

Interactive comment on “Initial steps of aerosol growth” by M. Kulmala et al.

M. Kulmala et al.

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Response to referees' comments on "Initial Steps of Aerosol Growth"

by Markku Kulmala et al.

First of all we would like to thank both referees on their constructive comments.

Referee 1:

We are very happy on very positive comments made by referee 1.

Referee 2:

We agree with the general comments made by the referee 2. On his/her specific comments: 1) This is a very important and very good comment. As referee 2 said it is very puzzling why the growth is pretty constant almost all around the world (see Kul-

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mala et al., 2004a, in the present MS). However the contribution of direct sulphuric acid condensation seems to vary between 5-10 % (rural background area, like Hyytiälä) to 30-100% (urban areas with high SO₂ concentration). In later conditions also the number concentration of nucleation mode aerosol particles and sometimes also clusters is high enough that coagulation processes described by Stolzenburg et al, at the recent AAAR conference would be important. However, after very preliminary calculations we can conclude that the mechanism are not significant for the cluster growth in our boreal forest site. In any case - in future - we will perform more detailed calculations in order to be able to verify how important intramodal and extramodal nucleation is for 1-3 nm clusters.

2) We agree with the referee. However, the analysis shown in figure 4 and discussion in section 4 will show the effects in details.

3) The fitting procedure is explained in details by Lehtinen and Kulmala (2003). It is very important to point out the uncertainties related to the determination of the growth. We also agree that it is very difficult to determine the growth rate for particles smaller than 5 nm. Actually we started from 1.5 nm. The uncertainty in the growth rate is typically factor of 2 at small sizes (1.5-3 nm). We are going to add corresponding text in the MS.

4) In figure 3 all data is presented, and one of the results shown is the uncertainty related to growth analysis. Therefore we would like to keep the figure as it is.

5) We agree that there are some days when ion-mediated condensation is possible, and we will add some sentences on that in the revised MS.

We have made all technical corrections suggested by the referee 2.

Interactive comment on Atmos. Chem. Phys. Discuss., 4, 5433, 2004.

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