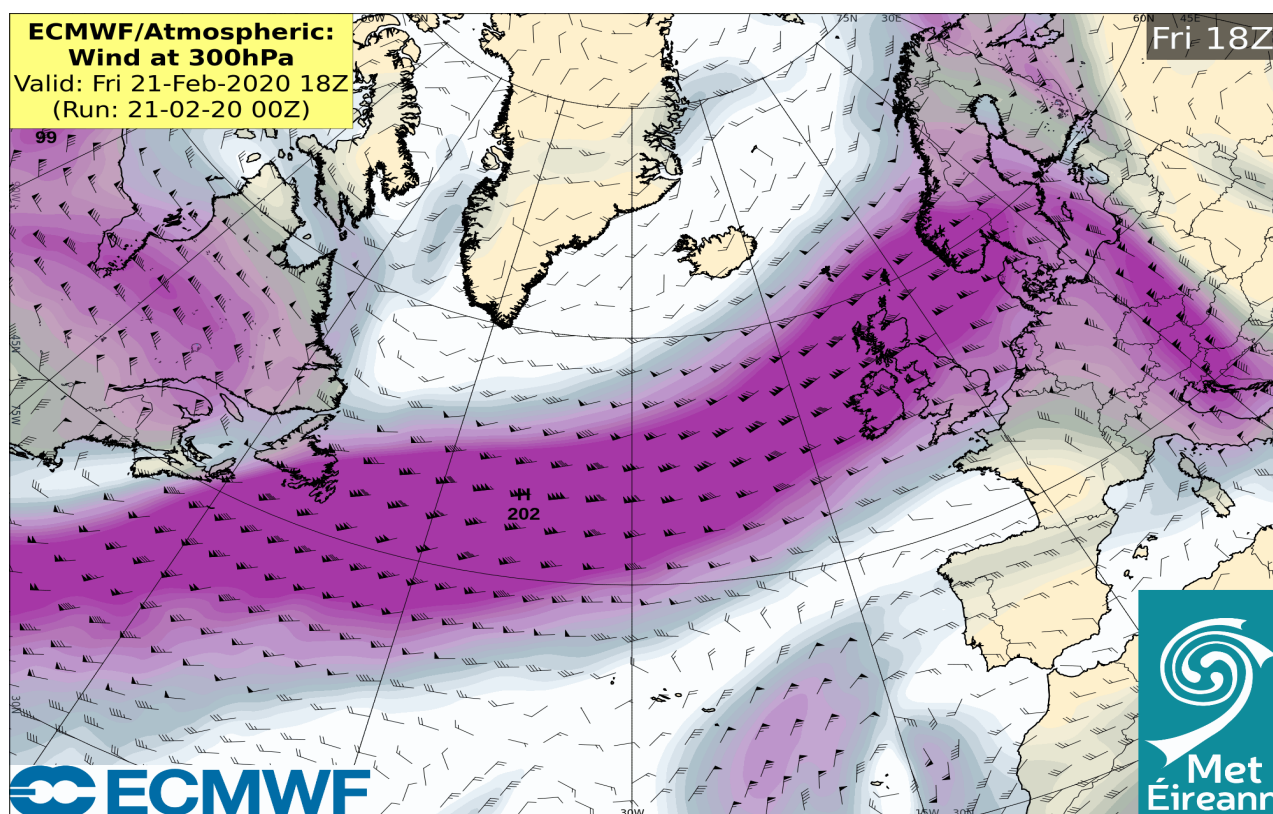


February 2020 Analysis, updated at 3pm, Monday 2nd March 2020, by Paul Moore, Aidan Murphy and Sandra Spillane, Climate Services, Met Éireann.

A strong Stratospheric Polar Vortex¹, well coupled with the troposphere, has led to the North Atlantic Oscillation² being in a strongly positive phase during February 2020. This has resulted in a very zonal pattern across the Atlantic with a strong Polar Jetstream, further south than normal, steering a series of vigorous Atlantic depressions, towards or just to the north of Ireland. These depressions, including three named storms Ciara, Dennis and Jorge, brought prolonged periods of heavy rainfall and stormy weather leading to extensive flooding in places, particularly along the Shannon catchment. Heavy rainfall falling on already saturated ground and low winter evaporation rates exacerbated the flooding.

The position and strength of the Polar Jetstream has resulted in 1.5 to 3.3 times the normal monthly rainfall for February throughout the country (a month usually associated with one of the least rainfall amounts).



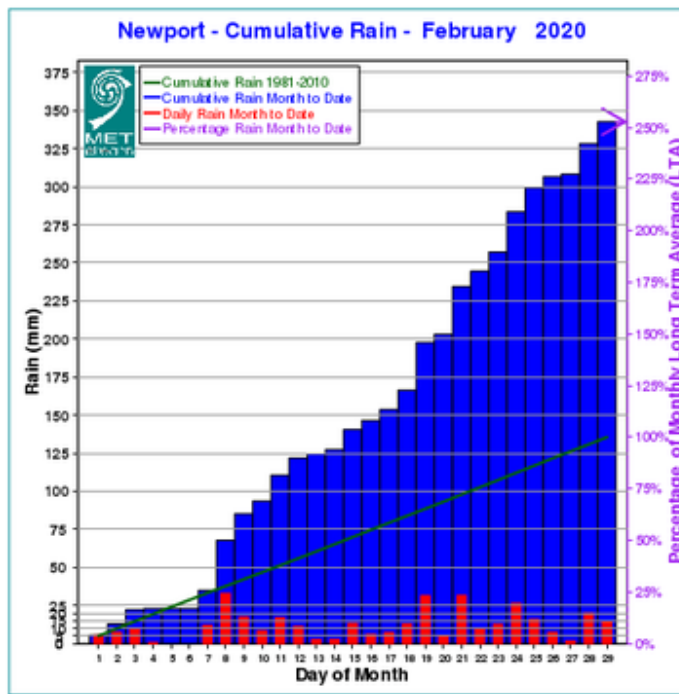
Synoptic analysis chart showing the position of the Jetstream on the 21st February 2020. Strongest winds in Purple.

The highest monthly rainfall total for February was recorded at Newport, Co Mayo with 342.7 mm (271 % of its February LTA). The lowest monthly rainfall total was recorded at Dublin Airport, Co Dublin with 130.4 mm (267% of its February LTA). While the highest daily rainfall total was 51.5 mm on Saturday 8th February 2020 at Knock Airport, Co Mayo (50% of its monthly LTA).

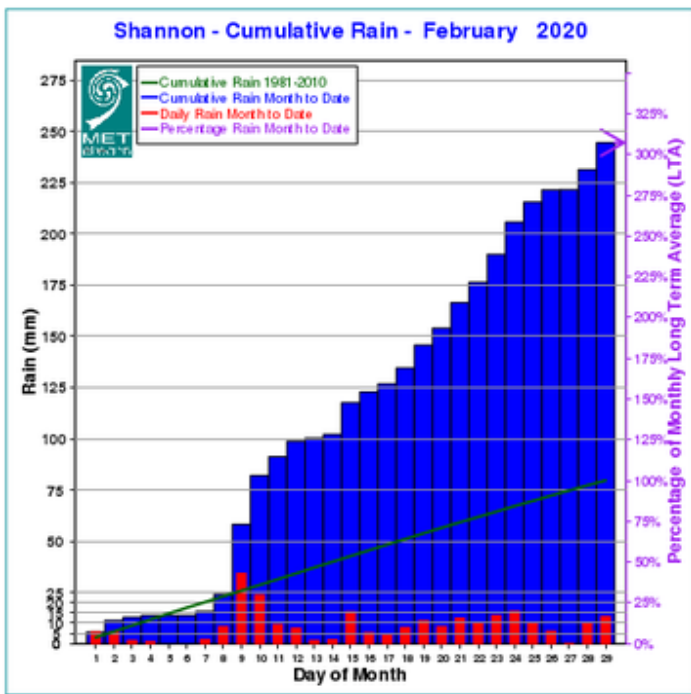
Most synoptic stations, predominately in the northern half of the country, had their wettest February on record, including Phoenix Park, Co Dublin and Malin Head, Co Donegal (records going back to 1850), Shannon Airport, Co Clare (record length 74 years), Newport, Co Mayo (record length 60 years), Claremorris, Co Mayo (record length 56 years), Casement, Co Dublin (record length 56 years) and Knock Airport (record length 23 years).

The following graphs illustrate cumulative, daily and percentage rainfall amounts for February for (a) Newport, Co Mayo (the highest monthly rainfall amount recorded) and (b) Shannon Airport, Co Clare.

(a)



(b)



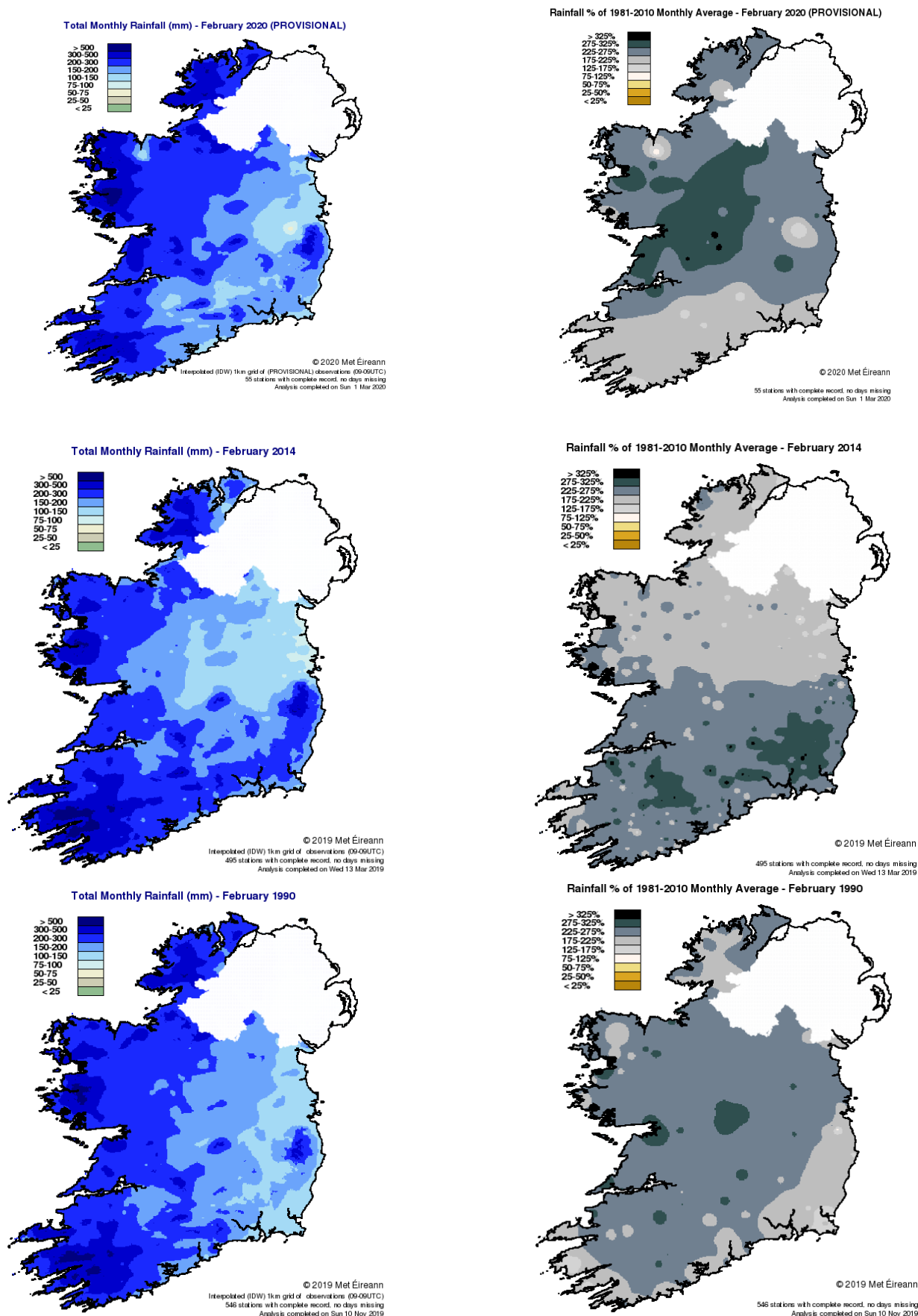
Synoptic station data for February 2020.

Station Name	Rainfall (mm) February 2020	Mean 1981 to 2010 Rainfall (mm) for February.	Percentage (%) of February Rainfall to date	Approximate Return Periods for monthly rainfall *
ATHENRY	248.5	87.8	283	1 in 20 year event
BALLYHAISE	212.9	72.6	293	1 in 90 year event
BELMULLET	241.9	97.1	249	1 in 40 year event
CASEMENT	155.4	48.5	320	1 in 5 year event
CLAREMORRIS	286.4	101.1	283	> 1 in 100 year event
CORK AIRPORT	199.3	97.8	204	1 in 2 year event
DUBLIN AIRPORT	130.4	48.8	267	1 in 2.5 year event
DUNSANY	157.1	59.7	263	1 in 4 year event
FINNER	263.2	95.3	276	1 in 60 year event
GURTEEN	220.1	66.2	332	1 in 60 year event
JOHNSTOWN CASTLE	152.8	75.5	202	1 in 18 month event
KNOCK AIRPORT	277.4	102.9	270	1 in 50 year event
MALIN HEAD	210.4	87.4	241	1 in 8 year event
MARKREE	240.3	91.6	262	1 in 40 year event
MOORE PARK	152.8	80.1	191	1 in 18 month event
MT DILLON	225.3	77.7	290	1 in 30 year event
MULLINGAR	197.5	70.3	281	1 in 12 year event
NEWPORT	342.7	126.5	271	1 in 10 year event
OAK PARK, CARLOW	172.8	57.3	302	1 in 20 year event
PHOENIX PARK	141.5	51.3	276	1 in 3 year event
ROCHES POINT	143.5	74.8	192	1 in 18 month event
SHANNON AIRPORT	244.5	76.2	321	> 1 in 100 year event
SHERKIN ISLAND	156.8	101.4	155	1 in 18 month event
VALENTIA	237.6	123.7	192	1 in 18 month event

* Return periods are estimates of the average period between rainfall events of a given magnitude, based on past data for all months.

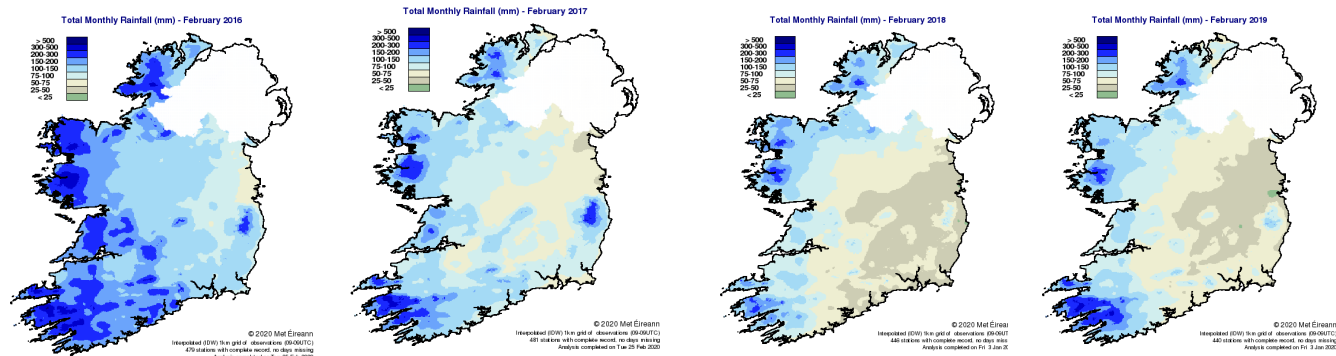
Historical context

February 1990 and 2014 were similarly wet and windy months, with prolonged heavy rainfall leading to widespread flooding. In 2014, a number of rainfall stations recorded February rainfall totals in excess of 350 mm. Comparisons with 2020 below:



Gridded rainfall totals (left) and Gridded % of LTA (right) for February 2020, 2014 and 1990. There may be some gaps in the 2020 maps as the climate station data from some upland stations are only reported at the end of each month.

The following gridded maps show the observed rainfall totals across the last four February's (2016, 2017, 2018 and 2019) for comparison.



Rainfall Trends

In Met Éireann, basic trend analysis has been performed on a number of high quality rainfall stations over a fifty year period. Some stations show an increase in the frequency of heavy precipitation (>10mm) / very heavy precipitation (>20mm) days over the past decades, however other stations show a decrease, there is large regional variation and occasionally conflicting trends from stations that are geographically relatively close. The fact that rainfall displays such a high degree of variability, both temporally and spatially makes it difficult to be definitive about trends.

In general, an increase in the frequency of extreme weather events has been attributed to climate change and is linked to human activity. However, without further detailed analysis, it's not possible to assess the role of climate change in this complex event.

Notes

This analysis is based on provisional data from Met Éireann's 24 synoptic weather stations.

¹ The stratospheric polar vortex is a large-scale region of air that is contained by a strong west-to-east jet stream that circles the polar region in the stratosphere (not to be confused with the Polar Jetstream that steers the weather in the mid latitudes, which is located at the top of the troposphere). The stratosphere jet stream is much higher up and is usually referred to as the polar night jet.

² The North Atlantic Oscillation is a weather phenomenon in the North Atlantic Ocean of fluctuations in the difference of atmospheric pressure at sea level between the Icelandic Low and the Azores High. A positive phase is when both the sub-polar low and the subtropical high are stronger than average, intensifying the Polar Jetstream.