

## **Extracting information from ensemble prediction**

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### *Abstract:*

Ensemble prediction systems have become strategic numerical weather prediction tools. Despite their enormous computational costs, their practical use is still limited. We will present new techniques for extracting valuable information from ensembles, using examples from ensembles at Météo-France (Arpège and Arome) and ECMWF (IFS).

The first problem is the summarizing of a large ensemble as a few likely forecast scenarios. This subsampling problem can be tackled using clustering tools. We will demonstrate problems with naive subsampling techniques, and present an improved algorithm, which is now used to couple the small, high-resolution Arome ensemble to the larger Arpège ensemble.

The second problem is the production of automated forecasts for thunderstorms. This parameter is tricky to verify, to diagnose in numerical models, its distribution is complex, and forecasts misses can have disastrous consequences. We will show that raw output from existing prediction systems can be improved using a 'seamless' multi-ensemble approach. It takes into account ensemble sampling limitations, spatial representativeness, and probability calibration. The result is a thunderstorm probability forecast that can be supplied to the public.

The last - but not least - problem is the presentation of ensemble forecasts to users who do not want a probability forecast, but a deterministic weather prediction. We will illustrate how this information can be extracted using well-known ensemble scores, by making some assumptions about what the user wants.