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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Airborne measurements of nucleation mode particles II: boreal forest nucleation events" *by* C. D. O'Dowd et al.

C. D. O'Dowd et al.

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General comment: The authors should bring up the potential uncertainties in their measurements and to explain shortly how the quality control of the measurement data was taken care off.

Response: quality control and data sampling is handled in Part I of the manuscript:

O’Dowd, C.D, Y. J. Yoon, W. Junkerman, P. P. Aalto, and H. Lihavainen, Airborne Measurements of Nucleation Mode Particles I: Coastal Atlantic Nucleation Events. Atmos. Chem. Phys., 7, 1491–1501, 2007

And a summary of particle losses is now described in the experimental section

It remains unclear for the reader how the different layers (boundary layer, surface layer, residual layer, free troposphere) have been defined and how they have been distin-

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guished from each other based on available data (the profiles of the potential temperature and relative humidity). More information with regard of this should be given in the manuscript.

Response: this is better clarified in the text as follows: “The layer structure is not so defined for this case and later cases presented, nevertheless, different layers or stratification is identified by a combination of both potential temperature and relative humidity inversions – that is notable increases in potential temperature and notable reductions in relative humidity, both promoting stratification.”

I feel that most of the readers find the conserved-variable mixing diagram analysis difficult to understand, especially as one of the pictures (Figure 15 b) seems to be replaced with a wrong one.

Response: This section is removed now.

Page 2823, lines 10-16: I do not agree with the statement that there is consensus on the mechanisms of nucleation in the boundary layer. In fact, there seems to be a continuous debate on this issue and even the same research groups are changing their view frequently. I suggest that the authors modify this paragraph to make it compatible with current state of affairs.

Response – Rephrased to ”While the current consensus (Kulmala et al., 2004) on the formation mechanism is that nucleation is most likely driven by sulphuric acid, rather than organic vapours, it is thought that the organic vapours are required to grow the nucleated clusters into quasi-stable aerosol particles larger than 3 nm (O’Dowd et al., 2002), and even further to sizes larger than 100 nm where they can contribute to direct and indirect radiative effects.”

Page 2824, line 16: "7 times dilution flow" sounds a little bit odd to me.

Response: This section is corrected.

Page 2825 (line 11): It is stated that there was 4 strong nucleation events between 24

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and 30 March 2003, while I see 5 when looking at Figure 2. The authors consider 3 cases in this manuscript. What are the reasons for these differences?

Response: This section is corrected. Flights only occurred during these three events due to available flying hours.

The legends P.T. and R.H should be explained in the figure texts, even though these quantities are probably evident for most of the readers.

Response: Done.

In right panel of Figure 7, the legend should probably read "3025-3010m". As a matter of fact, to be consistent with the text, one should use the notation 3010(m). There are still quite a few typos in the text that should be corrected.

Response: Done.

Interactive comment on Atmos. Chem. Phys. Discuss., 8, 2821, 2008.