A Review of Refractivity Structure Matching as a Pre-Processing Component When Considering its Use with Numerical Weather Prediction USNC-URSI National Radio Science Meeting

Katherine L. Horgan* [(1)], Edward H. Burgess [(1)], William D. Thornton[(1)], and Victor R. Wiss[(1)]
(1) Naval Surface Warfare Center Dahlgren Division, Dahlgren, VA 22448

Most propagation models, especially parabolic equation routines, utilize a marching algorithm solution that requires profiles with identical numbers of data points and profile range spacing with small increments. These models typically implement an interpolation scheme to provide profiles at the proper range spacing between the profiles when the input data set is not sufficiently populated. These techniques of interpolation typically work with data at consistent altitudes across range when creating the additional profiles in range. This approach tends to wash out features in the vertical profile of refractivity that change with range.

A Refractivity Structure Matching algorithm attempts to consider the location of features in a profile, relative to surrounding profiles, and create intermediate profiles where the features are maintained. An algorithm is employed that identifies the feature and relocates the feature within the profile relative to the date point count in surrounding profiles. Flexibility in desired range increments between profiles assists in creating a proper data set for analysis, relieving the propagation model from utilizing its own interpolation scheme.

Current efforts in the US Navy are attempting to make use of numerical weather prediction to provide gridded data sets of modified refractivity for use in propagation models. Since the scale of the gridded data sets is larger than the typical range increment utilized by the propagation models, concern for the implications of utilizing the gridded numerical weather prediction modified refractivity data as a direct input to a propagation model vice a data set that considers a feature matching pre-process is investigated.