Abstract

A comparison of 80m wind speed measurements from lidars, sodars, and two operational models during WFIP2.

Djalalova,I.[1,2], L. Bianco[1,2], J. Wilczak[2], J. Olson[1,2], A. Brewer[2], A. Choukulkar[1], R. Eckman[3], J. Kenyon[1,2], J. Lundquist[4], S. Wharton[5]

[1] University of Colorado/CIRES
[2] NOAA/ESRL
[3] NOAA/ARL
[4]University of Colorado
[5]DOE/LLNL

The second Wind Forecast Improvement Project (WFIP 2) was an 18-month (October 2015 - March 2017) DOE and NOAA led multi-agency project conducted in the Columbia River Basin in Oregon and Washington states. The major goal of this project is to understand and to improve the forecast skill of numerical weather prediction (NWP) models in complex terrain. The WFIP2 study region is well-known for its excellent wind resource, and many wind farms are installed there. Thus, improvements in NWP forecast skill in this region will have a direct and immediate impact on wind power generation and the potential for reducing grid balancing costs.

Because improving wind power production is the goal, winds in the atmospheric layer that spans the turbine blade heights are important. During WFIP2 data were collected from a variety of instruments, including, among others, sodars and lidars, measuring wind speed in the lowest 20-500 m of the atmosphere. Two sites, Wasco and Arlington, OR, are used for the analysis. Winds at approximately hub height (80m) from two lidars (one profiling and one scanning) and one sodar are compared at the Wasco site, and two lidars (one profiling and one scanning) are compared at the Arlington site.

Sodar and lidar datasets are also used for validation purposes. We use two operational models, the NCEP 13-km Rapid Refresh (RAP) and the NCEP 3-km High Resolution Rapid Refresh (HRRR), to perform a statistical analysis focused on 80-m wind speed. This analysis includes the regular bulk statistics (Mean Absolute Error, Root Mean Square Error and Correlation) and also a special metric using a Ramp Tool and Metric (RT&M) package developed as part of the first WFIP experiment (Bianco et al., 2016) , to measure the skill of NWP models at forecasting ramp events.

References

Bianco L., I. V. Djalalova, J. M. Wilczak, J. Cline, S. Calvert, E. Konopleva-Akish, C. Finley, and J. Freedman, 2016: A Wind Energy Ramp Tool and Metric for Measuring the Skill of Numerical Weather Prediction Models. Weather and Forecasting, 31 , 1157-1177