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

Challenges and potential obstacles for efficient probabilistic > predictions in the short range

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Any attempt at forecasting future events should maximize the information content that can be verified in retrospect against observations. However, the predicted information content should not come at the expense of the forecast reliability. High information contents imply that probabilities of event occurrence are close to either 1 or 0. While deterministic weather forecasts contain much verifiable information, they will inevitably become unreliable with forecast lead time. On the other hand, reliable predictions can be made for arbitrary long lead times, but only when the information content is reduced in accordance with the actual forecast uncertainty. A perfect weather forecast is thus fully reliable but its information content is gradually decreased with forecast lead time until it can not be distinguished from climate statistics. Such a perfect system requires reliable prediction of its own forecast uncertainty. The best possible deterministic forecast is a consensus with unpredictable components selectively removed.

Properly designed systems for weather forecasting should be set up to predict all predictable elements at any lead time. Since forecast errors in general grow faster and reach saturation levels earlier for decreasing spatial scales (locally forced structures may be excepted), predictions should include increasingly finer spatial structures for decreasing lead times. However, since in general the level of error saturation also decreases with spatial scales, this requires increased accuracy of initial data, lateral boundary data, and the forecasting model tool. Furthermore, the initial analysis must be produced quicker and with higher frequency than e.g. required for the medium range.

The talk will discuss the mentioned challenges and obstacles and give examples from experiments with the system for short-range ensemble prediction, GLAMEPS, under development in co-operation between the Hirlam and Aladin consortia in Europe.