Modeled Evaporation Duct Climatology in a Limited Area Using Multiple Data Sources

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Recent efforts in developing new evaporative duct climatology use various model reanalysis fields and the state-of-the-art evaporative duct models. Because of the broad range of data sources used in these studies, there may be discrepancies in the resultant evaporative duct properties that have not been thoroughly evaluated. This research focuses on an inter-comparison of evaporative duct climatology from different data sources for the region near Duck, NC.

Results for this particular region also provides guidance to experiment planning for the upcoming Coupled Air-Sea Processes and EM ducting Research (CASPER) program. We will first present evaporation ducting climatology using the five years of data from one coastal pier based station and another offshore buoy near Duck, NC. Profiles of temperature, humidity and wind speed were delineated from the single level station/buoy data using COARE algorithm modified to calculate the surface layer mean wind, temperature, and humidity profiles. Modified refractivity (M) profiles for the lowest 50 m were then generated from the temperature and humidity profiles.

Climatology of evaporation duct height (EDH) and evaporation duct strength (EDS) were derived from M profiles. EDH and EDS showed pronounced diurnal variability with maxima and minima in early afternoon and early morning, respectively. Seasonal variability shows that the EDH and EDS are the highest in the fall-winter months and the lowest during the spring-summer months. Variability of EDH and EDS with respect to the origin of air mass as well as the severe weather systems will be presented. These evaporation duct properties derived from station/buoy data will also be compared with those derived from different reanalysis data products such as ECMWF and NCEP CFSR.