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Assessment of observation network configuration on low solar and wind power predictability with Forecast Sensitivity to Observations (FSO).

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Accurate short term weather forecasts are essential to maintain power grid stability as well as for the energy stock market. In the frame of data assimilation, a monitoring tool called Forecast Sensitivity to Observations (FSO), can quantitatively assess the relative beneficial impact of different observation types on the short term forecast. The FSO algorithm is applied for the purposes of energy meteorology prediction. The focus of the study is placed on cases of poor short term solar and wind power forecasts. The results of the FSO algorithm are investigated and aim to link weather patterns with the observation network configuration.

The regional model Weather and Research Forecasting model (WRF) is applied for the simulations over Europe with a grid spacing of 15 km and for 6 hour forecasts at the synoptic hours. The observations types investigated are the space borne Infrared Atmospheric Sounding Interferometer (IASI) that provide information on temperature and humidity profiles and the Surface Synoptic Observations (SYNOP) that provide information on surface temperature, wind speed, pressure and humidity. The three dimensional variational assimilation (3DVAR) system of WRF is applied for the assimilation procedure and the impact of these observations on the 6 hour forecast is calculated by FSO.

The identification of the error events are based on the forecasted and actual total power values over Germany as provided by Germany's Transmission System Operators (TSOs). The time frame of interest is in the first fortnight of August 2014 and includes error events of wind and solar power predictions. It was found that at the shortest term forecast, space borne information reduces the forecast error by an order of magnitude more than the surface based observations, mostly due to the bulk number of observations. Moreover, the impact on the forecast error reduction was found to be greater for the momentum variables than moisture and mass in accordance with the World Meteorological Organization (WMO) report on 2012.

A closer examination of the results is then performed on the low predictability days and the network configuration is examined alongside the meteorological conditions.