

Interactive comment on “Vertical profiles of sub-3 nm particles over the boreal forest” by Katri Leino et al.

Summary:

This work demonstrates the Vertical profiles of sub-3 nm particles over the boreal forest. The data is valuable and the manuscript fits well to the scope of ACP. I recommend it to be published after the following comments have been adequately addressed.

Comments:

1. Line 16-17: The number of flight/vertical profiles is confused. There are only 13 morning flight profiles shown in Table 1, even though both the ascent and the descent flights are counted, how could be 27 morning vertical profiles in total? Please check your data.
2. Line 73-78: It seems that the vertical profiles of NPF/aerosol number size distribution around SMEAR II station have been reported (Väänänen et al., 2016), although the paper is still under discussion. I would suggest the authors to compare with the previous results.
3. Line 170-173: Does this mean the constant factor is used to correct diffusional loss for a certain size range (1.5-3 nm or 3-10 nm)? The diffusional loss for small particles should be size dependence. This method will introduce the additional uncertainty. Please clarify.
4. Line 183-185: Please explain more about the method to estimate the BLH. Is there any other vertical measurement, such as lidar, can be used?
5. Line 202: how about the pressure effect of UCPC?
6. Line 236-238: Here I would suggest the vertical profiles of condensation sink should be calculated with SMPS data, and then compared with that of ground measurements. In previous work (Zha et al., 2017), the vertical measurements were only conducted at ~36 m and ~1.5 m above ground. This height is too low to support your conclusion.
7. Line 271-273: how could explain the vertical profiles of 1.5-3 nm particles under BLH for undefined day in Fig.3? Why it is different from the NPF day?
8. Line 316-318: Please provide the precise value to support your statement.