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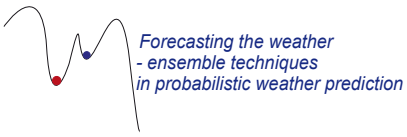

A multivariate probabilistic ensemble verification method based on a Bayesian approach

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We will present the first results of a newly developed multivariate probabilistic ensemble verification method which should fulfill three requirements
1. to verify and compare ensembles predictions of atmospheric state vectors
2. to include an uncertainty measure of the observations
3.to allow for relative measures between different EPS systems
We combine a multivariate Gaussian mixture model to extract probabilistic information from a raw ensemble forecast (the prior density) with a likelihood model for the observations including their uncertainties. The product defines the posterior density from which we can evaluate analytically in terms of Gaussian densities the posterior probability of the ensemble forecasts given the observations. Either by defining a reference model forecast or evaluating the posterior of a second ensemble system we calculated the ratio of the two posterior probabilities the socalled Bayes factor. It has been shown that the Bayes factor or its logarithm is true score function which is in the limit of perfect observations identical to the ignorance score.
The new method is applied to the experimental COSMO-DE ensemble prediction system and verified using a triangle of radio sonde ascents defining a 27-dimensional state vector of temperature. The method clearly shows that the high resolution, convection permitting COSMO-DE ensemble has a much higher probability given the observations than the COSMO SREPS ensemble.