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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Measuring condensation sink and ion sink of atmospheric aerosols with the electrical low pressure impactor (ELPI)" *by* H. Kuuluvainen et al.

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We thank the anonymous referee for constructive comments and suggestions. Our responses to the comments are listed below.

Specific comments

However, more testing in the both laboratories and fields will be needed to prove the proposed measuring principle.

We made measurements in the laboratory using generated NaCl particles with different particle concentrations and sizes. Variation of concentration had no effect on calibra-

tion, and particle size affected it as the response function predicts. In the field we did not have continuous data over a longer time period. We though checked other shorter periods and the values of calibration factors differed at maximum 10 % from the values we got in May. The chosen ten day data represents the round-year average.

One major concern of using ELPI for proposed measurement is the effort of environmental factors such as the relative humidity and temperature on the ELPI performance. Since ELPI electrically charges particles by ions produced in corona discharge, working ions may vary as the environmental factors change. The working ions may also vary with the gas composition (with the inclusion of trace gases) of sampled particle stream. How the above-mentioned factors influence the ELPI performance remains undetermined.

The ion properties are known to have a distribution of different mobility values, depending on the chemical composition of air, including humidity and tracer amounts of various vapours (e.g. Eisele and Tanner, 1990). The properties of the ions are determined by the ion-molecule reactions and are not much dependent on the ionization process. Although the ions in the ELPI charger are less aged than those in the atmosphere, we believe their properties are already dominated by the same ion-molecule reactions. Considering the effect of the environmental factors on the measurements, both the ELPI and the DMPS measured in the same conditions. Unfortunately our description of the measurement setup was rather incomplete. We added a paragraph to the section ”Measurements” to describe, how these environmental factors stayed stable in the measurements. The sample air was dried before both the ELPI and the DMPS and both instruments were at room temperature.

References

Eisele, F.L., and Tanner, D.J. (1990) Identification of ions in continental air. *Journal of Geophysical Research* 95, 20539-20550.

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Interactive Comment