

Interactive comment on “Intercomparison of four different cascade impactors for fine and ultrafine particle sampling in two European locations” by A. S. Fonseca et al.

Anonymous Referee #2

Received and published: 26 February 2016

General comments: The authors have conducted size resolved aerosol sampling by four cascade impactors at two European site and size distributions were compared by different type of impactors. The authors found that the best agreement regarding mass size distributions was obtained with the nano-BLPI, independently of the aerosol load and aerosol chemical composition by taking the BLPI as an internal reference. The authors also showed the size distribution of ionic components, and concentration of nitrate was considerable reducing in NanoMOUDI compare to BLPI and nano-BLPI for outdoor sample in winter campaign in Prague. The authors attribute this difference is due to dissociation of ammonium nitrate by internal rotating mechanism of NanoMOUDI which heat the impactor causing up. The reviewer think the topic of collection of ultrafine par-

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title is important from the aspect of health effect issues of ultrafine particle, however I don't recommend publishing in ACP by following reasons. Although the authors speculate the cause of difference in size distribution obtained by different cascade impactors, the reviewer thought the evidence is too poor to accept the author's speculation. For example, the author describe that the rotating plate generates heat and that in turn rising temperature inside the NanoMOUDI. The reviewer wonder is it really? and if so, want to know how much temperature rise in this study. Further, the reviewer want to know how this increase temperature influence on size distributions and dissociation of ammonium nitrate in quantitatively, and to check the results of measurement. At least, the authors must show the temperature data inside NanoMOUDI. The second, the reviewer did not feel what is the implication of this study. What is recommendation way to collect ultrafine particle? Please clarify this.

Specific Comments: Page 6, Lines 15 day L min⁻¹ What means “L”? Please remove “L”.

Page 7, Lines 12-13 PTFE filters PET foils are used in nanoBLPI as collection media. Some studies show the sampling media also influence of size distribution even if using the same impactor. Do you check the effect of sampling media on size distribution?

Page 8, Lines 3-6 The NanoMoudi, in order to protect its electrical components, was kept inside an air-conditioned cabin with a temperature continually lower than 20°C and a metal pipe (about 300 cm long) was extended through the roof of the building. The air-condition cabin and metal pipe were only used for NanoMOUDI? How these effect on size distribution? The reviewer expected higher temperature inside the cabin than outside, so it is easy to evaporate semivolatile materials in NanoMOUDI sample and there is a probability of particle deposition loss inside tubing.

Page 10, Lines9-10 All samples were equilibrated for a period of 24 hours before weighing in a temperature and relative humidity controlled room. Please add the average and sd for temperature and relative humidity.

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Table 2 Mean PM14* What mean for *?

Page 12, Lines13 M is Please change to Mi.

Page 13, Lines13 the instrument does not reach such high temperatures Please make clear how much temperature increase.

Page 13, Lines15-16 However, it is important to take into account that some differences in the results could be partially attributed to the differences in the real cut points for the selected size fractions. To prevent such problem, it is better to fit the certain size distribution such as lognormal size distribution.

Page 16, Lines9-11 The higher pressure drop in the stationary impactors (e.g., BLPI) may increase the probability of volatilisation of semi-volatile species during prolonged sampling, Please assess how this pressure drop induces evaporation of semi-volatile species in quantitatively.

Page 18, Lines20-23 Also, the residence time of particles inside the nano-Moudi low pressure stages is longer due to the lower volumetric flow rate in this instrument. All of this could thus explain the mass size distributions from the nano-Moudi being skewed towards smaller particle fractions during the Barcelona and Prague campaigns (Figure 4). Please (rough) estimate how this difference of residence time effect on size distribution.

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