EMS Annual Meeting Abstracts
Vol. 11, EMS2014-484, 2014
14th EMS / 10th ECAC

Solar radiation forecast verification and post processing.

Tomislav Kovačić, Igor Horvat, Mario Hrastinski, Kristian Horvath, Stjepan Ivatek Šahdan, and Antonio Stanešić
Meteorological and Hydrological Service, Zagreb, Croatia

Solar radiation forecast from limited area model ALADIN are verified and post processing method is tested. This study is done in framework of project ENHEMS with the goal to develop and demonstrate control strategy for energy-efficient indoor climate control that considers the encompassed building zones as a whole (Building Energy Management System, BEMS). DHMZ's (Croatian meteorological service) task is to develop meteorological service support for BEMS.

Forecasts are provided by our operational model ALADIN/ALARO at horizontal resolution of 8 km and 37 levels. The set of hourly accumulated global and diffused downward solar radiation forecasts for the year 2010 is used for forecast verification and post processing method testing. Measurements of global and diffused solar radiation are taken from two stations in Croatia.

Basic, moment - based verification methods were used (Bias, RMSE, scatter plots) for solar radiation (global/ diffuse/direct) and cloudiness data. Case study using the cloudiness data (total cloud cover as well as low, mid and high level cloud coverage) was also made, since the cloud cover is one of the most important solar radiation predictors.

The tested post processing method is bias removal using a Kalman filter. The method is well known in meteorology and recently it was used for bias correction of global horizontal irradiance (Pelland et. al. 2011). The method assumes that bias is a linear function of several predictors available from model. Performances of the method were tested using only one predictor and it was global solar irradiance on horizontal surface at the lowest model level. To reduce RMSE horizontaly averaged irradiance forecasts were used. While bias was substantially removed RMSE rose compared to RMSE of horizontally averaged data. The effect of introducing more predictors on bias and RMSE raduction will be tested and presented.