Dynamics and Predictability of an Extreme Norwegian Precipitation Event

Richard Moore, *Norwegian Meteorological Institute / University of Oslo, Henrik Mohnsplass 1, 0313 Oslo, Norway; richardm@met.no; +47 22 96 32 98*
Eivind Støylen, *Norwegian Meteorological Institute*

A flood resulting in excess of 20 million USD occurred in western Norway in late October 2014. From an ingredients based perspective, the two key elements were the near-continuous resupply of warm moist air and the intermittently strong southwesterly winds impinging upon the mountainous terrain.

Significant precipitation occurred over a 12-day time period, culminating in the flood. The large-scale setup exhibited a number of consistent features: i) a semi-stationary low pressure system in the Norwegian Sea, ii) persistent high pressure over central Europe, iii) repeated cyclogenesis in the west Atlantic basin (including the extratropical transition of Hurricane Gonzalo), and iv) a robust cut-off low in the central/eastern Atlantic. All of these features played an integral role in providing the necessary moisture for intense orographic precipitation.

ECMWF correctly identified a region in western Norway susceptible to extreme precipitation up to six days in advance. This speaks to the impressive ability of global models to 'predict' events based on the model forecast and the model climatology. Yet, the deterministic ECMWF forecast had a significant low bias in terms of precipitation amounts.

In contrast, the operational model of the Norwegian Meteorological Institute (limited-area, convective-permitting) did an admirable job in terms of simulating the area-averaged observed mean precipitation. However, meso to catchment scale biases were evident and, perhaps more importantly, not geographically consistent over time.

This event, which was identified in a long-term objective climatology of extreme Norwegian precipitation (see companion paper by Ødemark et al.), provides a northern Europe, high latitude corollary to examples in the Pacific basin. While a solitary event, we believe it represents an excellent case for discussion regarding the predictability of extreme precipitation in the context of state-of-the-art numerical weather prediction.