

Second revision:

Authors' response to reviewers' comments for "Cloud droplet number enhancement from co-condensing NH₃, HNO₃, and organic vapours: boreal case study" by Yu Wang, Beiping Luo, Judith Kleinheins, Gang I. Chen, Liine Heikkinen, and Claudia Marcolli

Comments of Reviewer 1:

My original comment "Why are only organics considered? Semivolatile inorganics are also likely to evaporate and should be addressed in a similar manner." may have been misunderstood. What I intended to refer to was the initialization of the gas phase in the simulations. Since there were no gas-phase observations of HNO₃ and NH₃ available during the campaign, I was wondering why values from previous years were used, rather than applying the same approach as was done for the organic species. Are the inlets in Makkonen et al (2014) for gas phase concentrations similar to the ones used in aerosol data in the present manuscript? I understand that the main focus of the manuscript is on the co-condensation of organics; however, the role of inorganics remains highly uncertain, and this uncertainty can also affect the inferred relative contributions.

Hyytiälä is still misspelled on line 139.

Responses:

This study was intended to explore factors that influence – for a realistic environmental situation – co-condensation of organics rather than to reproduce exactly the situation in Hyytiälä during the autumn of 2018. As such, it is between a case study and a sensitivity study. This was the main reason why we decided to use the values measured during 2010 instead of simulating the evaporation of HNO₃ and NH₃ during sampling. Moreover, the deduction of the total concentration (gas and condensed phase) of organic and inorganic species from the condensed-phase concentrations only would be very hard to bring to convergence as many interdependent species are involved, whose total concentration must be varied until the simulated condensed-phase concentrations match the measurements.

We have corrected the typo in Hyytiälä on line 139.