EMS Annual Meeting Abstracts
Vol. 15, EMS2018-746-1, 2018

Qualitiy of the estimation of wind gusts and variability from reanalysis and hindcasts

Ronny Petrik, Beate Geyer, and Burkhardt Rockel
Helmholtz-Zentrum Geesthacht, Meteorological Institute, Germany (ronny.petrik@hzg.de)

The variability of electricity load within complex power grids are simulated with so-called energy system models. Performing them over a couple of years allows to investigate where to install storages for renewable energies.
However, the energy system models require to have input data of the energy production for conventional power plants as well as the renewable power plants. Regarding the latter, we rely on data from regional hindcasts, because they provide consistent long-term and three-dimensional data about the atmospheric processes. Thanks to the UERRA and other projects, reanalyses data are available from various European meteorological services (for instance the COSMO-REA6 product by the DWD). Moreover, regional hindcasts based on pure dynamical downscaling as well as large-scale constraints are available.

Our focus is on feed-in power from wind turbines. The short-term variability and the gustiness is of particular interest for the estimation of generated wind power. Sub-hourly variability and turbulence statistics is not resolved by the regional hindcasts and thus information has to be extracted using parameterizations. We utilize different gust parameterizations and evaluate their estimates using data from different measurement towers and remote-sensing devices located over Mid-Europe.
In our presentation the model's quality is discussed for atmospheric PBLs over land and ocean. In particular, we examine causes for short-term variability like thermal stratification and wind shear. In addition, we make use of ramp statistics to analyze the temporal consistency, the frequency statistics and the magnitude of wind gust events in hindcasts. It is shown
to which extent the reanalyses products differ from each other and to which extend they are superior over a simple pure downscaling product, but also to which extent all models share errors.