Variability of Surface Radiation Observations and HRRR Forecasts at Sites across the Columbia River Basin as Part of the Wind Forecasting Improvement Project (WFIP-2)

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The second Wind Forecast Improvement Project's (WFIP-2) major goal is to improve atmospheric processes in numerical weather prediction models for more accurate wind forecasts in complex terrain. This effort involves multiple U.S. agencies, industry, and universities with a large suite of instrumentation including vertical profiling wind radars, sodars, lidars, shortwave and longwave radiation, sensible and latent heat for understanding the development of low-level winds. This suite of instrumentation was deployed across the Columbia River Basin from approximately October 2016 – March 2017 to capture meteorological regimes throughout the year, e.g. mountain gap events, cold pools. The sum of the incoming and outgoing radiative components at the surface is the bulk of the energy available for atmospheric dynamic processes that influence boundary layer height and low-level winds. In this presentation, surface radiation observations will be used to determine uncertainties (biases, root-mean-square error, mean absolute error) in the forecast of these variables from the NOAA 13-km Rapid Refresh (RAP), 3-km High Resolution Rapid Refresh (HRRR), as well as a high resolution (750-m) nest across four sites. This study will investigate whether the HRRR and RAP models capture the diurnal and seasonal variability in radiation quantities across the sites and within identified meteorological regimes. The HRRR has been targeted for specific improvements in model physics such as scale-aware aspects of turbulence parameterizations (planetary boundary layer + shallow cumulus scheme) and land-surface physics. This analysis will explore the improvements in the model physics on forecasts of surface longwave and shortwave radiation, and shortwave surface albedo.

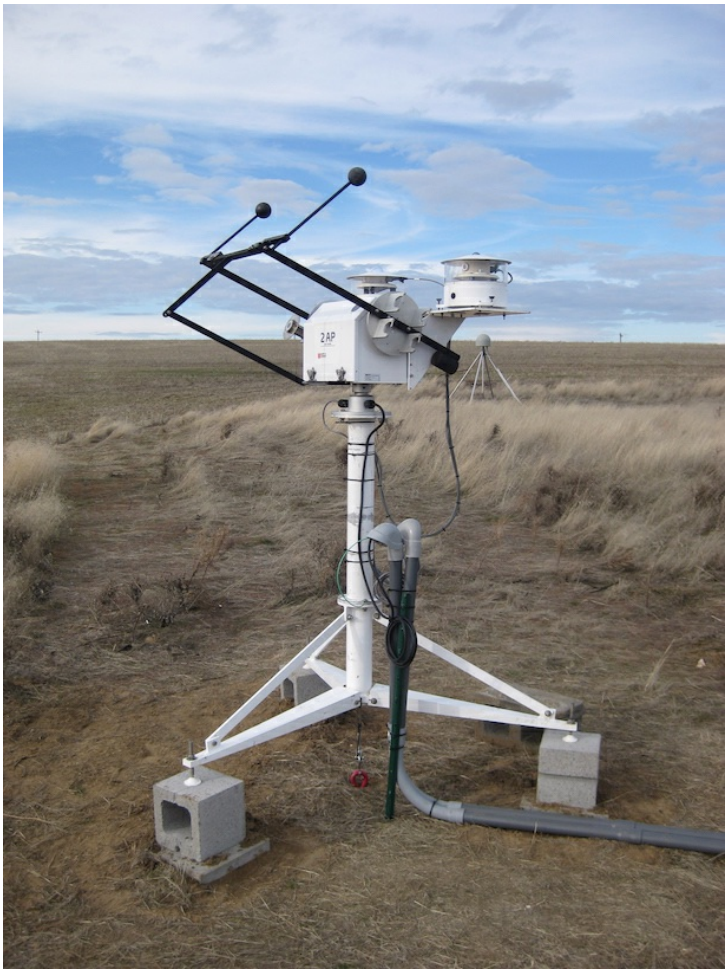

Figure 1. Mobile SURFRAD deployment at Wasco, OR for WFIP-2 Field Study.