

## ***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.***

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We appreciate the short comment in the interactive discussion by the Reviewer (Dr. T. Hussein) and have now considered his suggestions of improvement.

Comment:

This manuscript presented a comparison between five multi-stage impactors that measure the particle mass size distributions of both fine and coarse particles; each has its own setup with regards to cutoff size, number of stages, and upper limit of particle size. These instruments were tested in two European cities (indoor-outdoor Prague and outdoor Barcelona). This kind of measurement campaigns are important for the

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comment

scientific community in order to understand the performance of several instruments and operation range. Therefore, I support publication in ACP or even in another specialized journal such are "Aerosol Science and Technology" or "Indoor Air". Before I wrote my review I went through the reviewer reports submitted on Feb 13 and Feb 26. Both provided an extensive review with regards to the technical part and scientific parts. In that sense, I will not go in details about the technicalities of the instruments, but I will talk about the clarity of the results and improving it so that my comments will be taken into account in the ACP revised version.

1. Title: The title is focused on the fine aerosols; however, the sampling was conducted for both fine and coarse aerosols. I suggest the title to be modified as "Comparison between four cascade impactors for two urban aerosols with an emphasis for indoor-outdoor aerosols"

Response: We appreciate the suggestion and have now modified the title to: "Inter-comparison of four different cascade impactors for fine and ultrafine particle sampling in indoor and outdoor air." It is true that we measured coarse aerosols, but would like to keep the terms "fine and ultrafine" in the title given that these fractions were the main focus of the study. We have added the terms "indoor and outdoor" instead of the sampling locations in order to give more emphasis to the indoor part, as suggested in comment 2.

2. Abstract and objectives: While the article is focused on the comparison between the impactors, I believe the indoor-outdoor relationship with respect to the chemical analysis is also very important to be a part of the abstract as well as the objectives.

Response: The relationship indoor-outdoor with respect to the chemical analysis is now emphasized in the abstract and objectives. The following statement was added to the abstract: "Chemical processes linked to aerosol infiltration (e.g., evaporation) were identified in indoor air samples".

3. Figures 6 and 7 should be given more space to be discussed with respect to the



transport of outdoor aerosols into the indoor air.

Response: Further discussion regarding the transport of outdoor aerosols into the indoor was included based on a comment from Reviewer #1: "In outdoor air there is a clear decrease of NO<sub>3</sub><sup>-</sup> concentrations measured with the nano-Moudi (PM<sub>10</sub> = 1.7  $\mu\text{g m}^{-3}$ ; Table S2), confirming the interpretations provided in the previous sections. The same is valid for fine chlorides that are missing on same nano-Moudi samples showing ammonium chloride evaporation (NH<sub>4</sub>Cl). Nitrates present indoors (due to indoor ammonium nitrate dissociation; Allen et al., 1989; Stelson and Seinfeld, 1982; Talbot et al., 2016) are influenced by other species different to ammonium salts (e.g. sodium or potassium nitrate) that are not prone to dissociation. For this reason, the difference between nano-Moudi and the other impactors indoors (Figure 6) was much smaller compared to outdoors (Figure 5). The lower sulphate and mass concentration on nano-Moudi indoor samples were caused by other factors (possibly bounce) given that average RH indoors in winter was low (21%)." We believe that thanks to this previous Reviewer comment this section has now been given more space and weight, as suggested by Reviewer (Dr. T. Hussein).

Please also note the supplement to this comment:

<http://www.atmos-chem-phys-discuss.net/acp-2015-1016/acp-2015-1016-AC3-supplement.pdf>

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