



Ensemble post-processing with an analog-based approach

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The analog approach is a statistical post-processing method used to generate deterministic and probabilistic forecasts. The input data for this method can be either deterministic or ensemble numerical weather prediction (NWP) model. The method is based on searching similar past NWP forecasts (i.e. analogs) to the current prediction across several variables (i.e. predictors). The measurements corresponding to the closest analogs form the analog ensemble, with which the probability distribution of the future state of the atmosphere can be estimated.

There are several different ways to post-process ensemble numerical predictions. In this work the 16+1 member ALADIN-LAEF system ensemble forecasts are used. The main objective of this work is to test if there is a need to use all of the ensemble members as predictors, or if summarized statistics (i.e. ensemble mean) could be enough thus reducing the computational load. It is shown that the analog-based ensemble mean predictions, compared to the model used to generate them (ALADIN-LAEF), improve the correlation between predictions and measurements while reducing the bias and root-mean-square error.

The analog-based approach provides accurate predictions while reliably quantifying the forecast uncertainty. Further improvements can be achieved by optimizing and adapting the analogs searching procedure. It is shown that there is often no need to use all the information from the ensemble prediction in the analog-search. It might be enough to use basic information such as ensemble mean and spread which is computationally a less demanding procedure than using all of ensemble members as predictors.

Overall, the results encourage the use of analog approach in an operational environment at meteorological station locations.