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# Diagnostic studies of ensemble forecast "jumps"

Linus Magnusson, Tim Hewson, Laura Ferranti, and Mark Rodwell
ECMWF, Forecast department - Evaluation section, Reading, United Kingdom (linus.magnusson@ecmwf.int)

During 2015 we saw exceptional consistency in successive seasonal forecasts produced at ECMWF, for the winter period 2015/16, right across the globe. This winter was characterised by a well-predicted and unusually strong El Nino, and some have ascribed the consistency to that. For most of December this consistency was mirrored in the (separate) ECMWF monthly forecast system, which correctly predicted anomalously strong (mild) zonal flow, over the North Atlantic and western Eurasia, even in forecasts for weeks 3 and 4. In monthly forecasts in general these weeks are often devoid of strong signals. However in late December and early January strong signals, even in week 2, proved to be incorrect, most notably over the North Atlantic and Eurasian sectors. Indeed on at least two occasions the outcome was beyond the ensemble forecast range over Scandinavia. In one of these conditions flipped from extreme mild to extreme cold as a high latitude block developed. Temperature prediction is very important to many customers, notably those dealing with renewable energy, because cold weather causes increased demand but also tends to coincide with reduced wind power production. So understandably jumps can cause consternation amongst some customer groups, and are very difficult to handle operationally.

This presentation will discuss the results of initial diagnostic investigations into what caused the "ensemble jumps", particularly at the week two lead, though reference will also be made to a related shorter range (day 3) jump that was important for flooding over the UK. Initial results suggest that an inability of the ECMWF model to correctly represent convective outbreaks over North America (that for winter-time were quite extreme) played an important role. Significantly, during this period, an unusually large amount of upper air data over North America was rejected or ascribed low weight. These results bear similarities to previous diagnostic studies at ECMWF, wherein major convective outbreaks in spring and early summer over North America were shown to have a detrimental impact on forecast quality. The possible contributions of other factors will also be discussed; for example we know that the ECMWF model exhibits different skill levels for different regime transitions. It will also be shown that the new higher resolution ECMWF forecast system, then running in trial mode, performed somewhat better, at least for some of these cases.