Multiple-Source Assimilation and Refractivity Interpolator (MARI)

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The Multiple-source Assimilation and Refractivity Interpolator (MARI) program is continually being improved to process meteorological measurements for the characterization of *in situ* atmospheric propagation conditions to support radar and communications systems testing. This is accomplished through the common treatment of meteorological data from any or all of the measurement sources commonly used by The Johns Hopkins University Applied Physics Laboratory (JHU/APL) to characterize atmospheric refractivity. Measurement sources include surface observations from boats, ships, buoys, and helicopter instrumentation, as well as vertical profiles from balloon-dropsondes, rocketsondes, and helicopter instrumentation. In addition MARI accommodates a variety of evaporation duct models to characterize refractivity in the surface layer. The resulting profiles are merged with processed data from directly-measured profiles. Procedures for assimilating and processing the refractivity profiles from the various data sources are applied to characterize the atmospheric refractivity over a particular region. Many of the algorithms in MARI are derived from legacy refractivity processing tools such as the Rocketsonde Evaporation Duct (RED), Balloon-dropsonde Evaporation Duct (BED) and the Large-Scale Atmospheric Refractivity Range Interpolator (LARRI) tools, which have been successfully applied to hundreds of data sets for dozens of tests, which often include comparisons of modeled and observed RF system performance. MARI is now the primary, common refractivity-processing algorithm used at JHU/APL, and has been used extensively to process and analyze field test data. The analysis has resulted in improvements to existing capabilities. Furthermore, new algorithms have been implemented to handle inevitable complications in data collection and improve overall reliability in both program stability and output results. MARI, as it currently exists, has advantages over previous refractivity processing programs in terms of characterizing refractivity as well as facilitating data analysis, code maintenance, and development of new capabilities. In this presentation the current status MARI will be described and examples of capabilities and improvements will be shown.