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Irish weather is famous for being changeable but are we ready for a changeable Irish Climate?

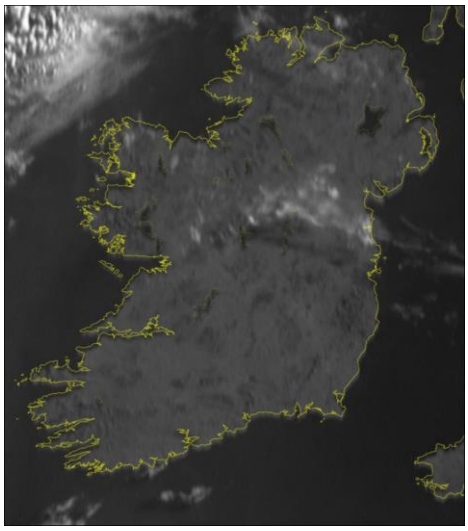
Séamus Walsh, Evelyn Cusack

Evelyn Cusack, Head of Forecasting, Met Éireann

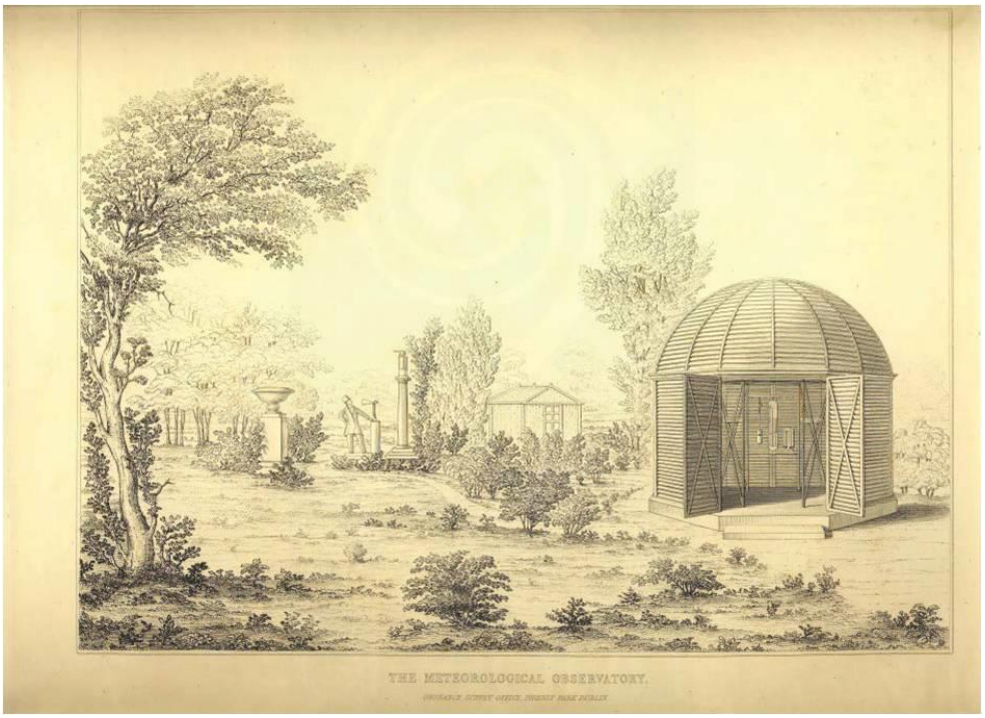
Séamus Walsh, Head of Climatology and Observations, Met Éireann

As Meteorological autumn begins across the Northern Hemisphere. The cooling days are welcome for some after what has been a hot and challenging summer season. From the Arctic right down to the tropics we have witnessed high temperatures, droughts, wildfires, floods and landslides. This has had widespread impacts on human health, agriculture, ecosystems and infrastructure which tragically resulted in many deaths. Here at home our summer has been a good deal less extreme, but nonetheless unusually dry and warm with some new records set at Met Éireann's stations. Settled weather developed in the middle of May and continued through June and for much of July as an exceptionally dry, Scandinavian air mass dominated most of Europe.

Malin Head Weather Station July 2018

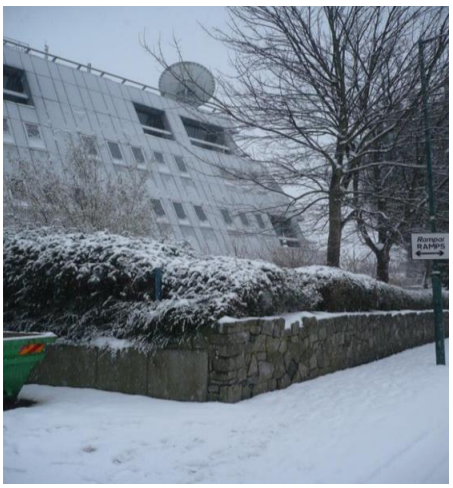


In Ireland the Atlantic influence broke through into the southwest, west and north during the latter part of July followed here by a more usual, unsettled August. Over much of Leinster and east Munster however, August rainfall continued below average with the weather fronts considerably weakened as they have traversed the country. It has been one of the driest and warmest summers on record in the east and south with less than 50% of average rainfall leading to water restrictions which are continuing into September as soil moisture deficits in the east remain high.



Phoenix Park Observatory

At our meteorological station in the Phoenix Park it has been the driest summer since 1995 and the second driest since records began here in the mid-1800's. While modest compared with our European neighbours we have two new Irish records: 32.0 Celsius at Shannon Airport on the 29th June was its highest temperature since records began in 1945, and Cork Airport registered its driest summer on record (observations began here in 1951).



Met Éireann during Storm Emma

In the past 12 months in Ireland we have experienced unusually extreme conditions from storm Ophelia on October 16th to a Siberian cold spell and widespread snow at the end of February and early March (storm Emma) and this summer's heatwave and drought. These recent extremes in weather are consistent with what we expect as a result of climate change caused by increased greenhouse gas emissions, which has raised global average temperature by circa 1 degree Celsius since the end of the 19th century.

In a changed climate, it is expected that new weather records will be set, and the frequency of extreme events will increase so that events which were relatively rare in the past become more

commonplace. Irish society has developed in a manner which is dependent on the reliability of climate patterns, for example that rain will fall in amounts enough for grass growth but not so much as to flood or that winter weather will be benign and not so bitterly cold that animals will perish outdoors, and that extreme events, when they occur, are a relatively rare occurrence. As the climate continues to warm and change at an accelerated rate, so too will weather patterns and extremes, our society is faced with considerable challenges to adapt to these changes.

The widespread record temperatures which occurred over western and northern Europe this summer were caused by a stationary 'blocking' area of high pressure which developed when the jet stream, a band of high level winds which steers weather systems around the globe, was situated much farther to the west and north than usual. While such weather patterns are not infrequent, the underlying cause for the increased intensity of this type of event is thought to be related to the more rapid warming in Arctic regions compared to the rest of the world, known as Arctic amplification. This has resulted in a decrease in the temperature difference between the mid-latitudes and the Artic and a weakening of the circulation between these two regions. The result is an occasional 'stalling' of weather systems where weather patterns linger for longer in the same place and is an example of how weather patterns might be modified in a warmer climate.

The extreme weather events being experienced around the globe are occurring in a warming world, and while human influence on the climate system is well established, attributing or linking specific extreme weather events with man-made climate change is complex as no one weather event has a single cause. Attribution science is a rapidly developing field of study which aims to determine the mechanisms responsible for extreme weather and climate change. Many attribution studies have found that the probability of extreme events has increased because of higher temperatures caused by human related greenhouse gas emissions.

Scientific attribution studies involve complex data analytics and can take months to complete, but it is now becoming possible using advanced computing systems to provide rapid attribution information for certain events, albeit not peer reviewed, within a few days of an event. One such preliminary study by the World Weather Attribution (WWA) network, based in part on data from Met Éireann's Phoenix Park weather station, has estimated that the recent heatwave over Ireland has been made twice as likely because of climate change.

Met Éireann's immediate role in extreme weather events is to provide accurate observations, climatological analysis, forecasts and warnings to protect human life and property allied with the National Emergency Coordination Group.

In order to provide information on future events we are part of the huge global effort underway to provide robust projections of the future climate. Met Éireann together with other Irish scientists are actively involved in a wide range of projects undertaking climate modelling and attribution research, including the award winning MÉRA (Met Éireann ReAnalysis) a high resolution study of Ireland's past climate. The current weather extremes are in line with previous global and regional climate projections for Ireland which we have been producing for over 15 years.

This ongoing climate change research ensures that Irish society and decision makers have access to the best available, scientifically verifiable, information related to both past and future climate and weather related extremes. In order to prepare for the increased societal risks due to a changed climate, Ireland's first National Adaptation Framework was published earlier this year. Under this plan Government Departments are required to prepare sectoral adaptation plans in relation to priority areas for which that they are responsible.