Comparisons of Radiosonde Measurements and Numerical Weather Prediction Results Blended with a Surface Layer Model for the Radio Frequency Application

Katherine L. Horgan*[1], Tracy Haack [2], Qing Wang[3], William Thornton[1], Victor Wiss[1], and Robert Marshall[1]

(1) Naval Surface Warfare Center Dahlgren Division, Dahlgren, VA, USA
(2) Naval Research Laboratory, Monterey, CA, USA
(3) Naval Postgraduate School, Monterey, CA, USA

As part of a larger Navy exercise known as Trident Warrior 2013, extensive meteorological measurements were taken over a period from 13 – 17 July 2013 in the Virginia Capes Operating Area. Radiosondes were employed to measure the meteorological conditions in the marine atmospheric boundary layer (MABL). A controlled-leak was utilized to limit the height of the radiosonde measurements to less than 5,000 ft providing an up and down measured MABL profile. A drifting flux buoy was employed periodically during the exercise to measure the surface layer. Handheld infrared sea surface temperature measurements and ship meteorological data were also taken. In addition to the measurements, the US Navy's mesoscale numerical weather prediction model, the Coupled Ocean / Atmosphere Mesoscale Prediction System (COAMPS), was run over the area. These data captured varying atmospheric radio frequency (RF) propagation conditions over the time period of the test event.

This presentation will provide an overview of the MABL evolution and resulting RF propagation conditions during the 5-day test even. Advection, surface based and elevated ducting was measured. The buoy, ship, and handheld IR measurements were used as input into a surface layer model. The meteorological profiles from both the radiosondes and COAMPS will be blended with the surface layer model results using the Naval Surface Warfare Center Dahlgren Division (NSWCDD) physics-based surface layer blending technique. The resulting refractivity profiles will be shown as well as output from the Advanced Refractive Effects Prediction System (AREPS) comparing the NSWCDD Notional S and X band radars within these environments.