Analysis of the Irish Snow Event of January 1982 using Met Éireann ReAnalysis (MÉRA) and ERA-Interim data

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In January 1982, Ireland experienced heavy snowfall in southern and eastern parts of the country. The snowfall was much heavier than forecast, strong easterly winds caused drifting, and prolonged low temperatures prevented the snow from melting for almost a week. We set out the impacts of the snowfall on Ireland and use two climate reanalyses datasets to analyse and gain a better understanding of the precipitation and temperature conditions during the period from 5 to 17 January 1982. Analysis of past snow events is useful for investigating how current forecast models might predict future heavy snowfall and therefore assisting government agencies and the public to prepare for such events. The climate reanalyses used are Met Éireann ReAnalysis (MÉRA) and European Centre for Medium-Range Weather Forecasts (ECMWF) Interim ReAnalysis (ERA-Interim). We evaluate the performance of the models using four measures: bias, standard deviation, root mean squared error and mean absolute error. In general, MÉRA is a better predictor than ERA-Interim of precipitation and temperature on all skill scores as it makes better allowance for the region's orography (2.5 km grid versus 79 km grid). For precipitation, on average, the MÉRA model exhibits a bias of less than 2 mm for most of the country (with the bias being positive for most areas). However, the results vary by day with MÉRA over-predicting precipitation on the days that experienced the heaviest snowfalls. In addition, the largest biases occur on the days for which least observations are available. The quality of ERA-Interim forecasts varies more from day-to-day, for example, it underpredicts the snowfall for 7 January, but overpredicts for 8 and 9 January. For temperature, on average, the MÉRA model's bias is consistently within +/- 0.5°C, only once passing above 1°C. There is no consistent bias direction and no time pattern to the biases with MÉRA performing as well on the warmer days as on the colder days. The ERA-Interim bias is regularly greater than 1°C and almost 3°C at its worst. One clear pattern in the skill score results is ERA-Interim's declining performance in the second week of the analysis. MÉRA much more accurately reproduces the severe cold-spell from 11 to 14 January, as well as the warming that followed on 15 and 16 January, than ERA-Interim does.