the United Kingdom

The United Kingdom lies in the latitude of predominately westerly winds where depressions and their associated fronts (bands of cloud and rain) move eastwards or north-eastwards across the North Atlantic, bringing with them unsettled and windy weather - particularly in winter.

Between the depressions there are often small mobile anticyclones that bring a welcome period of fair weather. It is the sequence of depressions and anticyclones that is responsible for our notoriously changeable weather.

The airstreams associated with the depressions often originate in very cold or very warm regions, but by the time the airstreams reach the United Kingdom, their extreme temperatures have been modified by the seas over which they have travelled.

Consequently, summers in the United Kingdom are usually cooler than those on the continent, but the winters are much often milder.

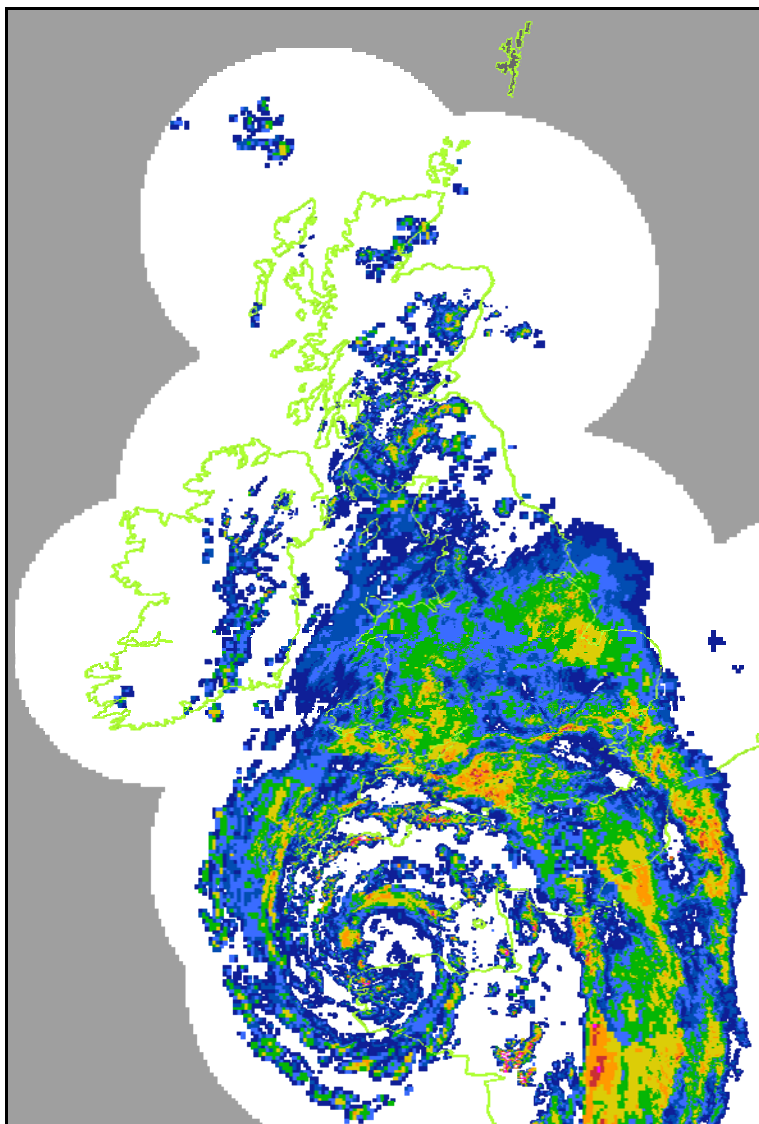


Figure 1. Radar imagery showing a vigorous depression situated to the south of the United Kingdom.

Sometimes large stationary anticyclones become established near the United Kingdom and they 'block' the passage of depressions. These anticyclones are most common in spring but can occur in all seasons - sometimes they can persist for a month or more and completely change the character of the weather.

In summer, the blocking anticyclones can bring a prolonged spell of warm or hot weather to the United Kingdom - they are responsible for 'heat waves'. In winter too, dry weather prevails in anticyclones, but, during cloudless nights, the temperature falls and does not recover during the following day because there is only weak sunshine or persistent fog. If a winter anticyclone settles to the north of the United Kingdom (Scandinavia is a favoured location), then easterly winds on its southern side can draw bitterly cold air from the continent into the United Kingdom for a long period.

Main characteristics of the United Kingdom climate

The western and northern parts of the United Kingdom tend to lie close to the normal path of the Atlantic depressions. Consequently, their winters tend to be mild and stormy, while the summers - when the depression track is further north and the depressions less deep - are mostly cool and windy. The mountains in these regions have an effect — they produce a marked increase in rainfall.

The lowlands of England have a climate similar to that on the continent (drier with a wider range of temperatures than in the north and west). However, the winters are not as severe as those on the continent.

Overall, the south of the United Kingdom is usually warmer than the north, and the west is wetter than the east. The more extreme weather tends to occur in mountainous regions where it is often cloudy, wet and windy.

Temperature

Temperatures are lower at night than by day, with the minimum temperature usually occurring shortly after dawn and the maximum temperature occurring two or three hours after midday.

In urban areas, the minimum temperatures experienced tend not to be as low as those recorded in rural areas (also maximum temperatures are often higher). There are two main reasons for the 'urban heat island' effect: the materials used in buildings store heat; and the release of heat as a result of industrial and domestic energy consumption. Some sheltered low-lying areas have a greater incidence of frosts (and more severe frosts) than the surrounding areas — these are known as 'frost hollows'.

The temperature varies according to the season because the axis of the Earth is tilted in relation to the plane in which it revolves around the sun. January is, on average, the coldest month and July the warmest. In January, the coldest areas are parts of the Aberdeenshire and Perth and Kinross regions of Scotland and the least cold are the extreme southwest of England and the Channel Islands. The main factor determining the distribution of temperature is nearness to the coast, particularly the west coast. Temperatures are lower inland than near the coast. In July, the warmest areas are around London, and the coolest are in parts of Scotland. Areas near the coast are less warm than inland areas — the opposite to what happens in January — and the temperature decreases from south to north.

For both January and July, the modifying influence of the sea on coastal regions (keeping temperatures up in winter but down in summer) is mainly felt in a region up to 15 to 20 miles from the coast.

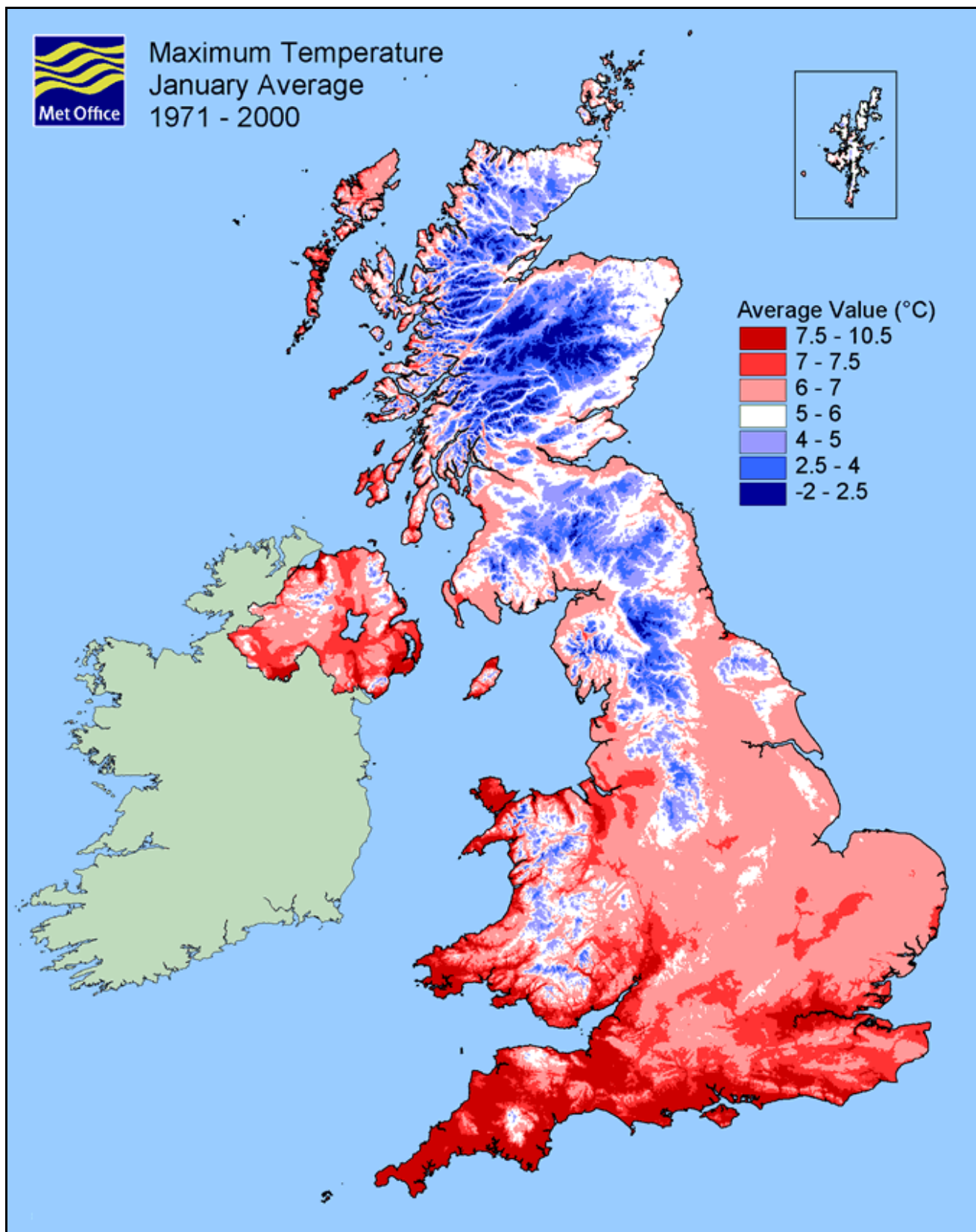


Figure 2. Map showing the 30-year (1971-2000) average maximum temperature values for January.

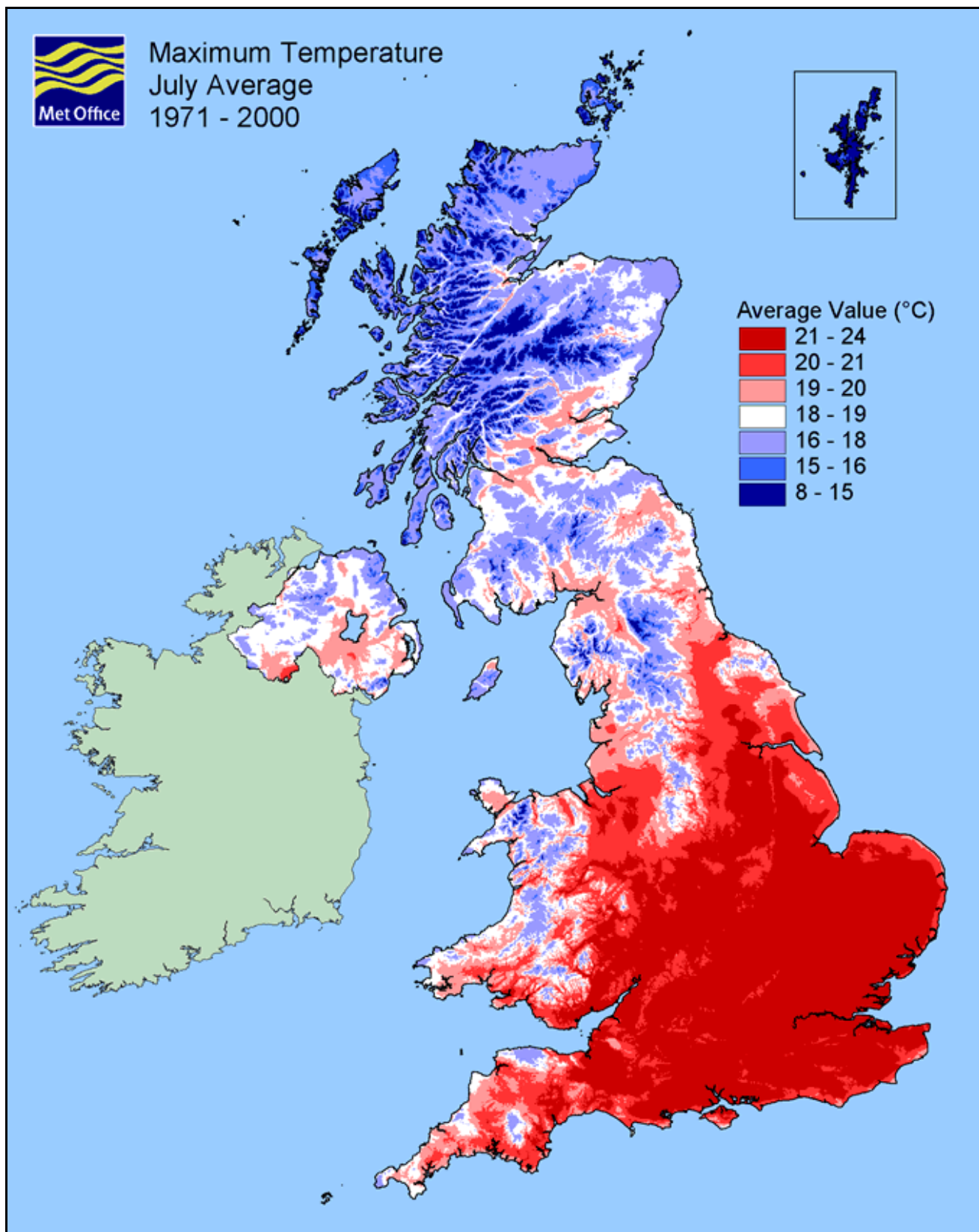


Figure 3. Map showing the 30-year (1971-2000) average maximum temperature values for July.

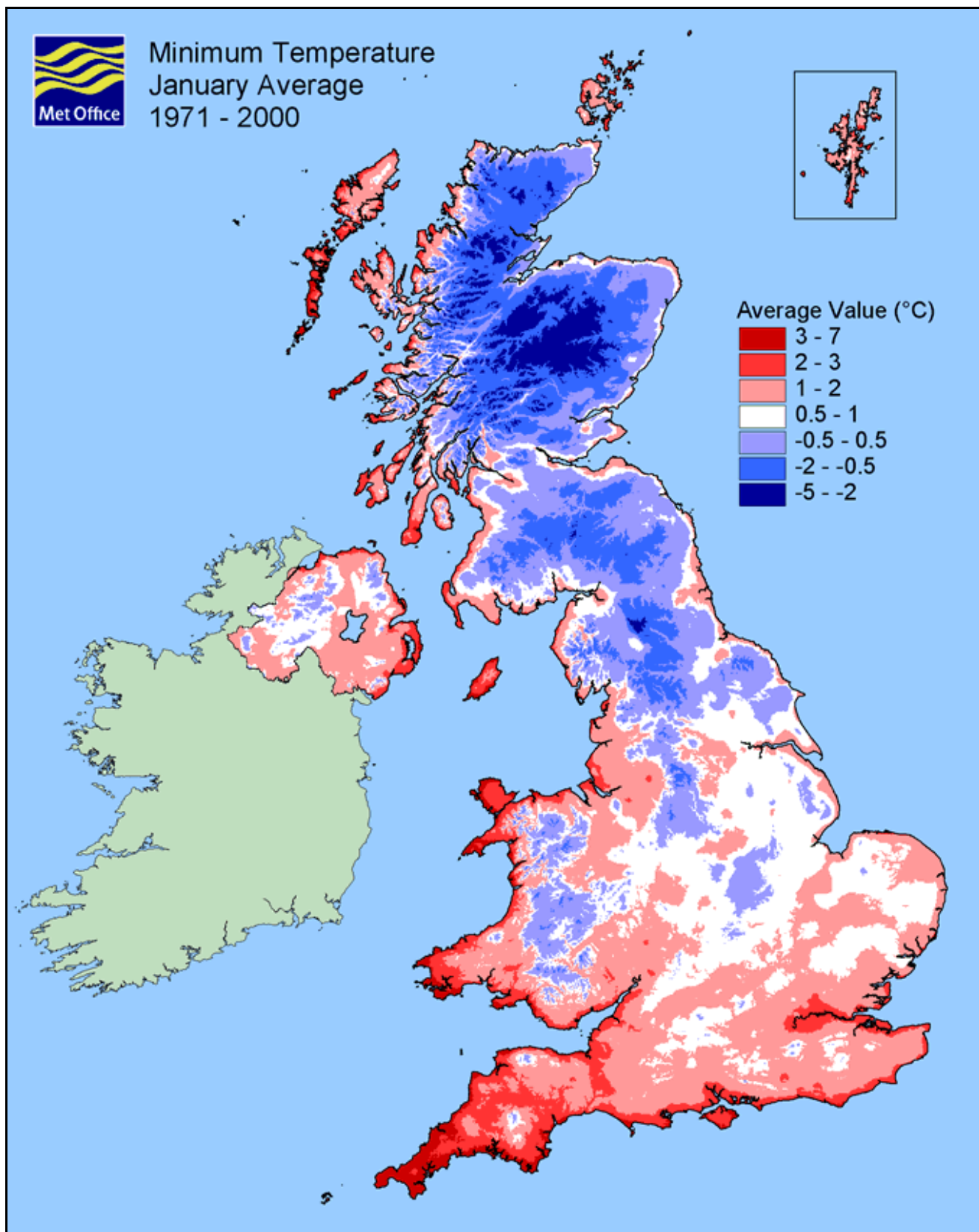


Figure 4. Map showing the 30-year (1971-2000) average minimum temperature values for January.

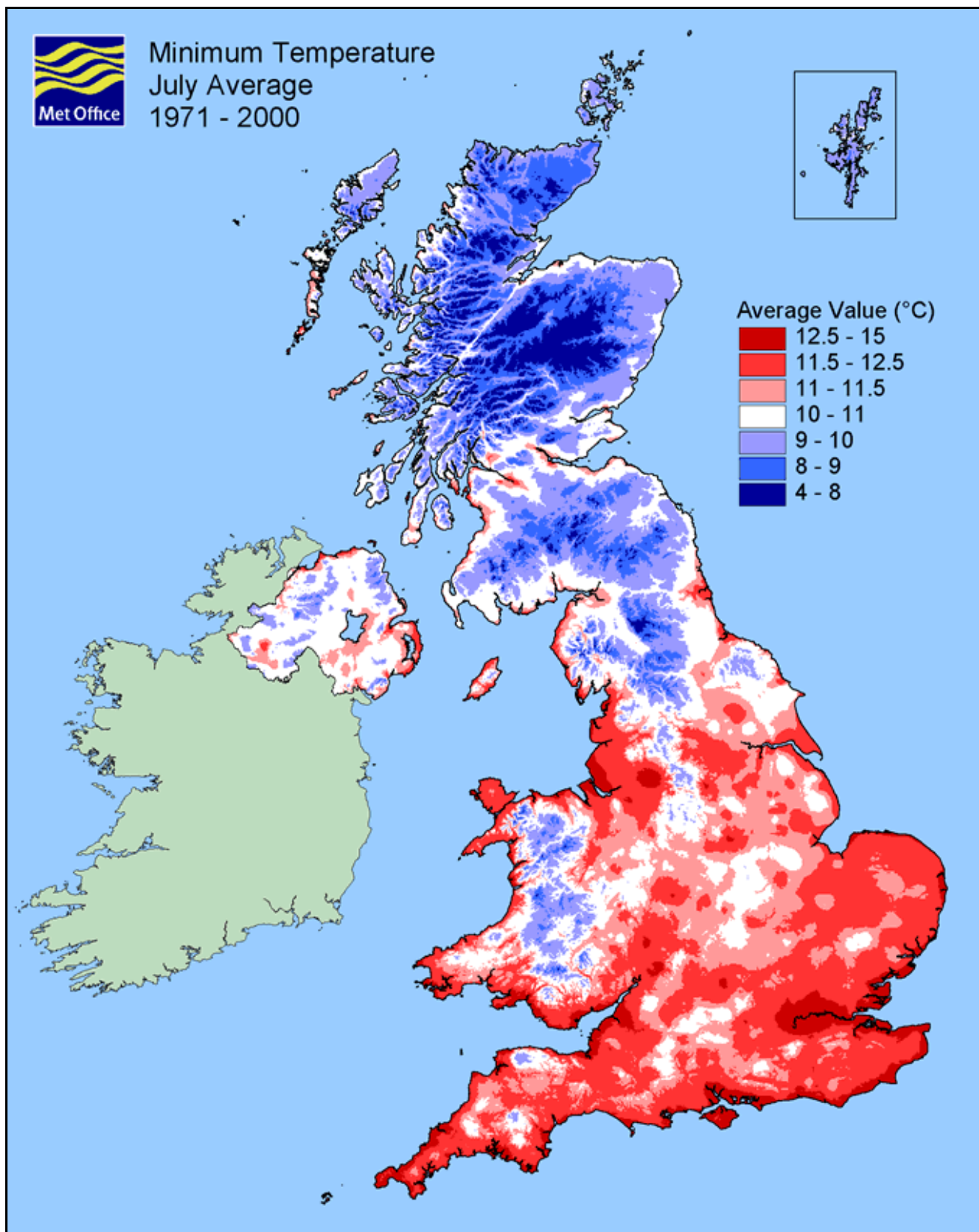


Figure 5. Map showing the 30-year (1971-2000) average minimum temperature values for July.

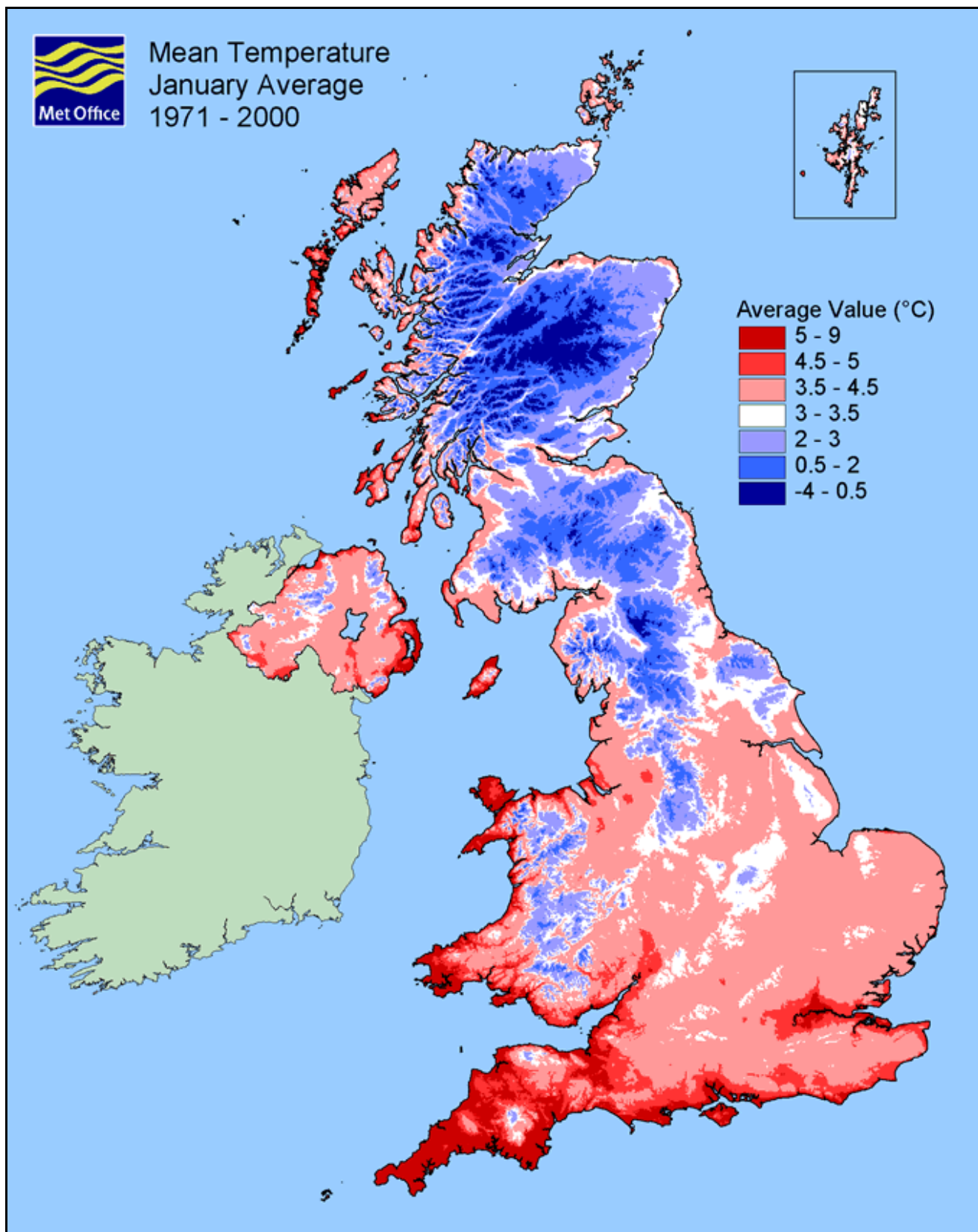


Figure 6. Map showing the 30-year (1971-2000) average mean temperature values for January.

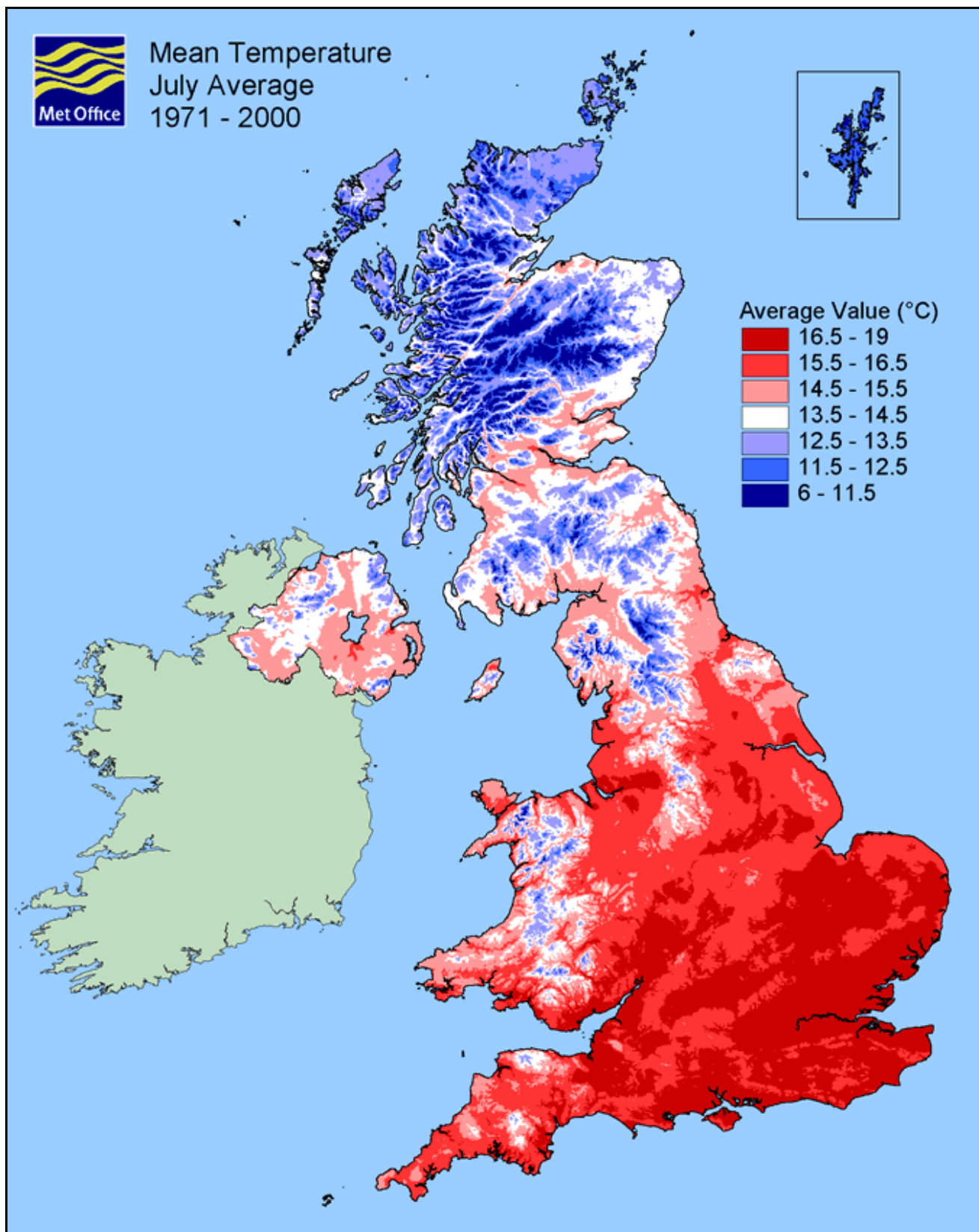


Figure 7. Map showing the 30-year (1971-2000) average mean temperature values for July.

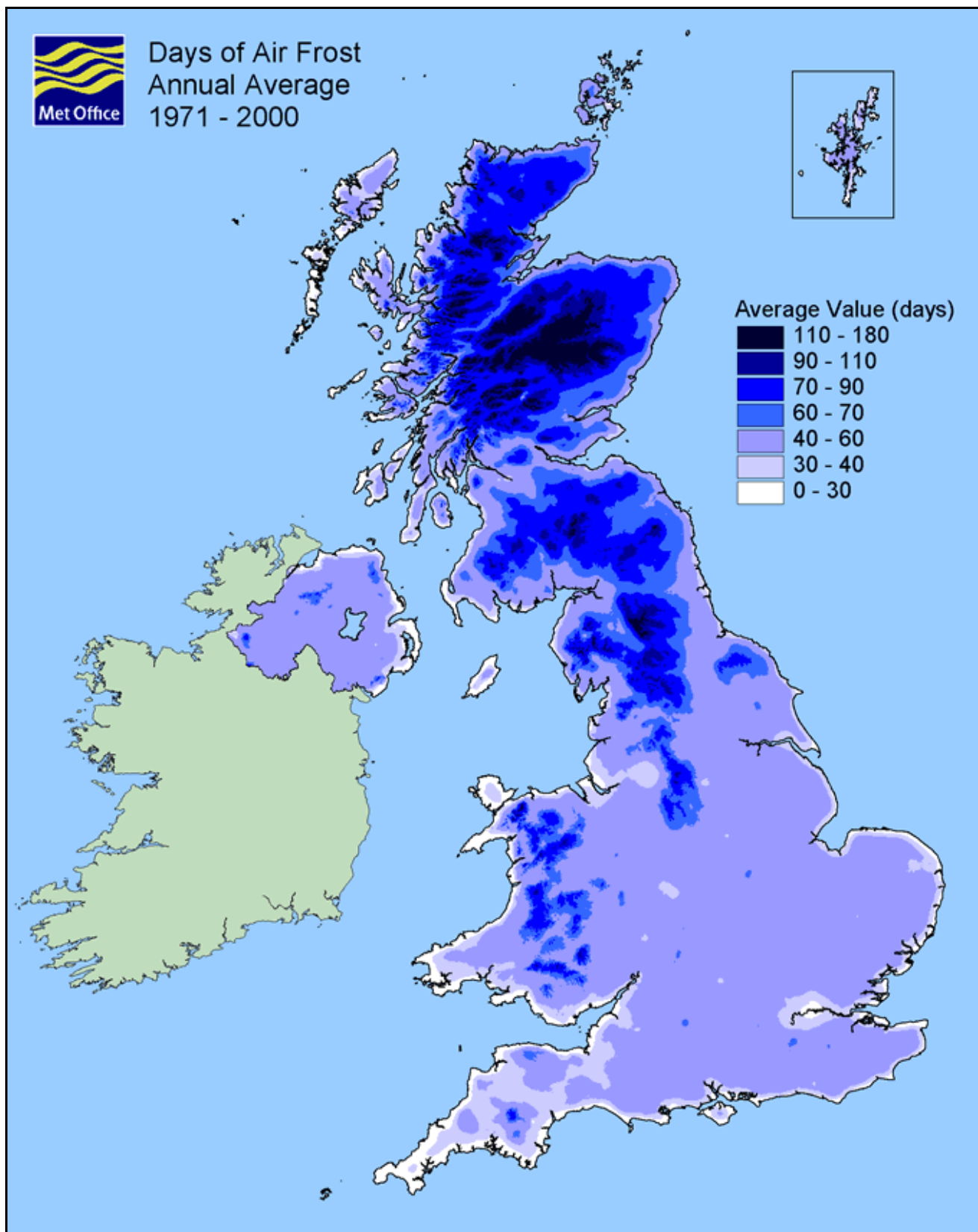


Figure 8. Map showing the 30-year (1971-2000) average number of days of air frosts per year.

Sunshine

Because of the variation in length of day from winter to summer, the duration of sunshine shows a marked seasonal variation. As a consequence, December is, on average, the month with least sunshine and June is the sunniest. In general, sunshine durations decrease with altitude and increasing latitude. Aspect also plays an important part - for example, south-facing slopes receive more sunshine than those facing north.

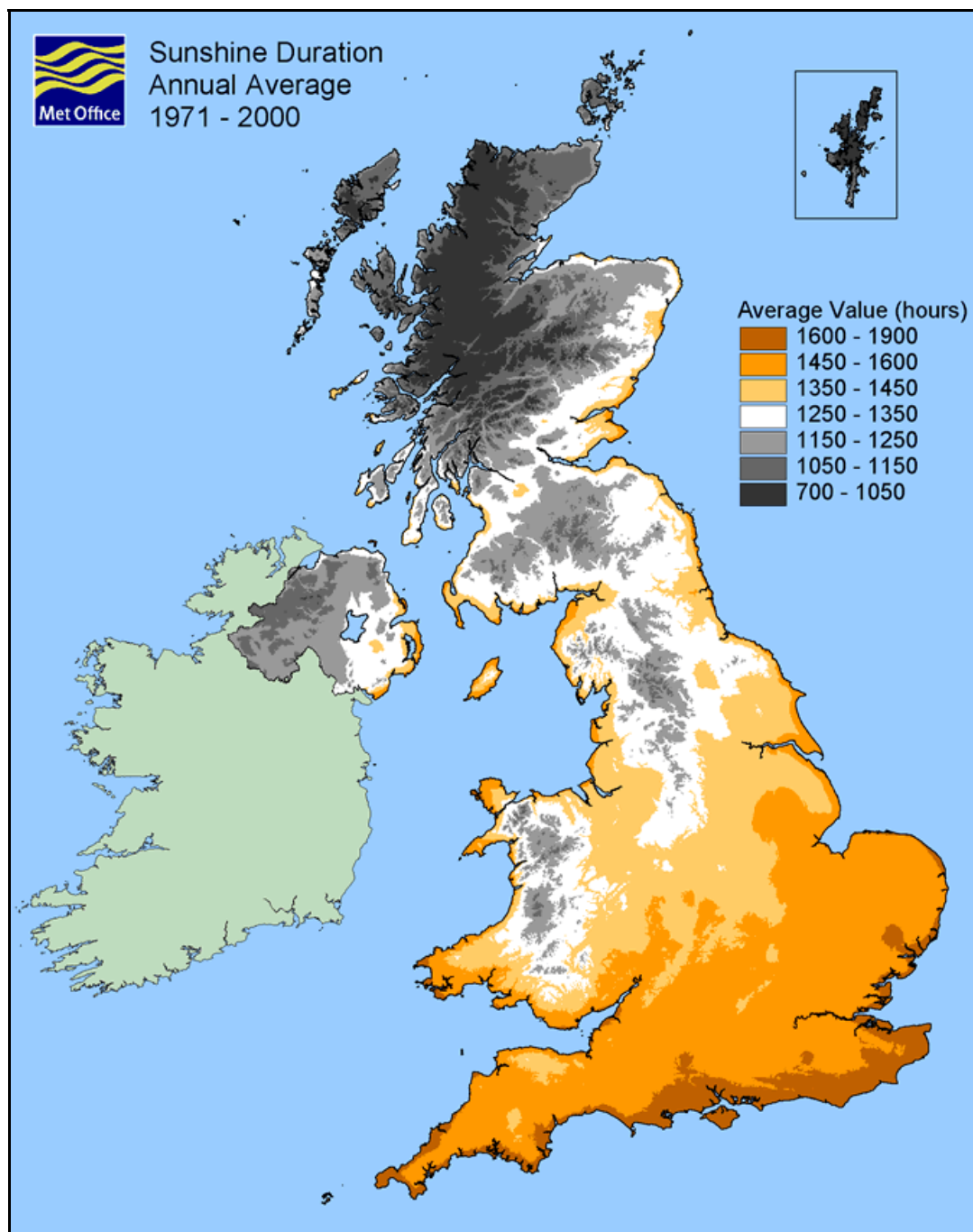


Figure 9. Map showing the 30-year (1971-2000) average annual sunshine duration.

Over the year as a whole, the sunniest places are flat areas near the coast. Some sites along the south coast, from the Isle of Wight eastwards, and the Channel Islands record more than 40% of the maximum amount of sunshine possible in a year (1,800 hours out of 4,000). The Shetland Islands, on the other hand, only achieve about 24% of the maximum possible.

Rainfall

The average annual rainfall varies enormously over the United Kingdom from about 5,000 mm (200 inches) in parts of the western highlands of Scotland, to about 500 mm (20 inches) in parts of East Anglia and the Thames Estuary. Overall, the wettest areas are in the western half of the country.

There are two reasons for this:

- They are nearest to the normal track of rain-bearing depressions.
- The most mountainous parts of the United Kingdom are in the west and, when the moist westerly winds are forced to rise over the mountains, rain is produced.

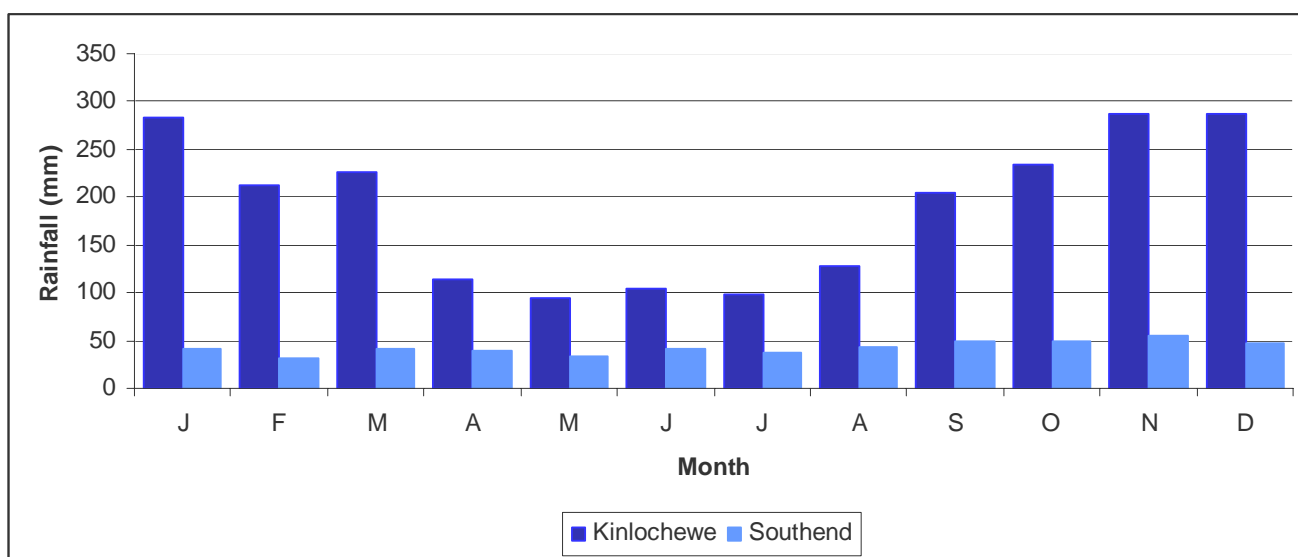


Figure 10. Graph showing the monthly rainfall averages for Kinlochewe in northwest Scotland and Southend in southeast England.

The south-eastern parts of the country have low rainfall because they are further away from the normal track of the depressions. However, much of the Midlands, north-east England and eastern Scotland also have low rainfall because the westerly winds have already dropped much of their water over the mountains in the west. These regions are in a 'rain shadow'.

Although the wettest parts of the United Kingdom have, on average, ten times as much rain as the driest parts, there is much less difference in the number of rain days. Rain days are defined as days when 0.2 mm (0.01 inches) or more of rain falls. On average, the drier areas have 150 and 200 such days a year, while the wettest areas have slightly more than 200. In most areas, December is the month with the most rain days.

In western areas, the winter half of the year (October to March) tends to receive over half the annual average rainfall. However, in eastern areas there is not such a marked variation, although they generally have more rain in the autumn and less in the spring than in the other two seasons.

The nature of the rainfall varies during the year. In summer, rainfall is often showery and is normally more intense than winter rainfall, which tends to be associated with fronts and depressions. The heaviest falls of rain are usually associated with summer thunderstorms. Sometimes more than 100 mm (4 inches) per hour for just a few hours.

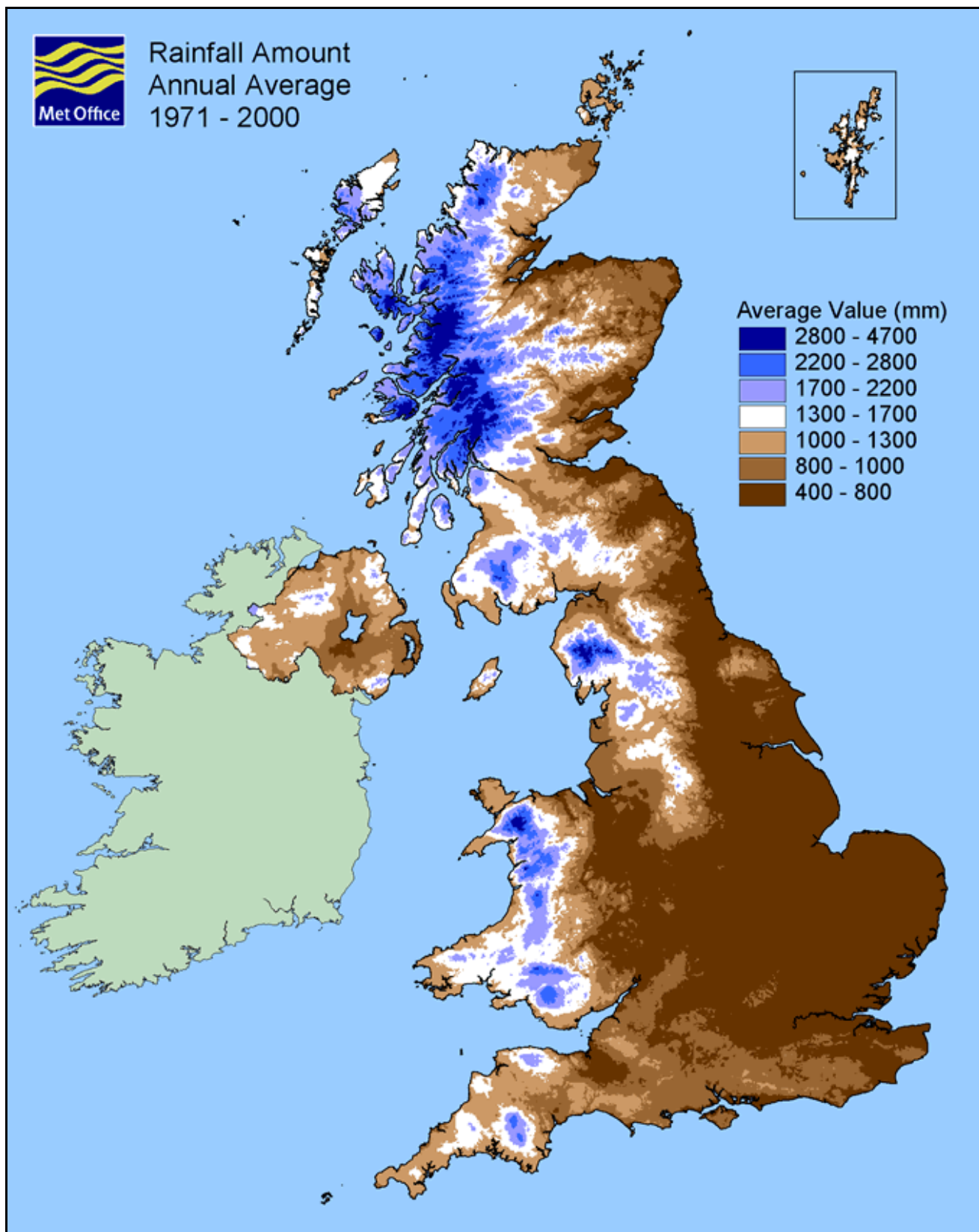


Figure 11. Map showing the 30-year (1971-2000) average annual rainfall amounts across the United Kingdom.

Snow

The average number of days in a year on which snow is observed to fall increases with latitude and height above mean sea level. Falls of sleet and snow over low-lying areas are normally confined to October to April. Although falls of sleet or snow do occasionally occur in May and there have been isolated falls in June. There are, however, large variations from one year to another in the frequency of snowfalls.

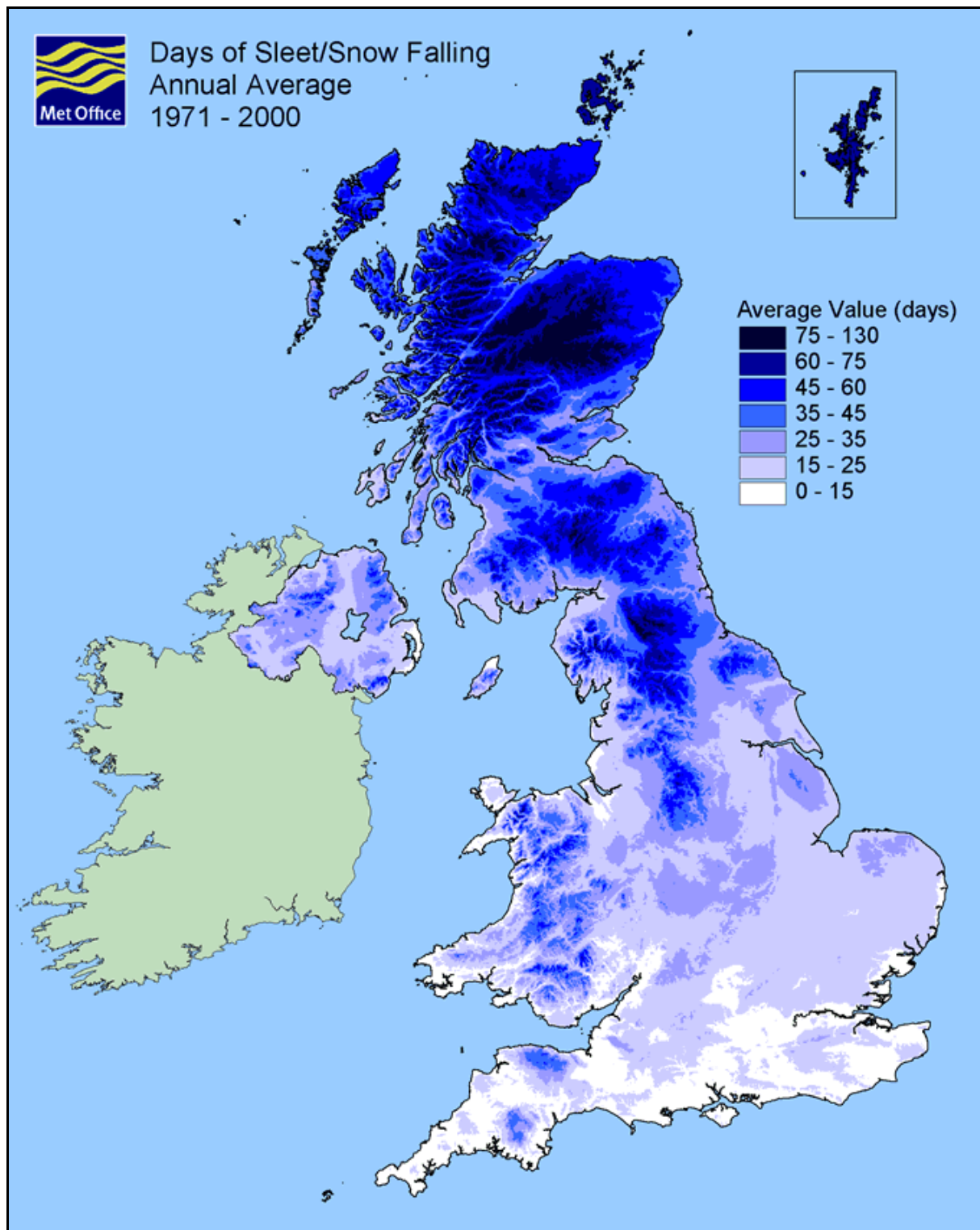


Figure 12. Map showing the 30-year (1971-2000) average number of days of snow/sleet falling per year across the United Kingdom.

Snow rarely lies on low ground before December or after March. The number of days with snow lying is usually less than the number of days with snow falling because, in many cases, when snow is falling, the temperature of the air above the ground remains above freezing point, so the snow melts.

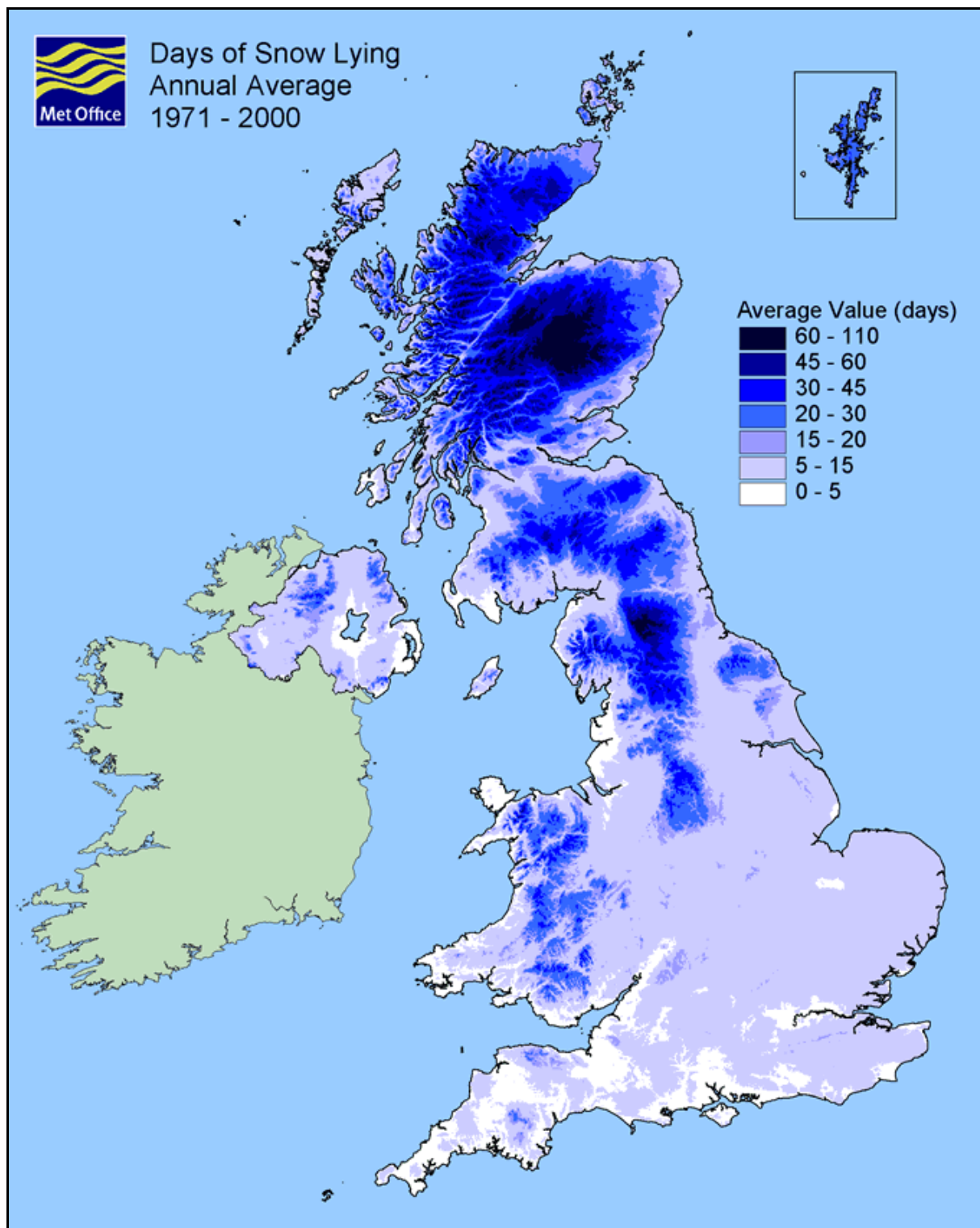


Figure 13. Map showing the 30-year (1971-2000) average number of days of snow lying per year across the United Kingdom.

For every 100 m increase in altitude there is an increase of about five-a-year in the number of days with sleet or snow falling and lying.

Wind

The strongest winds are associated with the passage of depressions across or close to the United Kingdom. As the frequency of depressions is greatest during the winter months, this is when the strongest winds usually occur. The majority of depressions approach the United Kingdom from the Atlantic, so the windiest areas are the western coasts and hills. Wind speeds decrease away from the coasts due to increased friction over the land, but increase over hills and mountains.

An interesting aspect of wind over the United Kingdom is the frequency of gales (average wind speeds of 34 knots (39 mph) or more). Most places inland have gales a few times a year. Western coasts have the highest frequency of gales, especially the western isles of Scotland. On other coasts, gales are still more frequent than inland.

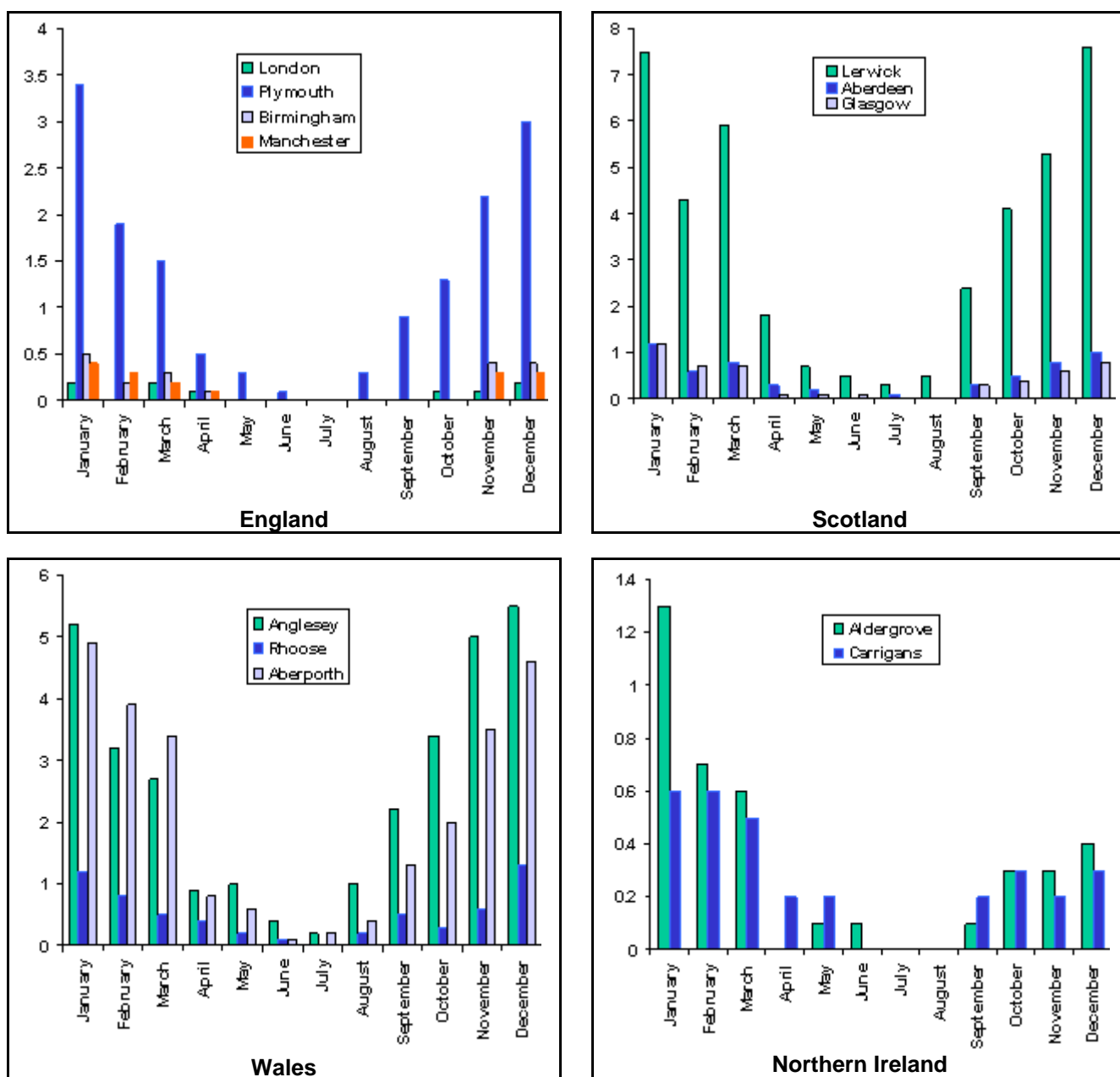


Figure 14. 30-year (1961-1990) average number of days of gales for selected stations.

Thunder

Thunder can occur in any part of the United Kingdom at any time of the year, but in most places there is a maximum frequency of occurrence in the summer months. The areas with the greatest frequency over the year are East Anglia, east Midlands and south-east England.

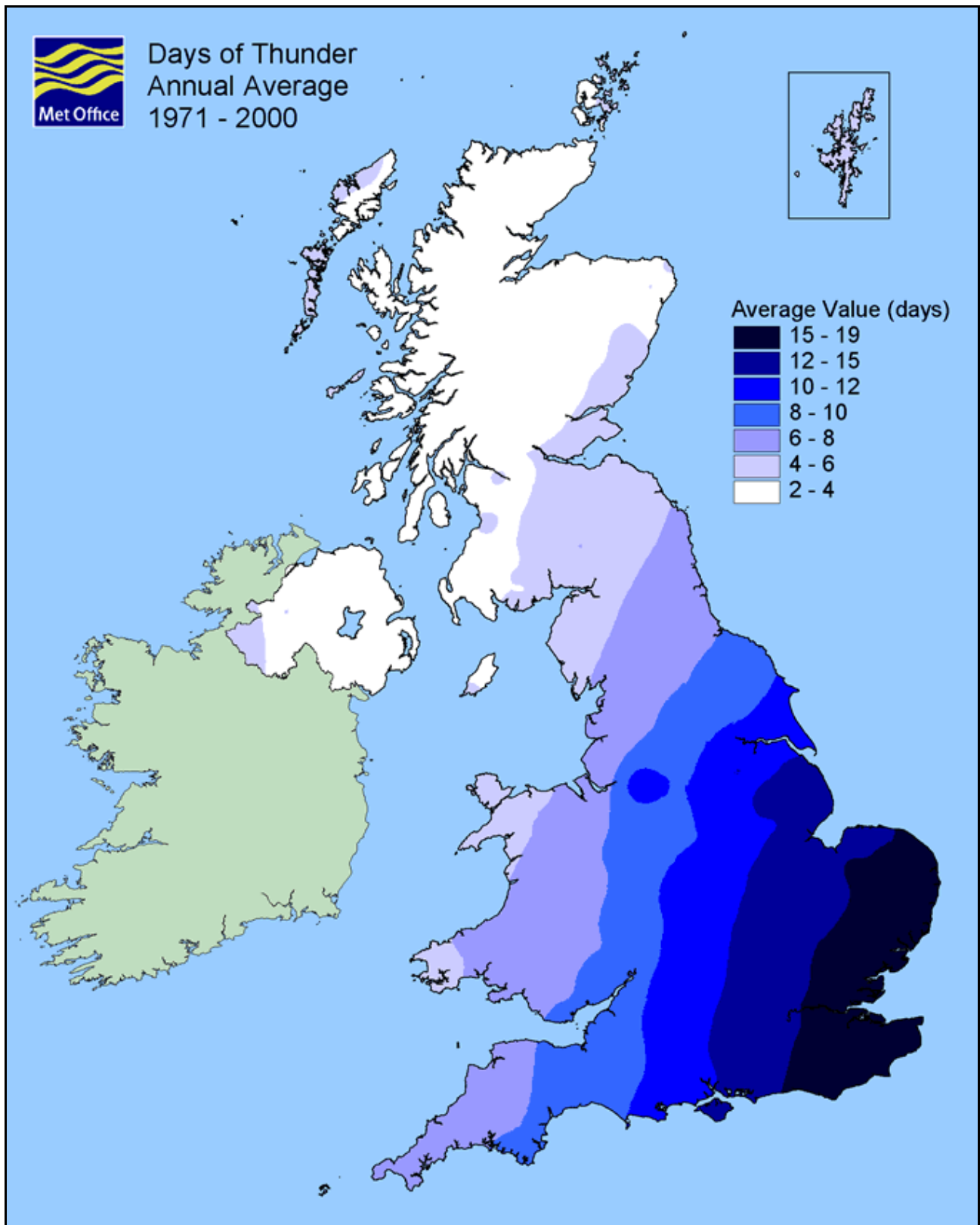


Figure 15. Map showing the 30-year (1971-2000) average number of days of thunder per year across the United Kingdom.

This fact sheet has been produced in conjunction with the Met Office's National Climate Information Centre.

For more information about services supplied by the Met Office, please contact the Met Office Customer Centre for details.

Contact the Customer Centre: **Tel: 0870 900 0100**
Fax: 0870 900 5050
Email: enquiries@metoffice.gov.uk

If you are outside the UK: **Tel: +44 (0)1392 885680**
Fax: +44 (0)1392 885681

The National Meteorological Library's collection includes books and reports, many of which are available for loan. We also hold a comprehensive journal collection and a selection of images covering clouds and weather phenomena, to instruments and the work of the Met Office. For more information about any of the above, please contact the Library for details.

Contact the Library: **Tel: 01392 884845**
Email: metlib@metoffice.gov.uk

Our unique collection of weather images is available via the National Meteorological Library and Archive's online catalogue. The collection illustrates all aspects of meteorology, from clouds and weather phenomena, to instruments and the work of the Met Office. Our online catalogue can be found at:

<http://www.metoffice.gov.uk/corporate/library/catalogue.html>

All of the fact sheets in this series are available to download from the Met Office's website. The full list can be found at:

<http://www.metoffice.gov.uk/corporate/library/factsheets.html>

Other titles in this series still available are:

- Number 1 – Clouds
- Number 2 – Thunderstorms
- Number 3 – Water in the atmosphere
- Number 5 – White Christmases
- Number 6 – The Beaufort Scale
- Number 7 – Climate of Southwest England
- Number 8 – The Shipping Forecasts
- Number 9 – Weather extremes
- Number 10 – Air masses and weather fronts
- Number 11 – Interpreting weather charts
- Number 12 – National Meteorological Archive
- Number 13 – Upper air observations and the tephigram
- Number 14 – Microclimates
- Number 15 – Weather radar
- Number 16 – World climates