The ABCANZ Mesoscale Numerical Weather Prediction Refractivity Collaboration

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Allied naval radio frequency (RF) acquisition programs, at sea tests and operational tactical decision aids are being increasingly supported by refractivity fields provided by mesoscale numerical weather prediction (NWP) models. The America, Britain, Canada, Australia, New Zealand (ABCANZ) RF/IR/Visible Propagation Working Group has established a need for a gridded prognostic refractivity capability based on mesoscale NWP to support naval surface warfare RF sensors. In order to more rapidly improve the quality of mesoscale NWP in support of littoral refractivity forecasts, NSWCDD and NRL-MRY are leading collaboration amongst ABCANZ mesoscale NWP modelers to leverage technology from each country. This two year research and development program involves mesoscale NWP modelers from NRL-MRY, UK Met Office, Environment Canada, Defence Science and Technology Organization, Australia and the Defence Technology Agency, New Zealand.

During FY08, each ABCANZ NWP modeler employed their country's Navy preferred mesoscale NWP model to reproduce the refractivity fields sampled during the Wallops 2000 Microwave Propagation Measurement Experiment (MPME). Surface meteorological and helicopter thermodynamic variable and derived modified refractivity profiles were compared to mesoscale NWP forecasts. Lessons learned on modeling techniques were compiled.

This paper will present the results of this refractivity modeling collaboration including model to measurement comparisons and suggestions for improvements to mesoscale NWP models required to increase the quality of refractivity field forecasting.

The FY09 effort will also be presented. In February and March of 2009, each ABCANZ country will use their NWP model to support the New Zealand Sea Breeze Trial (NZSBT) on the Bay of Plenty. Sea breeze circulations tend to produce strong RF ducting and are forecast to increase in frequency, intensity and inland penetration during the 21st century. Each country will repeat the meteorological comparisons made for the MPME with the NZSBT data and then compare propagation modeling results for both the MPME and NZSBT.