

## Exceptionally wet month for parts of the Midlands, September 2024

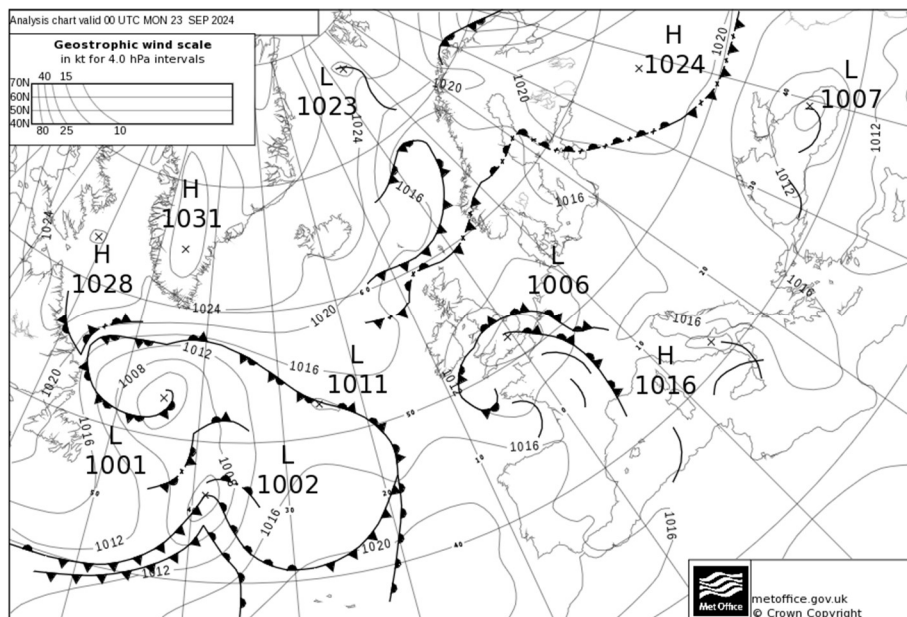
A series of low pressure systems brought very unsettled weather during the last ten days of September 2024, with 150 to 200mm of rain falling in the wettest areas. Several counties in the Midlands recorded their wettest September on record with over three times the 1991-2020 September average rainfall. Oxfordshire and Bedfordshire recorded their wettest calendar month on record in series from 1836. A long-running weather station at Oxford recorded its wettest calendar month for 250 years, and from 22 to 23 September its highest 2-day rainfall total in a near 200-year daily series.

### Impacts

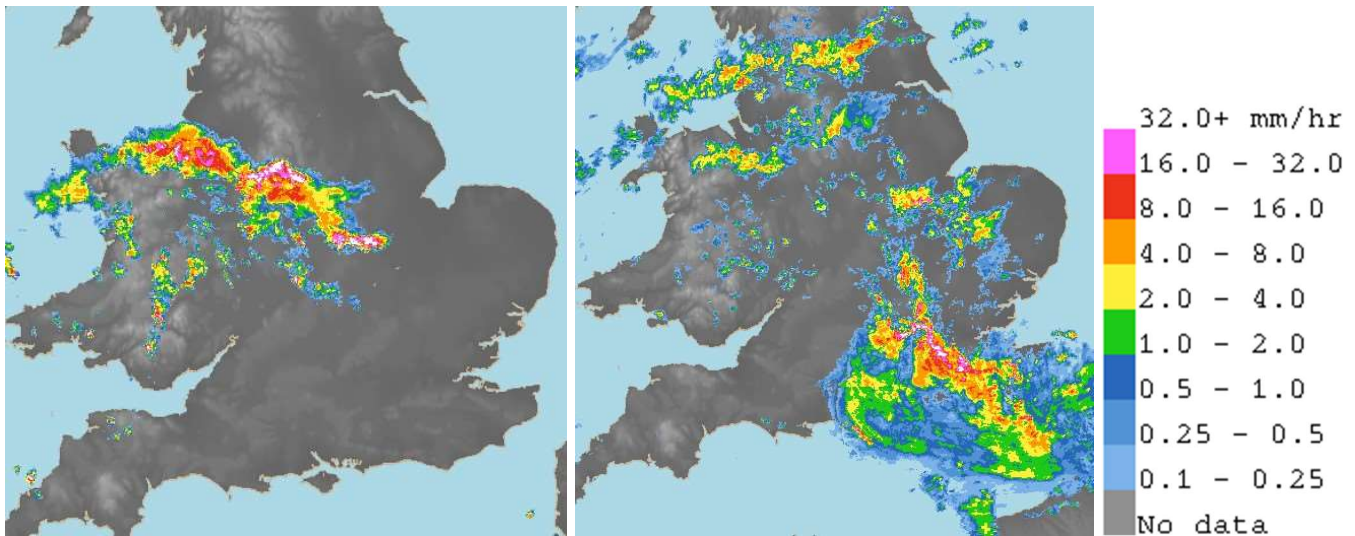
The heavy rain caused disruption and damage, with roads and schools closed. A section of the A421 in Bedfordshire was closed for an extended period when the carriageway was submerged. Several hundred properties were reported flooded across Hertfordshire, Bedfordshire, Northamptonshire, Oxfordshire and elsewhere. Torrential downpours caused surface water flooding in the west Midlands with major roads closed including a section of the M5. Houses in Stoke-on-Trent and Derby were reported to be struck by lightning and there was also disruption on the London Underground. The AFC Wimbledon football stadium was closed due to a sinkhole on the pitch. Cars were submerged in floodwater and there was disruption to the rail network with flooded sections of track.

### Weather data

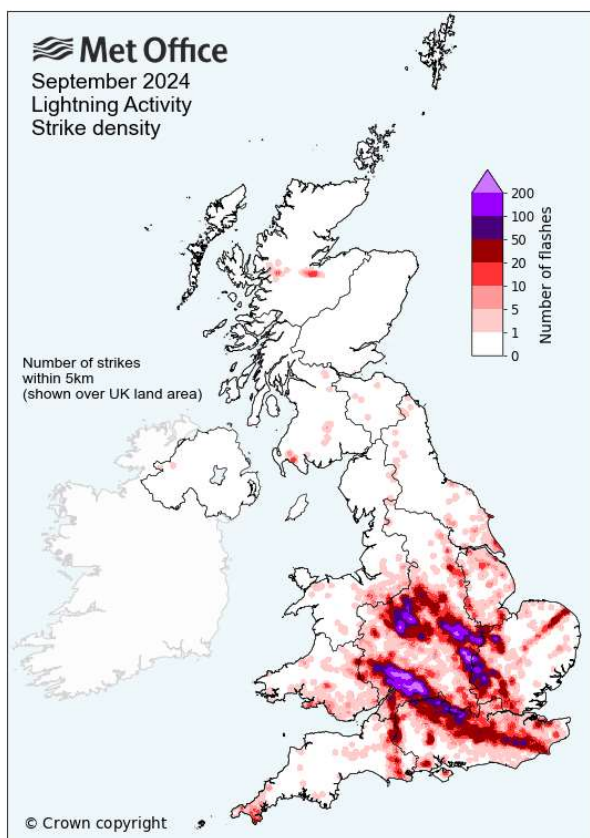
The analysis chart at 0000UTC 23 September 2024 shows occluded fronts across England and Wales associated with an area of low pressure, bringing thunderstorms and heavy rainfall, torrential at times, in a south-easterly flow of unstable air.



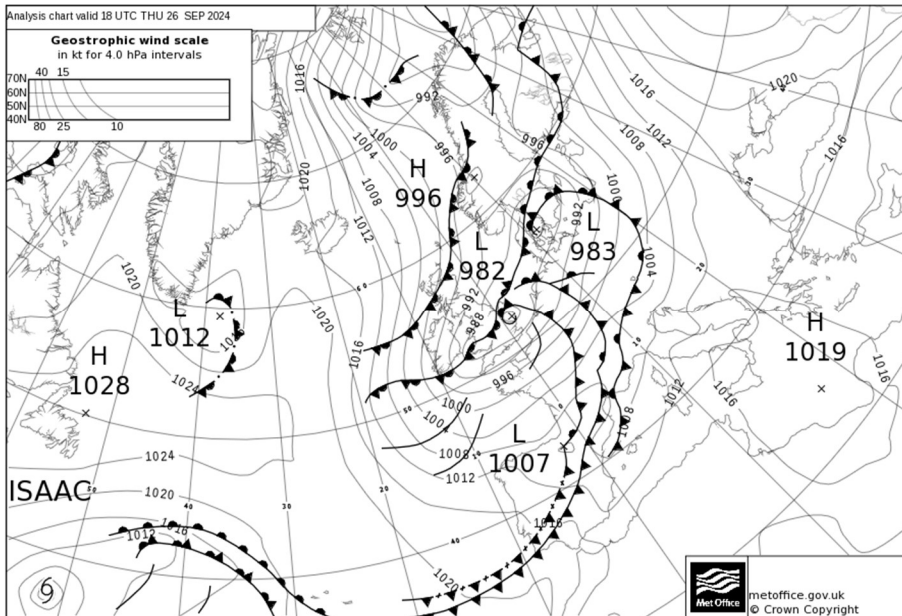
The rain-radar images at 1700UTC 21 September (left) and 0000UTC 23 September (right) provide an indication of the intensity of rainfall experienced from this event. Woburn, Bedfordshire recorded 37.8mm in the hour to 1600UTC on 22 September – an example of the torrential downpours experienced.



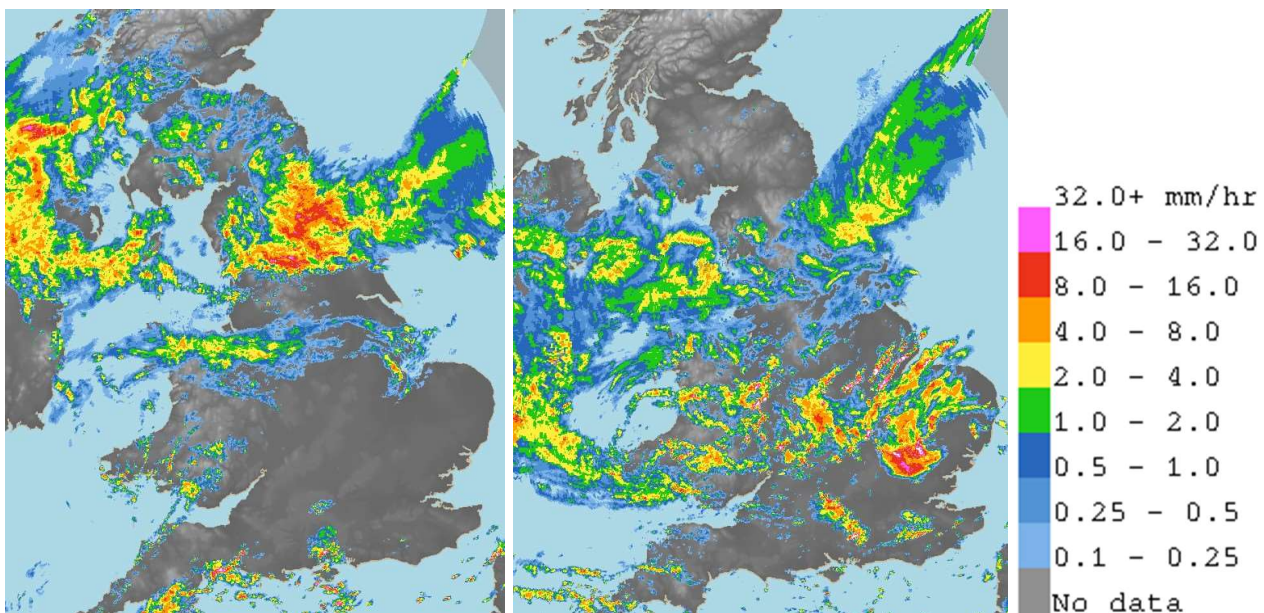
The map below shows recorded lightning strikes during September 2024, much of this activity occurring from 21st to 23rd; the lines of thunderstorms are clearly visible.



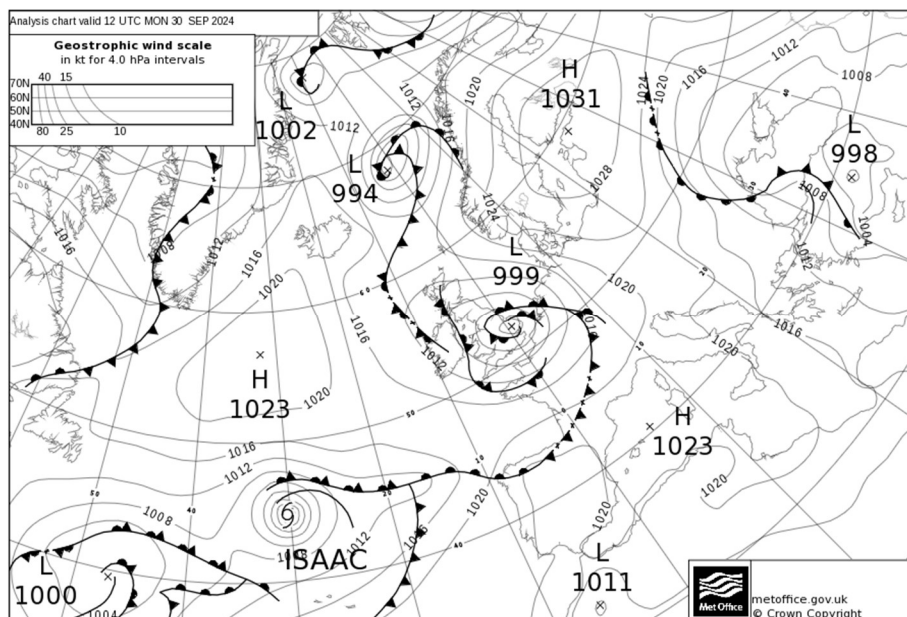
The analysis chart at 1800UTC 26 September 2024 shows the next area of low pressure bringing further persistent, widespread and heavy rain.



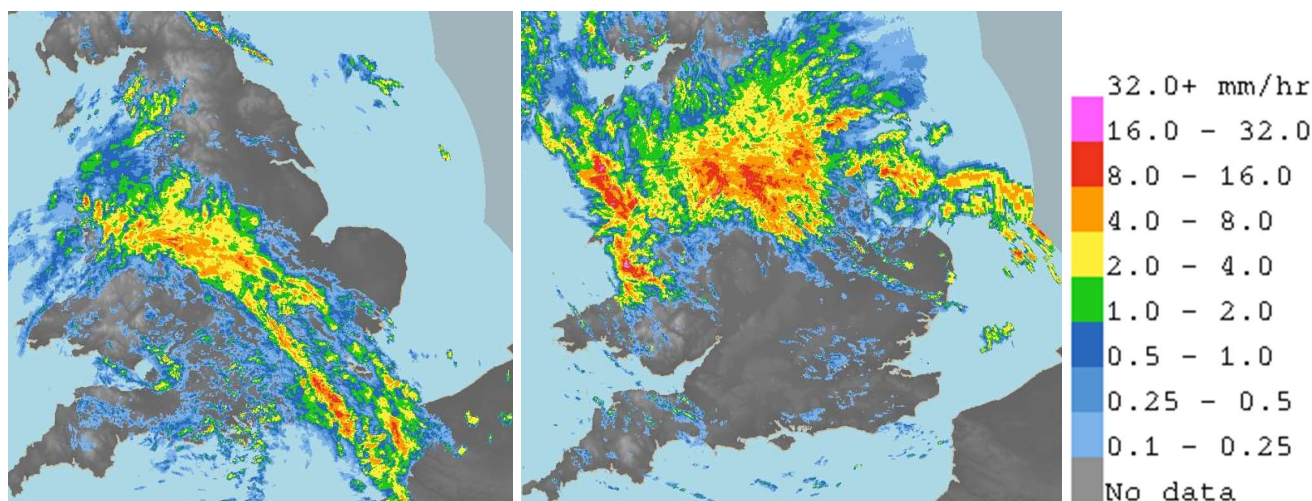
The rain-radar images at 0900UTC and 1630UTC 26 September show the heavy rainfall associated with this next area of low pressure across north-east England, with bands of torrential downpours spreading across much of central England and Wales.



The analysis chart at 1200UTC 30 September 2024 shows the third area of low pressure centred over East Anglia, responsible for further very wet weather at the end of the month, accompanied by some strong winds, bringing very autumnal weather. Winds gusted at 40 to 50Kt (46 to 58mph) or more across parts of south-west England.

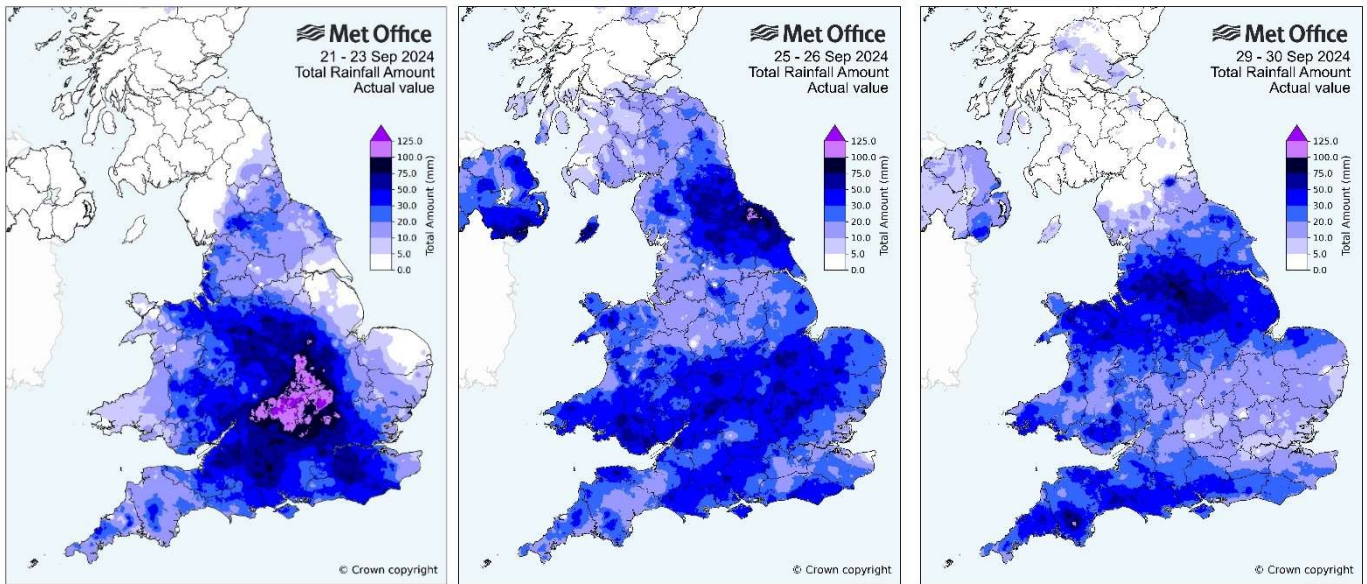


The rain-radar images at 0300UTC and 1500UTC 30 September show the widespread heavy frontal rain from this system sweeping north-east across England and becoming slow-moving across Lincolnshire and the south Pennines.

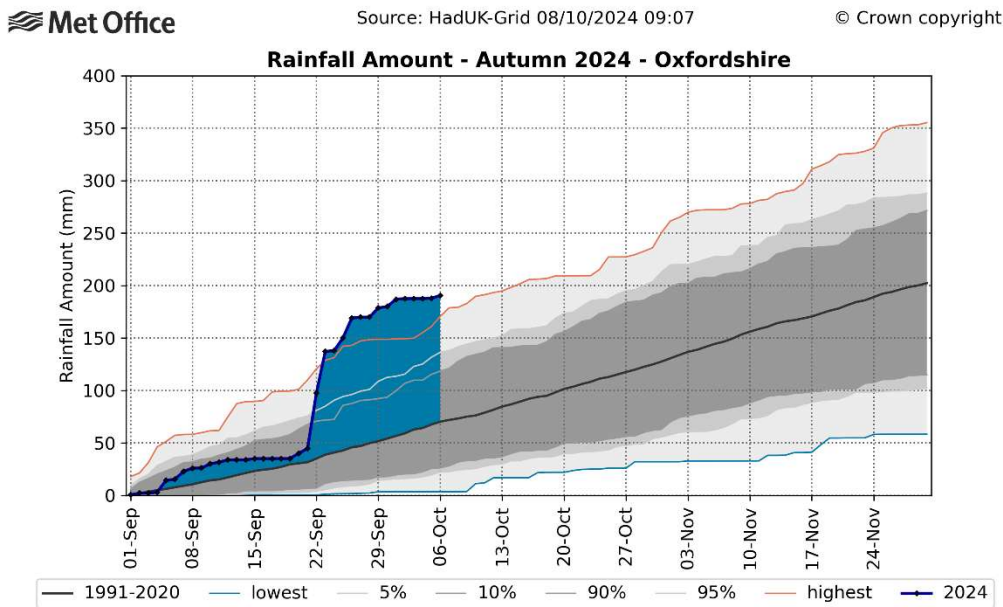


The charts below show rainfall accumulations from each of these three low pressure systems: 21 to 23 September (left); 25 to 26 September (centre); 29 to 30 September (right). The most extreme rainfall was from the first of the three, with over 100mm falling widely across parts of Oxfordshire, Northamptonshire, Buckinghamshire and Bedfordshire, and over 125mm in some locations. At Oxford, the 2-day rainfall total from 22 to 23 September of 118.9mm smashed the previous record, 98.1mm on 9 to 10 July 1968 (itself an event with major flooding of national significance to the west in the Bristol area), making this the wettest 2-day period at Oxford in a near 200-year daily record from 1827).<sup>\*</sup> Daily rainfall totals on 22 September included 90.6mm at Woburn (Bedfordshire), 83.2mm at Shirburn Model Farm, Oxfordshire and 77.1mm at Oxford; at least ten stations in this area recorded daily totals exceeding 60mm.

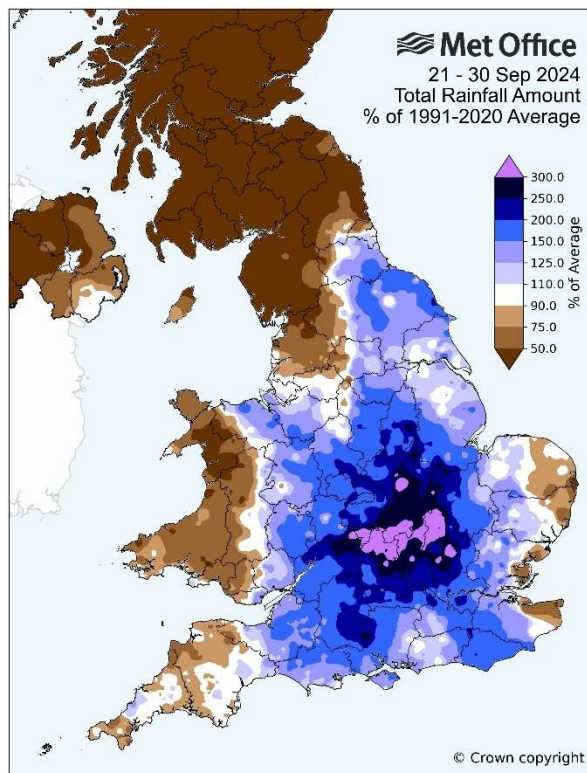
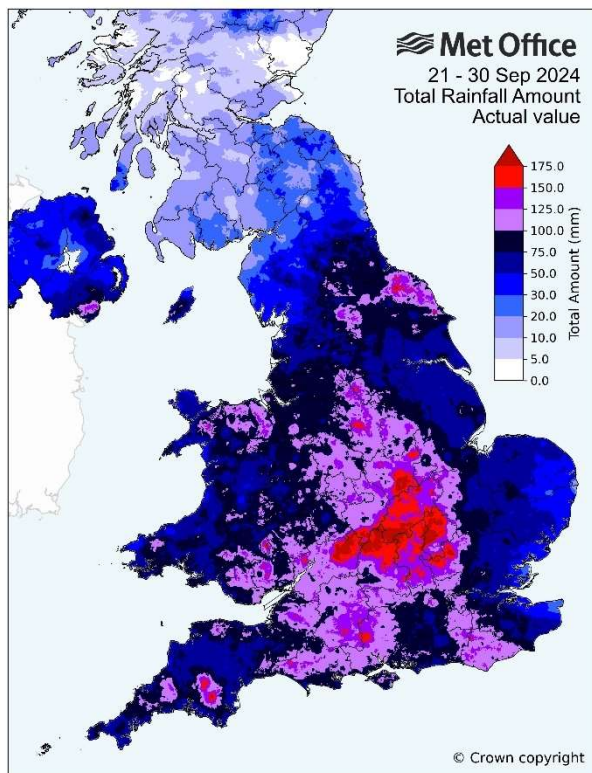
<sup>\*</sup>Thanks to Stephen Burt, University of Reading and Charles Knight, University of Oxford for Oxford statistics.



The chart below shows autumn 2024 rainfall accumulations for Oxfordshire based on the HadUK-Grid rainfall dataset, with the blue shaded area illustrating accumulated rainfall exceeding the 1991-2020 average for the autumn so far. The step-increase corresponds to 21 to 23 September. The red and blue lines and percentiles are based on the period 1891 to 2023. The Oxfordshire September 2024 total of 185.2mm was 92% of the autumn 1991-2020 long-term average rainfall for this county.



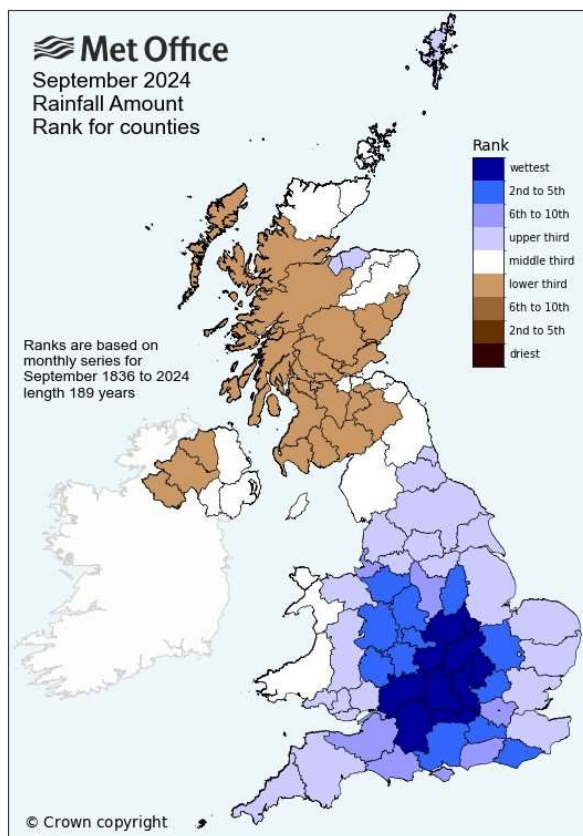
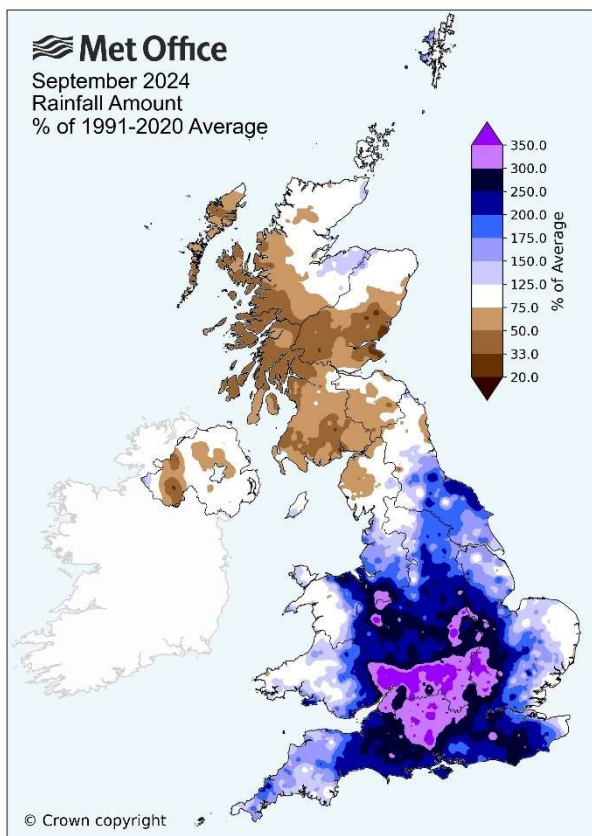
The charts below show rainfall totals and accumulations from 21 to 30 September 2024, including all three of these systems. 100mm of rain fell very widely across a large area of the Midlands, well over 150% of average rainfall, with the wettest areas receiving 150 to 200mm (shown in red), with some locations recording over three times the monthly average.



The table below lists accumulated rainfall totals at selected stations during this period, with several stations recording as much as 3.5x the September average rainfall in just 10 days. (Data are provisional and subject to change).

Station	Total 21-30 September 2024	September 1991-2020 average	% of average
Whitwell s wks, Hertfordshire	191.4	46.5	411.9
Woburn, Bedfordshire	216.4	55.4	391.0
Shipston on Stour, w wks, Warwickshire	185.8	49.5	375.7
Banbury, Grimsbury p sta, Oxfordshire	185.3	52.7	351.8
Etton w wks, Lincolnshire	133.8	38.3	349.1
Bicester s wks, Oxfordshire	165.9	48.4	343.1
South Newington, Oxfordshire	204.4	59.9	341.3
Evington resr, Leicestershire	172.0	51.5	333.9
Fleckney, Leicestershire	186.2	55.8	333.8
Hannington resr, Northamptonshire	157.6	47.8	329.8
Cardington, Bedfordshire	156.8	48.4	324.0
Chipping Norton s wks, Oxfordshire	186.1	57.5	323.9
Chipping Campden, w wks, Gloucestershire	180.0	56.0	321.4
Dingley w twr, Northamptonshire	156.0	48.9	318.9
Aylesbury s wks, Buckinghamshire	154.7	48.9	316.3
Bedford, Bedfordshire	157.0	50.0	314.1
Kibworth s wks, Leicestershire	184.5	59.1	312.1
Oxford	160.7	51.9	309.8

The map below shows rainfall totals for September 2024 as a percentage of the September 1991-2020 long term average. While the UK September rainfall total was only slightly above average (125%), most of central and southern England recorded twice the normal rainfall, with a large area extending from Bristol to Hertfordshire recording 300 to 350% or more. Counties in this area recording their wettest September on record, in series from 1836, included Gloucestershire (340%), Wiltshire (319%), Oxfordshire (342%), Berkshire (314%), Warwickshire (271%), Leicestershire (286%), Northamptonshire (305%), Buckinghamshire (318%), Bedfordshire (342%) and Rutland (269%). For Oxfordshire and Bedfordshire, September 2024 was the wettest calendar month on record (Oxfordshire, 185.2mm, next wettest 182.8mm in October 1875; Bedfordshire 182.7mm, next wettest 169.2mm in November 1940). Just seven months earlier, several of the counties listed also recorded their wettest February on record in 2024.



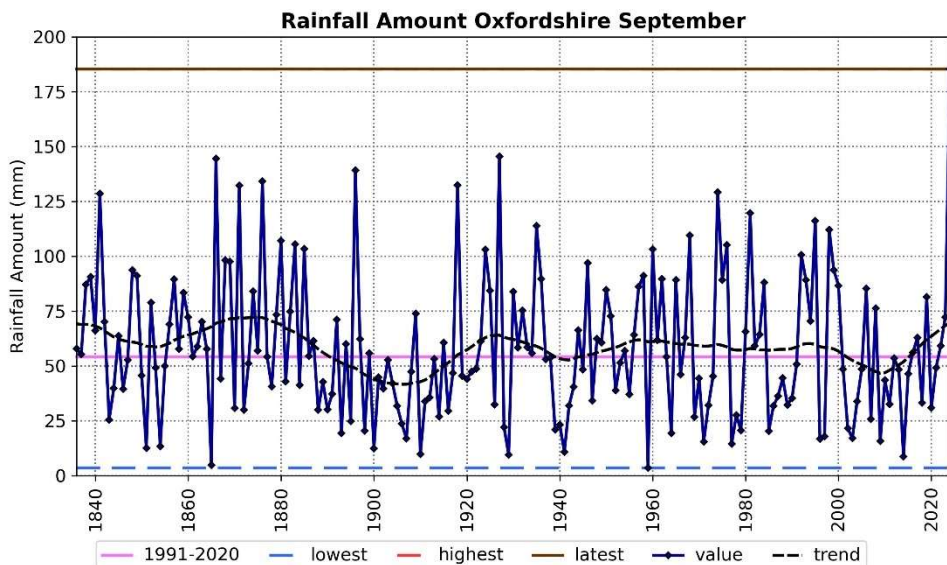
The chart below shows September monthly rainfall totals from Oxfordshire from 1836. This clearly demonstrates the huge margin by which September 2024 (185.2mm, 342%) exceeded the next wettest September 1927 (145.5mm, 269%). The Oxford Radcliffe weather station recorded a monthly total of 193.3mm, 374% of the September 1991-2020 at this site, making this the wettest calendar month since September 1774 – and second wettest in a monthly series from 1767.\*

\*Thanks to Stephen Burt, University of Reading and Charles Knight, University of Oxford for Oxford statistics.



Source: HadUK-Grid 03/10/2024 15:17

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Last updated 09/10/2024

