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TI: Ten Years of Black Carbon Measurements in the North Atlantic at the Pico Mountain Observatory, Azores (2225m asl)
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AB: The Pico Mountain Observatory is located in the summit caldera of the Pico mountain, an inactive volcano on the Pico Island in the Azores, Portugal (38.47°N, 28.40°W, Altitude 2225m asl). The Azores are often impacted by polluted outflows from the North American continent and local sources have been shown to have a negligible influence at the observatory. The value of the station stems from the fact that this is the only permanent mountaintop monitoring station in the North Atlantic that is typically located above the marine boundary layer (average MBL heights are below 1200 m and rarely exceed 1300 m) and often receives air characteristic of the lower free troposphere. Measurements of black carbon (BC) mass have been carried out at the station since 2001, mostly in the summer seasons. Here we discuss the BC decadal dataset (2001-2011) collected at the site by using a seven-wavelength AE31 Magee Aethalometer. Measured BC mass and computed Angstrom exponent (AE) values were analysed to study seasonal and diurnal variations. There was a large day-to-day variability in the BC values due to varied meteorological conditions that resulted in different diurnal patterns for different months. The daily mean BC at this location ranged between 0 and ~430 ngm-3, with the most frequently occurring value in the range 0-100 ngm-3. The overall mean for the 10 year period is ~24 ngm-3, with a coefficient of variation of 150%. The BC values exhibited a consistent annual trend being low in winter months and high in summer months, barring year to year variations. To differentiate between BC and other absorbing particles, we analyzed the wavelength dependence of aerosol absorption coefficient and determined a best-fit exponent i.e., the Ångström exponent, for the whole dataset. Visible Ångström exponent (AE: 470-520-590-660 nm) values ranged between 0 and 3.5, with most frequently occurring values in the range 0.85 to 1.25. By making use of the aethalometer light attenuation measurements at different wavelengths and Hysplit back trajectories, we divided the data into two categories. One for periods characterized by AE values close to 1; these periods are typically correlated with back trajectories originating from Canada, North America or northern Europe, indicating the dominance of BC on the light attenuation. Another characterized by AE values substantially different from 1; these periods correlated with back trajectories originating from dust-prone regions (e.g., the Sahara desert).The above measurements, with the aid of ancillary satellite and ground-based measurements will be employed in estimating the radiaitve effects of BC in the North Atlantic.

Pico Mountain Observatory

DE: [0305] ATMOSPHERIC COMPOSITION AND STRUCTURE / Aerosols and particles
DE: [0368] ATMOSPHERIC COMPOSITION AND STRUCTURE / Troposphere: constituent transport and chemistry
SC: Atmos. Sciences (A)
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