Updated Aerosol Climatology for Cape Point, South Africa

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The Cape Point cooperative aerosol sampling program is currently in its 5th year of existence. The data set has grown significantly to the point where seasonal and annual patterns can be discerned using statistical distributions with an ever increasing amount of confidence. The aerosol optical data displays typical features of a site that is strongly influenced by oceanic emissions (sea salt as well as marine organic particles), combined with episodes of urban impacted air masses as well as the occasional biomass burning episode. A strong seasonal component is evident for many of the aerosol parameters being measured. Figure 1 show that light scattering remains relatively constant throughout the year, while single scattering albedo is lowest during austral winter. The Ångström exponent (not shown) is quite low (annual median <0.02) throughout the year, thus indicating that the sampling site is dominated by sea salt aerosols. However, the observed wintertime incursions of pollution and biomass aerosols do result in seasonal increases in the Ångström exponent (indicated by elevated 75th – 95th percentiles). This finding is consistent with a significant increase in the amount of sub-micrometer aerosol. Generally, the observed seasonal variability in the aerosol parameters is well correlated with the overall circulation experienced at the site – continental outflow and inversion trapping of pollutants during the austral winter and strong oceanic winds from October to March bringing clean marine air to the sampling site. The aerosol single scattering albedo (ω_0), which is an indicator of the relative amount of aerosol light absorption, shows a dominance of dark, absorbing particles during May – Aug, whilst Nov – Feb is characterized by whiter and predominately scattering aerosol particles. These variations are useful when identifying urban / biomass burning smoke plumes; continental outflow and oceanic aerosol emissions which all need to be considered in terms of their respective radiative forcing efficacies.

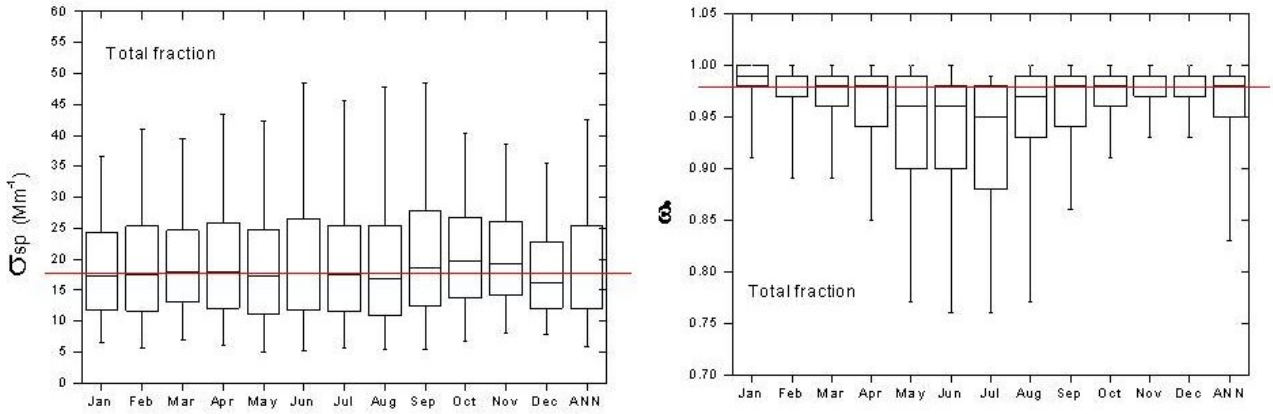

Figure 1. Annual climatology of aerosol optical parameters. The data is represented as monthly percentile values (2006 - 2009). Center line = median, top and bottom of box are 25th and 75th percentiles respectively and top and bottom whiskers correspond to 5th and 95th percentiles. The red line represents the annual median for the entire data set. Left: aerosol light scattering coefficient. Right: aerosol single scattering albedo.