Application Bayesian Model Averaging method for ensemble system for Poland

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The aim of the project is to evaluate methods for generating numerical ensemble weather prediction using a meteorological data from The Weather Research & Forecasting Model and calibrating this data by means of Bayesian Model Averaging (WRF BMA) approach.

We are constructing height resolution short range ensemble forecasts using meteorological data (temperature) generated by nine WRF's models. WRF models have 35 vertical levels and 2.5 km x 2.5 km horizontal resolution. The main emphasis is that the used ensemble members has a different parameterization of the physical phenomena occurring in the boundary layer. To calibrate an ensemble forecast we use Bayesian Model Averaging (BMA) approach. The BMA predictive Probability Density Function (PDF) is a weighted average of predictive PDFs associated with each individual ensemble member, with weights that reflect the member's relative skill. For test we chose a case with heat wave and convective weather conditions in Poland area from 23th July to 1st August 2013. From 23th July to 29th July 2013 temperature oscillated below or above 30 Celsius degree in many meteorology stations and new temperature records were added. During this time the growth of the hospitalized patients with cardiovascular system problems was registered. On 29th July 2013 an advection of moist tropical air masses was recorded in the area of Poland causes strong convection event with mesoscale convection system (MCS). MCS caused local flooding, damage to the transport infrastructure, destroyed buildings, trees and injuries and direct threat of life.

Comparison of the meteorological data from ensemble system with the data recorded on 74 weather stations localized in Poland is made. We prepare a set of the model – observations pairs. Then, the obtained data from single ensemble members and median from WRF BMA system are evaluated on the basis of the deterministic statistical error Root Mean Square Error (RMSE), Mean Absolute Error (MAE). To evaluation probabilistic data The Brier Score (BS) and Continuous Ranked Probability Score (CRPS) were used. Finally comparison between BMA calibrated data and data from ensemble members will be displayed.