A Technique to Evaluate Numerical Weather Prediction Performance: An Engineering Perspective

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As the applications of numerical weather prediction data continue to expand, users often find themselves trying to describe how best to evaluate the performance of numerical weather prediction models. The model developers frequently provide statistics in meteorological quantities about model performance, but often these do not adequately translate for the specific application. For example, when examining the modified refractivity application, the gradients of temperature and moisture are more important than the absolute values at any given height; however, model developers do not typically collect statistics on gradient performance. As a result, the Propagation Measurement and Analysis Group at the Naval Surface Warfare Center Dahlgren Division have designed a few engineering metrics relevant to the Navy's communities of interest. The engineering metrics designed for the radar and electronic warfare communities will be discussed.

During October – November of 2015, the Coupled Air-Sea Processes and EM Ducting Research (CASPER) – East intensive operational period (IOP) occurred. Daily, on a semi-hourly basis, radiosondes were launched from the Army Corps of Engineers Field Research Facility's pier in Duck, NC as well as two research vessels, the R/V Atlantic Explorer and R/V Sharp, at varying distances from the coast. In coordination with the radiosonde launches at these locations, sea surface temperature information was collected. The radiosonde profiles taken during CASPER will be blended with output from an evaporation duct model and treated as the "control" dataset. Results from the Coupled Ocean / Atmosphere Mesoscale Prediction System (COAMPS), the US Navy's mesoscale numerical weather prediction model, will be compared to this "control" dataset using the engineering metrics discussed above.