

Storm Alex and heavy rain 2 to 4 October 2020

Storm Alex¹ marked an emphatic transition to unsettled autumnal weather across the UK. Alex brought stormy conditions with strong winds to the southern half of the UK and the Channel Islands on 2 October 2020, with associated fronts bringing prolonged and widespread heavy rain on 3rd to 4th. Parts of central southern England and eastern Scotland recorded totals of 100mm or more in the first four days of the month, and on 3 October many weather stations recorded their wettest October day on record. The extensive nature of the rain resulted in the UK receiving 31.7mm as an area-average for the rain-day 3 October 2020, making this the UK's wettest day on record in a daily series back to 1891.

Impacts

The strong winds and heavy rain brought some impacts and travel disruption, while large waves affected parts of the south coast exposed to the east – for example at Swanage (Dorset). There were temporary power cuts in several areas, including the Isle of Wight, Portsmouth, Southampton, Devon, Cornwall, towns east of Reading and parts of west London. However, although storm Alex and subsequent fronts brought widespread heavy rain, flooding impacts were relatively limited; mitigating factors are likely to have included the dry state of ground prior to storm Alex (most of the UK recording below-average rainfall in September) and the steady nature of the rainfall, with an absence of intense rain-bands embedded in the frontal rain. As it moved south-east into the continent, storm Alex brought extreme flooding to parts of south-east France and north-west Italy, with dozens of houses destroyed, roads washed away, and several fatalities reported. As much as 500 mm of rain fell in the worst affected parts of the Alpes-Maritimes department², equivalent to three months rainfall.

Weather data

The image below shows the Met Office shipping forecast issued for Biscay on the evening of 1 October 2020, with a hurricane force 12 warning for this area as storm Alex rapidly deepened to the west of Brittany.

Biscay

GALE WARNING
Issued: 21:46 (UTC) on Thu 1 Oct 2020

Hurricane force 12 veering northwesterly and decreasing gale force 8 imminent, increasing storm force 10 later

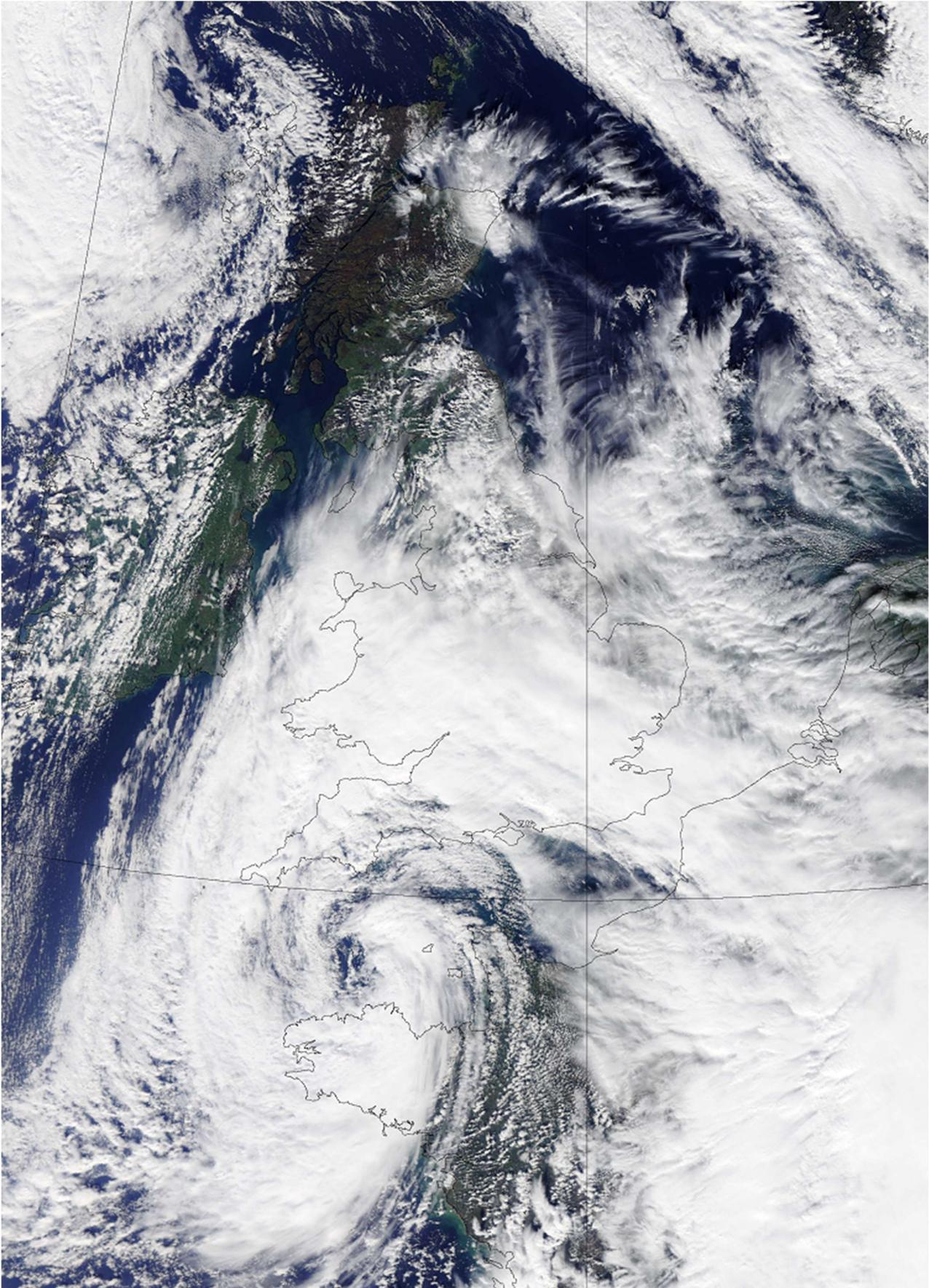
WIND
Northwest 6 to gale 8 becoming cyclonic gale 8 to storm 10, then northwest 7 to severe gale 9 later.

SEA STATE
Rough or very rough, becoming high or very high, then very rough or high later.

¹ Storm Alex was named by Meteo-France. For the UK, the first named storm of the 2020/2021 season was storm Aiden on 31 October 2020 under the Name our Storms collaboration between the Met Office, Met Eireann and KNMI.

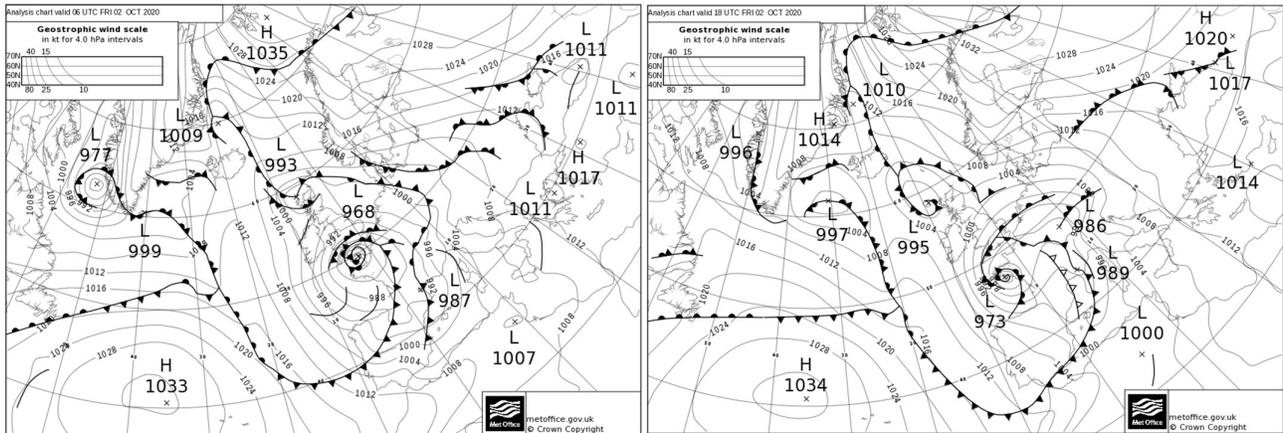
² <https://public.wmo.int/en/media/news/mediterranean-episode-causes-unprecedented-rainfall>

The visible satellite image on 2 October 2020 shows the southern half of the UK swathed in cloud and the centre of storm Alex located to the west of the Channel Islands. In contrast, Northern Ireland and Scotland experienced clear and calm conditions.

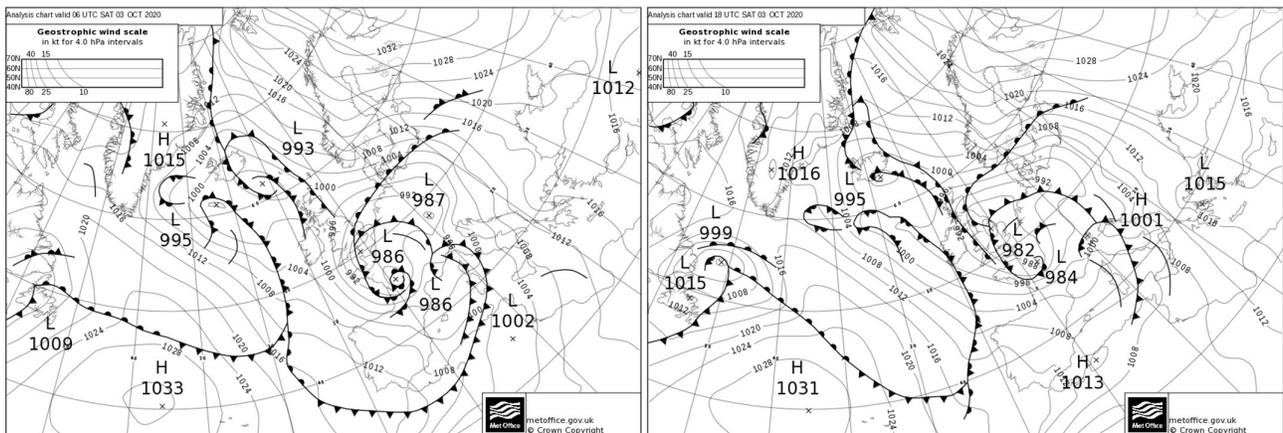


The sequence of analysis charts shows the centre of storm Alex located over the Channel Islands before moving south across Brittany and then south-eastward into the near continent, with associated weather fronts across the UK bringing persistent heavy rain.

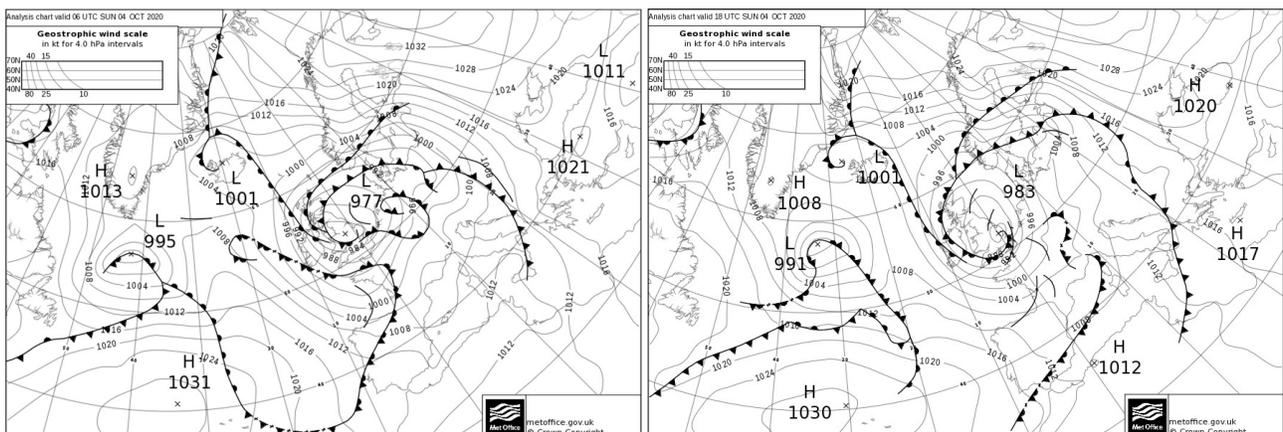
0600 and 1800 UTC 2 October 2020



0600 and 1800 UTC 3 October 2020

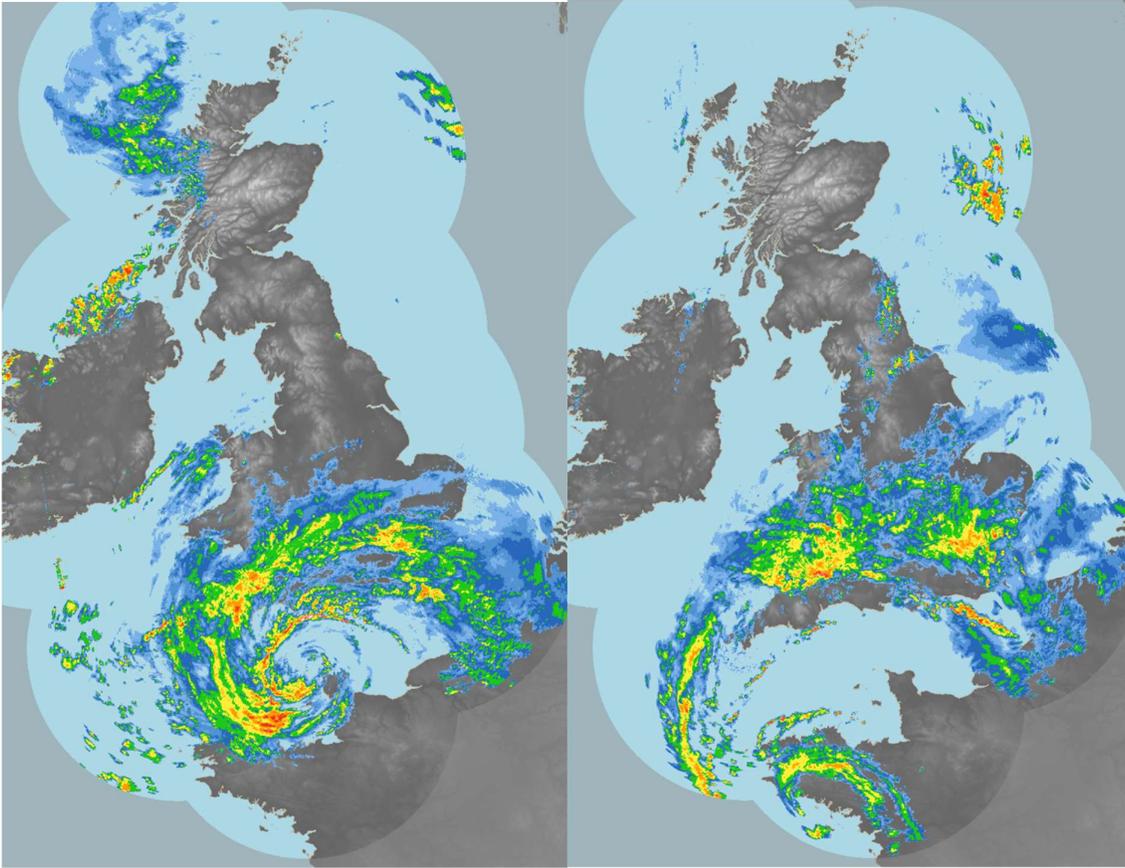


0600 and 1800 UTC 4 October 2020

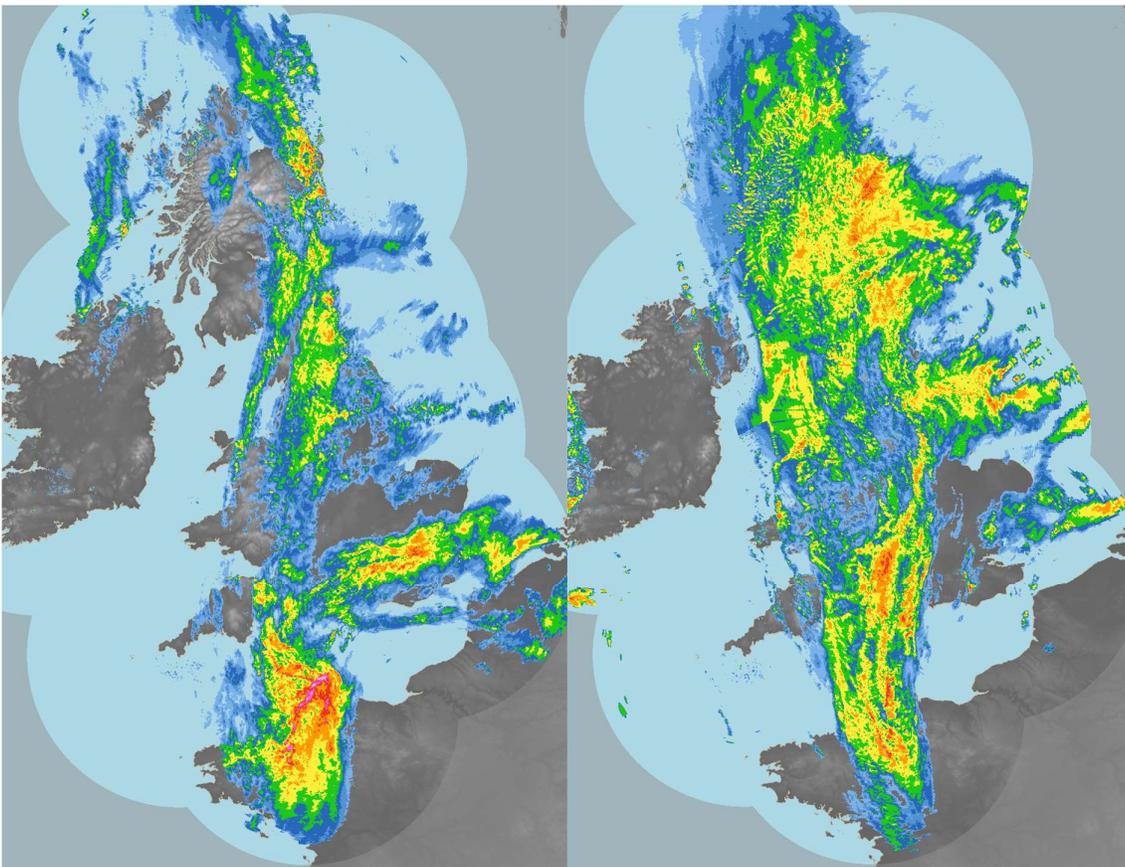


The sequence of rain-radar images shows the rain from fronts associated with storm Alex. Initially the heaviest rain on 2 October was across southern England, but on 3 October the area affected expanded to include much of England, Wales and eastern Scotland in an easterly airflow. Heavy rain continued to affect southern England, Wales, Northern Ireland and eastern Scotland into 4 October but as the low pressure system gradually began to fill, the fronts moved around the periphery of the UK, with drier weather in the centre. The rainfall was sustained in duration but

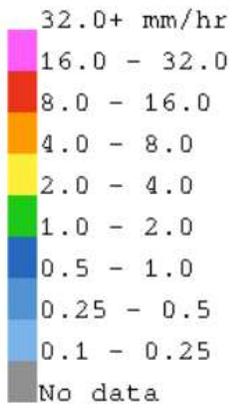
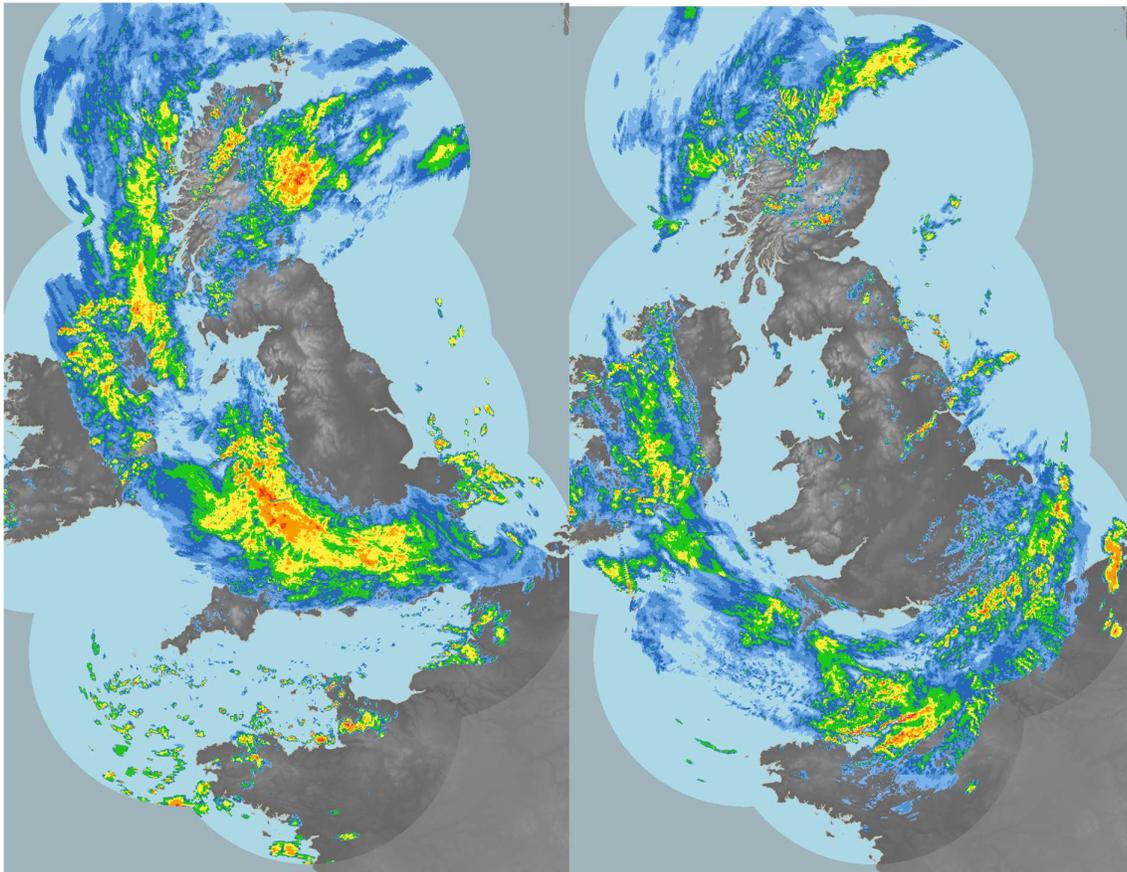
relatively modest in intensity with rain-rates generally less than 8mm per hour and mostly less than 4mm per hour.



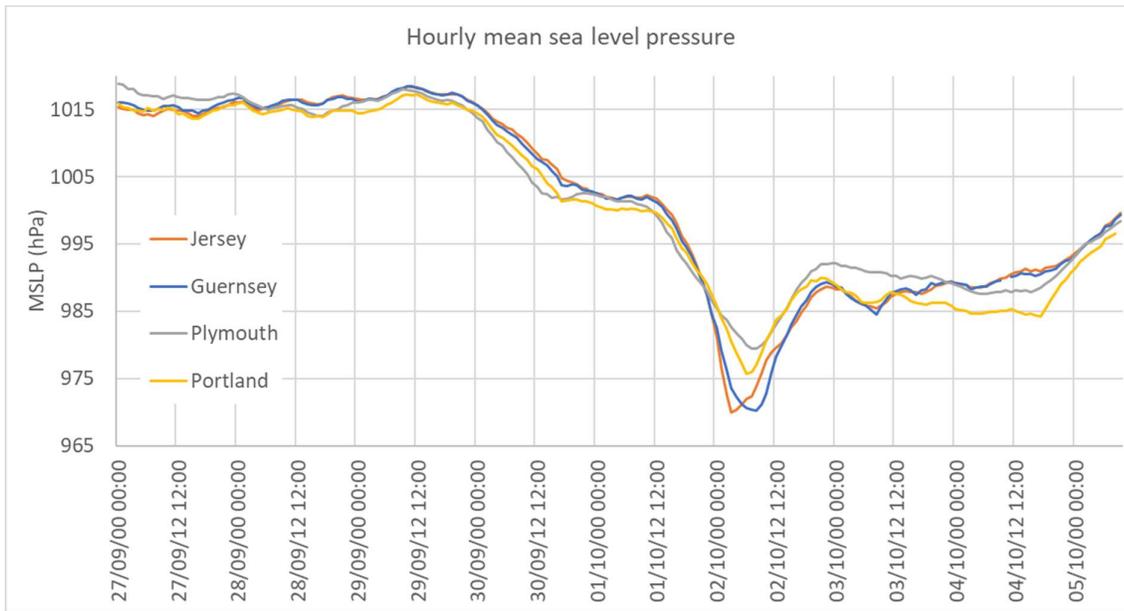
Above: 0600 and 1800 UTC 2 October 2020 Below: 0600 and 1800 UTC 3 October 2020



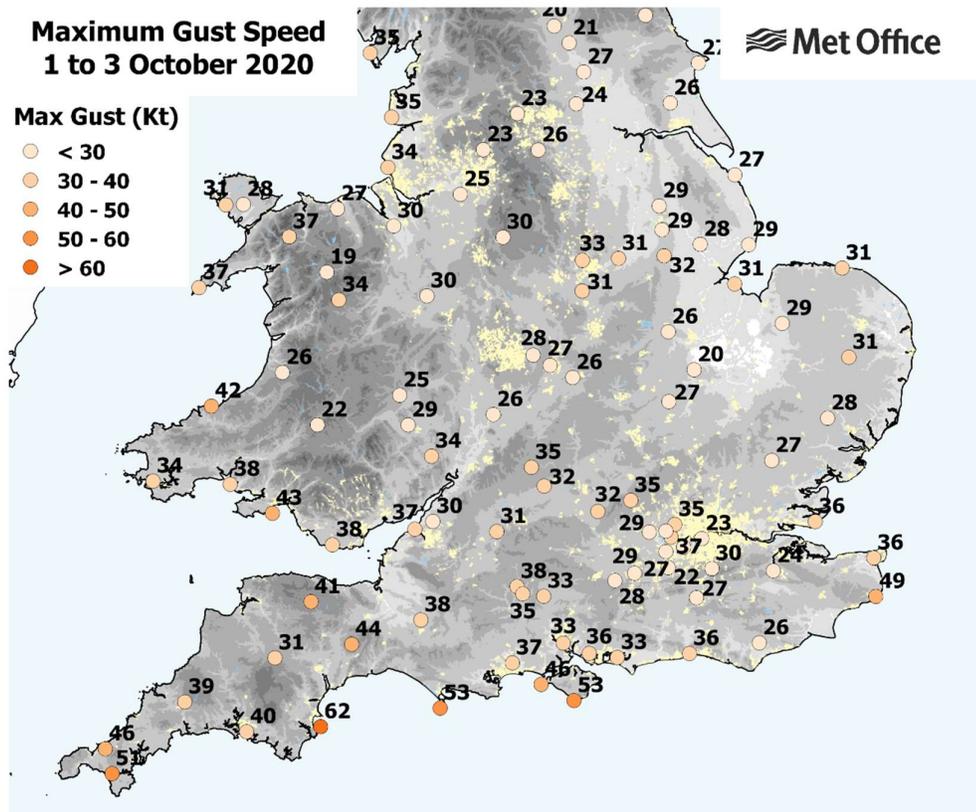
0600 and 1800 UTC 4 October 2020



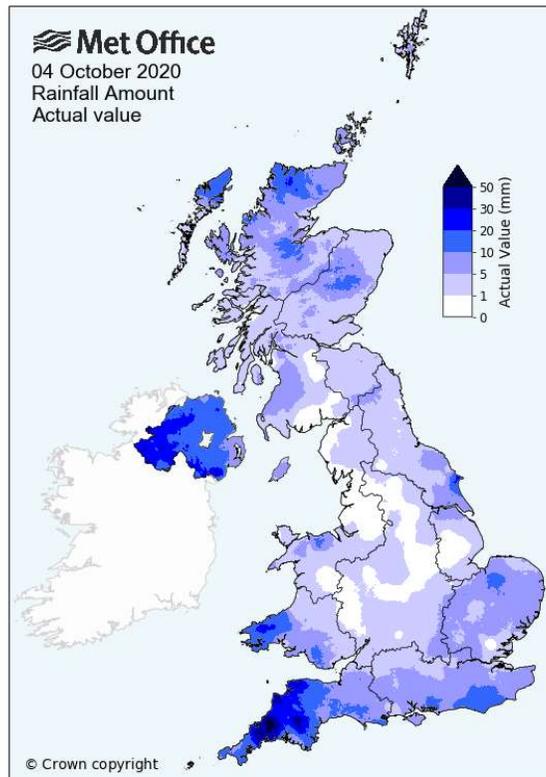
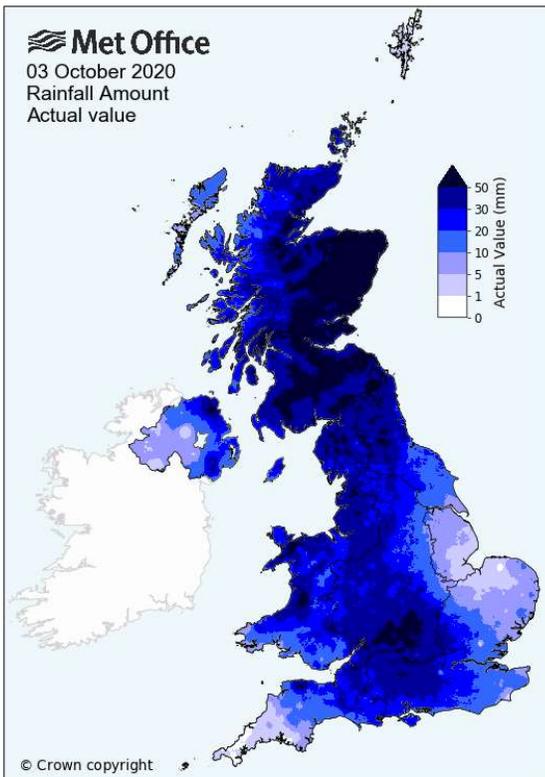
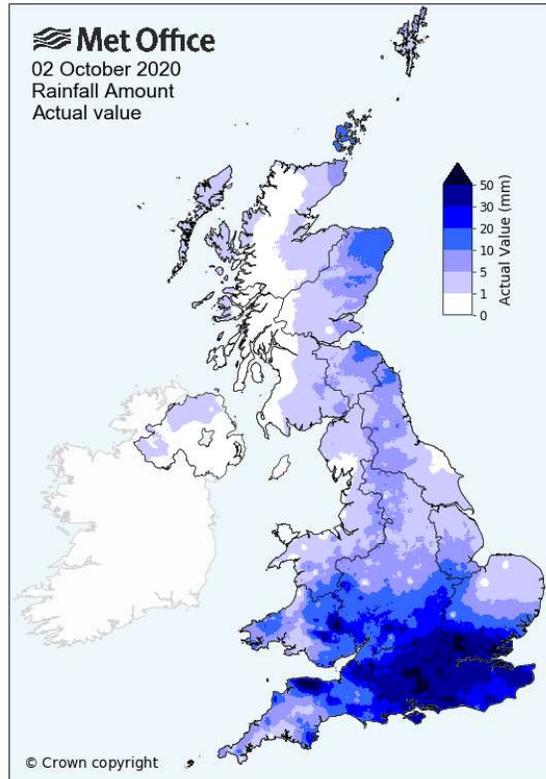
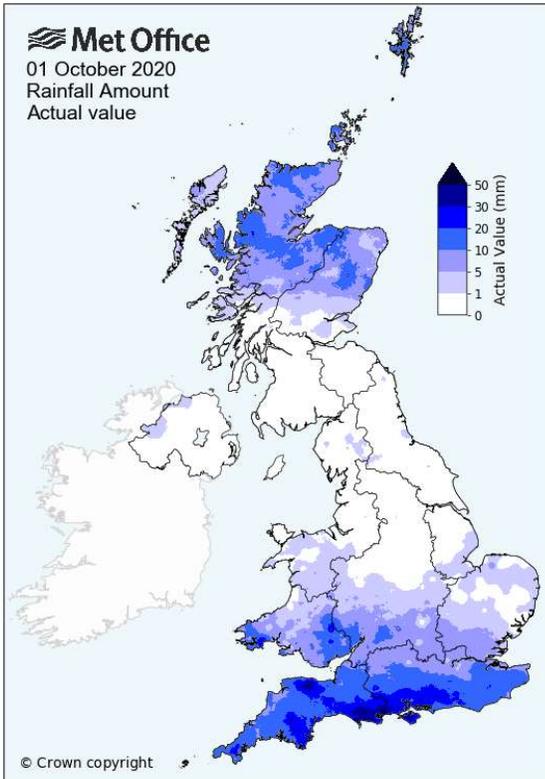
The chart below shows a time-series of mean sea level pressure at Jersey and Guernsey Airports, Plymouth, Mountbatten and Isle of Portland from 27 September to 5 October, with the abrupt drop in pressure from storm Alex on 2 October as the storm centre came close to the Channel Islands.



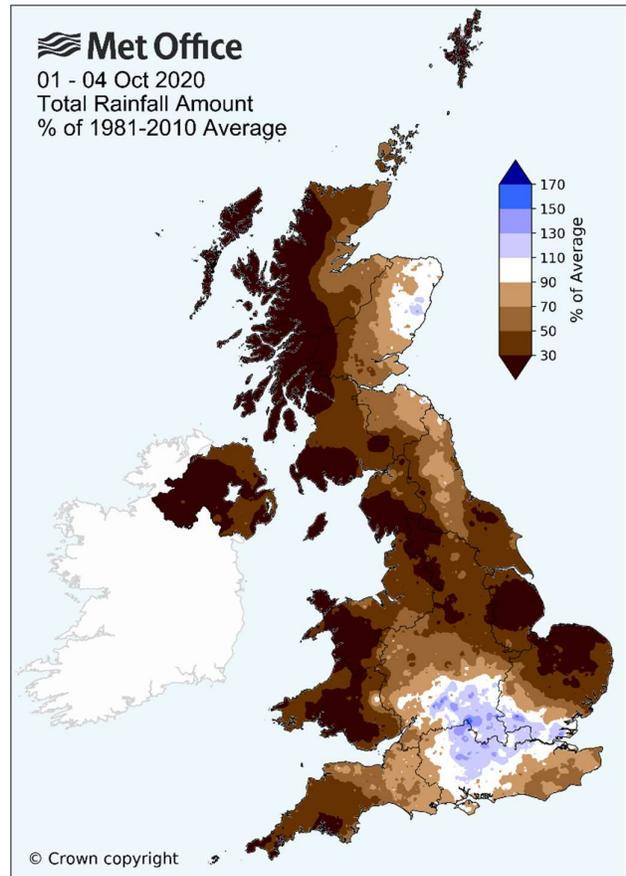
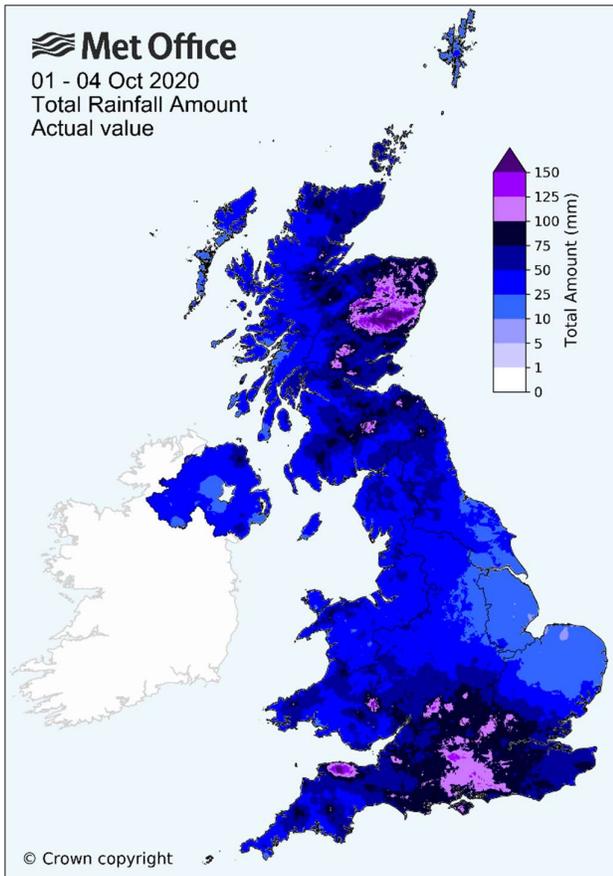
The map below shows maximum gust speeds across the southern half of the UK from storm Alex. Stations along the south coast of England – particularly in the south-west – recorded gusts of 50Kt (58 mph), with 62Kt (71 mph) at Berry Head, Devon. Gusts of over 50Kt were also recorded in the Channel Islands. However, in general this storm was more notable across the UK for rain than wind, and this storm was less significant both for spatial extent and strength of wind gusts than either storms Ellen or Francis in late August 2020.



The panel of maps show daily rainfall totals from 1 to 4 October 2020. Heavy rain affected parts of southern England on 1 October, and more widely on 2 October but by far the wettest day was 3 October with 30 to 50mm or more of rain falling very widely across the UK and significantly more than this in some areas. It is highly unusual for rainfall totals as high as this to be recorded on the same day across such a large spatial extent of the country. By 4 October the wettest areas were confined to Northern Ireland and the far south-west.



The maps below show rainfall totals for 1 to 4 October 2020 – both actuals and as a percentage of the October 1981-2010 long-term average. In the first four days of the month, 50 to 75mm or more of rain fell widely across southern England and parts of southern and eastern Scotland, with over 100mm across some areas and reaching 150mm in parts of eastern Scotland and on Exmoor. An orographic component to the rainfall is clearly apparent with rainfall totals enhanced across upland areas of southern England such as the Cotswolds, Mendips, Chilterns and Exmoor. Much of central southern England and Aberdeenshire recorded more the whole-month average rainfall, or more, in the first four days of the month.



The table below lists 4-day totals at selected stations over this period.

| Station | Total 1 to 4 October 2020 (mm) | % of October 1981-2010 average |
|-------------------------------|--------------------------------|--------------------------------|
| Winchcombe, Gloucestershire | 118.6 | 158 |
| Oxford | 108.8 | 156 |
| Reading University, Berkshire | 97.4 | 136 |
| High Wycombe, Buckinghamshire | 108.2 | 133 |
| Rothamsted, Hertfordshire | 106 | 131 |
| London St James's Park | 88.2 | 127 |
| High Beach, Essex | 86.6 | 118 |
| Aboyne, Aberdeenshire | 107.8 | 116 |
| Guernsey Airport | 107 | 113 |
| Wisley, Surrey | 86.4 | 111 |
| Otterbourne, Hampshire | 108.6 | 111 |
| Boscombe Down, Wiltshire | 88.2 | 107 |
| Velindre, Powys | 111.8 | 102 |
| Jersey Airport | 105.4 | 102 |

On 3 October 2020 the UK recorded a daily rainfall total of 31.7mm (as an average across the whole of the UK). This made this the UK's wettest day on record in a series from 1891 – in over 47,000 days - beating the previous record from 25 August 1986, and the first time that the UK area-average rainfall for a single day has exceeded 30mm. It was also provisionally the wettest day for Scotland with an average of 46.1mm.

A large number of weather stations recorded their wettest October day on record, including several with 100+ year records, and scattered widely across the UK from London to the west Midlands to Lancashire to Aberdeenshire. These are listed in the table below. At Oxford, 60.0mm on 3 October made this Oxford's sixth wettest day in almost 200 years daily record (1828), and its wettest day for 47 years (since 67mm on 27 June 1973). The three day fall of 104.8 mm was the highest 72-hour total on record at this station, just surpassing July 1968 (104.5mm). (Thanks to Stephen Burt, University of Reading).

| Station | Daily rainfall 03/10/2020 (mm) | Previous wettest October day (mm) | Date | Record length |
|---------------------------------|--------------------------------|-----------------------------------|------------|---------------|
| Oxford | 60.0 | 49.3 | 09/10/1875 | 165 |
| Rothamsted (Hertfordshire) | 59.8 | 55.2 | 12/10/1993 | 105 |
| Balmoral (Aberdeenshire) | 66.6 | 53.9 | 15/10/1976 | 105 |
| Leuchars (Fife) | 60.6 | 51.2 | 11/10/2012 | 98 |
| Wellesbourne (Warwickshire) | 48.6 | 47.4 | 15/10/2002 | 65 |
| Benson (Oxfordshire) | 43.6 | 38.8 | 29/10/2000 | 65 |
| Preston, Moor Park (Lancashire) | 51.6 | 50.6 | 27/10/1980 | 63 |
| London St James's Park | 52.4 | 41.6 | 15/10/1980 | 56 |

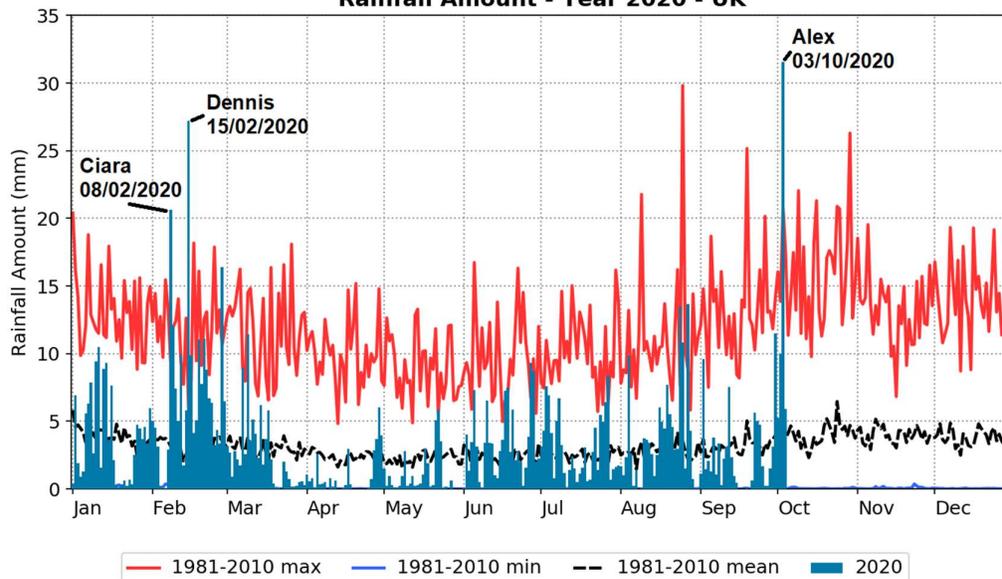
Remarkably, of the 40 days in the UK area-average daily rainfall series from 1891 where the total has exceeded 20mm, three have occurred in 2020 including storm Alex (31.7mm, 3 October 2020, rank 1), storm Dennis (27.2mm, 15 February 2020, rank 3) and storm Ciara (20.7mm, 8 February 2020, rank 31). The chart below shows UK daily rainfall totals for January to October 2020, including spikes for each of these storms. (Note the red line marks the highest value from the period 1981-2010 for each calendar day).



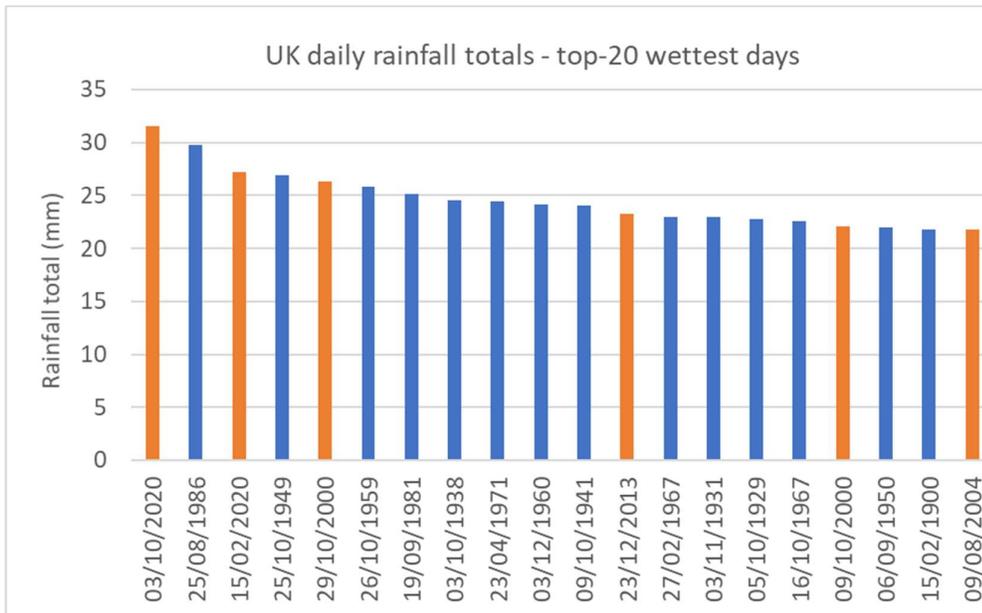
Source: HadUK-Grid 05/10/2020 15:05

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Rainfall Amount - Year 2020 - UK



The chart below shows the UK's top 20 wettest days (as UK area-average daily rainfall) in the series from 1891. Six out of the 20 wettest days have occurred this century (since 2000) and of these, two in year 2020.



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