

The Coupled Air-Sea Processes and Electromagnetic Wave (EM) ducting Research (CASPER) is a Multidisciplinary University Research Initiative (MURI) project aimed at improving the prediction of EM propagation in the marine atmospheric environment. CASPER Pilot experiment occurred 20 April -4 May 2015 offshore of Moss Landing, CA with the main objectives of testing out of essential measurement components in preparation for CASPER field East campaign to occur between Oct 4 and Nov 3, 2015 off shore of Duck, NC. Major platforms of CASPER East include R/V Hugh Sharp and R/V Atlantic Explorer, an instrumented Twin Otter research aircraft, and a shore site at a 500 m long pier at Duck, NC. A second aircraft, a SAAB 340, is also involved with multiple upper ocean remote sensing instruments.

The CASPER east field campaign intends to obtain coordinated environmental characterization and electromagnetic (EM) propagation measurements with multiple research platforms/sites. The basic design of the measurements is to use the two ships or one ship and the shore site as the two ends of the EM propagation link denoted as the ship-ship and ship-shore EM evolution, respectively. These two type of EM measurements are to sample the range-dependent propagation at multiple frequencies for the ship-shore evolution and at X-band for the ship-ship evolution, the latter having a vertical array of receivers on R/V Atlantic Explorer. Meanwhile, RF beacons are installed on the research aircraft to provide addition EM link measurements. Additional receivers are also installed on the R/V Atlantic Explorer to obtain signals of opportunity.

CASPER field measurements emphasize coordinated measurements of EM propagation and environmental characterization. The two vessels, the Twin Otter, and the shore site are fully equipped for air-sea interaction measurements including turbulence fluxes, mean thermodynamic and wind measurements, as well as upper ocean measurements. Profiles of the lower atmosphere are to be measured by free flying rawinsondes as well as multiple tethered balloons from ships, small work boat, and the shore site. These profiling measurements are to be made concurrently from different platforms at various locations along the propagation path. Meanwhile, the aircraft over flight is designed to sample the boundary layer profiles and turbulence variability along the propagation path between the two ends of EM measurements. Air-sea fluxes and near surface profiles are also obtained from small flux buoys and Wave Gliders with instrumented mast for sampling in minimally disturbed marine surface layer. Multiple waves buoys are also scattered near the propagation path to quantify the ocean waves.

The CASPER measurements in both the pilot experiment and the east coast field campaign were designed to maximally benefit numerical model evaluation and improvements. For this purpose, repeated measurements at the same location and the same time are to be made to allow consistent data for model evaluation. Meanwhile, mesoscale model simulations with the Navy's mesoscale forecast model, COAMPS, will be made in real time to support experiment planning.

In this presentation, a general overview of the experiment design and execution will be discussed. Preliminary results will be shown to illustrate the types of data available from this field campaign.