

Interactive comment on “Why formation rate of 3 nm particles depends linearly on sulphuric acid concentration?” by M. Kulmala et al.

M. Kulmala et al.

Received and published: 14 November 2005

We thank the anonymous referee for his/her comments. We will take the comments into account to improve the quality of our MS. The sulphuric acid measurements are performed by MPI/Heidelberg, Germany and described in more detail by Fiedler et al. (ACP, 5, 1773-1785, 2005). The aerosol size distributions are measured using DMPS technique and performed by University of Helsinki. This is permanent part of SMEAR II activity, and has been described in more details e.g. by Aalto et al. (Tellus, 53B, 344-358, 2001). The corresponding references will be added in the MS.

The measured period will be (and actually is) investigated in detail in a follow-up MS by Sihto, Kulmala et al., which will be submitted to ACPD within a month. As answers to questions raised by the referee, we can say that there are several days where the data

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can be explained by activation theory and other days when the data can be explained by the kinetic theory. Using the same time shift works surprisingly nicely for number concentration, and this finding was the starting point for our study. Actually one can see from several observations, that the growth rate is almost constant during the day, which supports the idea for constant time shift. However, the time shift is different (also growth rate is) for different days. In the follow-up paper we will clarify this more, and also add some clarification in the present MS.

The basic new finding in the present paper is that we can give one explanation why the slope (log sulphuric acid concentration vs log formation rate of new particles) is below two as observed in several atmospheric conditions. Therefore we have focused on the activation theory. The use of the activation theory in this concept, according to our knowledge, is new. Thus we believe that a detailed paper on theory is worth a paper of its own, and the detailed analysis of all data will follow later, including discussion on those days in which the slope approaches 2. On the other hand - according to the activation theory - the slope could be also bigger, if in activating cluster there is more than sulphuric acid molecules than one. We will explain this in more details in our revised MS.

Interactive comment on Atmos. Chem. Phys. Discuss., 5, 11277, 2005.

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