



Annual changes of aerosol optical depth and Ångström exponent over Spitsbergen

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The Arctic region is especially sensitive to climate change and its climate is modulated, in part, by atmospheric aerosols that affect the distribution of radiative energy passing through the atmosphere. We present the annual changes of two major, climate related aerosol optical parameters measured at three Spitsbergen locations over a period between 2000 and 2012. These stations include Hornsund in the south of the island, Longyearbyen in the center of the island and Ny-Alesund, in the north. We discuss the changes of aerosol optical depth (AOD) at 500 nm and the Ångström exponent (AE) (440-870 nm) measured with use of different types of sun photometers. For the measurement data we adopted several data quality assurance techniques and the calibration of the instruments was taken into consideration.

Atmospheric aerosols originate from a wide variety of sources in both marine and continental environments and their content varies significantly depending upon the air mass source and history. These species are, in general, poorly accounted for in climate models. The results obtained show that marine source has been a dominating of aerosol sources over Spitsbergen. Some years (2005, 2006, 2008 and 2011) show very high values of AOD due to strong aerosol events such as the Arctic Haze. In general the mean AOD values increase over the period of 2000 and 2012 over Spitsbergen. This may indicate the presence of larger scale of atmospheric pollution in the region.