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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Semi-empirical parameterization of size-dependent atmospheric nanoparticle growth in continental environments" *by* S. A. K. Häkkinen et al.

Anonymous Referee #2

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The manuscript describes work to explore the growth of nanoparticles in the atmosphere. Observations of nanoparticle growth from air ion number size distributions are used to evaluate different scenarios of particle growth. The study confirms a large contribution of secondary organics to nanoparticle growth and presents evidence for a yet unknown vapour that contributes to "background" particle growth rates. The paper will be of interest to both the particle formation and secondary organic aerosol communities. It is within scope of ACP and I suggest publication after the following minor comments have been dealt with.

Minor Comments

One of the intriguing findings of this paper is the possible existence of an organic compound with little seasonal cycle in its contribution to particle growth rates. I think a little additional discussion (e.g., on P8512 or elsewhere) would be useful on 1) uncertainty in sulfuric acid concentrations and the relevance for this background organic; 2) Uncertainty in GR1.5-3. You already mention that uncertainty in GR1.5-3 is likely greater than uncertainty in GR for larger particles. Is there also likely to be a larger uncertainty in GR1.5-3 in winter (when there are fewer particle formation events to constrain GR) than in spring and summer?

P8494. What about isoprene? Maybe worth mentioning here. I know that you refer to isoprene later in the MS.

P8496, L19. Is there sensitivity to your assumed particle diameters that represent each size class? It appears that you selected the mid-point in dp space of each size class. Since Itot depends on dp^2 how different would your calculations be if you selected the midpoint in dp^2 space (e.g., 15 nm instead of 14 nm for the 7-20 nm size class)?

P8498, L1-8. Give the exact locations (lat/lon) of the sites.

P8499, L18. The treatment of monoterpenes in GLOMAP is described in Spracklen et al. (2006).

P8502. How do the GLOMAP monoterpene concentrations compare to the monoterpene concentrations observed by the PTR-MS? This comparison would be useful since it is less influenced (compared to SORGMT) by ambient O3 and OH concentrations or uncertainties in kinetics.

P8509, L1-3. What about tropical forest environments?

Figure 2. I found it difficult to work out which of the lines refer to the different assumptions. If possible make this clearer in the text somewhere (e.g., on P8500). Some issues with referencing (e.g., P8493, L3: "X. Zhang et al.,")

References

Spracklen, D.V., Carslaw, K.S., Kulmala, M., Kerminen, V-M., Mann, G.W., Sihto, S-L., The contribution of boundary layer nucleation events to total particle concentrations on regional and global scales, Atmospheric Chemistry and Physics, Vol. 6, 5631-5648, 2006.

Interactive comment on Atmos. Chem. Phys. Discuss., 13, 8489, 2013.