

Winter storms, January to February 2014

The UK experienced a spell of extreme weather from late January to mid-February as a succession of major storms brought widespread impacts and damage to the UK.

Around 6 major storms hit through this period, separated by intervals of 2 to 3 days. The sequence of storms followed an earlier stormy period from [Winter storms, December 2013 to January 2014](#). Taken individually, the first two storms were notable but not exceptional for the winter period. However, the later storms from early to mid-February were much more severe. Overall, the period from mid-December 2013 to mid-February 2014 saw at least 12 major winter storms, and, when considered overall, this was the stormiest period of weather the UK has experienced for at least 20 years.

Strong winds and huge waves made conditions extremely dangerous around exposed coastlines - particularly in the south and west, and caused widespread transport disruption. There were major flooding problems, with the Somerset Levels continuing to be inundated with floodwaters from the New Year period. Severe flooding also occurred along sections of the River Thames.

The photographs below provide some indication of weather impacts experienced from these storms.



This image shows huge waves

battering the Cornish coast at Porthleven on 5 February Photograph courtesy Matt Clark, Met Office

An aerial view of flooding on the Somerset levels on 2 February. Copyright Tim Pestrige. For a satellite image, see the [January 2014](#)

This image shows the south-west main-line railway at Dawlish, Devon, suspended in mid-air after the foundations were washed away by the storm of 5 February. Photograph courtesy Matt Clark, Met Office

Impacts



The storms resulted in




numerous weather-related impacts across the UK through the period. There were major flooding problems, with the Environment Agency reporting at least 6000 properties flooded. The Somerset Levels were very badly affected, with large areas remaining under water from late December through the winter period, and severe flooding also affected much of the River Thames through Oxfordshire, Berkshire and Surrey. Large swathes of the River Severn floodplain were also inundated, although many areas benefited from flood defences - for example Worcester escaped significant flooding and temporary barriers deployed at Upton-upon-Severn also prevented flooding.

As well as flooding to properties and businesses, transport infrastructure was also affected with many roads underwater and several villages on the Somerset Levels only accessible by boat. The South West main line railway was also affected by flooding on the Somerset Levels. Agriculture was badly affected, with large areas of crops underwater and farmers having to evacuate livestock from flooded land.

As well as inland flooding, there were numerous impacts from the storms around the coastlines of the south and west. Strong winds, high tides and tidal surges acting in combination led to huge waves battering the coastline. The wavelength of the swell was particularly long, with individual waves building up large amounts of speed and energy, and reaching record heights. The most severe storm was on 12 February, when the Kinsale Energy Gas Platform off southern Ireland recorded a maximum wave height of 25 metres (82 feet) and winds reached hurricane force.

The storms made conditions around the coastline exceptionally dangerous. The South West main line railway was severely damaged at Dawlish, Devon during the storm of 4 to 5 February, severing a key transport link to the South West for many weeks. Huge waves overtopped coastal flood defences and many coastal communities in Cornwall, Devon and Dorset experienced coastal flooding and damage to infrastructure, buildings and sea defences. The storms also resulted in major coastal erosion, for example by altering beach profiles in several locations. Coastal damage was exacerbated by the cumulative effect of the sequence of storms in rapid succession.

The storms and strong winds also caused widespread impacts inland. Many trees were felled by the wind and on 12 February around 100,000 homes and businesses were without power. Several buildings experienced structural damage from the strong winds. For example, the storm of 12 February resulted in some damaged roofs at Porthmadog, Gwynedd and a member of the public was killed on 13 February after trees brought down power lines in Wiltshire. A motorist was killed in central London on 14 February after falling masonry struck a car. The Met Office issued a Red Warning for wind - the highest level of warning - for parts of North Wales and north-west England for the storm of 12 February 2014, while at the height of the storms more than 15 severe flood warnings were in place for the coast of southern England, the Somerset Levels and the Thames valley.

In general, the storms resulted in mild conditions across the UK, with an absence of low temperatures or widespread snowfalls. However, there were persistent and heavy snowfalls across Scotland's mountains, particularly at higher elevations. The first image below shows deep and extensive snow cover on Carn Liath (Central Highlands) (1005 m.a.s.l.) on 16 February 2014, but with no snow cover at valley level (250 m.a.s.l.). The second image on 21 February 2014 shows debris (estimated up to 15 metres deep) from a very large avalanche on Buachaille Etive Mor (Glen Coe, West Highlands). Both images courtesy of the [Scottish Avalanche Information Service](#) .



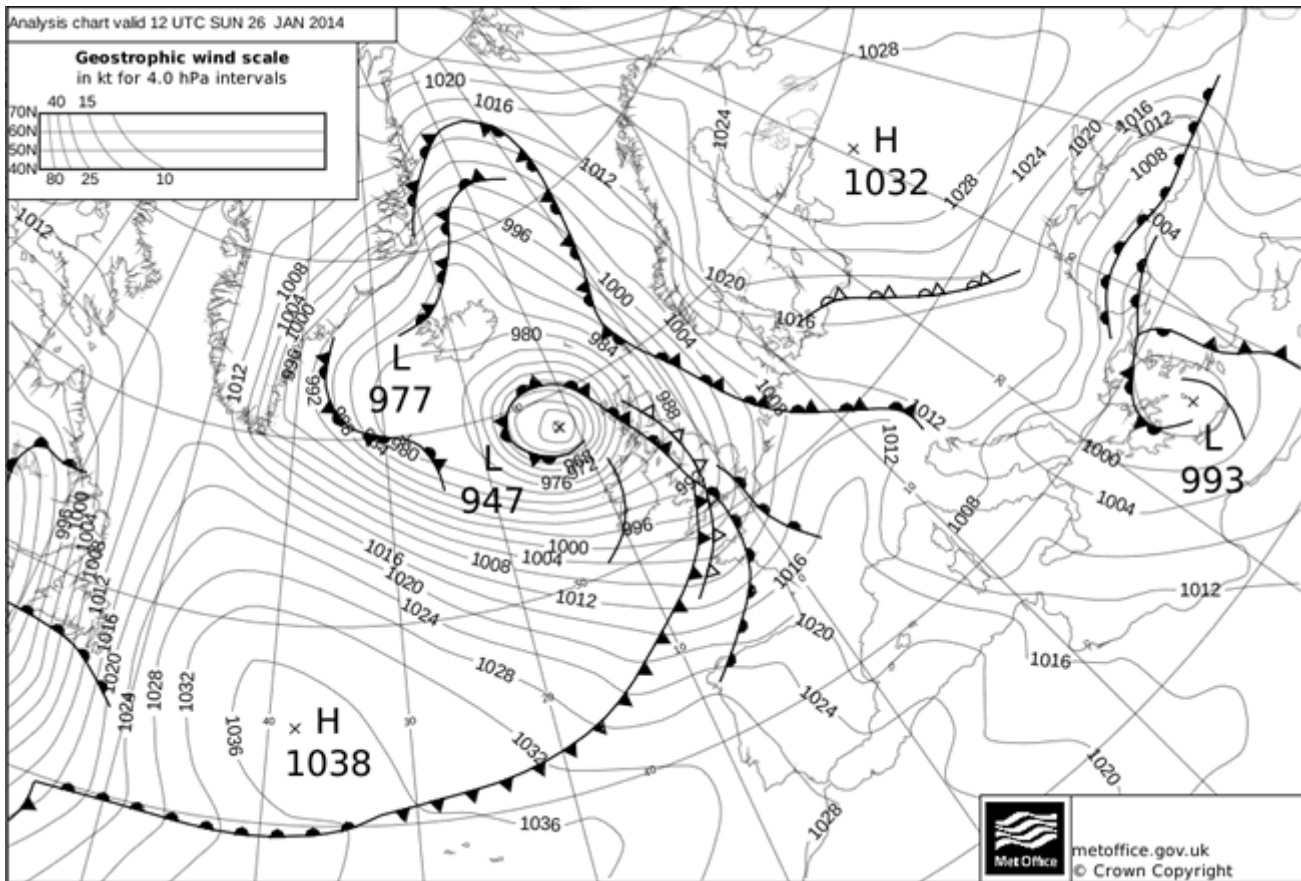


Weather data

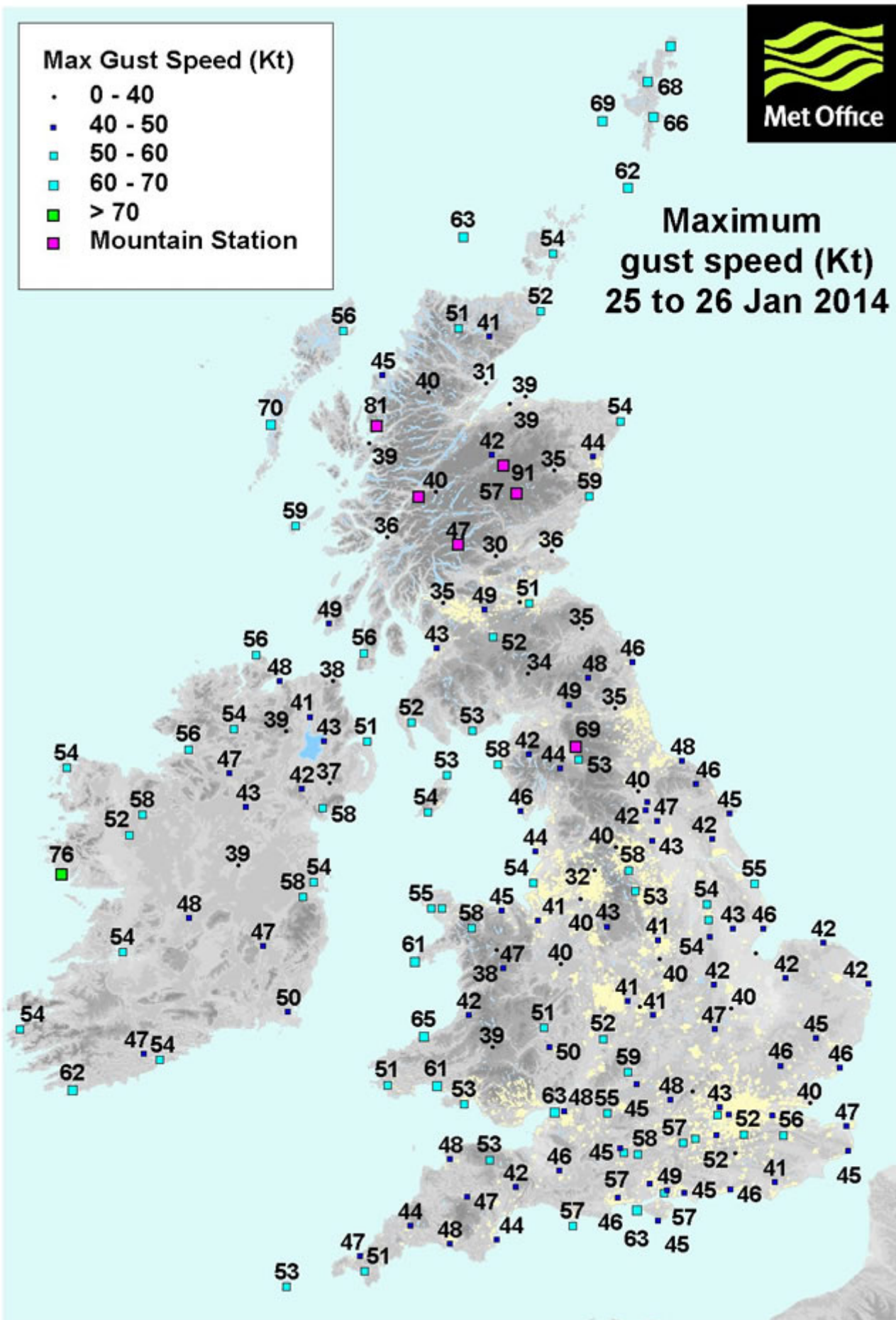
As was the case from mid-December to early January, the storms were caused by a powerful jet stream driving low pressure systems and associated storms across the Atlantic. The most significant storms occurred 25 to 26 January, 31 January to 1 February, 4 to 5 February, 8 to 9 February, 12 February and 14 to 15 February; these are presented in turn.

25 to 26 January

Synoptic situation at 1200 UTC 26 January 2014, showing a deep area of low pressure to the north-east of the UK bringing strong winds and heavy rain to much of the UK.

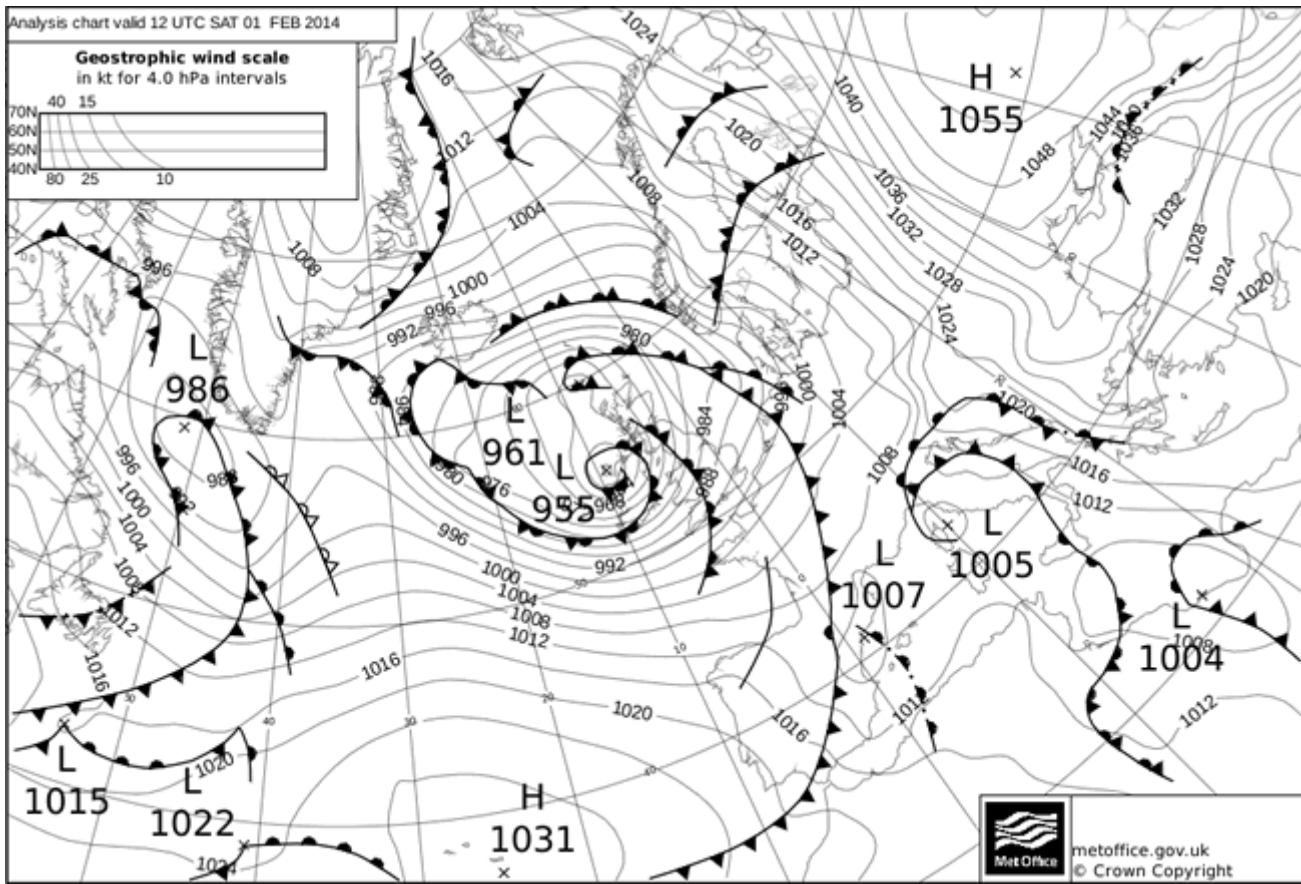


The map below shows maximum gust speeds 25 to 26 January 2014. Winds gusted widely at 50 to 60 kt around exposed coastlines of the west and north, with 70 kt (81 mph) at South Uist (Western Isles). Taken individually, this storm was notable but not exceptional for the time of year.



31 January to 1 February

Synoptic situation at 1200 UTC 1 February 2014, showing another deep area of low pressure over Ireland.



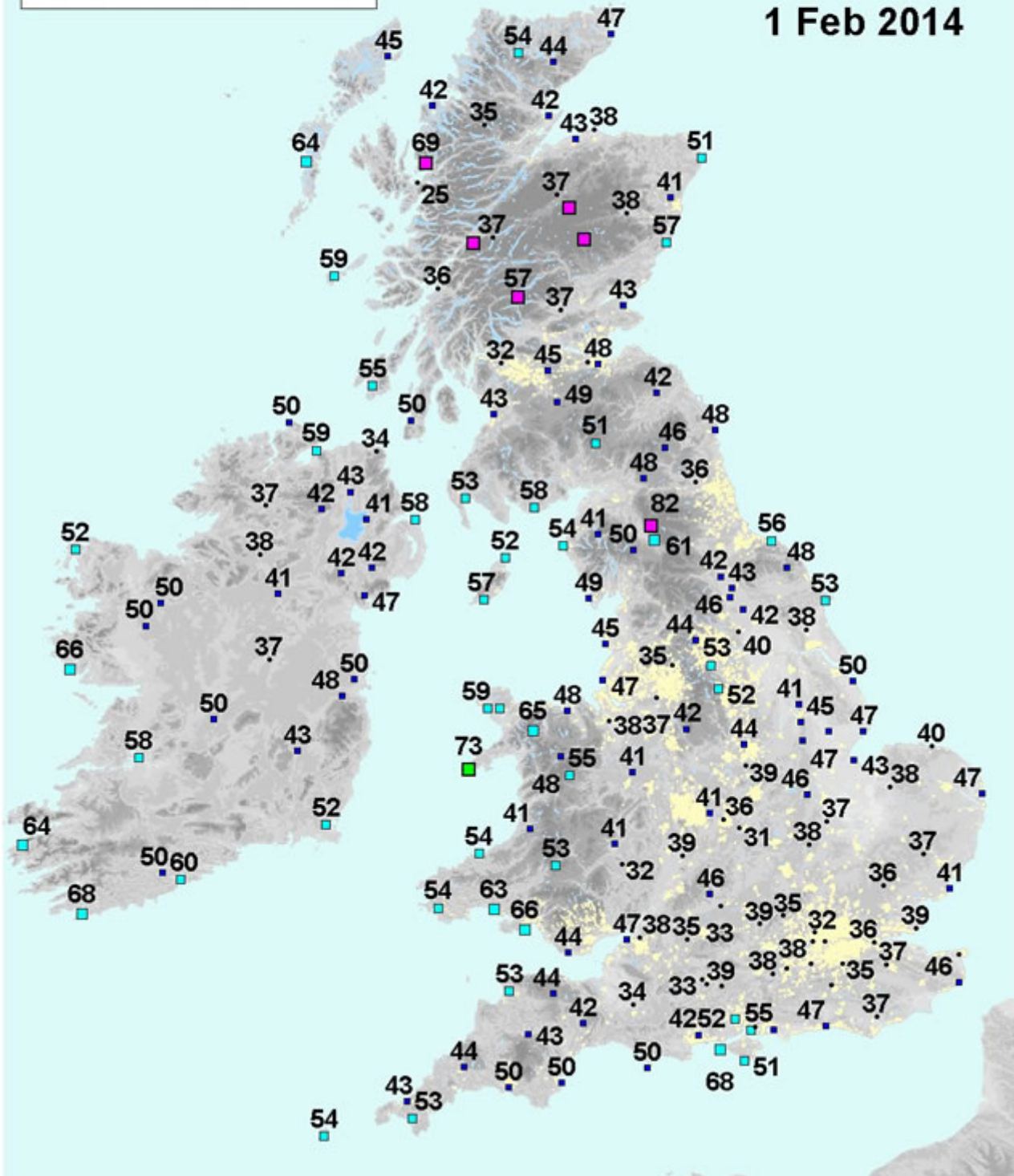
The map below shows maximum gust speeds 31 January to 1 February 2014. Winds gusted widely at 50 to 60 kt around exposed coastlines of the north and west - comparable with the storm of 25 to 26 January - with 73 kt (84 mph) at Aberdaron (Gwynedd). Again, taken individually, this individual storm was notable but not exceptional for the time of year.



Max Gust Speed (Kt)

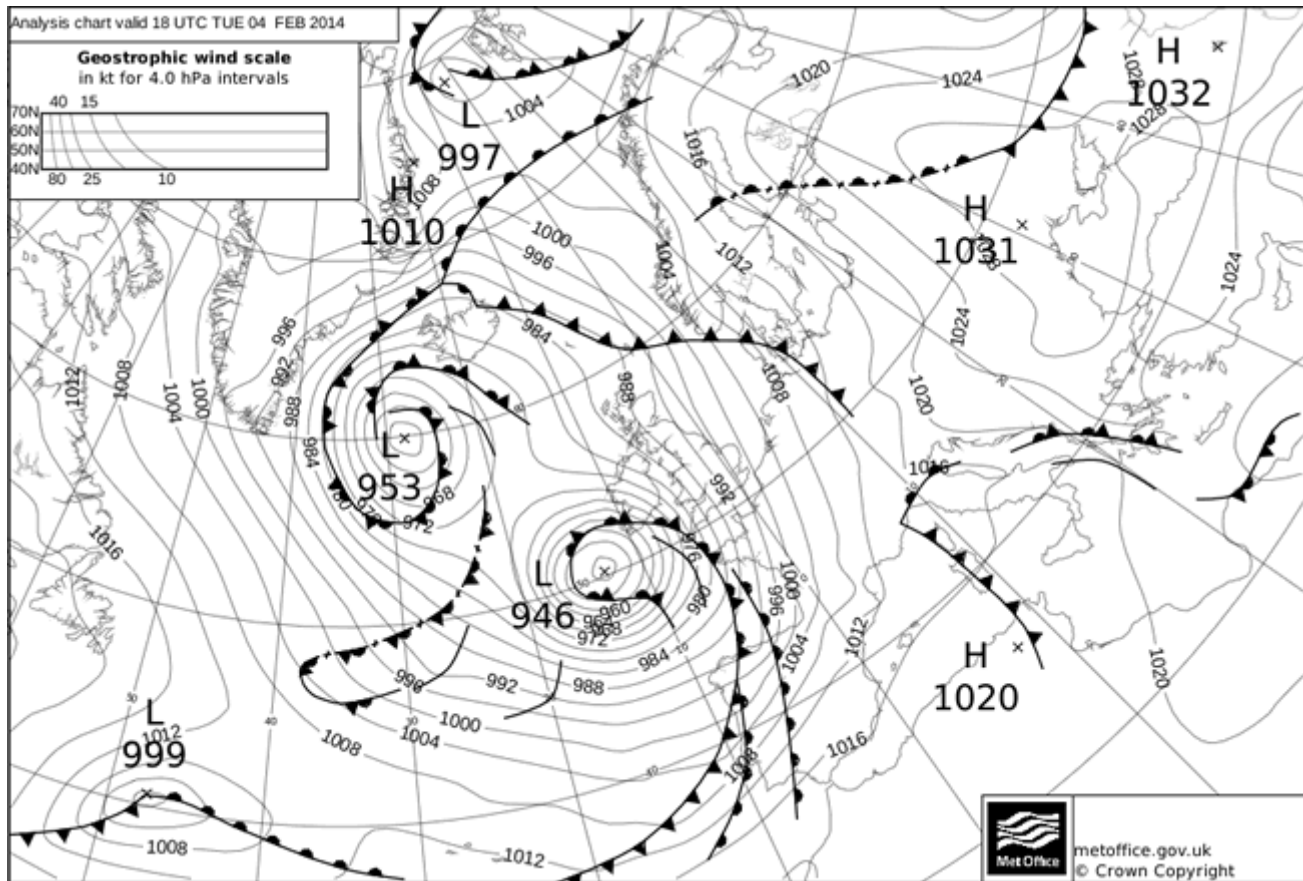
- 0 - 40
- 40 - 50
- 50 - 60
- 60 - 70
- > 70
- Mountain Station

**Maximum
gust speed (Kt)
31 Jan to
1 Feb 2014**



4 to 5 February

Synoptic situation at 1800 UTC 4 February 2014, showing another deep area of low pressure to the south-west of the UK bringing the next storm. The analysis charts for sequence of four storms from 4 to 15 February are strikingly similar.

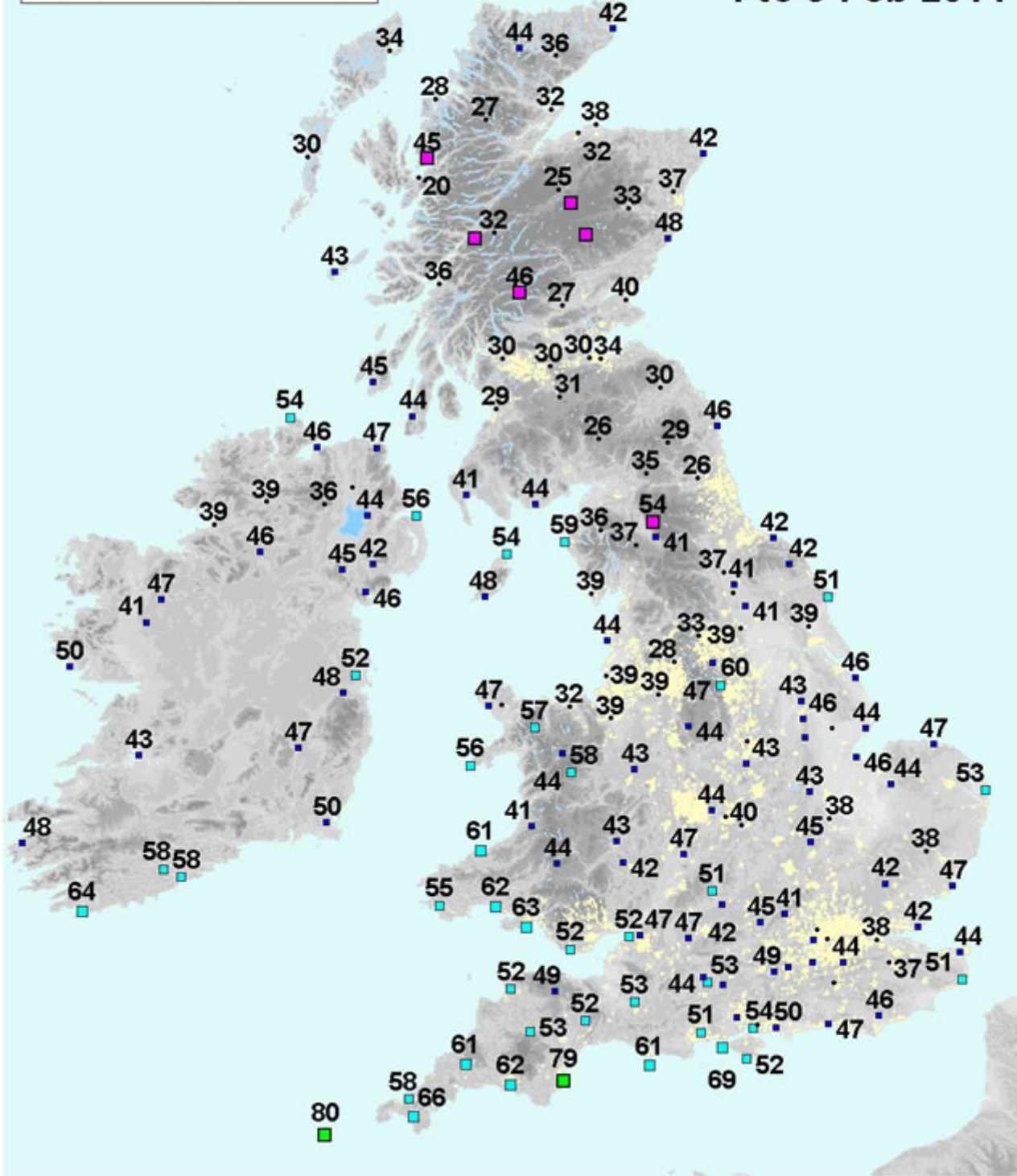


The map below shows maximum gust speeds 4 to 5 February 2014. This storm was more severe than the previous two, particularly across south Wales and south-west England where winds gusted at 60 to 70 kt widely around exposed coastlines. St Mary's Airport (Isles of Scilly) recorded a gust of 80 kt (92 mph) and Berry Head (Devon) 79 kt (91 mph). This storm damaged the South West main line railway at Dawlish.



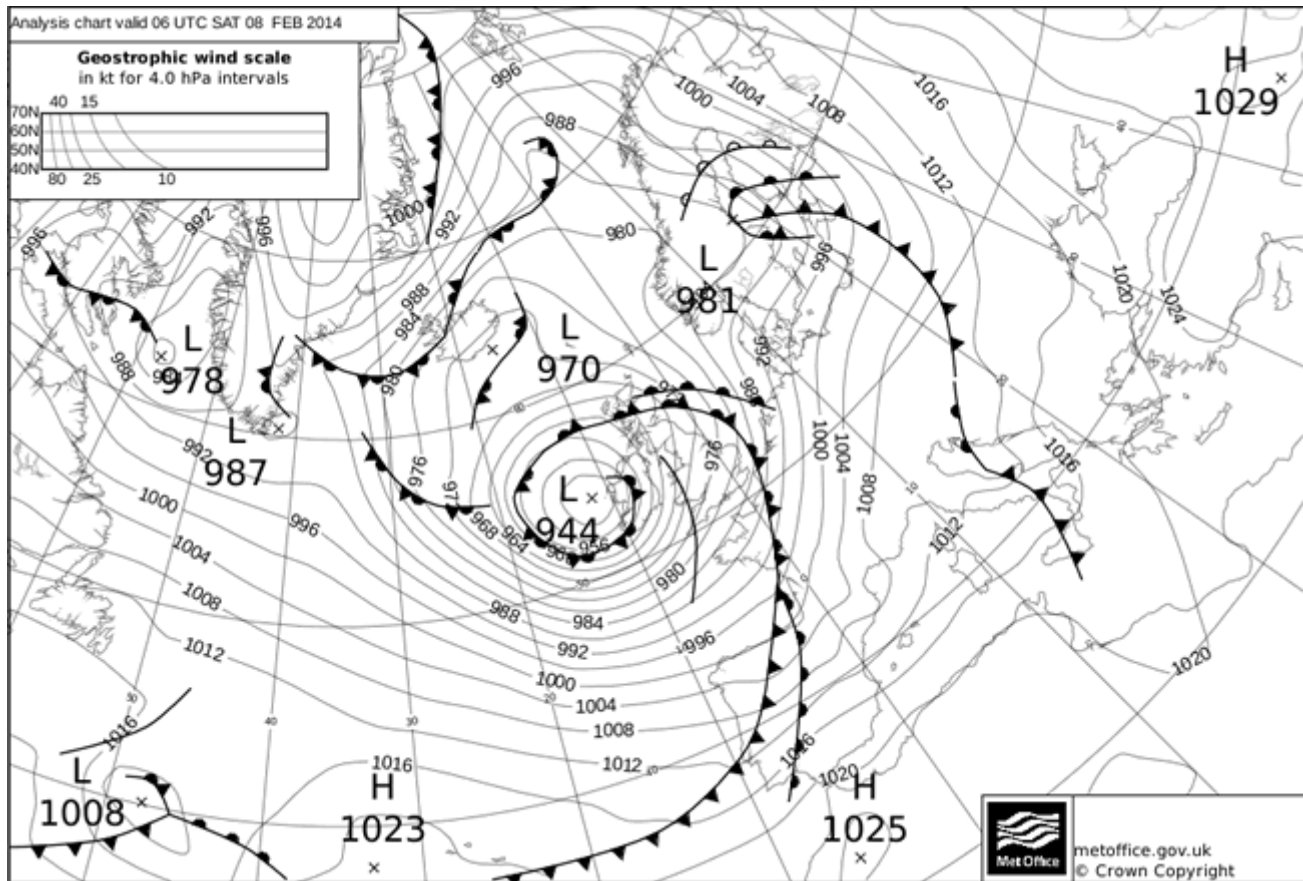
- Max Gust Speed (Kt)**
- 0 - 40
 - 40 - 50
 - 50 - 60
 - 60 - 70
 - > 70
 - Mountain Station

**Maximum
gust speed (Kt)
4 to 5 Feb 2014**



8 to 9 February

Synoptic situation at 0600 UTC 8 February 2014, showing the next storm and deep low pressure system to the west of Ireland



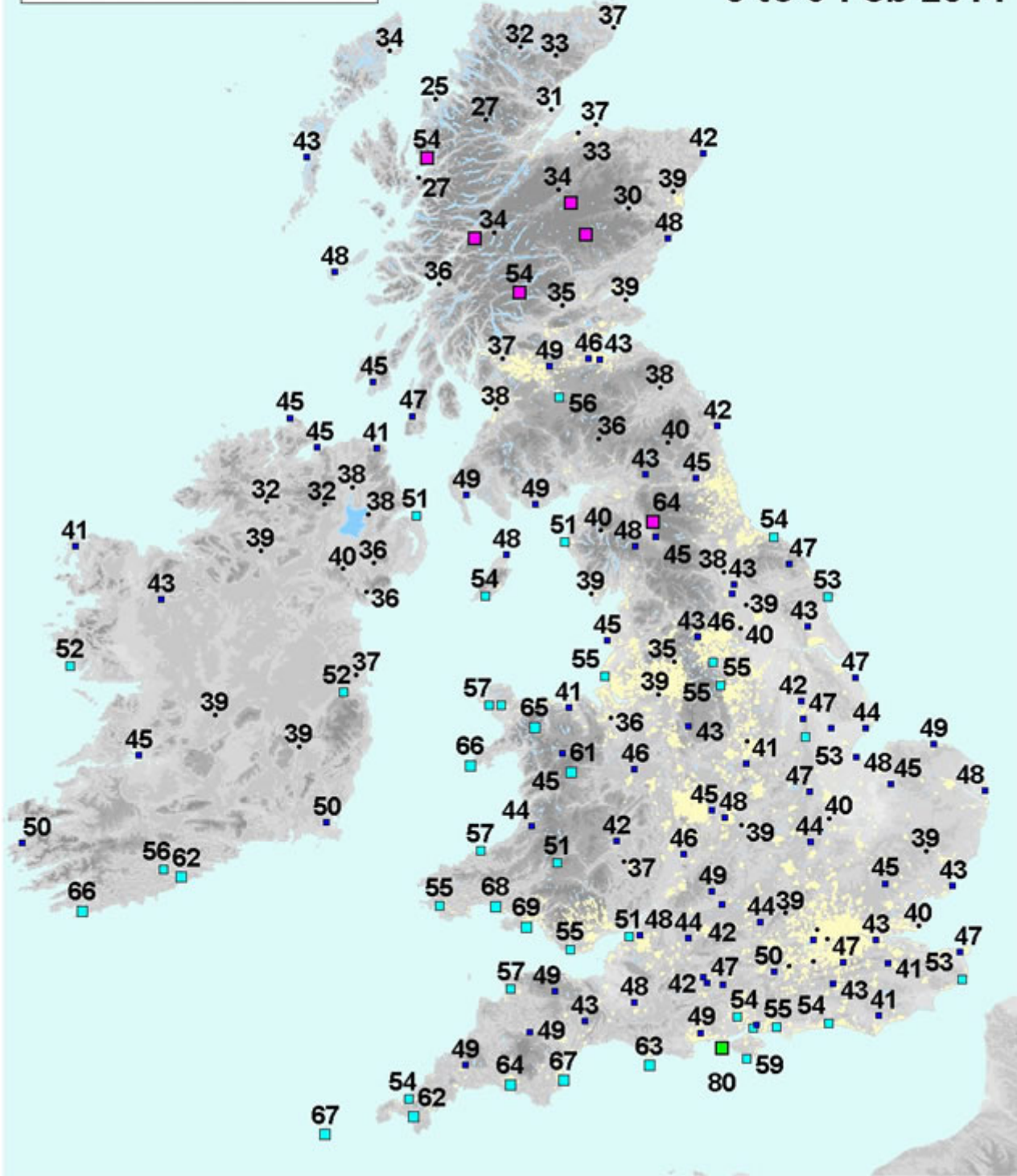
The map below shows maximum gust speeds 8 to 9 February 2014. Wind speeds were comparable with the previous storm and again gusted at 60 to 70 kt around the coastline of south Wales and south-west England, with 80 kt (92 mph) at Needles Old Battery (Isle of Wight).



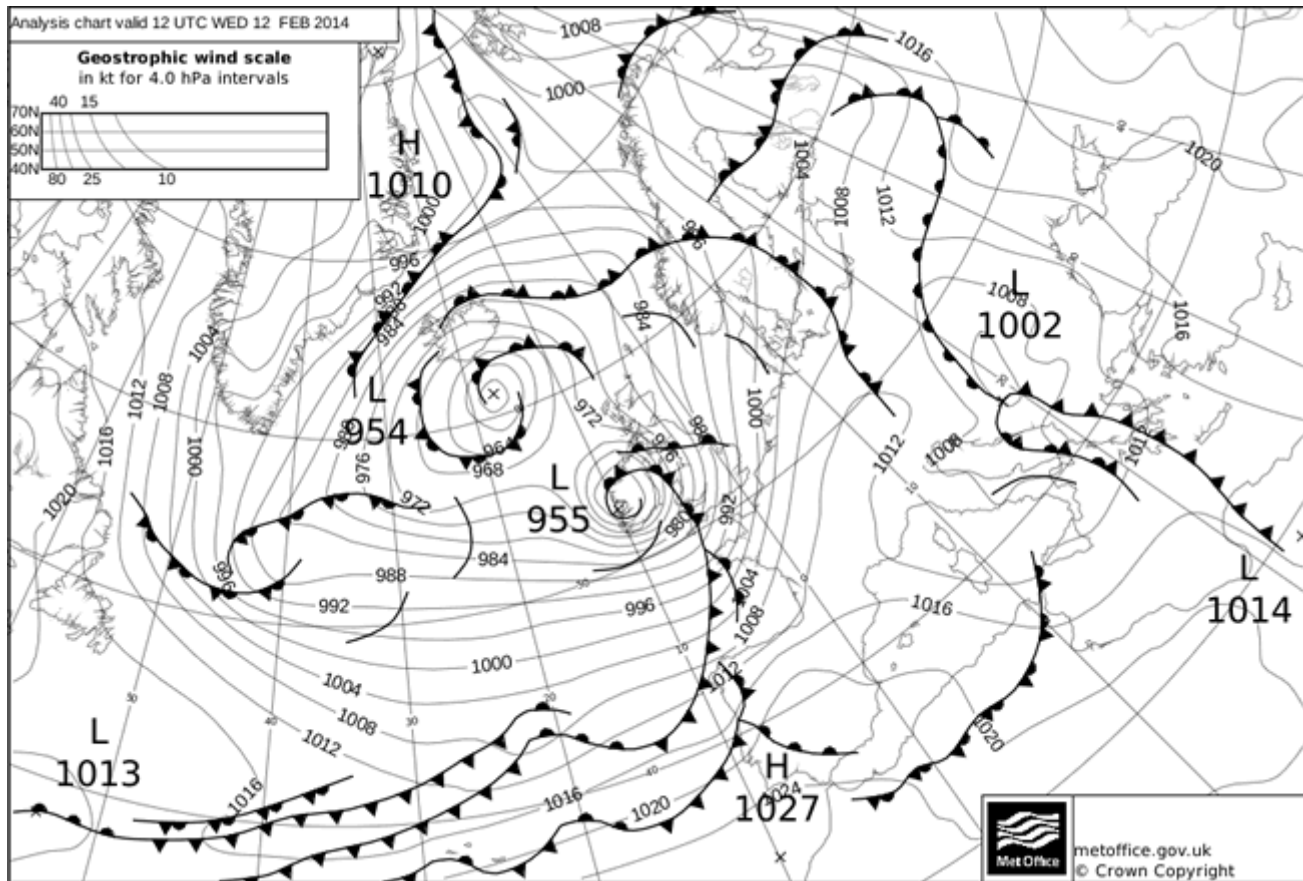
Max Gust Speed (Kt)

- 0 - 40
- 40 - 50
- 50 - 60
- 60 - 70
- > 70
- Mountain Station

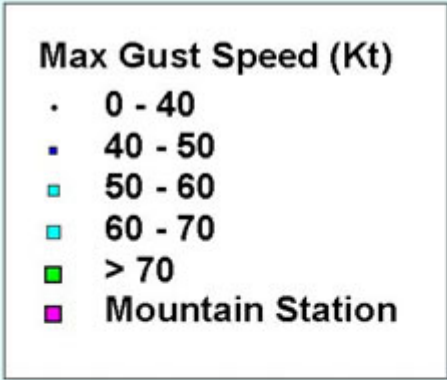
**Maximum
gust speed (Kt)
8 to 9 Feb 2014**



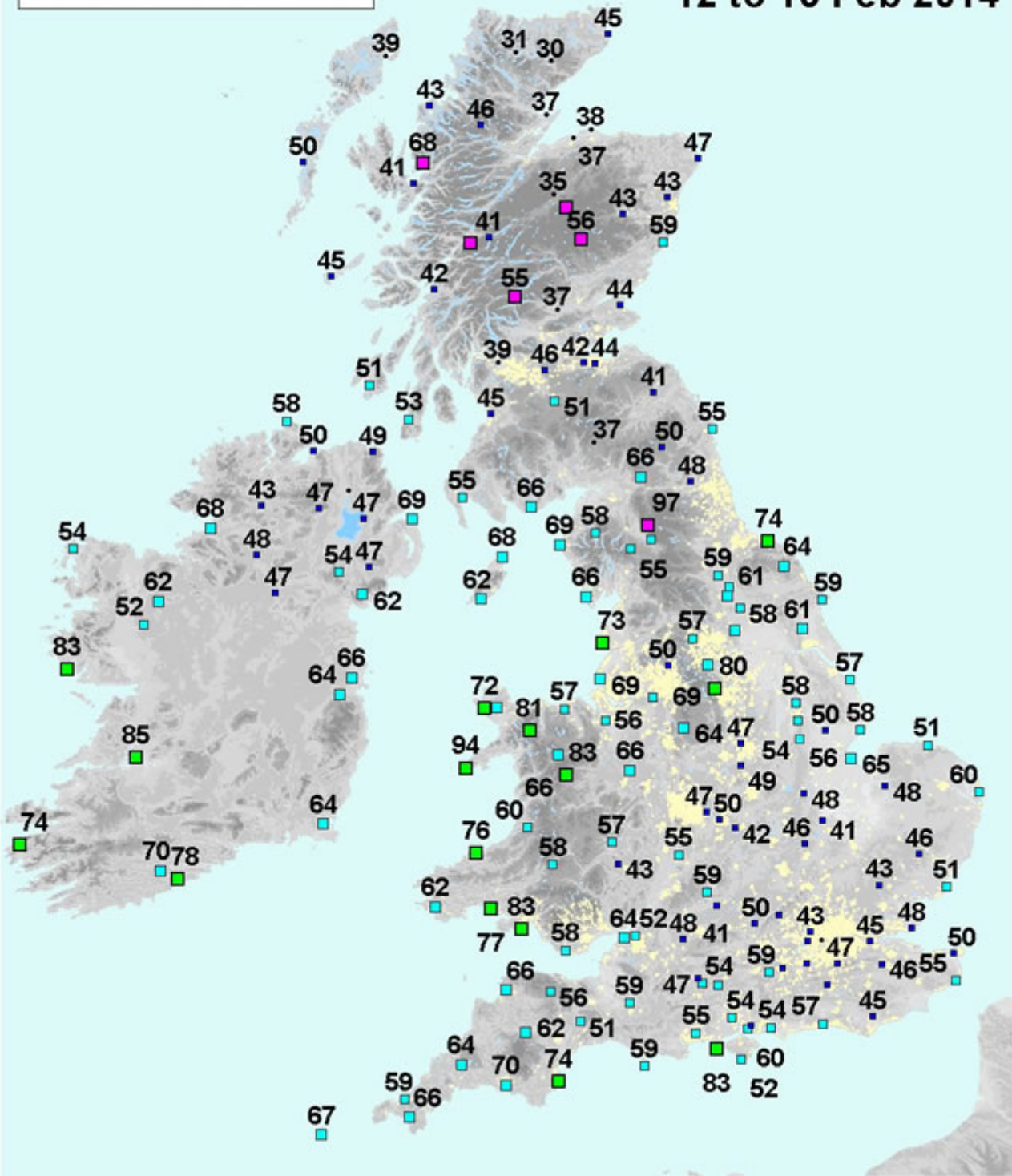
Synoptic situation at 1200 UTC 12 February 2013 showing the next storm and deep low pressure system over Ireland.



The map below shows maximum gust speeds 12 to 13 February 2014. This storm was arguably the most severe of the sequence, particularly for coastal areas of Wales and north-west England where winds gusted at 70 to 80 kt - and a Met Office Red Warning for wind was issued for this region. Maximum recorded gust speeds included 94 kt (108 mph) at Aberdaron, Gwynedd, 83 kt (96 mph) at Lake Vyrnwy (Powys) and 81 kt (93 mph) at Capel Curig (Gwynedd) - close to record values; the highest gust speed on record for North Wales is 97 kt (112 mph) at Aberdaron on 24 December 1997. This was one of the most significant storms to affect Wales and north-west England in recent decades.

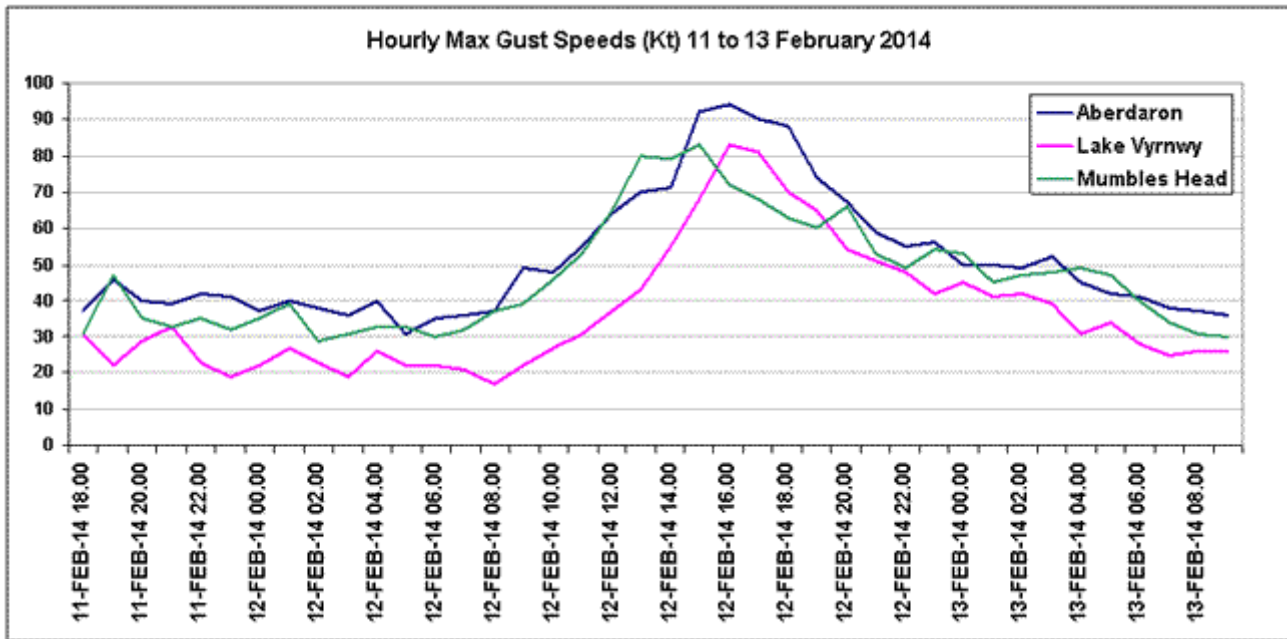


**Maximum gust speed (Kt)
12 to 13 Feb 2014**



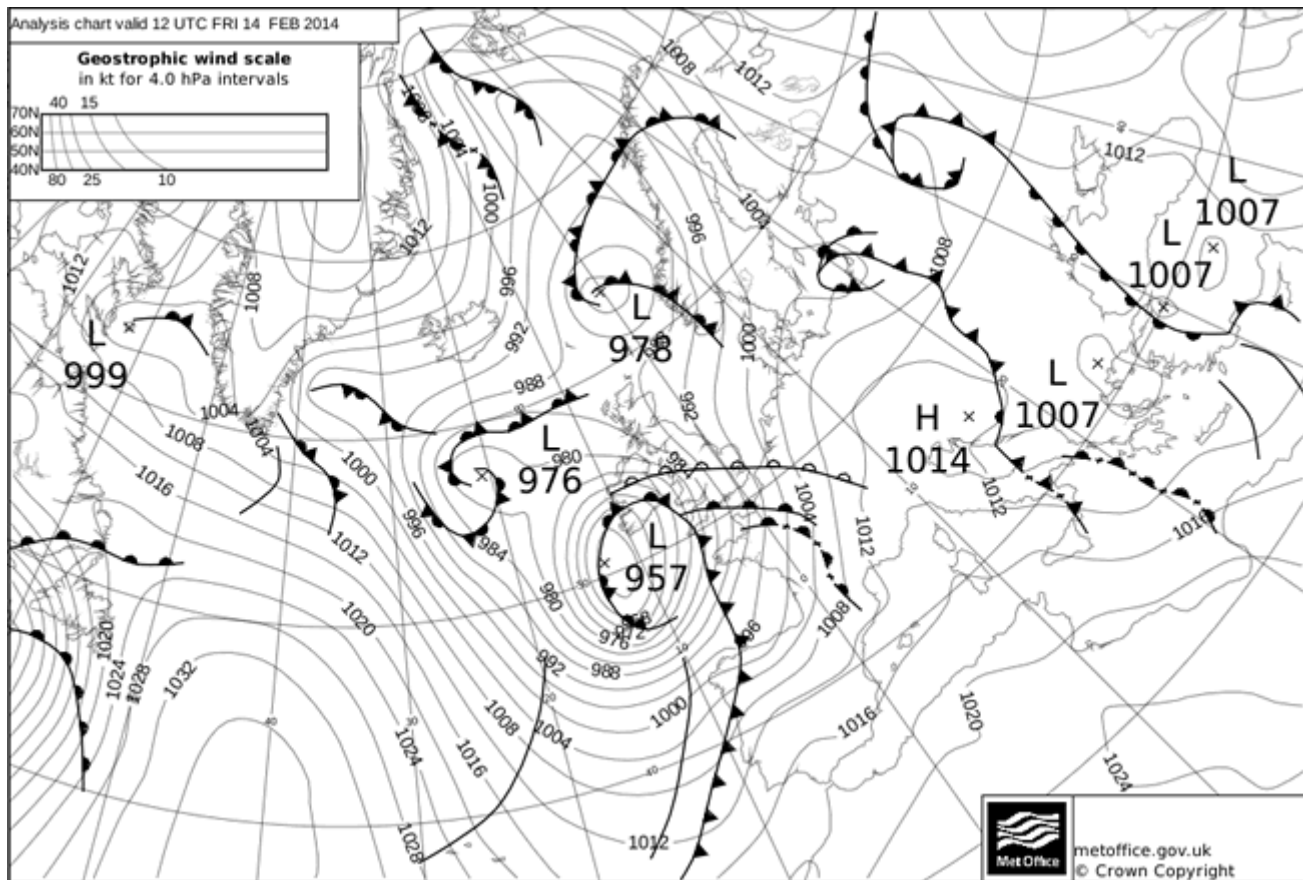
The time series below shows max gust speeds recorded at Aberdaron (Gwynedd), Lake Vyrnwy (Powys) and Mumbles Head (Swansea) during this event. At all three stations gust speeds exceeded 80 kt (92 mph) and peaked during the afternoon. At Aberdaron, maximum gust speeds remained at around 90 kt (104 mph) for

four hours between 1400 GMT and 1800 GMT, with the hourly mean wind speed to 1700 GMT being 68 kt (78 mph).



14 to 15 February

Synoptic situation at 1200 UTC 14 February 2014, with the last of the major storms affecting the UK and the centre of the low pressure system to the south-west of Ireland.

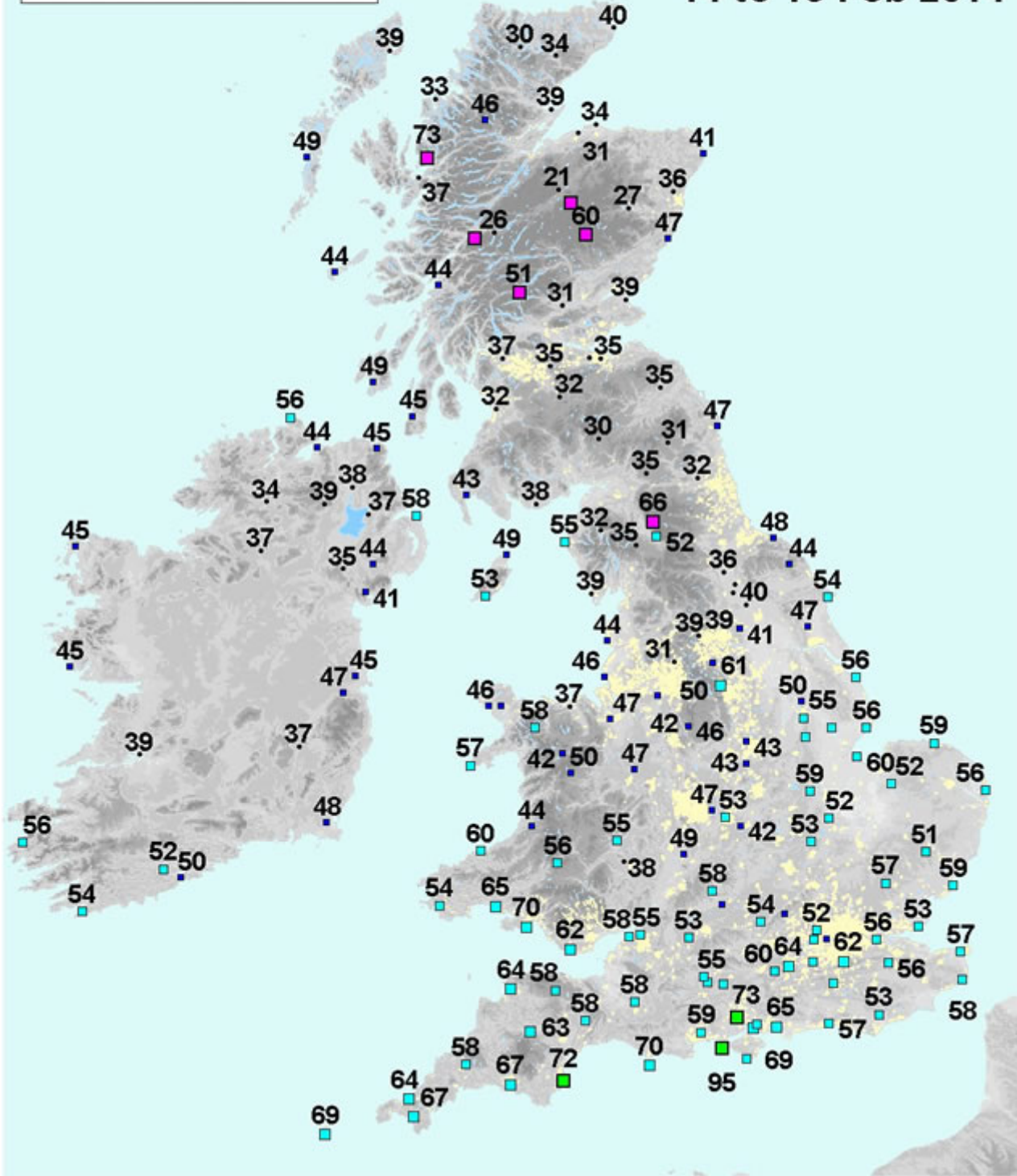


The map below shows maximum gust speeds for the last storm of the sequence from 14 to 15 February 2014. The coasts of south Wales and southern England were affected by the strongest winds, gusting at 60 to 70 kt or higher. Needles Old Battery (Isle of Wight) recorded a gust of 95 kt (109 mph).



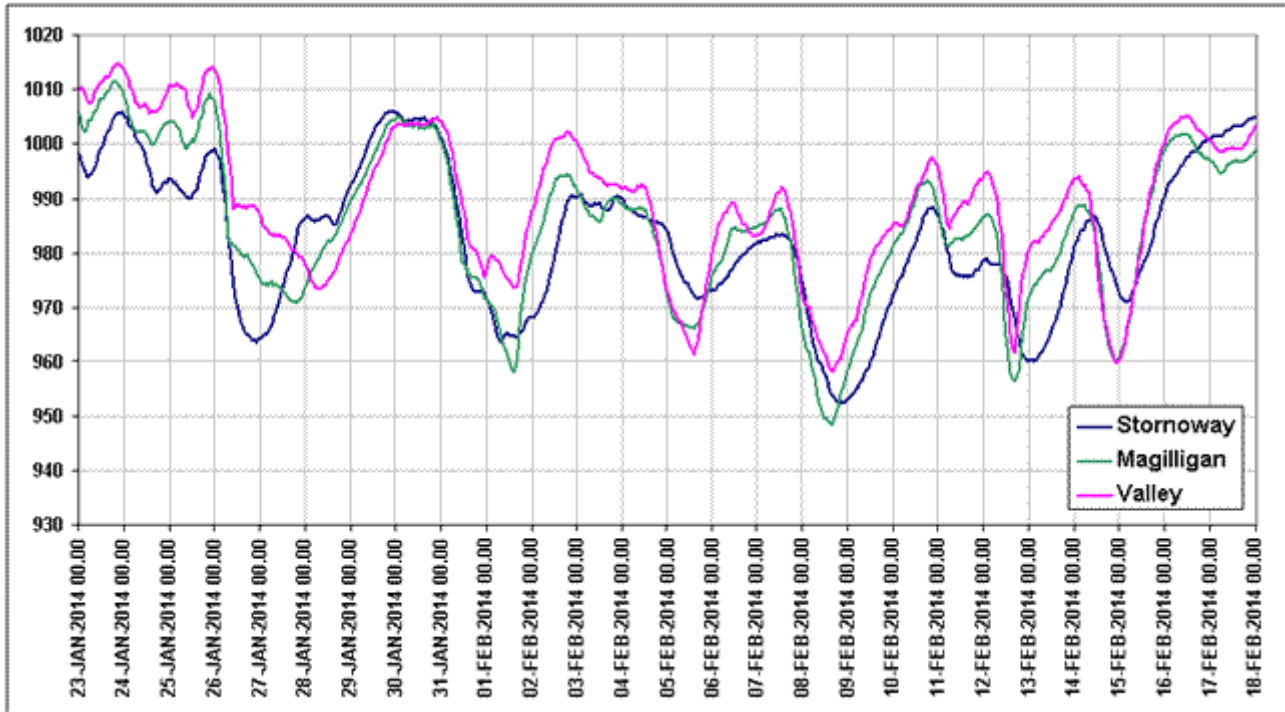
- Max Gust Speed (Kt)**
- 0 - 40
 - 40 - 50
 - 50 - 60
 - 60 - 70
 - > 70
 - Mountain Station

**Maximum gust speed (Kt)
14 to 15 Feb 2014**



Pressure

The graph below shows mean sea level pressure recorded at Stornoway (Western Isles), Magilligan (County Londonderry) and Valley (Anglesey) from 23 January to 18 February 2014. The pronounced downward spikes are the six storms of 25 to 26 January, 31 January to 1 February, 4 to 5 February, 8 to 9 February, 12 February and 14 to 15 February. The central pressure for each of these low pressure systems approached or fell below 950 hPa. This pressure graph may be compared against a similar figure for the [Winter storms, December 2013 to January 2014](#), with overall at least 12 major storms through the two-month period from mid-December to mid-February.

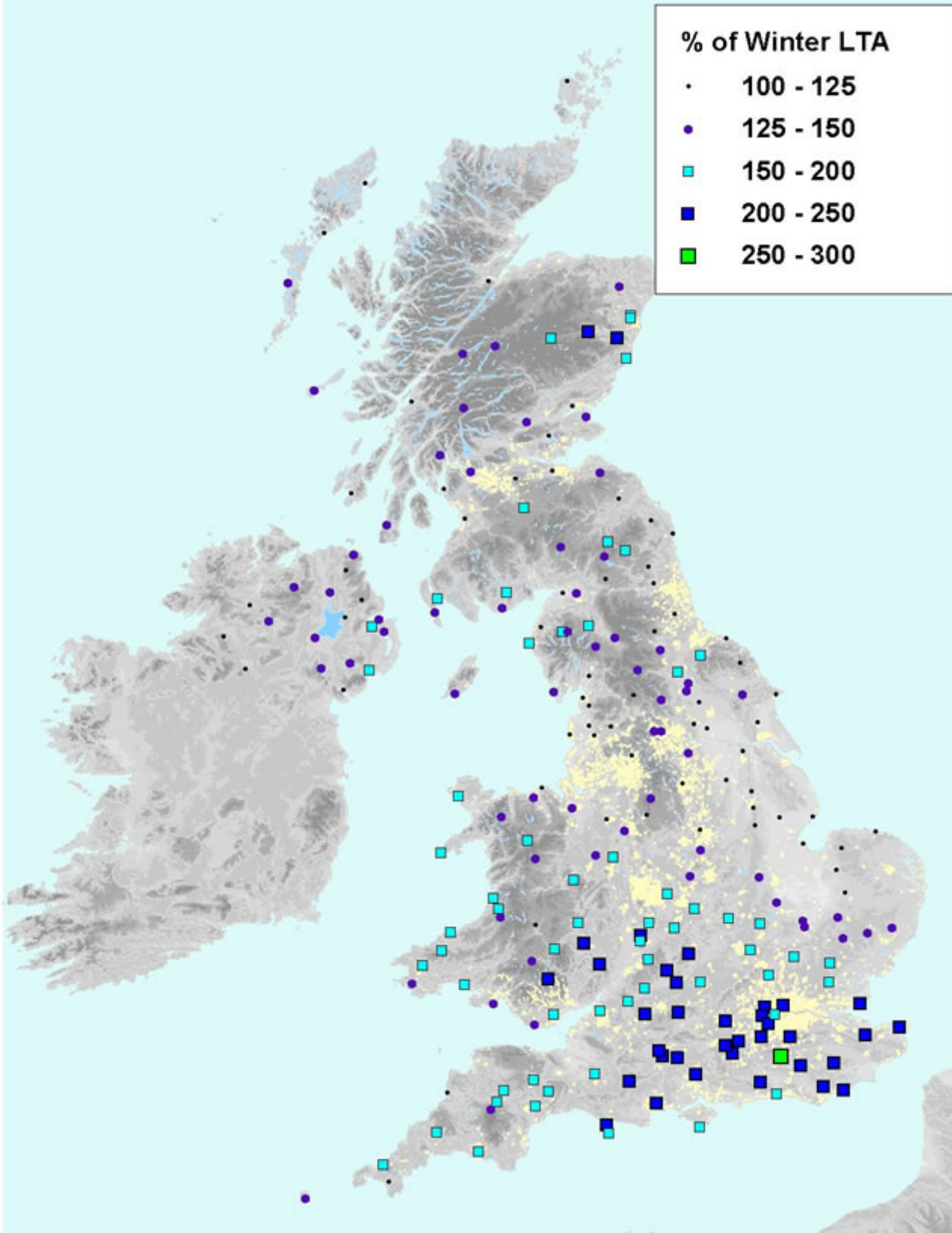


Rainfall

The mid-January period was less stormy but remained extremely unsettled and very wet. Although individual totals from each of these storms were not exceptional, it was the overall totals accumulated through the period from mid-December that led to the extensive flooding problems.

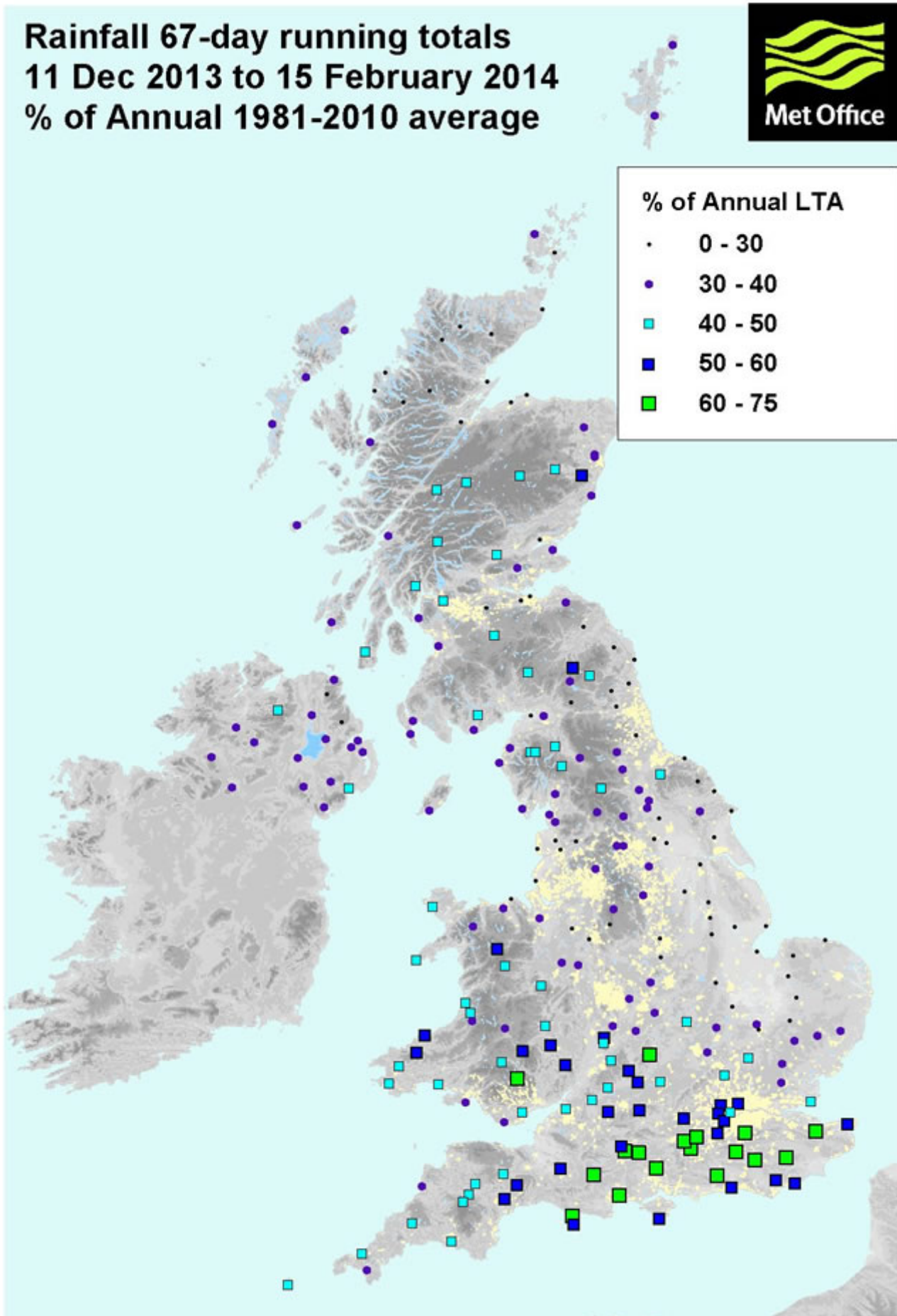
The map below shows accumulated rainfall totals for the 67-day period from 11 December 2013 to 15 February 2014 as a percentage of the winter 1981-2010 long term average. Much of central southern England received well over twice the winter average rainfall through this period.

Rainfall 67-day running totals 11 Dec 2013 to 15 February 2014 % of Winter 1981-2010 average

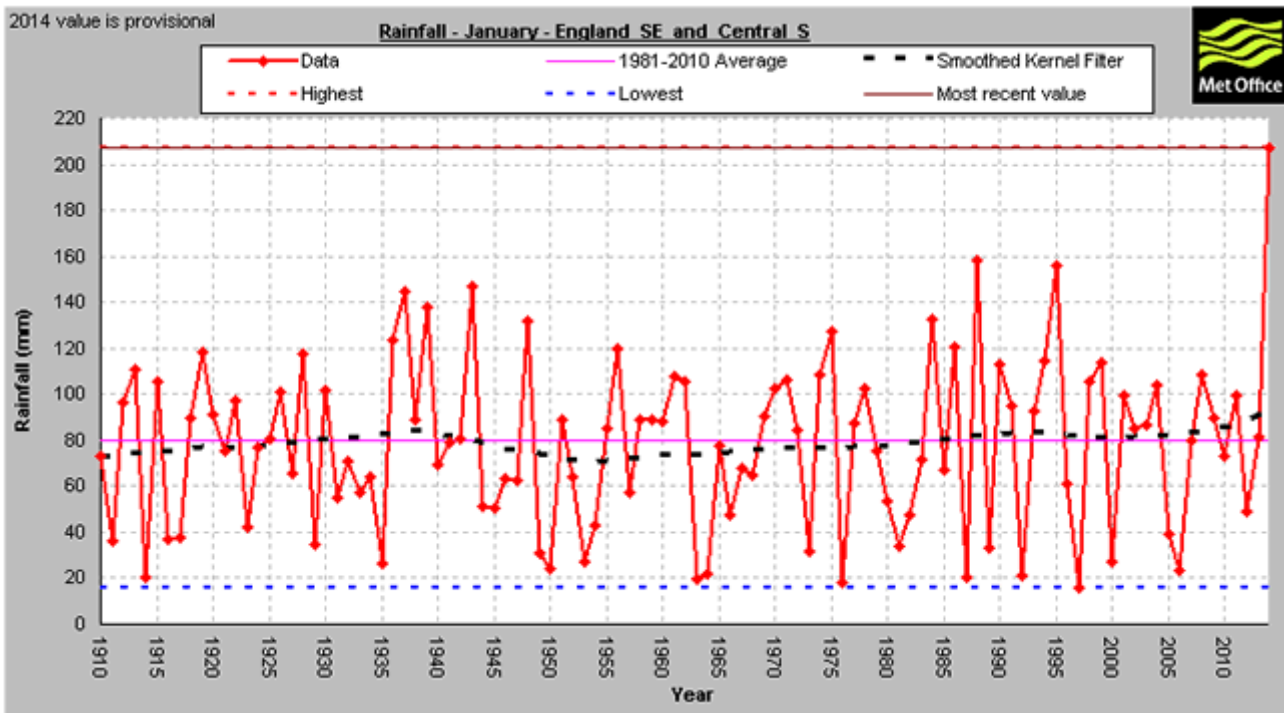


To emphasise the exceptional nature of the wet weather, the map below plots rainfall totals for this same 67-day period but as a percentage of the 1981-2010 long term average rainfall for the *whole* year. Remarkably, much of central southern England, parts of south Wales and eastern Scotland received around half a year's

worth of rainfall through this period, with a few locations approaching 75% of the annual average in just over two months.

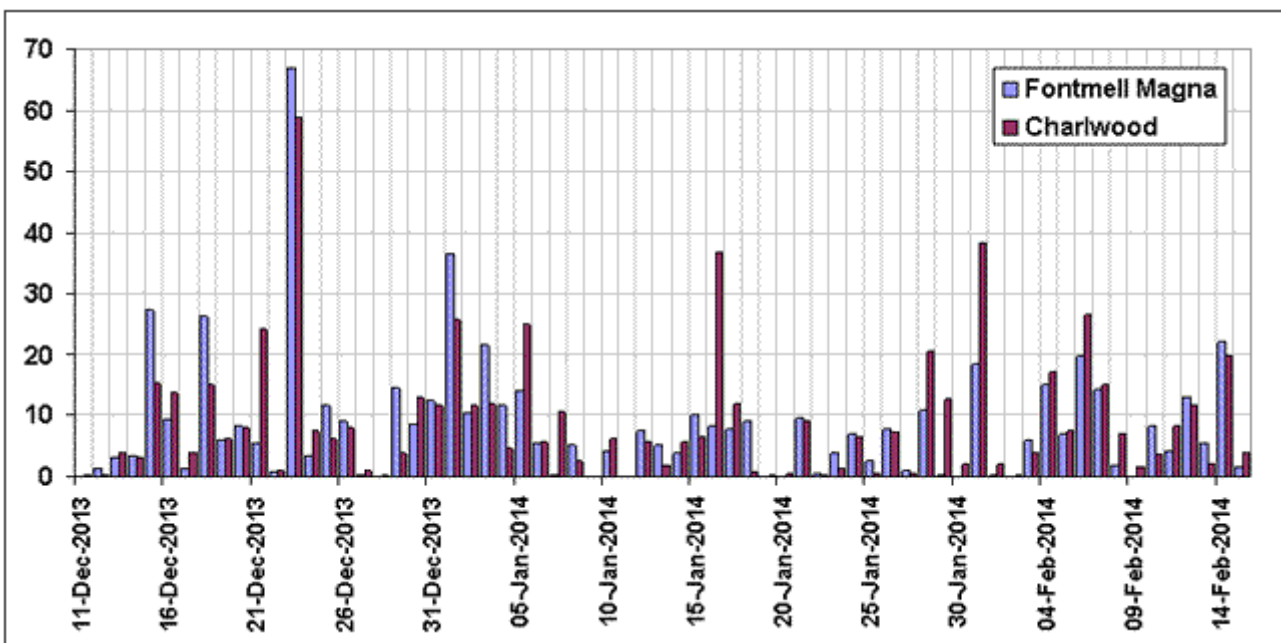


The rainfall totals were most exceptional across southern England which experienced one of, if not the most, exceptional periods for winter rainfall in around 250 years. The two-month December to January rainfall total of 372mm for the southeast and central southern England climate district was the wettest any two-month period in a series from 1910. The figure below shows January rainfall totals for the southeast and central southern England climate district; January 2014 was the wettest January in this series from 1910 by a very wide margin, and also provisionally the wettest calendar month on record for this district.



For the England and Wales precipitation series (EWP), the January rainfall total was 185 mm making this the wettest January in the series from 1766, just ahead of January 1948 (177 mm), and there were more days of rain for the UK in January 2014 than for any other month in a series from 1961.

The figure below shows daily rainfall totals for two locations - Fontmell Magna (Dorset) and Charlwood (Surrey) for the period 11 December 2013 to 15 January 2014. Individually, the only very wet day was 23 December 2013, but the steady accumulation of rainfall through the period is apparent, with each station recording around 20 days with 10mm or more of rain; more than twice the average for the whole winter. These stations recorded 560 mm and 608 mm of rainfall respectively through this period, more than twice the winter average.



For more rainfall statistics, please refer to the [2014 weather summaries](#).

Historical storm comparison

One measure of the extent and severity of storms is the number of stations each day recording maximum gust speeds greater than 60 knots (69 mph). The analysis excludes stations with an elevation greater than 250 m above sea level. These data are from the Met Office observing network and provide a series back to 1969. They give a general picture of the extent and duration of high wind events affecting the UK.

The figure below shows the count of stations for winters from 1970 exceeding 60 kt, and show that Winter 2014 (1 December 2013 to 15 February 2014) was the stormiest winter since 1993. December 2013 was within the top ten stormiest months in a series from 1969 and February 2014 was also a very stormy month. The first and last weeks of January 2014 were also stormy, but overall this month was exceptional for the rainfall totals, rather than for storminess.

