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Conditional Summertime Solar Power Forecast

Marco Giordano

Atmospheric Sciences Graduate Program, Department of Physics, UNR
Division of Atmospheric Sciences, DRI

John Mejia
Division of Atmospheric Sciences, DRI

The scope of this research study is to investigate the predictability of clouds and solar power in southwestern U.S., with a focus over southern Nevada. Accurate forecasts of solar irradiance are required for electric utilities to economically integrate substantial amounts of solar power into their power generation portfolios. Solar power forecasting can enhance the value of renewable energy by anticipating fluctuations in these variable resources. Summertime cloud variability depends largely on the combination of tropical and extratropical synoptic scale forcing, most of which we argue are observable and predictable, and highly related to the North American Monsoon moisture surge events. We use high resolution real-time Numerical Weather Prediction (NWP) output based on the Weather and Research Forecasting (WRF) model to study the ability of the model on delivering day-ahead cloud and solar power forecast for southern Nevada. Forecast products are obtained from the DRI Weather Intelligence and Numerical Decision Support (WINDS) archive. This poster presentation shows preliminary results of the model's ability to predict Global Horizontal Irradiance (GHI) in Las Vegas, during the monsoon season. We are using Skill Score defined as the forecast ability to predict bias corrected (Model Output Statistics) day-ahead, hourly GHI, relative to a persistence forecast (tomorrow's forecasts are today's observations). The model's performance indicates a decrease of up to 30% in the root mean square error (RMSE) and a gain of up to 50% in the Pearson correlation coefficient. This poster also shows details of how we are planning to improve these results, with attention to the critical challenges of forecasting incoming solar radiation in regions with complex terrain.

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