

Interactive comment on “Multicomponent aerosol dynamics model UHMA: model development and validation” by H. Korhonen et al.

Anonymous Referee #2

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General comments:

This manuscript introduces the multicomponent aerosol dynamics model UHMA developed to study the dynamics of tropospheric aerosol particles. The model features 3 different sectional techniques to represent the particle size distribution and it accounts for the important aerosol dynamical processes. The manuscript is original, more or less clearly written (see below) and well organised. It should be published in Atmospheric Chemistry and Physics after some modifications.

One additional remark: The authors should comment and make more clear what the actual assumptions are, regarding the condensation of organic vapours especially in the context of 'nano-Koehler' (e.g. activities, surface tensions) and growth law (e.g. diffusion coefficients).

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Specific:

page 477, lines 16-17: under study → investigated

page 478, lines 3: ... assumptions do not, however, hold ... → ... assumptions do not hold ...

page 478, line 9: ... that all vapour molecules ... → ... that the vapour molecules ...

page 478 - 479: It should be made more clear which species are assumed to be in equilibrium (water and NH_3 ?), which species are treated dynamically (all others ?) and how the equilibria are determined (calculation, parameterization, ...). The same holds true for vapour pressures at the particle surface. Maybe a table would be useful.

page 481, line 1: ..., e.g., in upper ... → ..., e.g., in the upper ...

page 482: The description of how coagulation is treated (lines 13 - 22) is confusing and should be re-written. The authors may decide to write a technical model description in a separate paper and leave out any technical details here.

page 483, line 1: the argumentation should be reversed, i.e. the deposition velocity has a minimum in the accumulation mode size range and therefore both mechanisms cease to be effective.

page 483, line 9 -10: How was the model extrapolated ?

page 484, line 1: Nguyen and Dabdub → Nguyen and Dabdub ?

page 486, line 9: It should be mentioned why these additional vapours should/could condense onto larger pre-existing particles only.

page 486, line 18: ... corresponding to typical size distribution ... → ... corresponding to a typical size distribution ...

page 486, line 19: ... prior to new particle ... → ... prior to a new particle ...

page 486, line 25: ... particle concentration ... → ... particle number concentration ...

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page 486, lines 24 - ... In this context, an additional plot similar to figure 1 is highly desirable, showing the calculated particle surface or volume concentration, as good comparison regarding number does not necessarily imply good comparison for other moments.

page 488, line 19: ... is not, however, available. -> ... is not available.

page 489, line 1 - It should at least be mentioned how the other models performed.

Again time series of total particle number and surface or volume concentrations would be desirable.

Interactive comment on Atmos. Chem. Phys. Discuss., 4, 471, 2004.

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