

The profiler is designed to measure vertical profiles of horizontal wind speed and direction from near the surface to above the tropopause. Wind profilers work similar to radars, in that, a beam is sent out at a specific frequency and the beam is then refracted/reflected off fluctuations in the atmospheric density, caused by turbulent mixing of volumes of air with slightly different temperature and moisture content. Measurements of the returning beam are interpreted to provide information on the air above the profiler site. The resulting fluctuations of the index of refraction are used as a tracer of the mean wind in the atmosphere.

The profiler site equipped with the RASS (Radio Acoustic Sounding System) option and therefore has the capability to measure and produce vertical temperature profiles. The speed of sound is affected by the temperature of the atmosphere. The RASS uses this principal to track the speed of the acoustic energy emitted from the RASS Transducers as the sound waves propagate up through the atmosphere. The temperatures of the atmosphere at specific heights are extrapolated from the speed of the RASS wave propagation.

The Johnston County profiler is identical to a second profiler owned and operated by NC DAQ. Our first profiler is in the Charlotte area, which operates under the call sign WC2XQU (File Number 0079-EX-PL-2001). The data from both of the profiler sites is useful to our Air Quality forecasting efforts as it provides real-time wind information in two of our EPA designated nonattainment areas for ozone. Wind speed, wind direction, and atmospheric temperature are influential factors in the formation of ground level ozone. By having real time data available to us, we are better equipped to identify conditions that lead to harmful ozone levels and then alert the public when these conditions are anticipated.

Data from profilers are also used to verify meteorological modeling output. This is useful in determining which operational model has the best handle on current conditions, which would then become the model used for forecasting purposes. Model verification is also important to our attainment demonstration, as meteorological model output drive the air quality model output.