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An Integrated Approach to Improved Wind Forecasting in Nebraska

Abstract.

Short-term wind forecasting skill has room for improvement, particularly for large-scale wind energy operations to maximize efficiency and properly determine wind generation output. In this project, the research-grade observations of the Nebraska Mesonet will be utilized to initialize and verify output from the Weather Research and Forecasting (WRF) model running at the University of Nebraska Lincoln - the High Plains Real-Time Earth System Model Complex. This model produces hourly forecasts going out to 72 hours and a methodology has been completed to predict winds at 80-m height. Currently the model does not incorporate Mesonet observations for the prediction. Two additional Mesonet sites will be installed in Year 1 using a 10-m tower configuration. To determine the location for these new sites, we will target under-represented areas of the state that are of high importance to Nebraska Public Power District (NPPD) wind energy electrical production.

Sensitivity testing will also be performed in Year 1 to assess the improvement in forecasting skill gained by incorporation of Nebraska Mesonet observations into the WRF model. Year 2 will include installation of an additional two Mesonet stations and continued sensitivity analysis. The primary outcome of the project will be a specialized WRF real-time simulation package specific to wind energy production needs in Nebraska.