One of the primary goals of the 2002 New England Air Quality Study (NEAQS-2002) is to gain knowledge about the meteorological processes that control air quality and, ultimately, to improve air quality forecasts. Micrometeorology deals with observations and processes in the smallest scales of time (less than a day) and space (less than 1 kilometer). An important aspect of micrometeorology is the surface layer, which is defined as approximately the lowest 100 meters of the atmosphere that are directly influenced by surface friction. Therefore, micrometeorology is closely connected to anthropogenic and biogenic activities that cause air pollution. Turbulent mixing is one of the physical processes responsible for spreading pollutants away from their source regions. In general, the spreading of atmospheric pollutants is referred to as dispersion.

The 10-meter meteorological tower deployed by NOAA/ETL at this site hosts several slow-response sensors to measure the mean properties of the atmosphere as well as two fast-response sensors for measuring turbulence. The sonic anemometer/thermometer measures wind and temperature fluctuations at a rate of 20 times per second. The infrared hygrometer measures humidity fluctuations at the same rate. Combined, these measurements allow us to estimate turbulence statistics that help us to determine the vigor of turbulent mixing. Additional instruments buried in the ground surrounding the tower provide measurements of how the subsurface interacts with the atmosphere. A variety of radiation sensors are deployed to measure the effects of aerosols and clouds on the balance of incoming and outgoing solar and terrestrial radiation.

This measurement site also includes two of NOAA/ETL's remote sensors. Remote sensing is a method of obtaining information about the atmosphere without having the instrument come in direct contact with the portion of atmosphere being measured. The chirping instrument is called a sodar because it uses the technique of SOund Detection And Ranging. Pulses of sound travel through the atmosphere at approximately 340 meters per second. A small portion of the transmitted sound scatters off of temperature fluctuations. The signals from these weak echoes are detected and can be plotted as a function of range. The example of a sodar backscatter intensity plot shows how the sodar can detect the top of the convective boundary layer as it develops in the early morning. The height of the boundary layer determines the volume of atmosphere over which pollutants are mixed and dispersed. The laser ceilometer uses an infrared light beam to measure the occurrence of clouds and also provides their altitude.

For more information, contact Dr. Allen White, (303) 497-5155, allen.b.white@noaa.gov