

Comparison of Climate Reanalysis Data with Data from a High-Resolution Mesoscale Model

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When predicting electromagnetic system performance in frequency bands or regions where the environment can significantly impact propagation, high-resolution forecast data from a mesoscale numerical weather model is the preferred source for refractivity. However, these are sometimes unavailable to planners in necessary regions at desired times or with desired resolution. Instead one must sometimes rely on global reforecasts (aka climatology data) or historical sounding data with comparatively low vertical resolution. These lower resolution data sets often fail to produce strong electromagnetic ducting behavior in propagation models because they lack sufficient samples in the vertical dimension to properly characterize energy trapping layers. The general preference for higher vertical resolutions is undisputed, but imperfect data must sometimes be used when none better is available. The consequences of using this data should be better understood.

This talk presents a comparison of NOAA's Climate Forecast System Reanalysis (CFSR) and low-resolution soundings from NOAA's Integrated Global Radiosonde Archive (IGRA) with the result of a high resolution forecast from NRL's Coupled Ocean / Atmosphere Mesoscale Prediction System (COAMPS®) over the same time and region. It discusses differences in sea temperature, thermodynamic variables, surface, and boundary layer characteristics in the context of refractivity and electromagnetic propagation. The resulting refractivity profiles are compared against profiles derived from the few available soundings in the region and time that IGRA provides. It also compares EM propagation predictions using refractivity derived from each of the three datasets. The result is a comparison on the relative quality of preferred versus sometimes necessary but non ideal datasets for propagation analysis.