

Evaluation of Vertical Refractivity Profile Blending Schemes

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Numerical weather prediction (NWP) models are increasingly being used to predict electromagnetic (EM) propagation and sensor performance for operational purposes. While NWP models have many attributes that make them potentially very useful for EM modeling purposes, there are also some special considerations that must be taken into account when using NWPs for this purpose. Among these special considerations is ensuring that the near-surface vertical modified refractivity profiles derived from the NWP forecasts have sufficient vertical resolution and fidelity to adequately characterize the evaporation duct for propagation modeling purposes. Currently it is not feasible for NWP models to be run with high enough vertical resolution to achieve this goal, though this will likely change at some point in the future. This current limitation in vertical resolution necessitates the use of surface layer refractivity models in conjunction with the NWP model. The surface layer vertical refractivity profile must then be smoothly and as realistically as possible blended onto the bottom of the NWP model refractivity profile. The Naval Postgraduate School (NPS) and others have developed different schemes for accomplishing this necessary refractivity profile blending. In this presentation the NPS blending method will be described and the rationale behind it explained. The NPS scheme attempts in performing the blending to not distort, insofar as possible, any important refractivity features, especially trapping layers, that may be present in either the surface layer or NWP model refractivity profiles. The NPS scheme will be compared with different methods developed by others and the different blending methods will be validated with meteorological and propagation measurements obtained during the Wallops Island 2000 experiment.