

## ***Interactive comment on “Cloud condensation nuclei production associated with atmospheric nucleation: a synthesis based on existing literature and new results” by V.-M. Kerminen et al.***

### **Anonymous Referee #1**

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This paper reviews current understanding of the role of atmospheric new particle formation (nucleation) in the creation of cloud condensation nuclei. The paper is a fairly comprehensive review of relevant work and will be a useful resource for the community. The paper is clearly written. I recommend publication after the following minor details are dealt with.

### **Minor Comments**

P22143, L16-L18. It is maybe worth being more careful with definitions of primary and secondary particles here. Some of the “primary particles” discussed in Adams and Seinfeld (2003) are largely the result of nucleation at small spatial scales (e.g.

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within anthropogenic pollution plumes). You refer to this issue of definition later in the manuscript (P22161, L2 and P22168, L2-5). But I think it might be worth clarifying here.

P22162. Is there a reason that you only review regional model simulations, and do not review global model simulations? I think such a review would be useful here. However, the manuscript is already extensive and I leave it up to the authors as to whether they would like to include.

P22165, L6-L16. Please clarify whether these are all aerosol radiative forcings (present day compared to pre-industrial).

P22617. It might be worth noting studies such as Reddington et al. (2011) who used non-volatile aerosol number as an indication of primary particles.

P22169, L9-L11. I missed your review of the literature on nucleation and direct aerosol effect? Please add a short summary of these studies.

P22141, L20. Change “the future” to “future”

P22153, L25. Change “forests” to “forest”

### **References**

Reddington, C. L., Carslaw, K. S., Spracklen, D. V., Frontoso, M. G., Collins, L., Merikanto, J., Minikin, A., Hamburger, T., Coe, H., Kulmala, M., Aalto, P., Flentje, H., Plass-Dülmer, C., Birmili, W., Wiedensohler, A., Wehner, B., Tuch, T., Sonntag, A., O’Dowd, C. D., Jennings, S. G., Dupuy, R., Baltensperger, U., Weingartner, E., Hansson, H.-C., Tunved, P., Laj, P., Sellegri, K., Boulon, J., Putaud, J.-P., Gruening, C., Swietlicki, E., Roldin, P., Henzing, J. S., Moerman, M., Mihalopoulos, N., Kouvarakis, G., Ždímal, V., Zíková, N., Marinoni, A., Bonasoni, P., and Duchi, R.: Primary versus secondary contributions to particle number concentrations in the European boundary layer, *Atmos. Chem. Phys.*, 11, 12007-12036, doi:10.5194/acp-11-12007-2011, 2011.

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