Evaporation Duct Height Comparisons from X-Band EM Propagation Measurements of the CASPER Campaign and NAVSLaM Predictions

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An important application of air-sea interaction research is in characterizing ducting properties in order to predict radar and radio communication conditions in the marine environment. This ongoing research project, CASPER (Coupled Air-Sea Processes & EM Ducting Research), conducted its first major experimental campaign off the coast of Duck, NC, during October-November of 2015 to measure EM propagation concurrently with extensive co-located atmospheric and oceanographic observations. The main objective of the EM experimental component of this project is to obtain data that is sufficient for determining the prevailing ducting conditions and range-dependent refractivity profiles based on improved environmental models. A versatile X-band receiving array is deployed to measure the one-way propagation loss between the emitters and receivers as a function of antenna height and range. In this paper the measured data is used to invert for the evaporation duct height (EDH) based on a standard log-linear refractivity profile input to a parabolic wave equation (PWE) computer code for generating the propagation curves numerically. The results are compared to the EDH calculated from concurrent meteorological and oceanographic measurements input to the Navy Atmospheric Vertical Surface Layer Model (NAVSLaM).

Initial results have shown that the signal vs. range simulated from the PWE code matches the collected data very well, and the corresponding best-fit EDH is consistent with the output of NAVSLaM, although the latter provides a range-dependent profile with small variations in the EDH. New results will be presented using the range-dependent profile from NAVSLaM as input to the PWE code and compared with measurements.