4.169 Long-term climatology of aerosol optical properties measured at a South African site.

Early Career Scientist

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Abstract:

Atmospheric aerosols affect the earth's radiative budget in two ways: firstly, particles that indirectly influence the lifetime and physical properties of clouds and, secondly, particles that directly absorb and scatter short- and long wave radiation. Due to the high spatial and temporal variability of aerosols, their climatic impacts are particularly important on regional scales. Consequently, high-resolution long-term, regional scale measurements are required in order to determine aerosol climatic impacts and to improve the uncertainty levels associated with these impacts. Although South Africa is the largest economy in Africa with numerous primary and secondary sources of aerosols, only few studies have been published on aerosol optical properties. In this study, aerosol optical properties, which include scattering and absorption coefficients, single-scattering albedo and Ångström exponent, are investigated based on in situ measurements conducted from September 2011 to November 2016 at the Welgegund measurement station – a regional background site situated in the interior of South Africa – with a multi-angle absorption photometer and a three wavelength light scattering nephelometer. The aerosol optical measurements conducted at Welgegund can be considered the most comprehensive in South Africa. The seasonal and diurnal trends of aerosol optical properties will be presented, which will also be related to possible sources of these species. It is foreseen that this study will make a significant contribution to improving the understanding of aerosol optical properties in South Africa and its associated impacts on climate change in this region.