Atmos. Chem. Phys. Discuss., 2, S1056–S1058, 2002
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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Particle formation at a continental background site: comparison of model results with observations" *by* U.Uhrner et al.

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Author's response to anonymous referee 2 on behalf of all co-authors.

First, we thank the anonymous referee 2 for his comments.

GENERAL COMMENTS:

The authors have decided to apply the binary system after careful consideration of the advantages and disadvantages of using a ternary nucleation parametrisation.

Important disadvantages are:

- It is reported that the ternary nucleation scheme generates large numbers of

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nuclei below the detectable minimum size. Kulmala et al.(2000) stated that in order to grow these particles into the detectable size range, other yet unidentified vapours "$X_{i(g)}$" then are required.

- As NH_3 concentrations were not measured during HAFEX, usage of a ternary nucleation parametrisation would imply the assumption of particular NH_3 concentations, i.e. another additional and undesired free parameter.
- To make nucleation and growth consistent, the effects of NH_3 and substances "$X_{i(g)}$" on particle growth have to be accounted for.
- At the time when the calculations were performed, no validated parametrisation for ternary nucleation was available.

All this together with the author's intention to keep the number of adjustable model parameters small (here essentially 1) and to relate this parameter to actual meteorological conditions, led to the decision to use a binary system. Introducing additional free parameters as outlined above would spoil that concept. Please note that possible influences of NH_3 are considered in the correction factor for the nucleation rate and that the main outcome of this work has been that for meteorological conditions characterised by strong vertical mixing, the correction factor acquires un-physically high values.

The authors clearly emphasised the above reasoning in the introduction! In addition the short coming "lack of ammonia measurements" was mentioned in the conclusions.

SPECIFIC COMMENT:

The authors are aware of this inconsistency. However, we consider it as unimportant with regard to the half quantitative nature of the results gained during the presented

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study.

References:

Kulmala, M., Pirjola, L., and Mäkelä, J. M., Stable sulphate clusters as a source of new atmospheric particles, , Vol. 404, 66–69, 2000.

Interactive comment on Atmos. Chem. Phys. Discuss., 2, 2413, 2002.