*Forecasting the weather
- ensemble techniques
in probabilistic weather prediction*

Heavy Precipitation at the Alpine South Side and Saharan Dust over Central Europe: A Predictability Study using TIGGE

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Around 26 May 2008 a pronounced potential vorticity (PV) streamer penetrated from the North Atlantic into the western Mediterranean Sea followed by widespread dust mobilization over the Maghreb and a subsequent northward transport into central Europe. At the same time, strong southerly flow over the Mediterranean Sea caused heavy precipitation and flooding at the windward side of the Alps. Using continuous and feature-based error measures as well as ensemble correlation techniques, this study investigates the forecast quality and predictability of synoptic and meso-scale aspects of this high-impact event in operational ensemble predictions from nine meteorological centres participating in the THORPEX Interactive Grand Global Ensemble (TIGGE) project. TIGGE has recently established an archive for ensemble forecast data using a standardized format, which allows an exciting new multi-model approach to investigating predictability.

The main conclusions from this study are: (I) Forecasts of the PV streamer degrade with lead time showing a general tendency of too weak Rossby wave breaking and therefore a northward shift of the streamers in the forecasts. (II) Focusing on the region around the streamer, most models show root mean square errors of the same magnitude or larger than the ensemble spread (underdispersive behaviour). (III) Errors are reduced by about 50% if the comparison is made to each center's own analysis instead of the ECMWF analysis. This reduction occurs particularly in regions of large PV gradients. (IV) Peak wind speeds over the Sahara tend to be underpredicted, with differences in model formulation dominating over differences in the representation of the PV streamer. (V) Ensemble-mean multi-model forecasts of four-day accumulated precipitation appear accurate enough for a successful severe-weather warning.