A five-point program to promote probabilistic weather forecasting

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Uncertainty information serves as positive addition to the forecast, in particular of extreme or high impact weather, and is not and should not be seen as "a cowardly attempt by the forecasters to escape responsibility".

Deterministic thinking is, however, deeply rooted in human behaviour and is still dominating meteorological forecasting. Drawing on the extensive literature, also outside meteorology, on humans as "intuitive statisticians", a five-point program is presented on how to promote a statistical-probabilistic practise and culture in operational weather forecasting:

1. Over-confidence can be countered by verification statistics and illustrative cases of unexpected developments. An introduction to Bayesian logic might also serve this purpose;

2. Underestimation of randomness deceives us to see patterns or statistical relations where there are none. This happens mostly when conclusions are drawn from too small samples, but even with sufficiently large samples the "regression to the mean effect" may deceive in the same way;

3. Estimating uncertainty is complicated not only by diversity of objective guidance but also by psychological pitfalls and statistical misconceptions, e.g. misinterpretations of "forecast jumpiness";

4. Communicating uncertainty will be facilitated by the use of probabilistic "base rate information", i.e. climatology. It will also be shown that already acknowledging uncertainty as such leads to a significant improvement. See http://www.rmets.org/events/should-weather-and-climate-prediction-models-be-deterministic-or-stochastic/uncertainty

5. Drawing the right conclusions from uncertainty information is, according to the literature, not only a problem related to meteorological forecasts. On our side we must, however, consider a revision of the simple "cost-loss model".

With increasing emphasis high-impact weather forecasting there will be a need of well-educated "statistically intuitive" forecasters avoiding 1. and 2. and skilful at 3. 4 and 5.