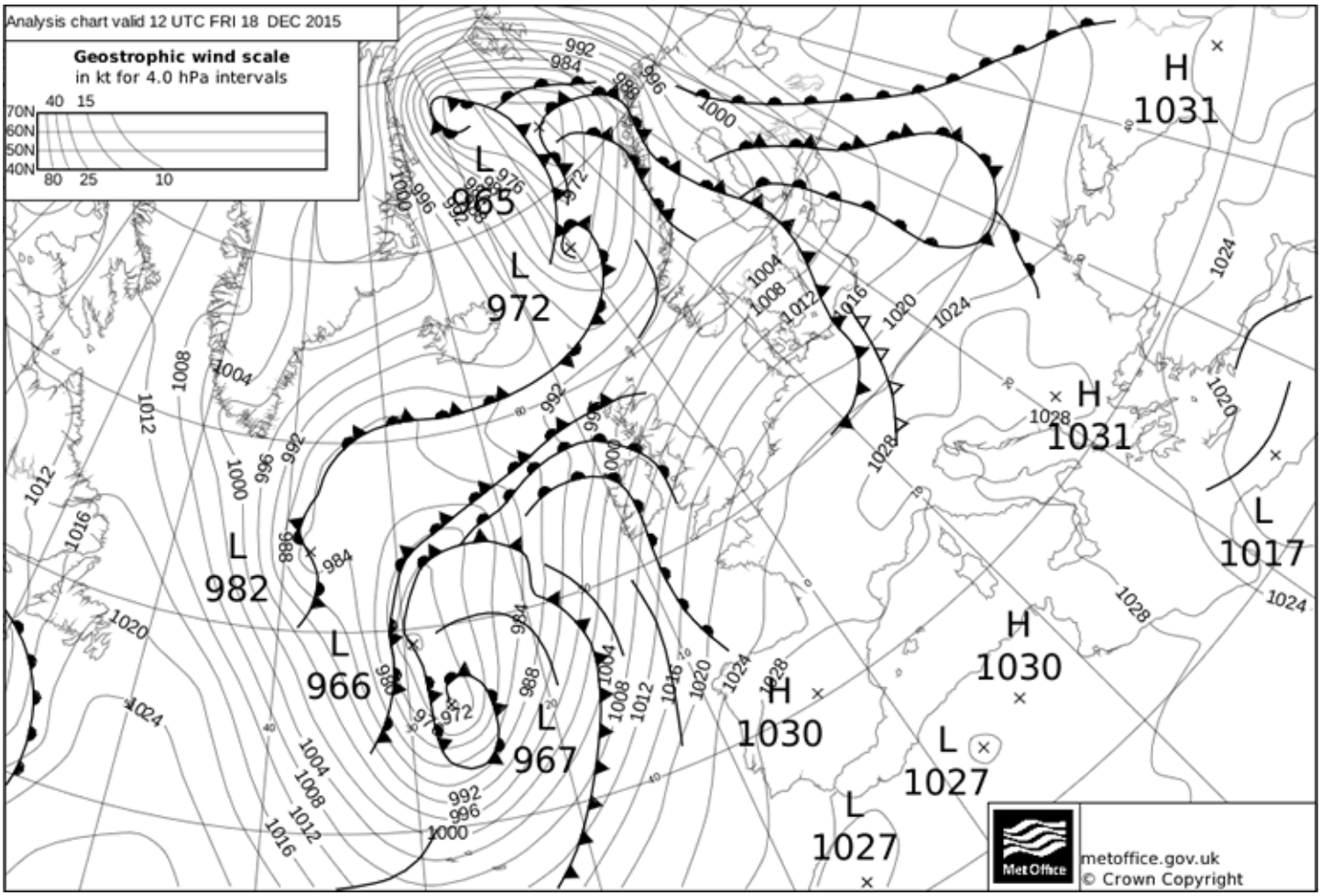
Exceptional warmth, December 2015

December 2015 was easily the warmest December on record across the UK.

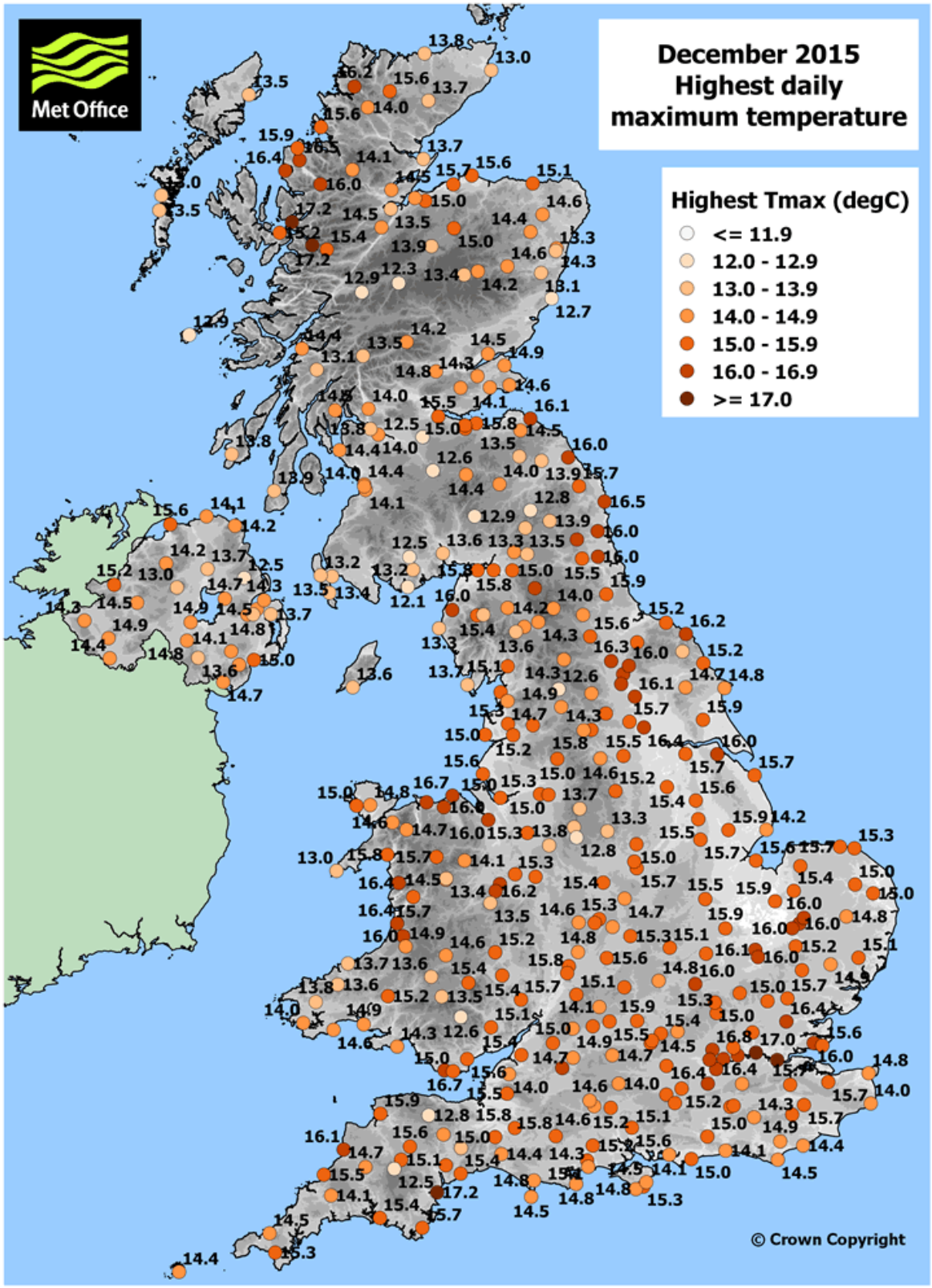
It was a record-breaking month not only for rainfall but also for temperature. For prolonged periods the weather was dominated by a mild, Tropical Maritime airstream from the south-west. It was also frequently cloudy and overcast and night-time temperatures often remained unusually high, particularly across southern England where there were no air frosts recorded during the month. Temperatures were frequently closer to what might be expected during April, or even May. The exceptionally mild nature of the weather resulted in December 2015 being easily the mildest December in the UK series from 1910 and the Central England Temperature (CET) series from 1659.

Weather data

The analysis chart for 1200 GMT on 18 December shows the UK in a south-westerly airstream bringing humid and exceptionally air to the UK. Daily maximum temperatures reached 14 to 16 °C widely across the UK, around 7, 8 or 9 °C higher than might be expected at this time of year.



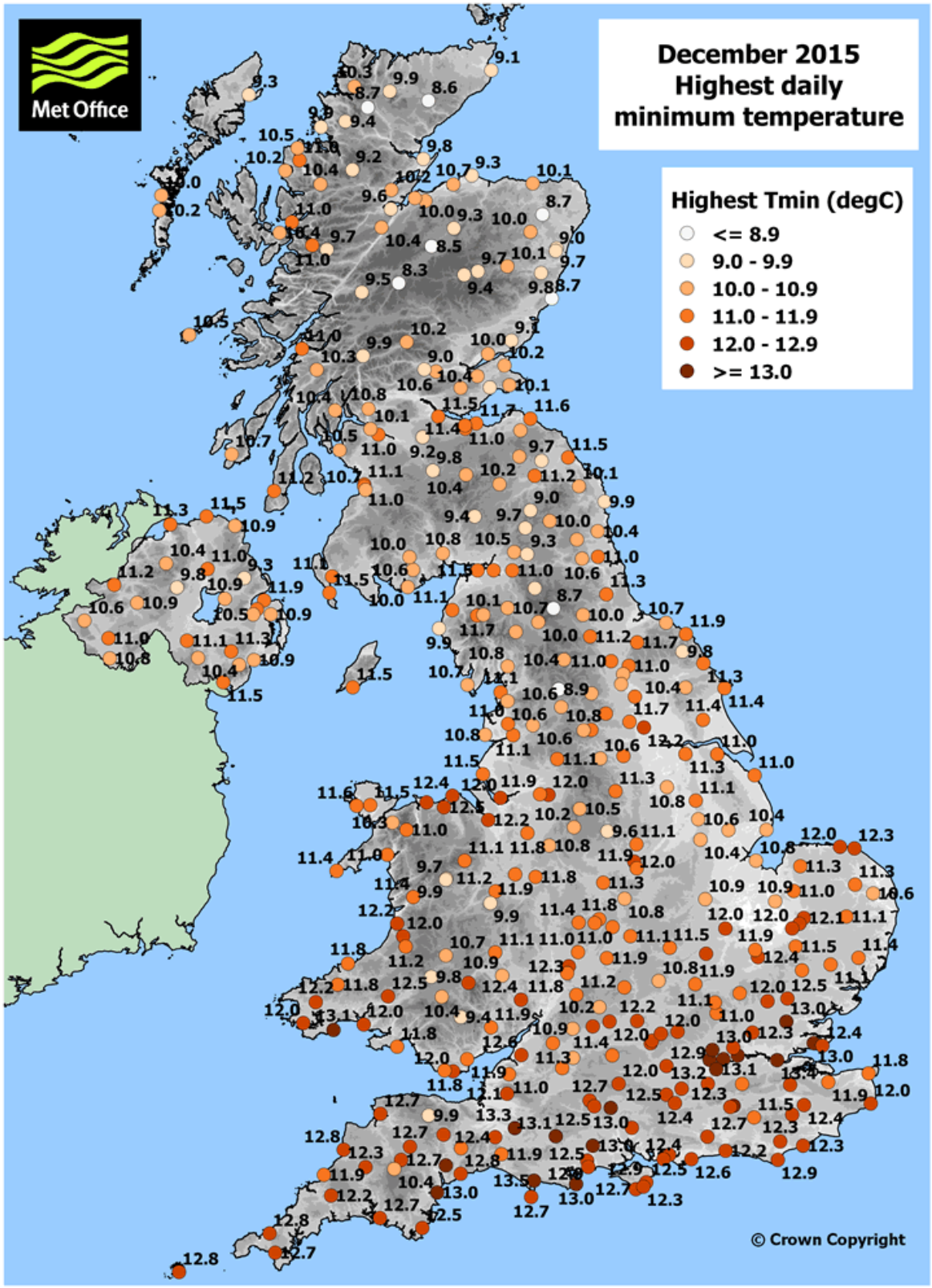
The map below shows the highest daily maximum temperature recorded during December 2015 across the UK (*note that this may have occurred on different days at individual weather stations).* 16 °C was exceeded across parts of south-west, eastern and northern England, North Wales, eastern and north-west Scotland during the month.



Many long-running weather stations broke their highest December maximum temperature on record; selected stations are listed in the table below.

Station	Date	Max temp (degC)	Previous maxtemp (degC)	Previous date	Record length (years)
Oxford	18-Dec-2015	15.9	15.2	02-Dec-1985	163
Durham	19-Dec-2015	15.9	15.1	22-Dec-1991	135
Bradford, West Yorkshire	18-Dec-2015	15.8	15.3	01-Dec-1985	108
Buxton, Derbyshire	18-Dec-2015	13.7	13.3	31-Dec-1925	102
Rothamsted, Hertfordshire	19-Dec-2015	15.3	14.4	01-Dec-1939	102
Balmoral, Aberdeenshire	18-Dec-2015	14.2	13.7	13-Dec-1998	102
Woburn, Bedfordshire	19-Dec-2015	16	15.7	02-Dec-1985	100

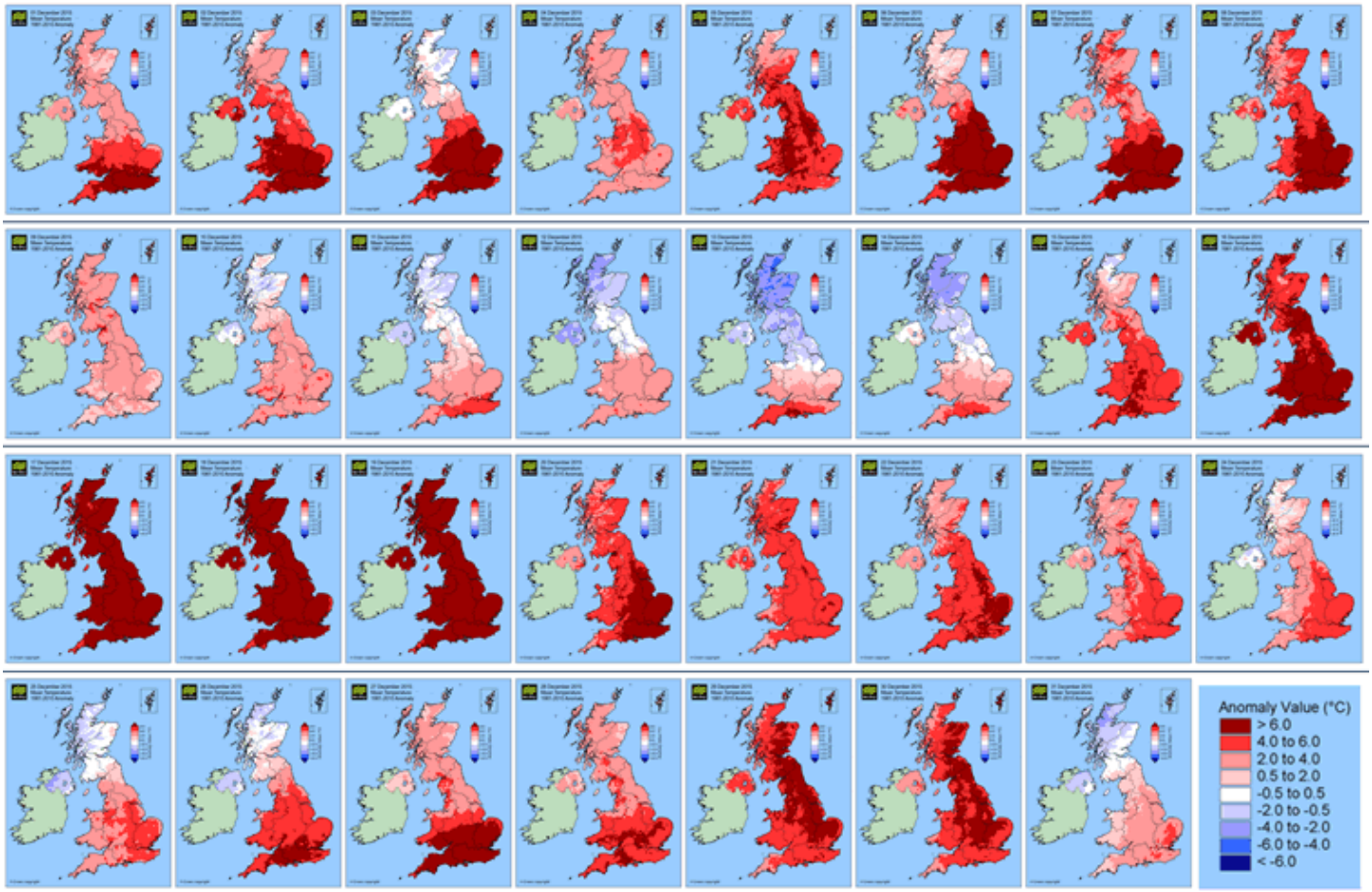
The map below shows the highest daily minimum temperature (0900 to 0900 GMT) recorded during December 2015 across the UK. The highest daily minimum temperature was widely above 11 °C, reaching 13 °C across parts of southern England.



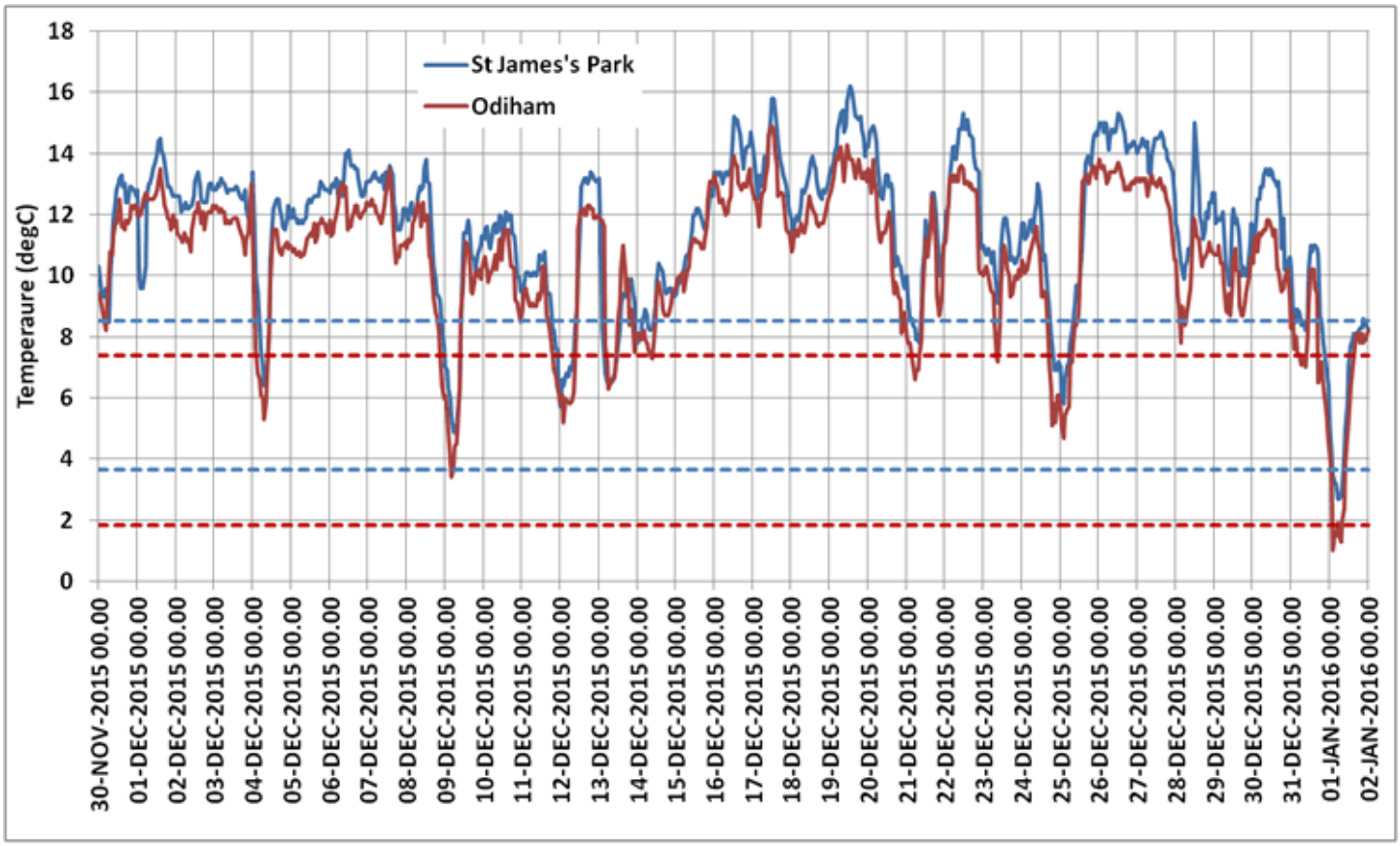
Many long-running weather stations also broke their highest December minimum temperature on record; selected stations are listed in the table below.

Station	Date	Mintemp (degC)	Previous mintemp (degC)	Previous date	Record length (years)
Bradford, West Yorkshire	17-Dec-2015	11.6	11.5	29-Dec-1987	108
Hastings, East Sussex	20-Dec-2015	12.3	11.9	12-Dec-1994	83
Plymouth, Devon	27-Dec-2015	12.7	12.5	03-Dec-1985	83
Heathrow, Greater London	27-Dec-2015	13.2	12.9	03-Dec-1985	67
Teignmouth, Devon	27-Dec-2015	13	12.8	12-Dec-1961	65

The panel below shows daily mean temperatures for each day of the month relative to the 1981-2010 average. At times temperatures were near or below average across parts of Scotland, but otherwise the month was dominated by well above average temperatures, entirely so for southern England and particularly in spells from 1st to 8th and 15th to 30th.

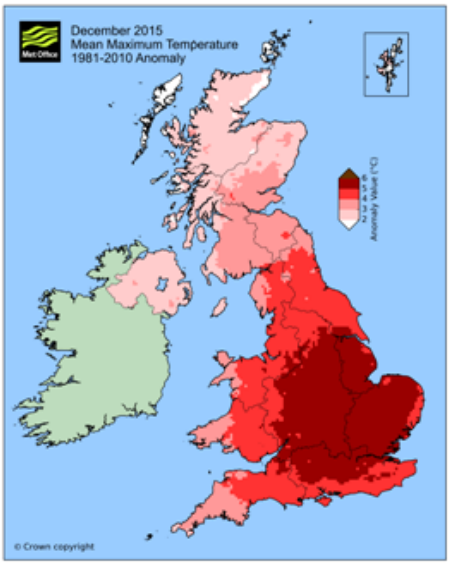


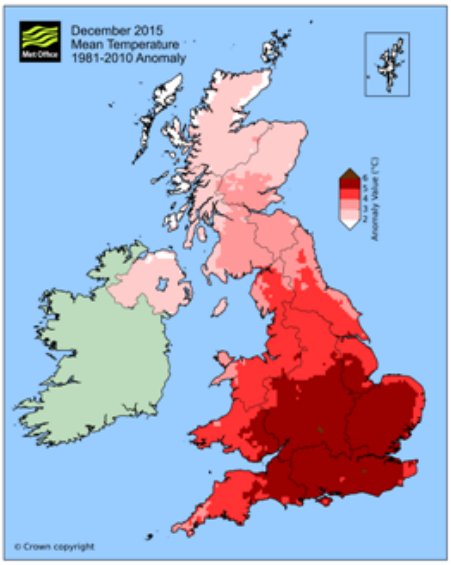
The figure below plots hourly air temperature for the month at two example urban and rural locations in southern England: St James's Park (Central London) and Odiham (Hampshire). The long-term average monthly mean maximum and minimum temperatures are shown as hatched lines. Temperature anomalies for the month were over 5 °C above average for the time of year at these stations. During cloudy periods with the exceptionally mild Tropical Maritime airflow, the temperature remained at around 12 or 13 °C (well above the average maximum), only briefly dropping with clear skies at night (but always well above the average minimum). St James's Park consistently recorded slightly higher temperatures than Odiham, reflecting the influence of the urban heat-island.

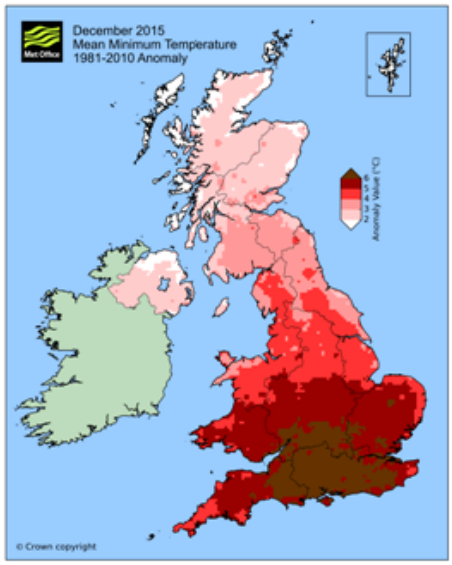


Monthly statistics

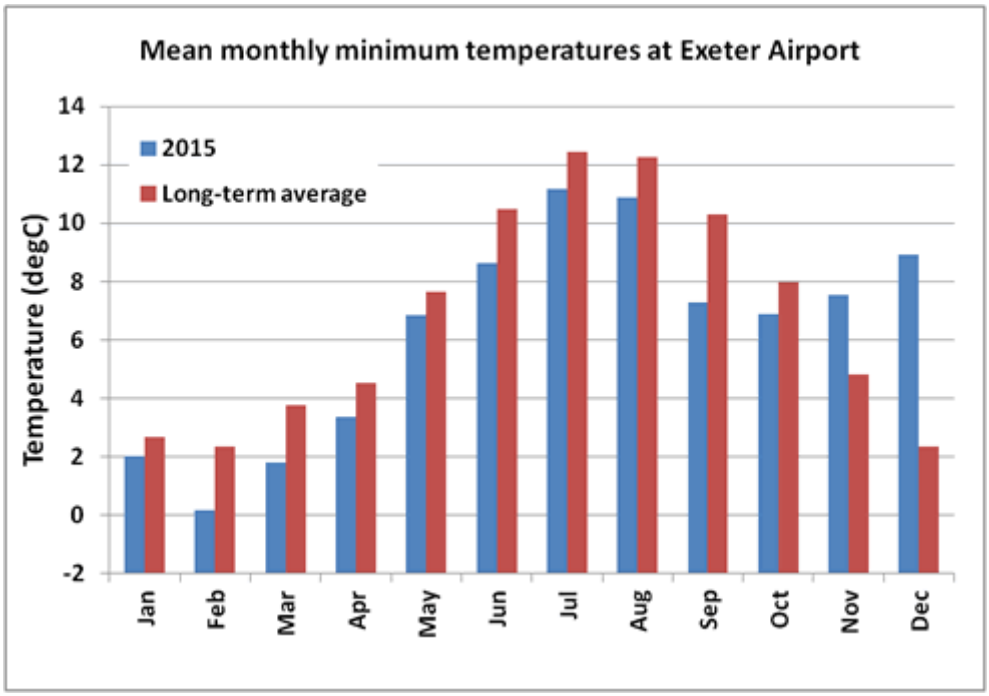
The maps below show monthly maximum, mean and minimum temperature anomalies for the UK for December 2015. Maximum temperature anomalies were highest across central England and East Anglia, whereas minimum temperature anomalies were highest across southern England with anomalies here widely exceeding 6 °C. Remarkably, almost all locations south of Lincolnshire recorded no air frosts during the month, compared to between 10 and 15 across central England and Wales that might be expected on average.



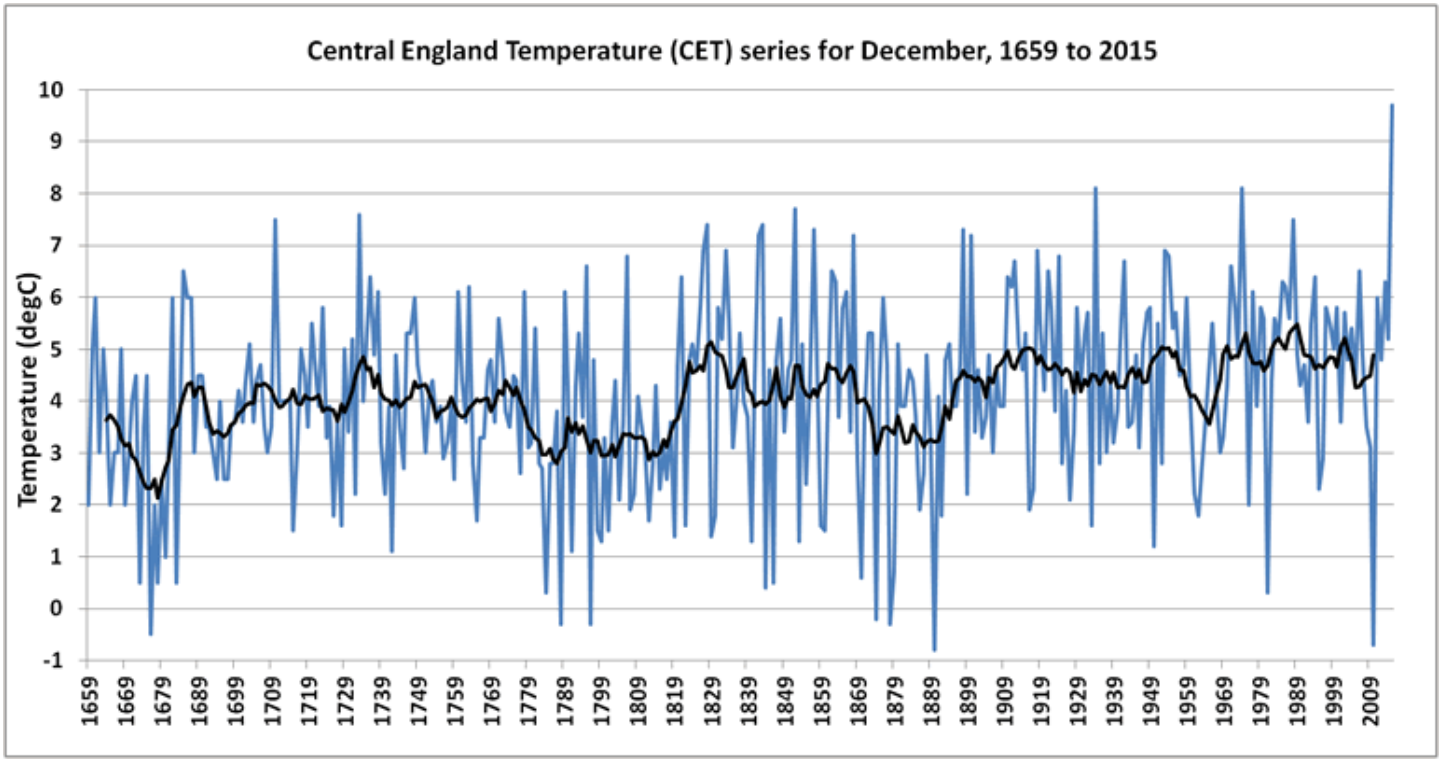




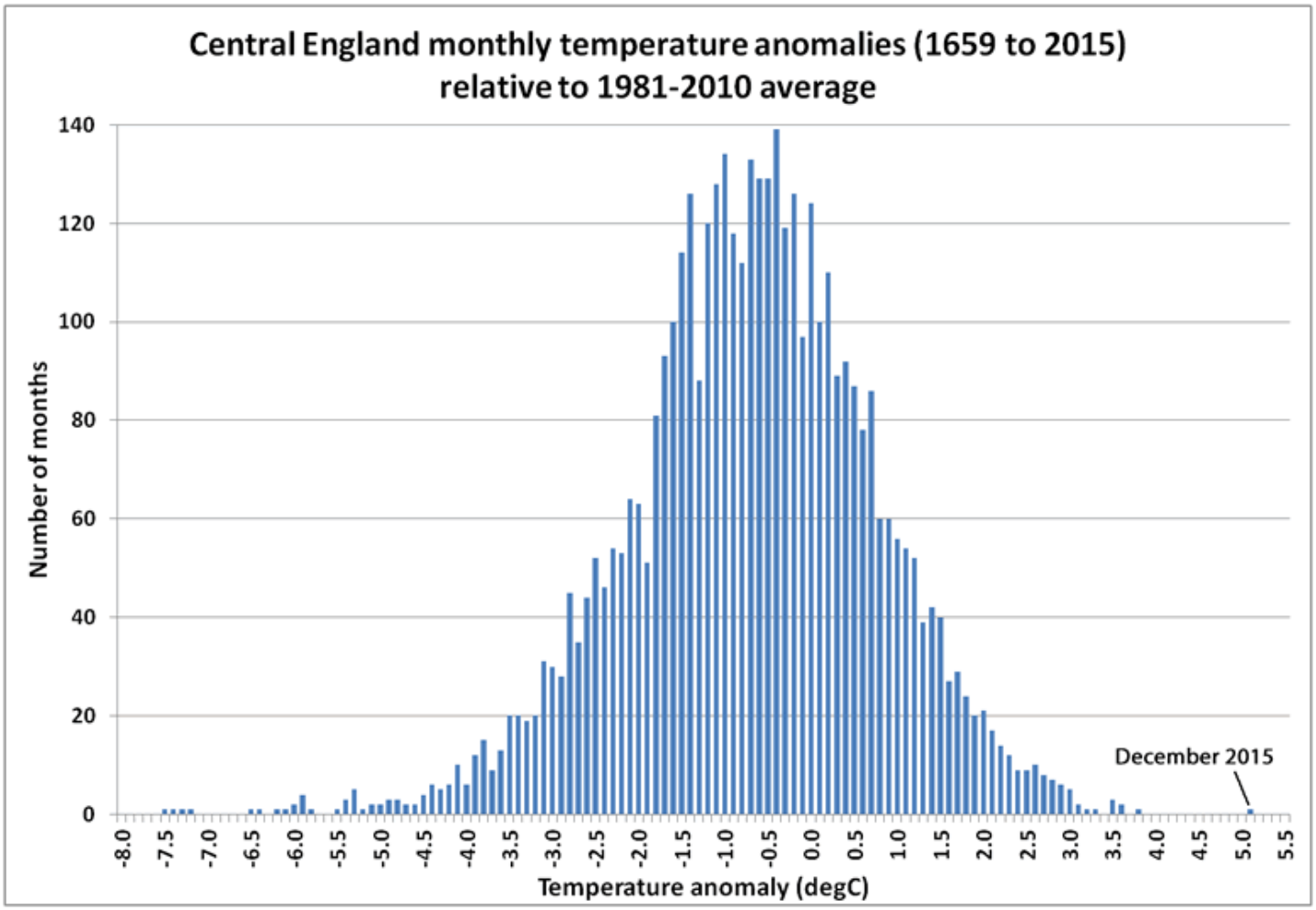
The figure below shows mean monthly minimum temperatures at Exeter Airport during 2015, compared to the 1981-2010 long term average. The 2015 value for November exceeded that for May, but more remarkably the 2015 value for December (8.9 °C) exceeded that for June (8.6 °C).



This was the warmest December in the UK series from 1910 and the warmest December in the CET series from 1659. The figure below plots December CET from 1659 to 2015 inclusive. The December CET value of 9.7 °C was the warmest in the series by a margin of 1.6 °C from the next warmest Decembers (those of 1934 and 1974). December 2015 (warmest in the CET series) and December 2010 (second-coldest) differ by 10.4 °C; this compares to a difference in long-term average CET between January and July of 12.3 °C.

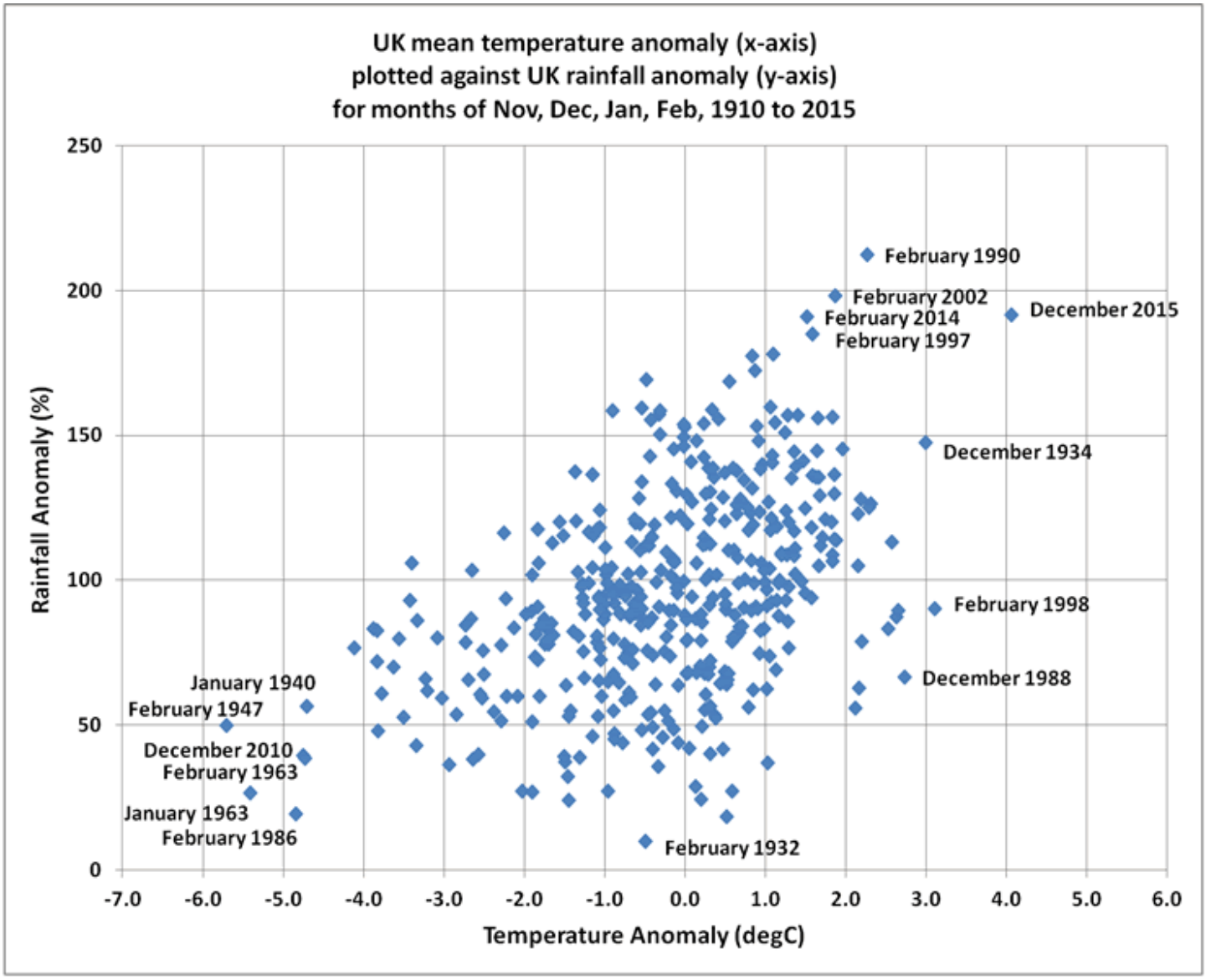


The histogram below plots CET monthly anomalies relative to the 1981-2010 average for *all months* from 1659 to 2015. The December 2015 anomaly of 5.1 °C easily exceeded the previous highest anomaly of 3.7 °C for June 1846, and represents an extreme outlier in this distribution. (Note that the outliers for extreme negative anomalies are dominated by January and February; for example in the 20th century the top-ten lowest include January 1963 and February 1947).



Temperature and rainfall in winter months

The relationship between temperature and rainfall for the UK for the months of November, December, January and February from 1910 to 2015 inclusive is shown in the figure below. Very wet months (with anomalies around 200% of average) tend to be associated with a mild, westerly weather type, including December 2015, February 2014, 2002, 1997 and 1990. Conversely very cold months are likely to be associated with blocked, easterly weather patterns and relatively dry conditions - any precipitation falling mainly as snow. Examples of the latter include December 2010, January 1940 and 1963, February 1947, 1963 and 1986.



Met Office