(56-240329-A) **Scattering Coefficient and Particle Number Concentration Indicating Particle Size**

A. Virkkula[1], K. Luoma[1], P.P. Aalto[2], T. Nieminen[2], and E. Andrews[3,4]

[1]Finnish Meteorological Institute, Helsinki, Finland; +358 50 572 0250, E-mail: aki.virkkula@fmi.fi
[2]University of Helsinki, Institute for Atmospheric and Earth System Research (INAR)/Physics, Helsinki, Finland
[3]Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado, Boulder, CO 80309
[4]NOAA Global Monitoring Laboratory (GML), Boulder, CO 80305

We present aerosol size-distribution-related information that can be obtained from scattering coefficient (σ_{sp}) and particle number concentration (N) measurements. This is a common, simple measurement setup used at several sites worldwide. We have used such data from several sites around the world to calculate the effective scattering cross section diameter $D_{sca} = ((4/\pi)\sigma_{sp}/N)^{1/2}$. For sites with collocated aerosol size distributions D_{sca} was compared with the arithmetic mean diameter (AMD) and the geometric mean diameter (GMD) obtained from particle number size distributions. As an example some results from the SMEAR II measurement station in Finland are presented below. The correlation coefficient of linear regression of GMD vs Dsca was ~0.7. A promising result is that when the contribution of nucleation mode particles (Fig. 1a) and the sum of nucleation and Aitken mode particles (Fig. 1b) is high D_{sca} is small D_{sca} obviously also depends on the scattering Ångström exponent (SAE) (Fig. 1b). SAE vs D_{sca} relationships, such as those presented in Fig. 2, can be used for estimating the contribution of the various modes to the total particle number concentrations and also the diameters of the modes.

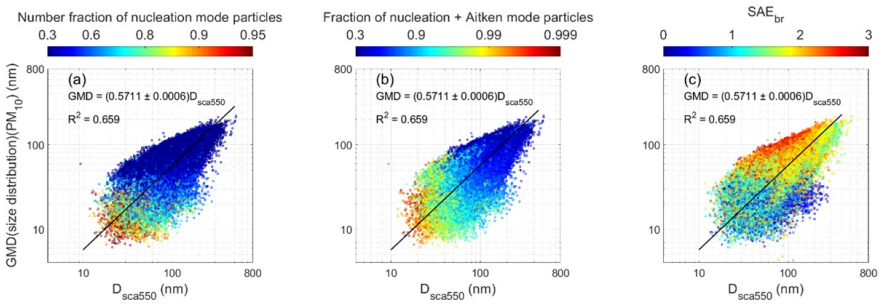

Figure 1. GMD vs. D_{sca} at SMEAR II in Hyytiälä, Finland in 2006 – 2022. Color coding: a) number fraction of nucleation mode particles, b) number fraction of the sum of nucleation and Aitken mode and c) SAE (450/700).

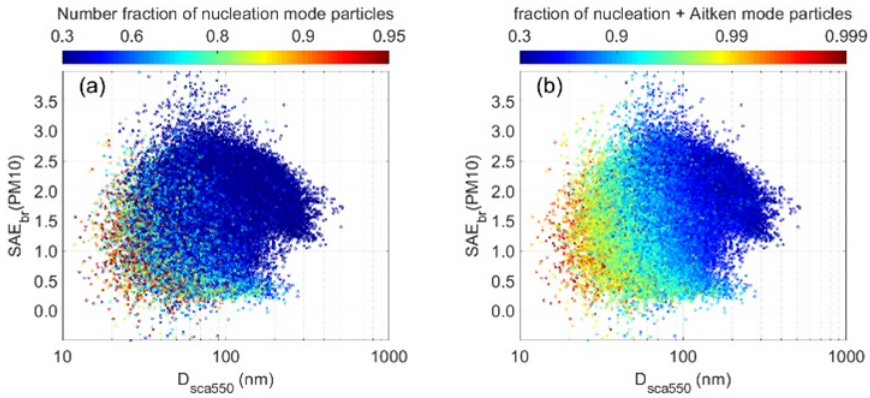

Figure 2. SAE vs D_{sca} at SMEAR II, Finland in 2006 – 2022, color-coded with the number fraction of a) nucleation-mode particles and b) the sum of nucleation and Aitken modes.