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Interactive comment on “Nanoparticles in boreal forest and coastal environment: a comparison of observations and implications of the nucleation mechanism” by K. Lehtipalo et al.

Anonymous Referee #2

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The manuscript 'Nanoparticles in boreal forest and coastal environment...' by K. Lehtipalo et al. presents important original results for the understanding of the crucial step in the formation of new particles. The text is concise and clear, the results topical and the methods are state-of-the-art. The authors further provide a comprehensive reference overview of previous relevant work. Thus, the manuscript merits publication without necessity of revisions. Few questions/remarks may be worth to be considered in the final version.

Driving nucleation mechanisms and limiting processes depend on the specific environmental conditions and neither theoretical kinetical nor laboratory-studies are at present

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capable to provide an integrated view of all available observations. Thus this study constitutes a significant increment in our understanding of the complex nature of nucleation processes.

Remarks/Questions:

p. 26630, l 3: ... to incorporate...

p. 26630, l 7: ... nucleation on 1.2 nm clusters...

p. 26632, l 28: Isn't this somewhat in between an optical and a mobility diameter which is determined by the PH-CPC? Spilä et al found the inversion of PH-CPC data to depend on the particle composition. Could this dependence account for a significant part of the missing nano-CN's at Mace Head? I admit however, that this seems unlikely and therefore may have no severe implications for the conclusions drawn in this study (and you shortly point to this on p. 26637, l 24 ff).

p. 26633, l 19: ... calculated with the HYSPLIT...

p. 26633, l 25ff: A brief motivation for the application (ion- vs. neutral particle activation) of eq. 1 would facilitate to keep track at this point.

p. 26635, l 21: ...On a few days nighttime maxima...

p. 26635, l 25: Are there estimates for the relative contributions of radon-induced and cosmic ray-induced ion concentrations. Can the latter at some point dominate?

p. 26636: l 17ff: Can it be excluded that vapour depletion leads to significant underestimation or even miss of extreme particle bursts?

Figures:

Fig. 3: Reduce the symbol size for PH-CPC

Fig 1+4: In both figures there occurs an obvious peak in the nano-CN diurnal variation around mid-night. Can this be an averaging artefact?

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Fig 6: If you can't explain the sharp drop in particle concentration around 13:00 LT, it might be better to exclude or mask these data in the plot.

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9, C12376–C12378,
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