

Interactive comment on “Aerosol cloud activation in summer and winter at puy-de-Dôme high altitude site in France” by E. Asmi et al.

Anonymous Referee #1

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General comments

Asmi et al present size resolved CCN measurements from the Puy-de-Dôme site in France, and use these data to examine aerosol hygroscopicity related to seasonality, air mass origin and organic fractions. The work is well presented and clear. It is for the most part scientifically sound, however I have a few questions regarding the analysis of distinct air masses and back trajectories that need clarifying, as listed in the specific comments below. I believe the manuscript is suitable for publication in Atmospheric Chemistry and Physics after the authors address a few minor comments below.

Specific comments

Page 23046, line 20: Could the authors explain in more detail how these new errors

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were derived?

Section 2.1.3, 1st paragraph: Is it possible to quantify this error – what sizes are significantly affected, at what wind speeds, and by how much are the concentrations / size distributions underestimated?

Page 23052, lines 14 – 16: The authors seem to be talking about a “persistent air mass” during the first part of the summer experiment, but from figure 2, it seems this period of increasing organic fraction is characterised by three different air masses. Could the authors please clarify this?

Page 23054, lines 1 – 4: In this statement, the authors are not taking into account possible seasonal variation. How do the CCN to CN ratios compare between summer and winter in the same air mass (marine or continental). There seems to be enough data to be able to answer this question in a quantifiable way, and the authors could use this to further justify their statement.

Page 23054, lines 6 – 7: The size distributions on their own don’t fully explain this – composition also has a role as the authors themselves stated in the previous paragraph. Please clarify this statement.

Page 23054, lines 25 – 28: The authors say that the summer average kappa “fits well to suggested global average continental aerosol kappa of around 0.3” after stating on the same page (see above) that measurements in summer “represent mainly marine aerosol”. Again, please clarify.

Page 23055, line 13: Please explain the choice of grid size and why they are different between summer and winter.

Page 23055, lines 14 – 20: Please explain the choice of weighting in more detail. Are these weightings realistic?

Page 23055, lines 15 – 19: This is a very good point and deserves a little more exploration. In particular how does it affect the conclusions on CCN to CN ratios (top of pg

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23054), kappa (section 3.3) and organic fractions in marine air? It would be useful to have a paragraph with a general discussion on the effect of the mountain on mixing of air masses along with specific mention of the issue when discussing characteristics of marine air mass. The limitations of back trajectory analysis should be noted.

Page 23061, lines 12 – 14: It is no surprise that removing outliers improves a fit, but you cannot simply remove points just to improve a fit. You need to be able to justify removing these points. Unless the authors can explain why they are outliers and why they can be removed, I would recommend removing this sentence.

Technical corrections

Page 23041, line 9: change “at large” to “largely”

Page 23043, line 3: change “contrains” to “constraints”

Page 23047, line 6: change “Similarly” to “Similarly”

Page 23048, line 1: “polystyrene” is one word

Page 23049, line 3: change “in which” to “to what”

Page 23049, line 3: change “asterix” to “asterisk”

Figure 4 caption: change “in within” to “within which”

Figures 6 – 10: It might be useful to mark the measurement location on these maps.

Figures 7 and 8: These appear to be mixed up. Please swap them to match the text.

Interactive comment on Atmos. Chem. Phys. Discuss., 12, 23039, 2012.