Aerosol Properties and Direct Radiative Effects Measured at a Representative Southeastern U.S. Site

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The southeastern U.S. is one of only a handful of regions worldwide which has not exhibited warming over the past century. Long-term measurements of key aerosol properties from a regionally representative site are necessary to corroborate recent studies indicating the potential role of aerosols in this lack of regional warming, especially during warm-season months. The semi-rural mountain location (1080m ASL) of the Appalachian Atmospheric Interdisciplinary Research facility at Appalachian State University (36.214°N, 81.693°W) is home to NOAA ESRL and NASA AERONET collaborative aerosol measurements, along with a suite of trace gas, meteorological, solar irradiance, and cloud-monitoring instrumentation. Two years of *in situ*-measured aerosol optical properties are presented here, placed in the context of those measured at other NOAA ESRL sites in the U.S. The *in situ* aerosol measurements and ten years of satellite-based aerosol optical depth (AOD) measurements highlight the large seasonal variability in regional aerosol optical properties and loading. Aerosol source types will also be presented, along with box model estimates of top-of-the-atmosphere direct aerosol radiative effect (based on the *in situ* and remote measurements) and recently-added aerosol hygroscopic growth measurements. Comparisons of aerosol direct radiative effects and optical properties between two very meteorologically-different summers could provide some insight into the possible aerosol response to future regional climate change.

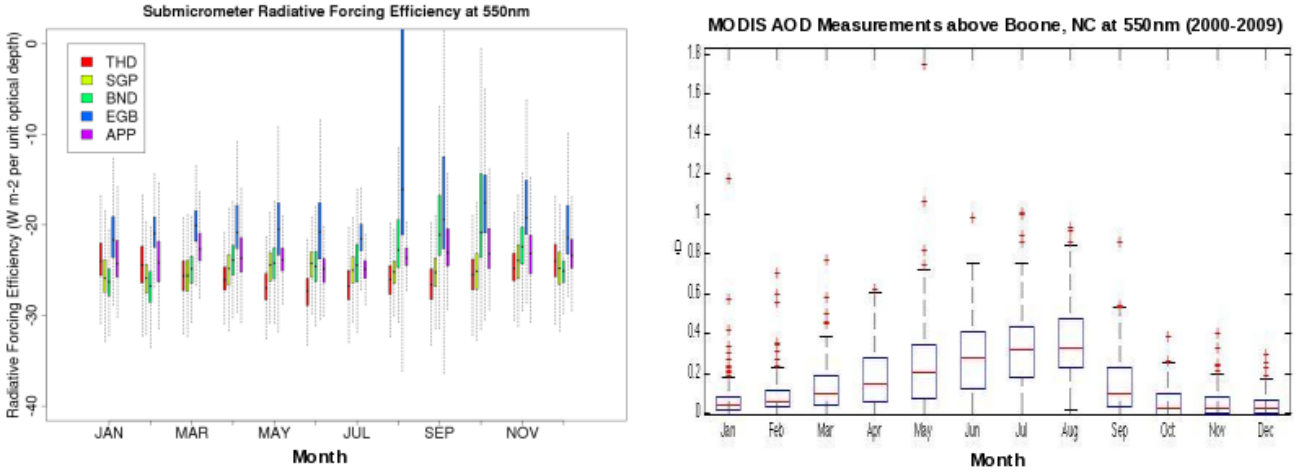

Figure 1. Comparison of monthly-binned sub-micrometer aerosol radiative forcing efficiency at 550nm, measured at five NOAA ESRL North American sites during the period 6/09-3/11 (Left), including the Appalachian State University (APP site). Ten years of MODIS-measured aerosol optical depth measurements made above Boone, NC (right).