Validation of COAMPS Simulations of the Marine Atmospheric Planetary Boundary Layer in Coastal California during May and June 2010

Lee W. Eddington and Kyle S. Edwards
Geophysics Branch, Naval Air Warfare Center Weapons Division
Point Mugu CA 93042-5000

Tracy Haack
The Naval Research Laboratory
Monterey, CA, 93943

Mesoscale numerical weather prediction models are routinely used to provide high resolution meteorological data for electromagnetic (EM) propagation models. The accuracy of the propagation models is thus dependent on the accuracy of the meteorological model simulation. Proper characterization of the marine atmospheric planetary boundary layer (PBL) by mesoscale models is important as the strong gradients of moisture and temperature that frequently occur at the top of this layer can have a significant impact on near surface EM propagation.

Four configurations of the COAMPS mesoscale numerical weather prediction model using two different initialization and radiation schemes are used to simulate the atmospheric conditions during May and June of 2010 over California with the output compared against weather balloon radiosonde measurements taken at San Nicolas Island, Point Sur and a research vessel operating northwest of Bodega Bay. For each radiosonde measurement with an inversion-capped marine PBL the PBL height and a representative PBL potential temperature was determined for the model and the measurement. Scatter plots and error statistics were generated comparing the measured PBL height and potential temperature to the model.

The model results show a shallow bias in PBL height for all four configurations of the model for San Nicolas Island and the research vessel off Bodega Bay, while the results at Point Sur show a deep bias in the PBL height. The differences in the PBL height and potential temperature errors for the four model configurations are shown to be consistent at each of the three locations. The horizontal and temporal variability of the model PBL simulations in the vicinity of the measurement locations will also be presented.