EMS Annual Meeting Abstracts
Vol. 14, EMS2017-465, 2017

Model output statistics (MOS) development at FMI

Jussi S. Ylhäisi, Juha Kilpinen, Marko Laine, Leila Hieta, Laila Daniel, Mikko Partio, Mikko Aalto, and Mikko Rauhala

Finnish Meteorological Institute, Helsinki, Finland (jussi.ylhaisi@fmi.fi)

Statistical postprocessing can greatly improve the quality of NWP forecasts, through reducing systematic errors. Since autumn 2016, FMI has been applying Model Output Statistics scheme over Europe for ECMWF HRES forecasts up to 240h forecast range. Only instantaneous temperature is currently calibrated, while other variables are being added in the near-future. Our approach is traditional: NWP forecasts interpolated to observation sites are calibrated at first, after which these calibrated observation are gridded. Statistical calibration needs a long data set for model training and sets up requirements for data management infrastructure. Benefits of using a longer training dataset have so far shown to be more important compared to disadvantages which heterogeneous training data has due to numerous model version changes: Generally, NWP model development can be seen as a constantly ongoing process of model evolution, where most of the model code and also a considerable portion of the systematic model error is inherited from the previous model version.

Our MOS scheme applies multiple linear regression for the estimation of the response variable, with Elasticnet lasso predictor screening. Linear models are developed independently for each analysis hour, forecast length and season. Most predictors are direct model output variables from the corresponding forecast length, but also some time-lagged and climatological variables, as well as variable conversions are used. Gridding of calibrated point forecasts are done using LAPS analysis system as well as kriging interpolation. Both of these use ECMWF DMO as the background field.

Verifying forecasts against station observations, results for our MOS system have been rather good, with smaller RMSE compared to direct model output for most areas over Europe. A considerable portion of the improvement is due to elevation difference between the model grid and observation site. Compared to pre-operational forecasts of summer 2016, winter 2016-2017 has been considerably harder for MOS. In particular, Northern Europe sites with small elevation differences are difficult compared to sites at lower latitudes. We cannot foresee how the future behaviour of systematic biases in IFS will continue as model versions will develop, but our experiences so far have been very couraging. There are several ways to improve our existing system, one of which is to blend the output of several models based on model performance. This could form a long-term strategy in forecast production, in the world of several NWP models and a rapid model development cycle.