Geophysical Research Abstracts
Vol. 18, EGU2016-18121-1, 2016
EGU General Assembly 2016

Aerosol absorption coefficient and Equivalent Black Carbon by parallel operation of AE31 and AE33 aethalometers at the Zeppelin station, Ny Ålesund, Svalbard

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Light absorbing carbon in atmospheric aerosol plays a critical role in radiative forcing and climate change. Despite the long term measurements across the Arctic, comparing data obtained by a variety of methods across stations requires caution. A method for extracting the aerosol absorption coefficient from data obtained over the decades by filter based instrument is still under development. An IASOA Aerosol working group has been initiated to address this and other cross-site aerosol comparison opportunities. Continuous ambient measurements of EBC/light attenuation by means of a Magee Sci. AE-31 aethalometer operating at the Zeppelinfjellet station (474 m asl; 78°54'N, 11°53'E), Ny Ålesund, Svalbard, have been available since 2001 (Eleftheriadis et al, 2009), while a new aethalometer model (AE33, Drinovec et al, 2014) has been installed to operate in parallel from the same inlet since June 2015. Measurements are recorded by a Labview routine collecting all available parameters reported by the two instrument via RS232 protocol. Data are reported at 1 and 10 minute intervals as averages for EBC (μg m-3) and aerosol absorption coefficients (Mm-1) by means of routine designed to report Near Real Time NRT data at the EBAS WDCA database (ebas.nilu.no)
Results for the first 6 month period are reported here in an attempt to evaluate comparative performance of the two instruments in terms of their response with respect to the variable aerosol load of light absorbing carbon during the warm and cold seasons found in the high arctic. The application of available conversion schemes for obtaining the absorption coefficient by the two instruments is found to demonstrate a marked difference in their output. During clean periods of low aerosol load (EBC < 30 ng m-3), the two instruments display a better agreement with regression slope for the 880 nm signal between the two at $\sim$ 0.9 compared to a slope at $\sim$ 0.6 during the period of higher absorbing carbon loads (400< EBC<30 ng m-3) A detailed analysis of the variability observed in the wavelength dependence and possible association with air mass origin was also conducted.

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