5.108 Long-term assessment of aerosol OC and EC contents collected in the northern interior of South Africa.

Early Career Scientist

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Abstract:

The baseline of uncertainty in aerosol radiative forcing is large and depends on aerosol characteristics (e.g. size and composition), which can vary significantly on a regional scale. Primary and secondary sources (natural and anthropogenic) can be directly linked to the aerosol characteristics of a region, making monitoring campaigns to determine background aerosol composition in different regions very important. Up until 2005, the Deposition of Biogeochemically Important Trace Species (DEBITS) International Global Atmospheric Chemistry (IGAC) DEBITS in Africa (IDAF) project activities in southern Africa did not include aerosol measurements. OC and EC measurements for $PM_{2.5}$ and PM_{10} fractions commenced in 2009. The data included in this study were measured from March 2009 to December 2015. OC and EC measured in South Africa (SA) were explored in terms of spatial and temporal patterns, mass fractions of the total aerosol mass, as well as possible sources. PM_{10} and $PM_{2.5}$ samples were collected at four sites in SA operated within the DEBITS-IDAF network. OC were higher than EC concentrations at all sites. OC/EC ratios reflected the location of the different sites, as well as possible sources impacting these sites. The OC mass fraction percentages of the total aerosol mass varied between 1% and 24%, respectively and EC varied between 0.2% and 8%. A relatively well defined seasonal pattern was observed, with higher OC and EC measured from May to October, which coincided with the dry season in the interior of SA. Biomass burning wild fires contributed significantly to regional OC and EC during the burning season, while additional sources such as household combustion, traffic and industrial emissions contributed more significantly only at sites impacted directly by such sources.

Keywords: organic carbon, black carbon, aerosol composition, spatial, temporal, DEBITS, IDAF