Multiple-Source Assimilation and Refractivity Interpolator (MARI)

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The Multi-source Assimilation and Refractivity Interpolator (MARI) program is being developed to process meteorological measurements to characterize *in situ* atmospheric propagation conditions to better support Navy testing of advanced radars. This will be achieved through a common treatment of meteorological data from any or all of the measurement sources commonly used by JHU/APL to support field tests to characterize atmospheric refractivity. Measurement sources include surface observations from boats, ships, buoys, and helicopters, as well as vertical profiles from balloon-dropsondes, rocketsondes, and helicopters. In addition MARI accommodates a variety of evaporation duct models to characterize refractivity near the surface. The resulting surface layer profiles are merged with processed data from directly measured profiles. The major algorithms from the Rocketsonde Evaporation Duct (RED) and the Large-Scale Atmospheric Refractivity Range Interpolator (LARRI) programs are used to accomplish this. These include a procedure for automatically identifying convective regions based on virtual potential temperature and mixing ratio, which is used to determine variations in mean refractive conditions with range. Existing procedures for assimilating the refractivity profiles from the various data sources are applied to determine a consistent characterization of atmospheric refractivity over the region of interest. Most of the algorithms in MARI derive from programs that have been successfully applied to hundreds of data sets for dozens of tests, which often include comparisons of modeled radar performance to observed performance. Others represent improvements over previously existing capabilities, but are less thoroughly tested. Yet MARI, as it currently exists, appears to have advantages over previous refractivity processing programs in terms characterizing refractivity as well as facilitating data analyses, code maintenance, and development of new capabilities. In this presentation MARI will be described and examples of capabilities will be shown.