Evaluation of COAMPS Using Measurements from the CASPER Pilot Experiment

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During the Coupled Air Sea Processes and Electromagnetic Ducting Research (CASPER) pilot experiment between April 20 and May 04, 2015, extensive measurements were made from a research vessel, R/V John Martin, and a shore site station at the shore lab of the Moss Land Marine Lab (MLML). In addition to a flux buoy deployed at 7 nm offshore of Moss Landing and the ship mast measurements, thirty-two combined upward and downward soundings were launched from R/V Martin at different time/location along the CASPER sampling track, which is coordinated with electromagnetic propagation measurements between the ship and the shore site. During this period, mesoscale simulations were made by the Naval Research Lab, Monterey using the Coupled Ocean/Atmosphere Mesoscale Prediction System (COAMPS). This research focuses on the evaluation of COAMPS simulations using the available measurements from the pilot experiment with special emphasis on its application in predicting the environment for characterizing EM propagation over the ocean. The COAMPS simulations were setup to have high vertical (70 sigma levels) and horizontal (4 Km) resolutions.

Initial analyses have been made to compare the temperature and humidity profiles, and hence the modified refractivity profiles, from COAMPS against the rawinsonde profiles during the measurement period. We have examined the vertical structure of water vapor mixing ratio, temperature, and modified refractivity at different locations in the Monterey Bay Area. The results show that COAMPS did a reasonable job overall for temperature and humidity in a statistical sense when forecast for the total of 10 days were evaluated. However, forecast for any given day show some discrepancies, suggesting the difficulties in representing the complicated coastal processes. For EM propagation purposes, the model has difficulties in capturing the properties of the ducting layers. Most of the ducting events in COAMPS have duct base height that are lower than 300 m, whereas the sounding data show ducting bases between 300 and 1000 m. COAMPS also shows shallower ducting layer and more surface-based ducts than those found in the soundings.

More in depth analyses of COAMPS and CASPER observations will be presented. The change in model performance with increasing forecast lead time is also explored.