

## ***Interactive comment on “Identification and classification of the formation of intermediate ions measured in boreal forest” by A. Hirsikko et al.***

**A. Hirsikko et al.**

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The authors thank referee 1 for the comments.

We agree with the referee that the classification of particle formation by visual method from surface plots may influence on the results, which can turn out to be different based on different groups. However, currently we have no other method for the particle formation classification. We have been developing a computer based program. The development of such a program is not easy task, and so far we have obtained more reliable results based on the visual method. We can expect the computer based analysis program to be ready after year or two.

The referee pointed out that we do not present quantitative results which enable us to discuss about the importance of positive and negative ions in ion-induced nucleation.

The purpose of this manuscript was to introduce what kind of changes in ion size distributions we have observed with the ion spectrometers. The classification of particle formation events is a first step in more detailed study of particle formation. Laakso et al. (2006, see manuscript) have introduced our first experimental results on importance of ions and charge polarity on particle formation in Hyytiälä for a short period (couple of months). Longer dataset is currently under more detailed study to find out the importance of ion-induced nucleation and charge polarity on particle formation in Hyytiälä. Results are expected to be published in near future.

Editorial comments:

Referee: Also, the approach that was used to establish the relationship between mobility and size should be explained.

Answer: The relationship between ion mobility and diameter is introduced and discussed in detail by Tammet (1995, see manuscript), whose algorithm with the corrections described by Tammet (1998) we have utilised.

Referee: What is a “plain type-differential mobility analyzer” (p. 9191)?

Answer: The mobility analysers of the BSMA consist of two plain-type aspiration capacitors instead of cylindrical aspiration capacitors often used in ion spectrometers. The differential means that the mobility analyser of the BSMA has divided air flow in the inlet (sample and sheath air) and one narrow collector electrode connected to electrometrical amplifier to collect ions and measure the ion current. In general, the dependence of the electrometer signal from the ion mobility (the transfer function) has approximately triangular shape smoothed a little by the diffusion of air ions. The BSMA has the second order differential characteristics similar to the DMPS. The continuously changing voltage is applied to the central electrode of the mobility analyser to get the whole spectrum.

Referee: p. 9193: what is meant by “(later shortly events)”?

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Answer: Particle formation event can be called just an event later in the text. Better expression for "later shortly events" will be used in the final paper.

Referee: Tables 2, 3, 4: Data are given by calendar year. However the three-year data set extends from April through March each year. Wouldn't the summary statistics be more meaningful if they were presented for the three April through March years? This would eliminate, for example, the unrepresentative results for 2006 shown in Table 4.

Answer: Referee is right. Probably we present these results as proposed by referee.

We will include corrections based on referee's technical comments and suggestions to improve the manuscript when making corrections in the final version for ACP.

#### References

Tammet, H.: Reduction of air ion mobility to standard conditions, *J. Geophys. Res.*, 103, 13933-13937, 1998.

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Interactive comment on *Atmos. Chem. Phys. Discuss.*, 6, 9187, 2006.

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