

Characterisation of Properties of Atmospheric Aerosol Particles - a combined laboratory and field study

Åsa Jonsson

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Abstract

In recent years, ultrafine particles have become of great concern due to their adverse health effects. Studies have indicated that the negative impact increases with decreasing particle diameter. Smaller particles have a greater tendency to become trapped in the lungs and will penetrate into surface tissues of the lungs more readily than larger particles. However, ultrafine particles are not only harmful. They are for instance essential in the cloud forming process, acting as CCN (Cloud Condensation Nuclei) and also important as participants in various chemical reactions, and as absorbers and scatterers in the atmosphere.

Within the GÖTE - measurement project air masses adjacent to a busy road have been characterised, with a particular emphasis on the contribution of particulate matter from traffic. The characterisation was conducted by continuously measuring concentrations of NO, NO₂ and O₃, as well as particle concentration and size distribution (10-368 nm). The particle concentration and size distribution were obtained by utilizing a DMPS system, where particles are separated depending on their ability to traverse an electric field.

To further analyse the features of particulate matter a tandem-DMPS system was developed. A tandem-DMPS system may be used to examine the water absorbing abilities, i.e. the hygroscopic properties, of particles. The particulate water content have an immense impact on a number of physical and chemical properties such as size, total mass of airborne particles, acidity, light scattering, reactivity, atmospheric lifetime and capability of acting as a cloud condensation nuclei (CCN).

The tandem-DMA system was tested in the laboratory using NaCl particles as reference particles. The hygroscopic properties of these particles were studied and their growth factor, G, i.e. particle diameter at a specific relative humidity divided by initial particle diameter, was determined.

The results from the fieldwork and the initial test of the tandem DMA system are presented and discussed.

-The presentation will be in English

Welcome!