Geophysical Research Abstracts
Vol. 20, EGU2018-9097, 2018
EGU General Assembly 2018

Member by member postprocessing of hydrological ensemble predictions

Joris Van den Bergh and Emmanuel Roulin
KMI, Meteorological Research and Development, Brussels, Belgium (jorisvdb@meteo.be)

Meteorological ensemble predictions can be used as input for hydrological models to generate hydrological ensemble predictions. These have become an important established tool in areas such as flood forecasting and water management. However, hydrological ensemble predictions still contain errors, originating for example from errors in the precipitation forecasts and from model errors in the hydrological model. When training data with past forecasts and corresponding observations is available, such errors can be partly corrected with statistical postprocessing methods.

A hydrological ensemble prediction system (HEPS) is running operationally at the Royal Meteorological Institute of Belgium (RMI) for ten catchments in the Meuse basin. It makes use of the conceptual semi-distributed hydrological model SCHEME and the European Centre for Medium Range Weather Forecasts (ECMWF) Ensemble Prediction System (ENS). An ensemble of 51 discharge forecasts is generated daily.

We investigate a postprocessing technique for the discharge forecasts, making use of a set of 10-member ECMWF precipitation reforecasts generated during 2016. These reforecasts are run twice per week, at the original O640 ($\sim$18km) ENS resolution, going back 20 years in the past. We use these as input to create a set of hydrological reforecasts. The postprocessing method is based on the member-by-member (MBM) approach of Van Schaeybroeck and Vannitsem (2015). Ensemble members are corrected individually, resulting in an overall shifting and/or scaling of the ensemble mean and spread. The MBM method retains rank correlations and thus takes correlations between lead times implicitly into account. This differentiates the method from ensemble model output statistics (EMOS), where such correlations are taken into account a posteriori via e.g. ensemble copula methods. Regression parameters are determined through minimization of a cost function such as the Continuous Ranked Probability Score (CRPS) for the observations and the corrected-forecast members.

We describe our operational setup and investigate the improvement attained though postprocessing for several catchments in the river Meuse basin. We provide verification results for our method, comparing the post-processed forecasts with the archived uncorrected 51-member hydrological forecasts, by means of probabilistic and deterministic verification skill scores.