

Aethalometer multiple scattering correction in an Arctic environment

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In this work, measurements of aerosol optical properties at Zeppelin station, near Alesund, Svalbard are reported. The station is located at 78.907 N° and 11.889 E°, at 474 m above sea level (a.s.l) in the untouched Arctic environment, far away from substantial contamination sources and is therefore an ideal place for monitoring global atmospheric gasses and long-transported contaminants. Spectral absorption properties of atmospheric aerosol are continuously monitored at the station since 1998.

Here we report absorption data from AE-31 and MAAP for the period between July 2015 and December 2017. Observations of the aerosol light absorption at 637 nm from the Multiangle Absorption Photometer (MAAP, Model 5012 Thermo Scientific) were used as reference. The instrument is described in detail in [1].

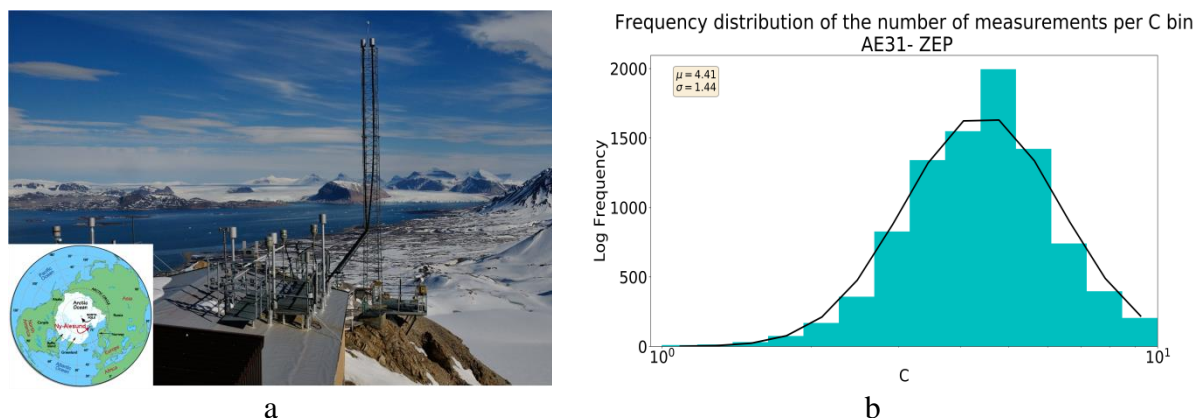


Figure 1. a: Zeppelin Station, b: Lognormal frequency distribution of the multiple scattering correction factor for the AE31.

The multiple scattering correction factor C for the Aethalometer is derived from the equation:
$$C = b_{ATN}(637\text{nm}) / (b_{absref}(637\text{nm}) * R@637\text{nm})$$

b_{ATN} is the aerosol attenuation coefficient measured by the Aethalometer, b_{absref} is the aerosol absorption coefficient measured by the MAAP and R is the filter loading effect correction factor [2].

In Figure 1b we present the histogram of C values for the AE31 aethalometer and its lognormal fit.

References

- [1] Petzold, A., Schonlinner, M., 2004. Multi-angle absorption photometry — a new method for the measurement of aerosol light absorption and atmospheric black carbon. *Journal of Aerosol Science* 35, 421–441.
- [2] Weingartner, E., Saatho_, H., Schnaiter, M., Streit, N., Bitnar, B., Baltensperger, U., 2003. Absorption of light by soot particles: determination of the absorption coefficient by means of aethalometers. *Journal of Aerosol Science* 34, 1445–1463.