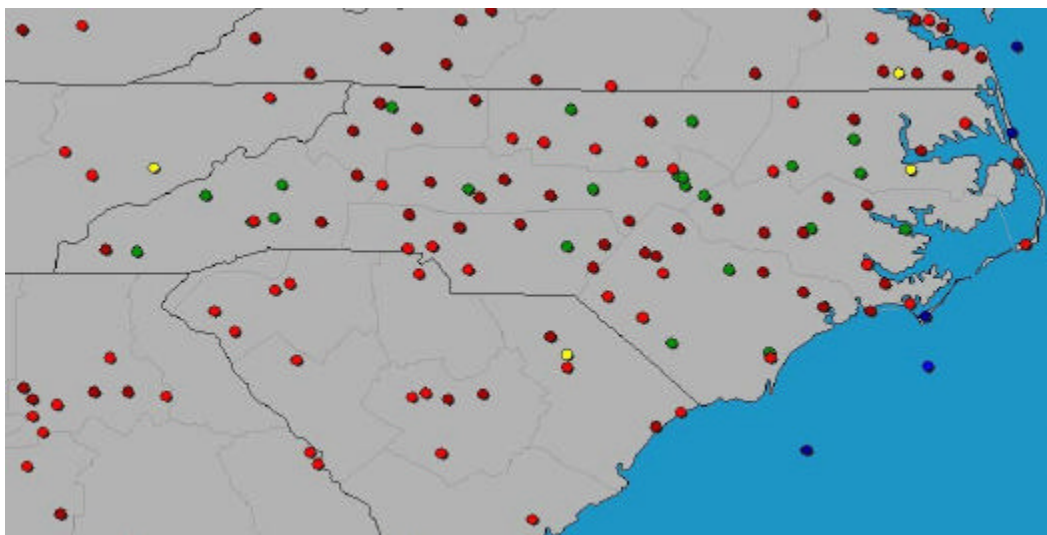


4.11 A COMPREHENSIVE DATABASE AND ANALYSIS SYSTEM FOR THE NORTH CAROLINA ENVIRONMENTAL AND CLIMATE OBSERVING NETWORK (NC ECO NET)

Dev dutta S. Niyogi, Ryan Boyles, Robb Ellis, Sethu Raman, Ameenulla Syed, Subhashini Sivagnyanam
State Climate Office of NC, North Carolina State University, Raleigh, NC 27695-7236

We discuss the development of a comprehensive database that combines observations from heterogeneous networks in and around North Carolina. This dataset incorporates observation sites throughout North Carolina and parts of six surrounding states, and the ocean. The data sources comprise of various types of stations, with each type recording a wide array of meteorological variables. For the entire dataset there are 132 ASOS/AWOS (Automated Surface Observing Sites / Automated Weather Observing Sites: NWS and FAA based) sites, 24 ECONet (Environmental and Climate Observing Network: State Climate Office of North Carolina based), 22 coastal buoys and 6 C-MAN sites. Of these, 55 ASOS/AWOS sites, 24 NC ECONet sites, 8 Bouys and 4 C-MAN sites are located within North Carolina region. This dataset provides high-resolution spatial observations for an area that presents many weather and climate challenges. Variables that available as part of these observations (hourly and daily) include: ECONet: Air Temperature (2m), Relative Humidity (2m), Wind Speed (10m), Wind Direction (10m), Soil Temperature (10 cm), Soil Moisture (10cm), Solar Radiation (1.5m), Pressure (surface), Hourly Precipitation rate (2 m), Photosynthetically-Active Radiation (1.5m); ASOS/AWOS: Air Temperature (2m), Dewpoint (2m), Wind Speed (10m), Wind Direction (10m), Pressure (surface), Hourly Precipitation, Present Weather, Cloud Layers, Visibility. Additionally, some of the ECONet sites have 2nd level of air temperature and relative humidity (at 10m), and wind speed and direction (at 2 m) measurements. These can be used for computing aerodynamic heat fluxes using standard formulae. Additionally, some ECONet stations are also being appended with hourly evapotranspiration measurements using an automated ET-gauge. A project under consideration for the North Carolina region includes addition of a high-density network of several precipitation gauges and one meteorological station per county as part of a Flood Warning System initiative undertaken following Hurricane Floyd (1999). These data will also be ingested into the database. For the coastal and open-ocean locations hourly observations are available through buoy and C-MAN sites. These provide both weather and oceanographic data, such as water temperature, wave heights and wave period. This is especially important to study the variability in regional models over coastal regions of eastern US, and have known teleconnection impacts on the southeast US region. Under this project, all the North Carolina (and adjacent) observations will be archived, QA/QC-ed, and prepared into a uniform database ingestible format for various activities. The purpose of the database is to provide a climatological archive of hourly observations (past and current). A user interface will be custom designed for retrieving data and formatting output. Also, incorporation of Geographic Information System software will allow a graphical interface for on-the-fly mapping and analysis with geographic overlays such as terrain and land-use. Satellite and radar imagery can also be ingested into a user interface that gives the user control to meet specific needs for present and past (1960s in some cases) archived data. Figure below, shows the location of the SCO AgNet, NWS ASOS, AWOS Stations, Buoy, NRCS SCAN sites



*Contact Information: Dr. Dev Niyogi, State Climate Office of NC,
North Carolina State University, Raleigh, NC 27695 – 7236,
Tel: 919 513 2101, Email: dev_niyogi@ncsu.edu*

Figure below shows a screen view of the java interactive tool showing the wind variations over the Carolinas Images such as these help understand and analyze the mesoscale features over the complex land use and topographic changes evident in this region. These observations form a good avenue for validating model performance over a complex terrain with operational observations.

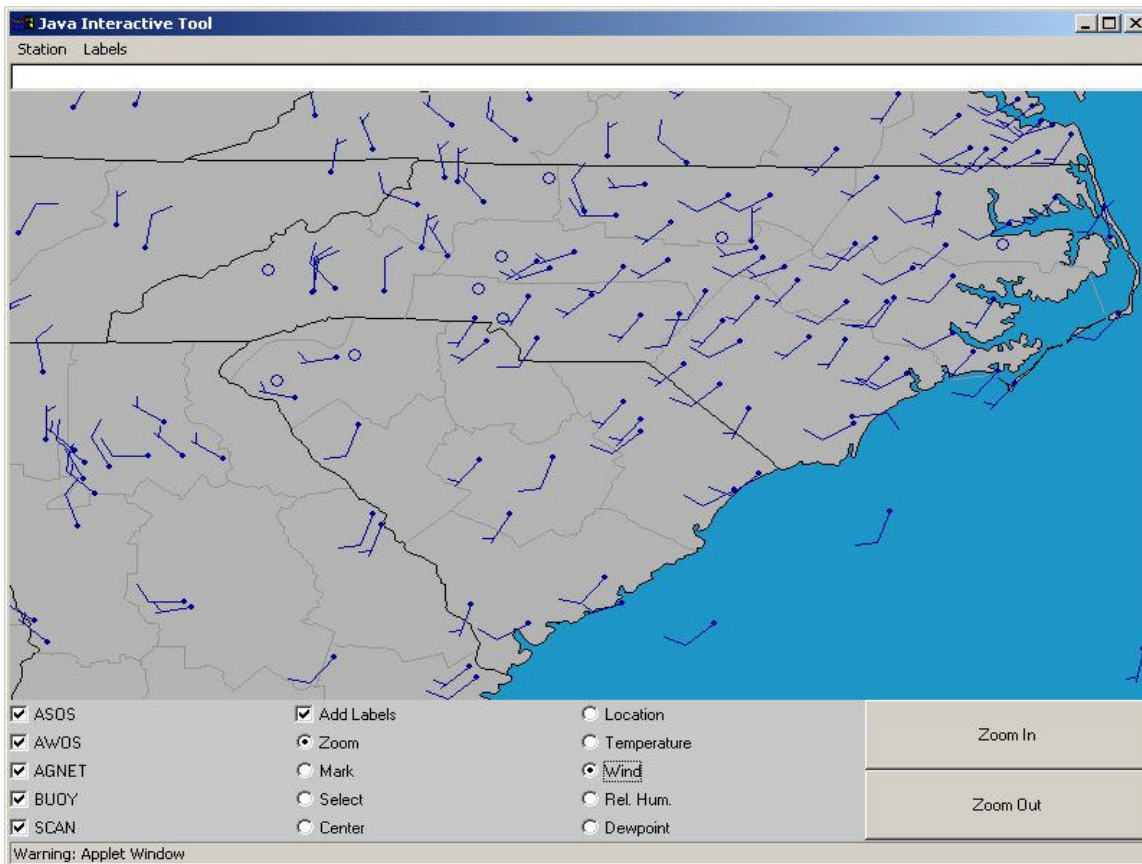


Figure below shows image of one of the 24 towers maintained by the State Climate Office of North Carolina as part of the NC ECO Net.

