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Aerosol particles are proven to affect climate change, visibility and human health. To gain a better understanding of their origin and behavior, it is necessary to describe their chemical composition and number size distribution with high resolution. In the Czech Republic or any of its neighboring countries except Germany, no results have been published from such measurement yet.

This abstract summarizes the results of two measurement campaigns conducted at a Prague background station Suchdol with focus on data from the compact-Time of Flight-Aerosol Mass Spectrometer (c-ToF-AMS). The c-ToF-AMS provides time resolved chemical composition and size distribution.

In order to obtain reasonable mass concentration measured by the AMS, it is necessary to set correct Collection Efficiency (CE), i.e. the fraction of particles that are detected by the instrument from all particles introduced to the system. The probability of particle detection depends mainly on its phase. The main factors influencing the particle phase in the AMS are relative humidity in the sampling line, acidity/neutralization of the sulfate content, and ammonium nitrate content [1].

It was shown that for most ambient environments it is possible to reach reasonable agreement with other measurements by using the CE of 0.5. In order to determine whether this applies for our measurement we compared AMS data with results from Ion Chromatography (IC). We found that for our summer and winter campaign the appropriate CE's were 0.294 and 0.352, respectively. This result was justified by further comparison of AMS data with measurement from Scanning Mobility Particle Sizer (SMPS, TSI) and Organic Carbon/Elemental Carbon Analyzer (OC/EC field instrument, Sunset).

We also applied the Chemical Dependent Collection Efficiency (CDCE) that accounts for the increased concentration of ammonium nitrate and high acidity of the sulfate content. However, the CDCE correction did not lead to a significant change in the agreement between the AMS and IC results.

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References

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