

Southern England: climate

This describes the main features of the climate of Southern England from Kent westwards to Wiltshire and Dorset

Much of the eastern half of this area is densely populated, as it includes Greater London and centres of population such as Reading, Slough, Southampton, Portsmouth, Brighton and the Medway towns. There are large areas of open countryside in the area as well, including the North and South Downs, the Chiltern Hills, Salisbury Plain and the Dorset Downs. Most of the area is below 100 metres above sea level but the hill and downland landscapes include large areas over 100m and high points such as Butser Hill, Hampshire (270 metres), Leith Hill, Surrey (294 metres) and Walbury Hill, Berkshire (297 metres). The eastward flowing Thames and its tributaries drain the northern half of the area, whilst elsewhere rivers such as the Arun, Test, Itchen and Avon flow southwards to the English Channel. In Kent, the Medway and its tributaries flow north to the Thames estuary.



Southern England is the part of the UK closest to continental Europe and as such can be subject to continental weather influences that bring cold spells in winter and hot, humid weather in summer. It is also furthest from the paths of most Atlantic depressions, with their associated cloud, wind and rain, so the climate is relatively quiescent.

Temperature

Mean annual temperatures vary from about 11.5 °C in central London and along the south coast to about 9.5 °C over higher ground well inland. Over the UK, mean annual temperatures range from about 7 °C in the Shetlands to over 11 °C in Cornwall and the Channel Islands.

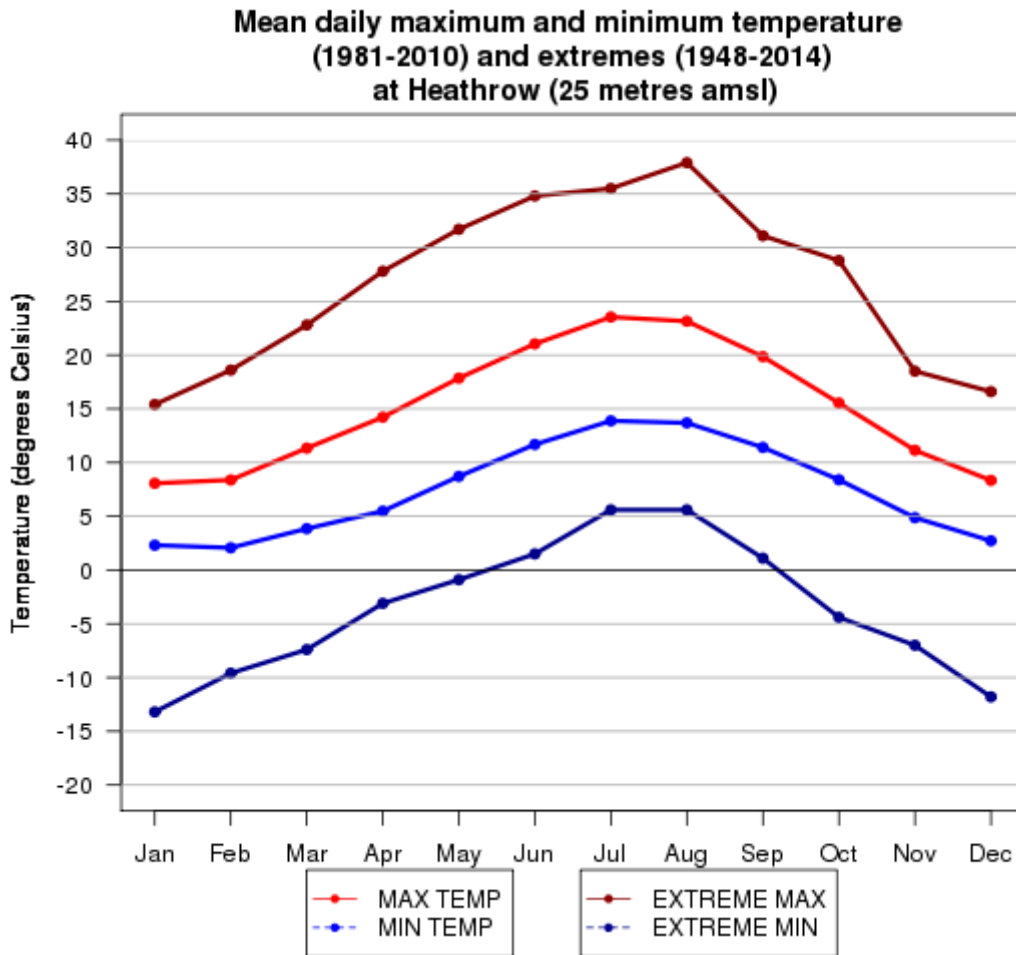
Temperature shows both a seasonal and a diurnal variation. Minimum temperatures usually occur around sunrise and maximum temperatures are normally 2 to 3 hours after midday.

January is the coldest month, with mean daily minimum temperatures varying from over 3 °C in London and along the coast to about 0.5 °C over the higher ground. Extreme minimum temperatures usually occur in December or January; examples include -13.8 °C at Marlborough, Wiltshire on 3 January 1979 and -18.2 °C at Lacock, Wiltshire on 13 December 1981. On the latter date, -11.8 °C was recorded at Heathrow (Greater London), whilst at St James's Park (Central London) the temperature fell no lower than -7.0 °C.

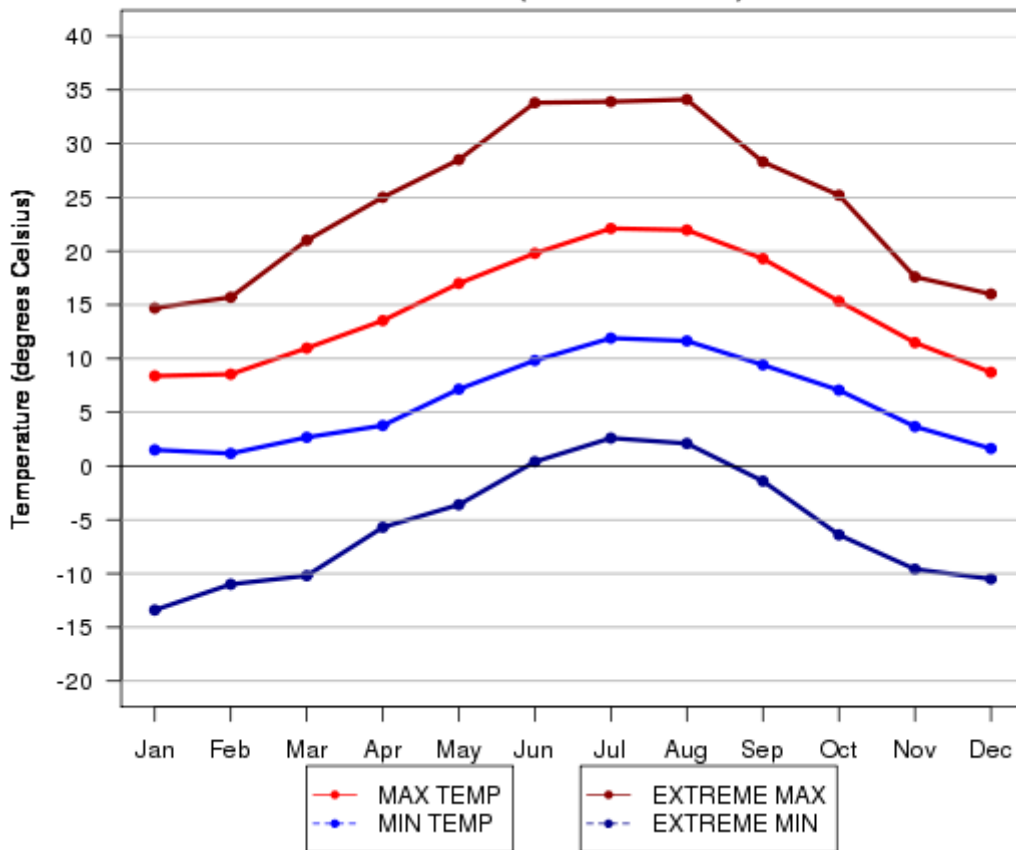
July is the warmest month, with mean daily maximum temperatures in the London area of 23.5 °C, the highest in the UK. Elsewhere in southern England the mean maxima are somewhat lower, and are close to 21 °C over the higher ground and along the south coast. Extreme maximum temperatures can occur in July or August, and are usually associated with heat waves lasting several days. Examples include that of late June/early July 1976, when 35.4 °C was recorded at North Heath, Sussex on 26 June and 35.6 °C at Southampton on 28 June, the heat wave of August 1990 when 36.5 °C occurred at Heathrow on 3rd and that of August 2003 when temperatures over 37 °C were recorded widely on 10th and a new UK record of 38.5 °C was set at Faversham, Kent. Heat waves are usually accompanied by warm nights, and notable examples include minimum temperatures of 23.9 °C at Brighton on 4 August 1990 (setting a UK record) and 23.2 °C at Ventnor, Isle of Wight on 10 August 2003.

From late spring through the summer, coastal areas can be affected by sea breezes, which result in lower maximum temperatures than further inland. In winter, coastal areas are generally milder than inland. However, in cold easterly winds places on the Kent and Sussex coasts can be just as cold as inland as the short sea track over the Dover Straits does not warm the cold continental air.

The variation of mean daily maximum and minimum temperatures month by month, together with the highest and lowest temperatures recorded, is shown for Heathrow and Hurn.



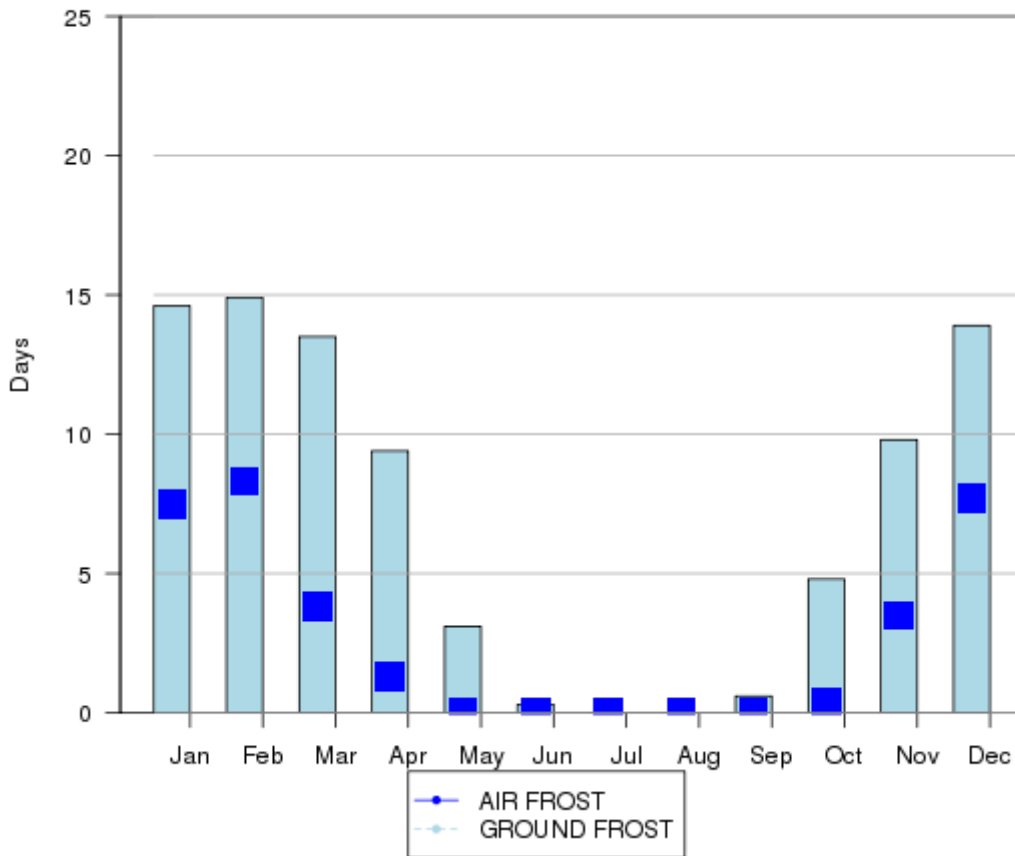
**Mean daily maximum and minimum temperature
(1981-2010) and extremes (1957-2014)
at Hurn (10 metres amsl)**



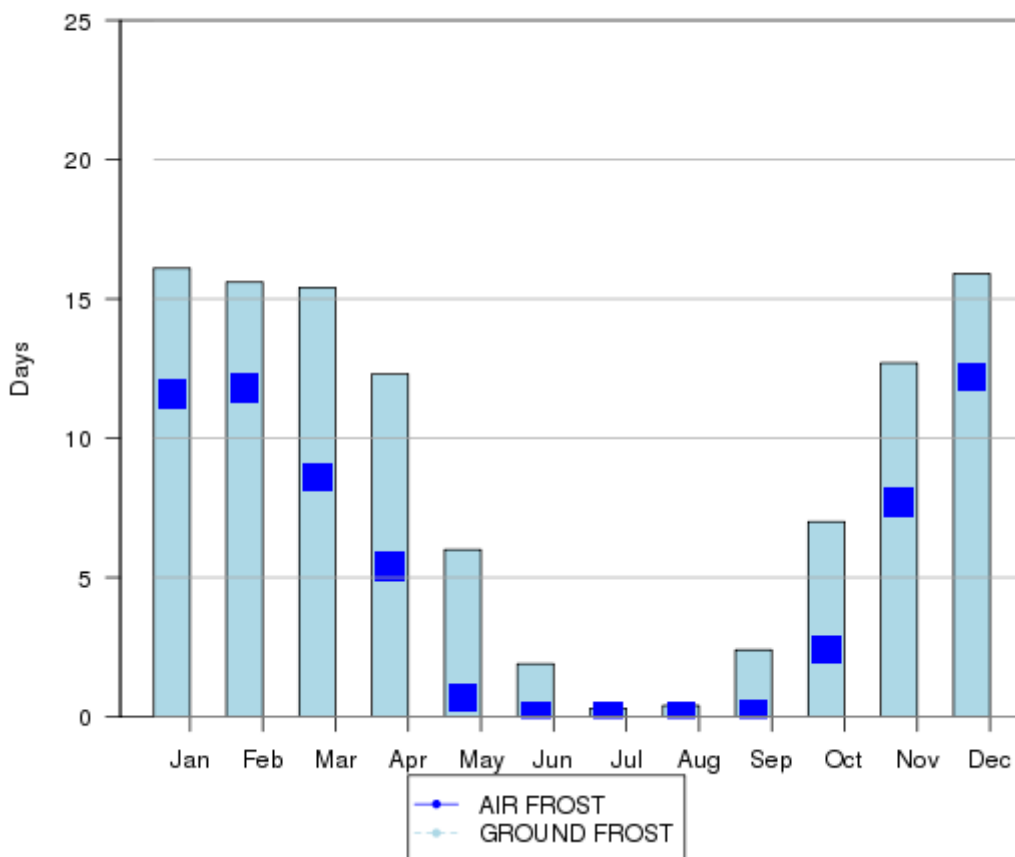
An 'air frost' occurs when the temperature at 1.25 metres above the ground falls below 0 °C, whereas incidence of a 'ground frost' refers to a temperature below 0 °C measured on a grass surface. The average number of days with air frost in Southern England varies from less than 30 a year in London and in areas bordering the Thames Estuary and the South Coast to more than 50 a year over the higher ground. Ground frost averages range from less than 60 days to over 110 days per year, with a similar distribution to air frost. However, those places into which cold air can drain are particularly prone to frost. Examples include the plain below the scarp slope of the Chiltern Hills in Oxfordshire where Benson, near Wallingford, averages about 55 air frosts and 110 ground frosts each year; here, only July and August are free of air frost and ground frost can occur in any month. In contrast, there is an urban heat-island effect associated with London, caused by the fabric of the buildings retaining heat from day time insolation. This is most conspicuous overnight in cold spells with light winds from late autumn to early spring, when temperatures in central London can be over 5 °C higher than in the outer suburbs and surrounding rural areas. The heat-island is also evident in summer heat waves.

The graphs show the average frequency of air and ground frost at Heathrow and Hurn. Although near to the coast, the topography and light soil at Hurn make it relatively prone to frost, with a ground frost possible in most months.

Average annual number of days of air and ground frost (1981-2010) at Heathrow (25 metres amsl)



Average annual number of days of air and ground frost (1981-2010) at Hurn (10 metres amsl)



Sunshine

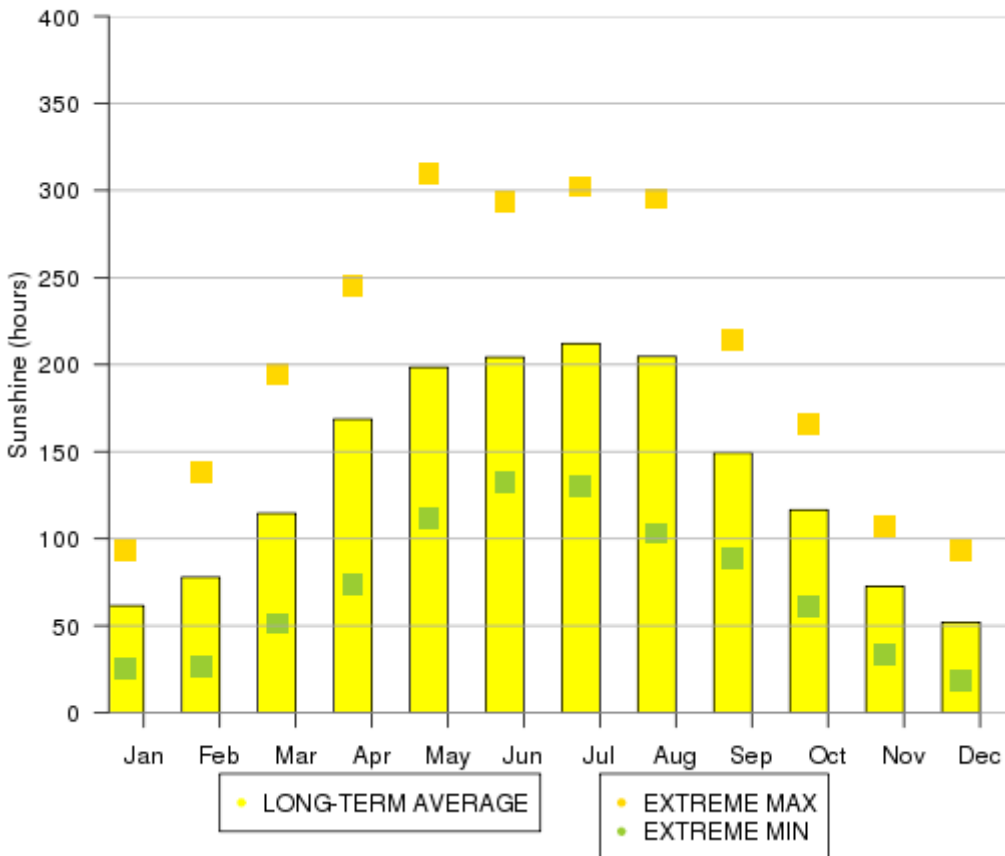
The number of hours of bright sunshine is controlled by the length of day and by cloudiness. In general, December is the dulllest month and June the sunniest.

Sunshine duration decreases with increasing altitude, increasing latitude and distance from the coast. Industrial pollution and smoke haze can also reduce sunshine amounts but, since the Clean Air Act of 1956 and a decline in heavy industry, there has been an increase in sunshine duration over the London area particularly in the winter months.

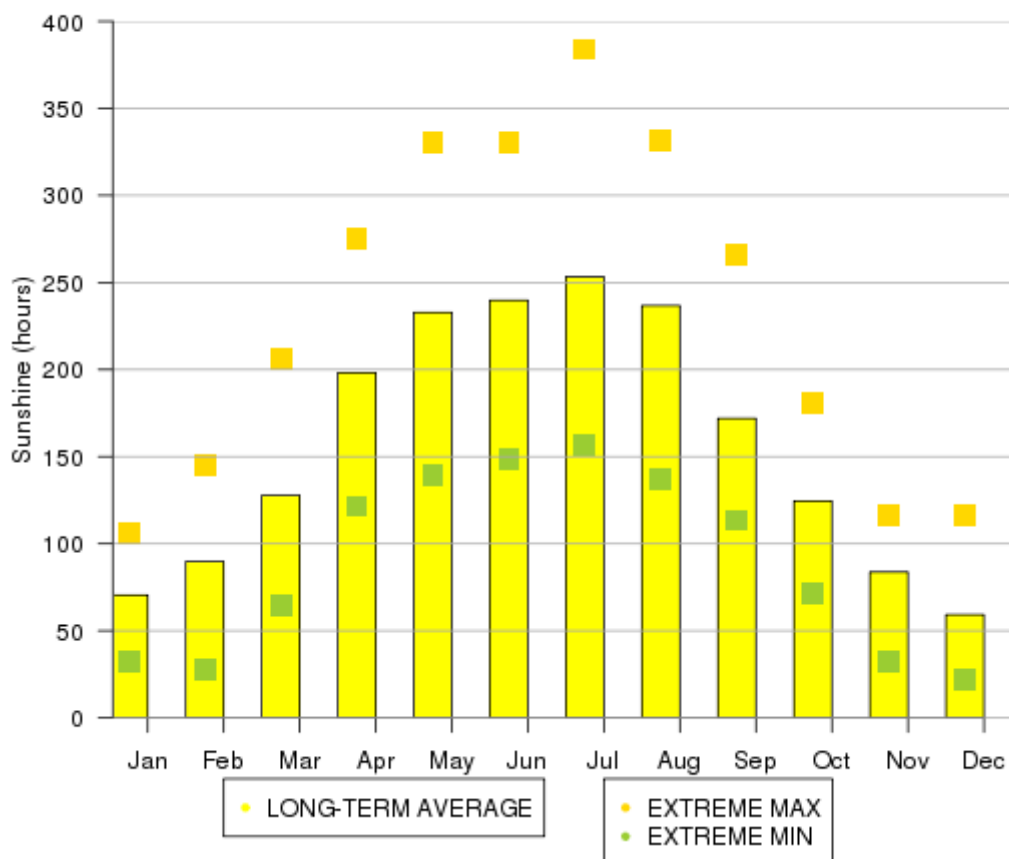
Southern England includes the sunniest places in mainland UK, these being the coastal resorts of Sussex and Hampshire. The Isle of Wight also features in the list of high sunshine averages. On the coast average annual sunshine durations can exceed 1800 hours, but 1550-1600 hours is typical of most of the region with a decrease towards the north (e.g. less than 1500 hours over the higher Chilterns).

The graphs show the average monthly sunshine totals for Heathrow and Eastbourne, together with the highest and lowest totals recorded in the stated periods.

Mean monthly sunshine (1981-2010) and extremes (1957-2014) at Heathrow (25 metres asl)



Mean monthly sunshine (1981-2010) and extremes (1911-2014) at Eastbourne (7 metres asl)



The highest known monthly sunshine total in the region is 383.9 hours at Eastbourne, East Sussex in July 1911, which is a UK record. In the duller winter months, less than 20 hours have been recorded with none at all in central London in December 1890. High annual totals include the 2237 hours recorded at Bognor Regis in 1990, one of a remarkable series of years 1983-1991 when the West Sussex resort was the sunniest place on the mainland.

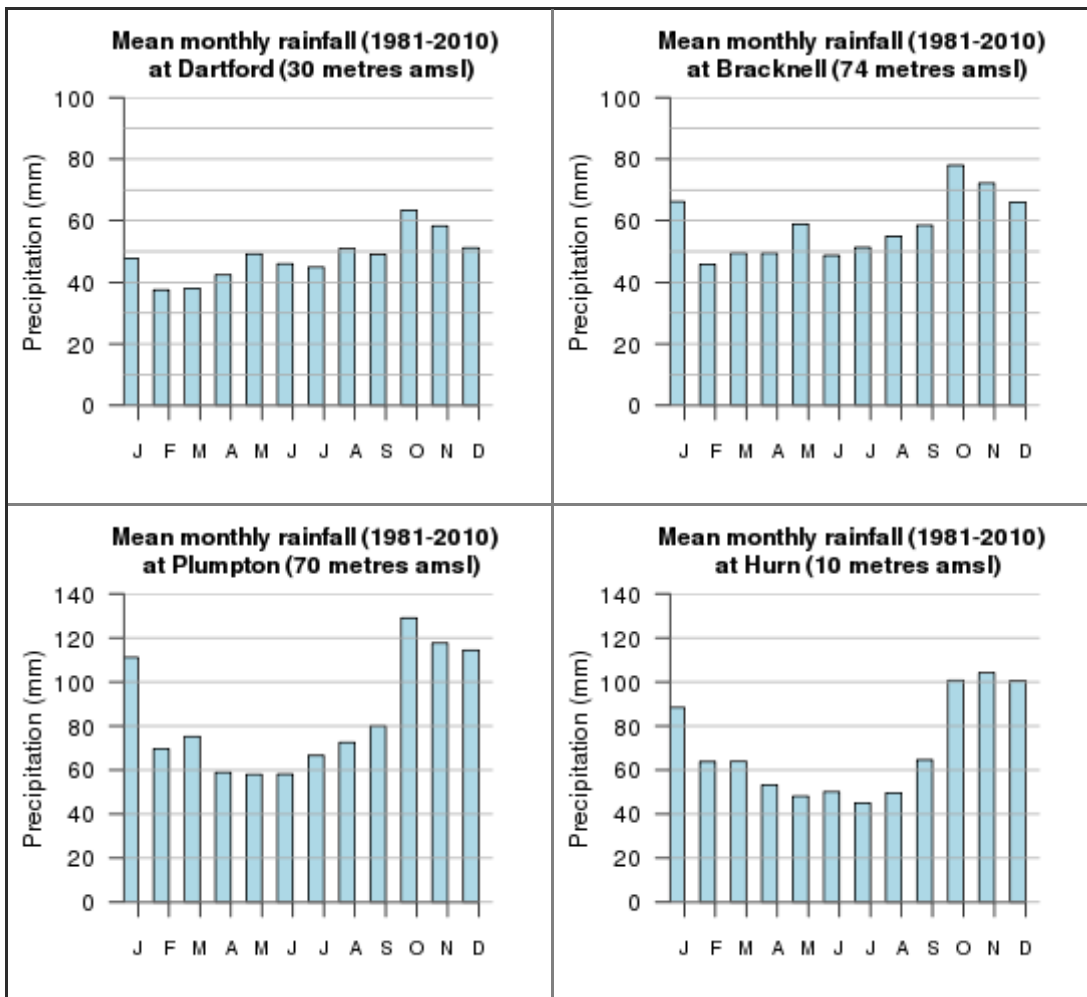
Rainfall

Rainfall is caused by the condensation of the water in air that is being lifted and cooled below its dew point. Rainfall tends to be associated with Atlantic depressions or with convection. The Atlantic Lows are more vigorous in autumn and winter and bring most of the rain that falls in these seasons. In summer, convection caused by solar surface heating sometimes forms shower clouds and a large proportion of rain falls from showers and thunderstorms then. The additional heat from the London urban area can encourage such shower development in summer.

A further factor that greatly affects the rainfall distribution is altitude. Moist air that is forced to ascend hills may be cooled below the dew point to produce cloud and rain. A map of average annual rainfall therefore looks similar to a topographic map.

Much of Southern England is relatively distant from the route of many Atlantic depressions and towards the north-east of the region there is increasing shelter from rain-bearing SW winds. This shelter reaches its greatest potential around the Thames Estuary. The wettest areas are therefore the South Downs and the higher parts of Dorset, with an average of over 950 mm per year. In contrast, the Thames Valley, London and the north Kent coast normally receive less than 650 mm of rain per year, and less than 550mm around the Thames Estuary. These values can be compared with annual totals around 500 mm in the driest parts of eastern England and over 4000 mm in the western Scottish Highlands.

Rainfall is generally well-distributed throughout the year but with an autumn/early winter maximum that is more pronounced in counties bordering the English Channel. Further north, in London and the Thames Valley, there are also significant amounts in the summer associated with showery, convective rainfall. The course of mean monthly rainfall for 1981 - 2010 for 4 sites is shown below.



Over much of Southern England, the number of days with rainfall totals of 1 mm or more ('wet days') tends to follow a pattern similar to the monthly rainfall totals. In winter (December to February), there are 35 to 40 wet days on average over the Downs and the higher parts of the west, decreasing to less than 30 days around the Thames Estuary. In summer (June to August) there are about 25 wet days, with the North Downs and western areas being most prone.

Periods of prolonged rainfall can lead to widespread flooding, especially in winter and early spring when soils are usually near saturation. An example was the widespread inundation of the Thames flood plain in early January 2003, following well above average rainfall the previous autumn and significant rain in late December 2002. Flows on the middle reaches of the Thames were the highest since March 1947. Heavy rainfall in October 2000 also resulted in severe, localised flooding, with Sussex being particularly hard hit including Uckfield where homes and businesses were inundated when the River Uck burst its banks. Falls included 134 mm in 24 hours on 11 October at Plumpton.

Southern England is susceptible to summer thunderstorms, especially at inland locations. The associated high intensity rainfall can also result in flooding, but this is usually short-lived. Noteworthy examples include the storm at Hampstead (Greater London) on 14 August 1975, when 169 mm fell in 2.5 hours, and one at Bracknell (Berkshire) on 7 May 2000 when 65 mm occurred in 1 hour. The intense thunderstorms that broke out during the afternoon and evening of the 18 July 1955 resulted in rainfalls of over 175 mm in south Dorset. The highest was a remarkable 279.4 mm at Martinstown, near Dorchester and this is the highest daily fall ever recorded in the UK.

Conversely, the region can be subject to dry periods that place demands upon water supplies and require conservation measures such as summer hosepipe bans. If a period with below average rainfall includes winter months as well as the high-demand summer months, then conditions can become severe as the winter is the normal recharge time not only for reservoirs but the chalk aquifers upon which much of the region relies for water supplies. Examples include the period November 2004 to February 2006, when about 75% of the normal rainfall occurred over the area, making it the driest such period since 1932/34.

Snowfall

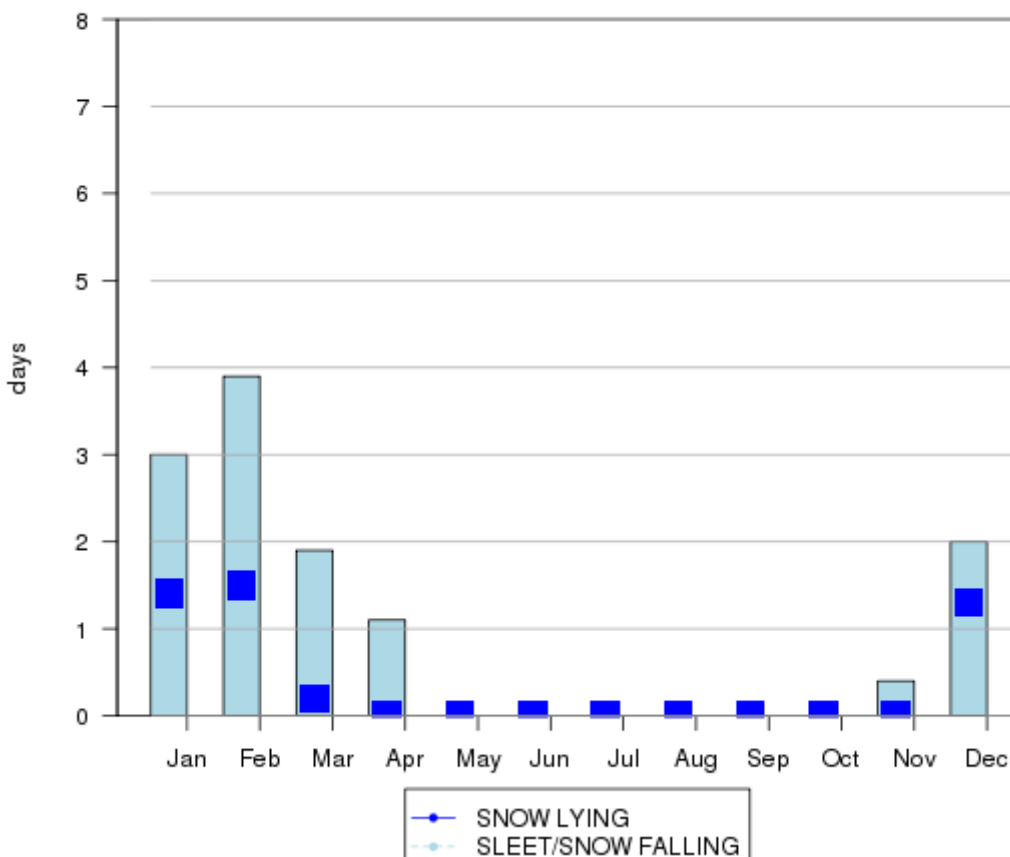
The occurrence of snow is linked closely with temperature, with falls rarely occurring if the temperature is higher than 4 °C. For snow to lie for any length of time, the temperature normally has to be lower than this. Over most of the area, snowfall is normally confined to the months from November to April, but upland areas may have brief falls in October and May. Snow rarely lies outside the period from December to March.

On average, the number of days with snow falling is about 12-15 per year over the lower lying areas but about 20 days over the higher ground of the Chilterns, North Downs and Weald. The least snow-prone places are those close to the English Channel, with less than 10 days.

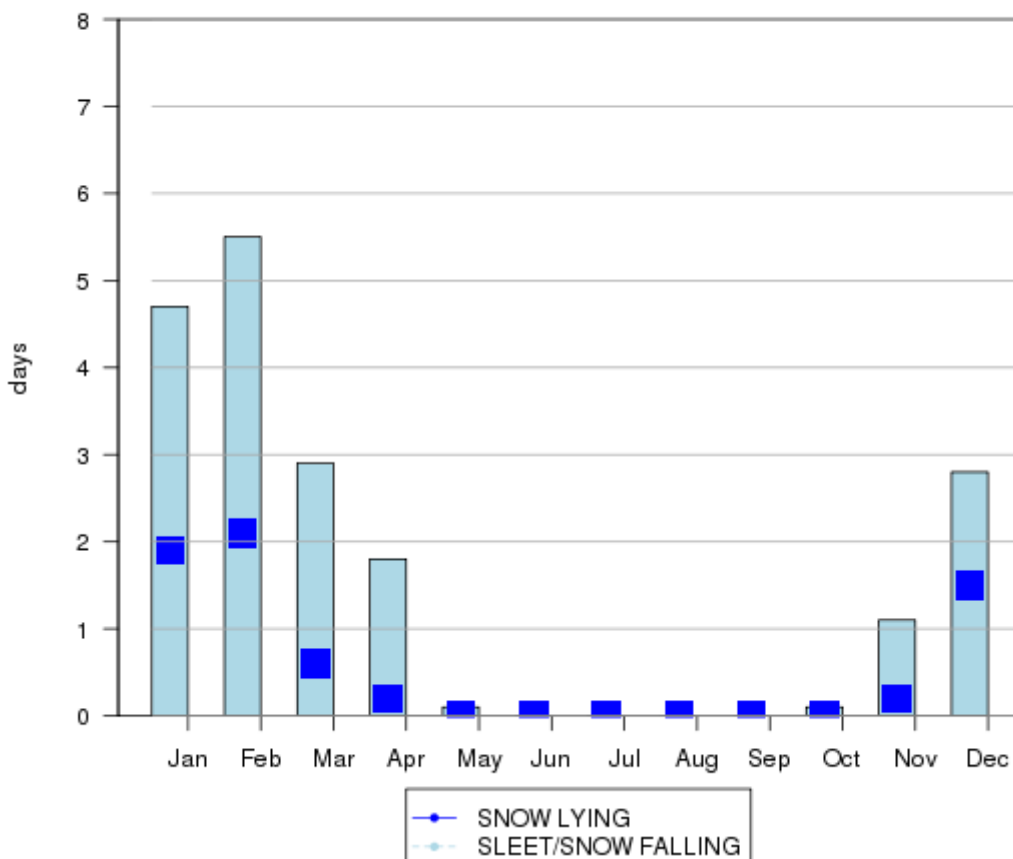
The number of days with snow lying has a similar distribution, with 5 days per year in most inland areas but over 10 days on the higher ground particularly to the east and north. These averages can be compared with parts of the Scottish Highlands where on average there are 60 days with snow lying and the coasts of SW England with less than 3 days per year.

The monthly averages of days with sleet/snow falling and lying at Heathrow and Lyneham are shown below (a day of lying snow is counted if the ground is more than 50% covered at 0900).

Average number of days per year of sleet/snow falling and snow lying (1981-2010) at Heathrow (25 metres amsl)



Average number of days per year of sleet/snow falling and snow lying (1981-2010) at Lyneham (145 metres amsl)



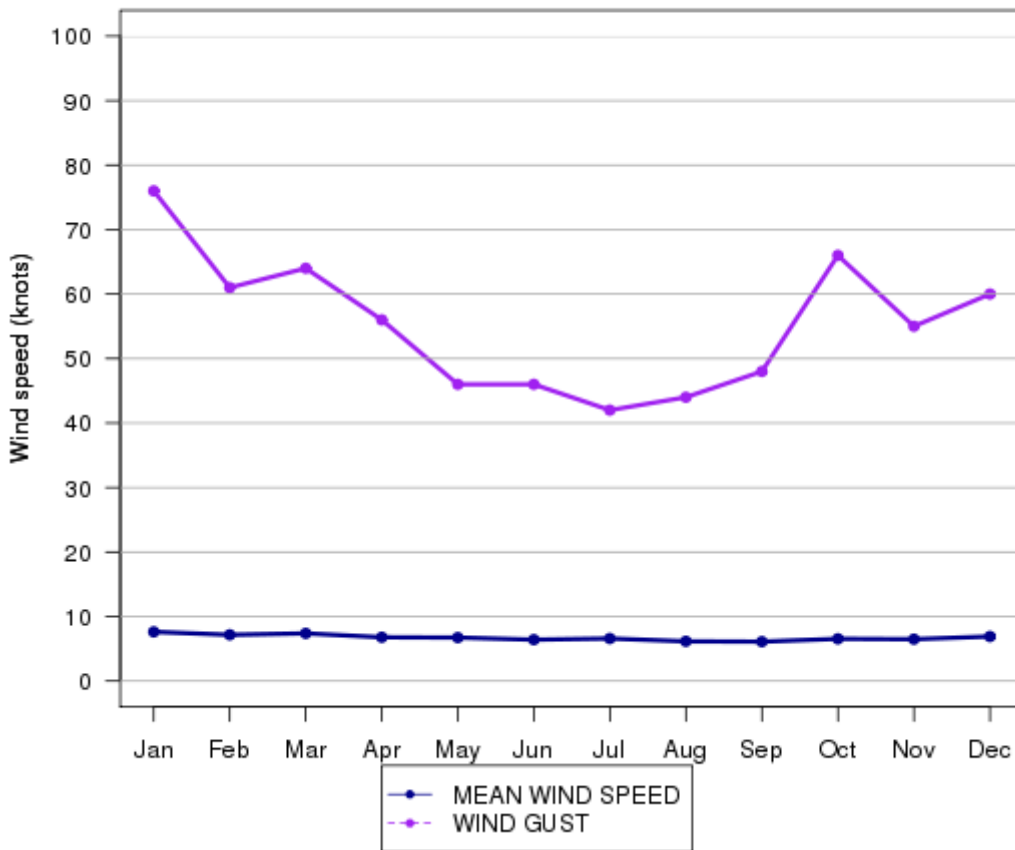
Kent and the Thames estuary are especially prone to falls associated with unstable east or north-east winds bringing snow showers in from the North Sea. Examples include 12 January 1987 when persistent heavy showers resulted in over 35 cm of level snow either side of the Thames estuary and 52 cm at East Malling, Kent with travel disruption, and early March 2005 when drifts of up 30 cm occurred over the Downs in Kent and East Sussex.

Wind

Southern England is one of the more sheltered parts of the UK, the windiest areas being in western and northern Britain, closer to the Atlantic. The strongest winds are associated with the passage of deep areas of low pressure close to or across the UK. The frequency and strength of these depressions is greatest in the winter half of the year, especially from December to February, and this is when mean speeds and gusts (short duration peak values) are strongest. The graph shows a typical variation of the monthly mean speeds and highest gusts.

The variation in monthly mean speeds (average of a continuous record) and highest gusts ('instantaneous' speed averaged over about 3 seconds) at Heathrow is shown below.

Monthly mean wind speed (1981-2010) and maximum gust (1959-2014) at Heathrow (25 metres amsl)



Another measure of wind exposure is the number of days when gale force is reached. If the wind reaches a mean speed of 34 knots or more over any ten consecutive minutes, then that day is classed as having a gale. Over most inland areas of the region the average is around 1-2 days per year but exposed places along the South Coast experience about 10 gales in an average year. Wind speed is sensitive to local topographic effects and land use. Places sheltered by hills or in extensive urban areas will have lower mean wind speeds and fewer days of gale, but can have strong gusts.

There have been several noteworthy gales affecting Southern England, accompanied by property damage and disruption to travel and power supplies. The most famous was the 'Great Storm' of 15-16 October 1987, considered to be the most severe to affect this region since that of November 1703. It brought a swathe of destruction across an area to the south and east of a line roughly from Southampton to London, with considerable damage to buildings, an estimated 15 million trees uprooted, disruption to power supplies and transport and 18 storm-related deaths. The highest speed recorded was a gust of 100 knots at Shoreham-by-Sea (West Sussex), where the hourly mean speed reached 72 knots. The scenes of widespread building and tree damage, transport and power disruption were repeated during the 'Burns Day Storm' of 25 January 1990 when gusts of 70-80 knots were recorded widely with 85 knots at Herstmonceux (East Sussex). Unlike the 1987 event, this storm struck during the day and consequently the death toll was higher (47 in the whole UK). The gale of 27 October 2002 again saw gusts of around 60-70 knots across the region.

The direction of the wind is defined as the direction from which the wind is blowing. As Atlantic depressions pass the UK the wind typically starts to blow from the south or south-west, but later comes from the west or north-west as the depression moves away. The range of directions between south and north-west accounts for the majority of occasions and the strongest winds nearly always blow from this range of directions. Spring time tends to have a maximum frequency of winds from the north-east.

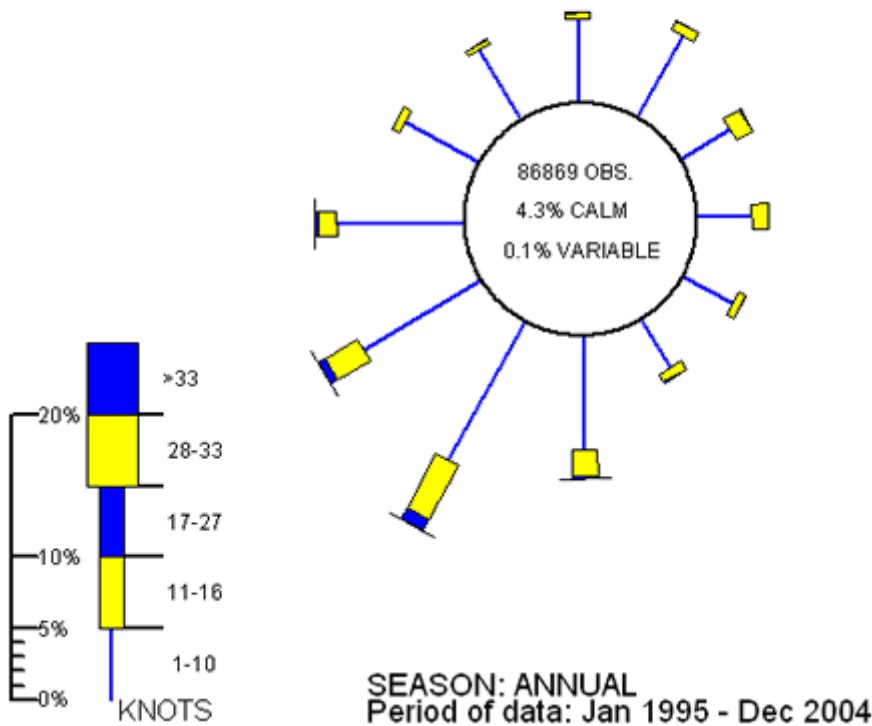
Coastal areas experience sea breezes from late spring through the summer, caused by the temperature differential between the sea and the warmer land. These sea breezes will often reach London, originating from either the North Sea or, occasionally, the English Channel.

The annual wind rose for Heathrow is typical of open, level locations across the region, with a prevailing south-westerly wind direction through the year.

WIND ROSE FOR HEATHROW

N.G.R: 5076E 1767N

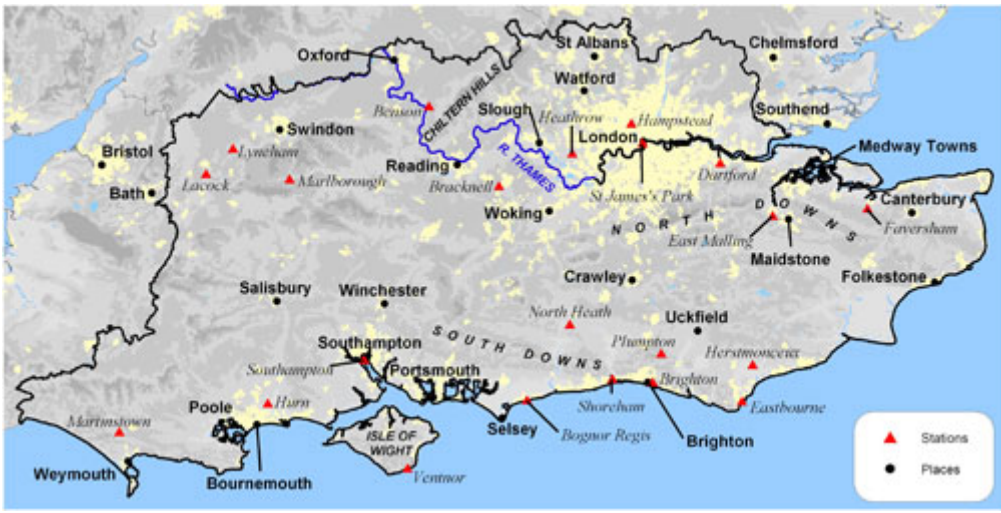
ALTITUDE: 25 metres a.m.s.l.



A tornado is a violently-rotating column of air, caused by the rapid displacement of warm moist air by cold dense air often associated with the occurrence of active cold fronts. It will typically last for a few minutes, track across the land for 2 to 5 km and have a diameter of 20 to 100 metres. On average, 33 tornadoes are reported each year in the UK although the number can vary significantly from year to year. The UK has the highest frequency of reported tornadoes per unit area in the world, although they are nowhere near as intense as those reported in the USA.

An example of a tornado that affected southern England is the one that struck Kensal Rise in west London on 7 December 2006. Up to 150 homes were damaged and 6 people were injured in violent winds that lasted less than 1 minute. This was the first tornado to cause significant damage in London since one at Gunnersbury, west London, in December 1954. A further example is the tornado that struck Selsey (West Sussex) on 7 January 1998 causing an estimated £10M of damage to 1000 buildings. This part of the south coast seems somewhat prone to tornadoes, and Selsey also suffered damage in November 1986 and October 2000.

Location map



Last updated: 11 October 2016

