

Interactive comment on “Investigation of nucleation events vertical extent: a long term study at two different altitude sites” by J. Boulon et al.

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The authors thank referee #2 for his comments and remarks which contribute to improve and clarify the present manuscript.

Referee's comment (RC): In introduction Komppula et al 2003, should be mentioned.

Author's reply (AR): We add the paper from Komppula and coworkers (2003) in the introduction.

RC: Measurement sites; the puy de Dôme site is quite extensively described but C2200

from Opme site very little information is give. More extensively description also instrumentation of Opme site should be given.

AR: Actually, the instrumentation of the Opme site available for this study is quite limited. It is composed by an AIS/NAIS (depending on the considered period) and basic meteorological measurements (temperature, pressure and relative humidity measurements). This is now clearly mentioned in the manuscript.

RC:How were losses in different wind condition calculated, reference.

AR: Those calculation were made by Venzac et al., 2007. Here we just report those results, the reference was added in the text.

RC: Nucleation events, page 8256, from line 25; average growth rates are given with quite accuracy. Is there any seasonal variation in growth rates.

AR: We computed the growth rate seasonal variation and no significant pattern could be pointed out. This result is now mentioned in the text.

RC: 4.1.1 the role of sulfuric acid page 8258, line 14; year should be 2009.

AR: Yes, you're right, this error in my bibliography has been corrected.

RC: 4.1.2 air mass backtrajectories influence Air mass are stated to come from Africa, western or eastern Europe, is there some definition like percentrages how much air mass spend in certain part. How about vertical transportation, is there differences ?

AR: We did not compute the time an air mass spend in a specific area. For the classification we use in this paper, we only consider the geographical coordinate of the three days prior air mass location. The vertical transportation was also computed using Hysplit model and 77.7% of the time air masses are located between 0 and 1500 m a.s.l. and 22.1% of the time above 1500 m but below 2500 m a.s.l.. No difference was found between the origin and the vertical transportation of air masses. This is now

mentioned in the text. However, at the measurement sites scale, Hysplit altitude output are not relevant since it uses 1° resolution meteorological data as an input variable so the vertical motion due to local topographical effect could not be taken into account.

RC: 5.1 The atmospheric composition Was CS calculated from DMPS data? Both sites ?

AR: The CS was calculated from SMPS data only for the PdD site since Opme is not equipped by a SMPS or DMPS.

RC: 5.2 O cases:... When there were no event at puy de Dôme it was inside cloud or vicinity of clouds. Was there clear sky at Opme site? Could this be also one reason, of course added to others ?

AR: Indeed, during O events, the Opme site is not in in-cloud conditions (cloud are usually located at or nearby the PdD summit). This is now made clearer in the text.

RC: 6. Conclusions Page 8269 from line 20; Between different cases little is said about differences in CS, formation and growth rates. This could be analyzed more extensively.

AR: We added a more detailed description of the CS, formation and growth rates results in the conclusion.

RC: References, I did not find Kerminen et al 2010 in the text.

AR: The work of Kerminen and coworkers (2010) is cited in the table 1 caption (formation rate parametrizations).

References used in the response:

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Kerminen, V.-M., Petäjä, T., Manninen, H. E., Paasonen, P., Nieminen, T., Sipilä, M., Junninen, H., Ehn, M., Gagné, S., Laakso, L., Riipinen, I., Vehkamäki, H., Kurten, T., Ortega, I. K., Dal Maso, M., Brus, D., Hyvärinen, A., Lihavainen, H., Leppä, J., Lehtinen, K. E. J., Mirme, A., Mirme, S., Hörrak, U., Berndt, T., Stratmann, F., Birmili, W., Wiedensohler, A., Metzger, A., Dommen, J., Baltensperger, U., Kiendler-Scharr, A., Mentel, T. F., Wildt, J., Winkler, P. M., Wagner, P. E., Petzold, A., Minikin, A., Plass-Dülmer, C., Pöschl, U., Laaksonen, A. and Kulmala, M.: Atmospheric nucleation: highlights of the EUCAARI project and future directions, *Atmos. Chem. Phys.*, 10, 10829–10848, doi:10.5194/acp-10-10829-2010, 2010.

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