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## ***Interactive comment on “Size-dependent particle activation properties in fog during the ParisFog 2012/13 field campaign” by E. Hammer et al.***

**E. Hammer et al.**

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We would like to thank the referee for his/her valuable and detailed comments. Our answers to the comments are given below, where the referee comments are given in italics. We also improved the grammar in some sentences without changing the scientific output.

### **Specific comments**

*This manuscript presents results from a measurement campaign focusing on aerosol-fog interactions. The measurements were performed in France, at a measurement station near Paris. The measurement system, equipment and data analysis are quite similar to those used in many aerosol-cloud interaction studies. However, the appli-*

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*cation of these methods for fog research in this study has provided new, interesting observations which improve the scientific knowledge about fog formation. In general, the manuscript is well written and I have only a few comments. The manuscript meets the criteria for publication in ACP after minor revisions.*

*Introduction: I would suggest changing the order of the third and fourth paragraph. This way the first part of the introduction would deal with the background and theory and the rest would explain what needs to be done and what is done in this study.*

We agree and swapped the 3<sup>rd</sup> with the 4<sup>th</sup> paragraph as suggested.

*Section 2.2: Please explain why you decided to try different cut-off sizes for the interstitial inlet. Just for comparison purposes or did you decide to change the inlet cut-off after noticing that the wet threshold diameter was well above the 1  $\mu\text{m}$  limit?*

We added the following sentence to Sect. 2.2: "The cut-off diameter of the interstitial inlet was varied, in order to test how the best separation between interstitial particles and activated fog droplets could be achieved. The interstitial inlet consists of ..."

*Section 2.2: In the beginning of the second paragraph you mention "dried number size distributions of total and interstitial particles". Does this mean that the interstitial inlet also had some heating? Please clarify.*

For clarification we added in the first paragraph of Sect. 2.2.: "In the laboratory, the aerosol from both the interstitial and total inlets was dried to  $\text{RH} < 20\%$  as it was heated to room temperature (typically 20 to 30 C)."

*Page 9494: You can remove the first three rows of this page, the same information is already given in chapter 3.5.*

Following your suggestion, we removed the first sentence of the first paragraph at page 9494.

*Page 9495, rows 13-14: Please give the number of the event (F15?) here as well, this*

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would make it easier to check the relevant figures and tables.

We added the fog event number in the suggested sentence: "... (as occurred for example on 30 November 2012, F15) ...".

*Chapter 4.3 and table 2: Here you compare light scattering coefficient by hydrated particles and droplets smaller than  $10\ \mu\text{m}$  ( $b_s, \text{hyd} + b_s, \text{drop}$ ) with the particle extinction coefficient,  $pec$ , by saying that the difference between these two is moderate. In some cases this is true, but there are many cases where the  $pec$  is clearly higher. Wouldn't it be more realistic to present the ratio  $\frac{b_s, \text{hyd}}{pec}$  instead the  $\frac{b_s, \text{hyd}}{b_s, \text{hyd} + b_s, \text{drop}}$ ? Or then present both ratios in table 2 for comparison purposes.*

We agree that the  $pec$  is sometimes clearly higher, however, since  $pec$  was obtained from different measurements than  $b_s, \text{hyd}$  we left the already presented ratio of  $(b_s, \text{hyd}) / (b_s, \text{hyd} + b_s, \text{drop})$  and added the ratio of  $\frac{b_s, \text{hyd}}{pec}$  for comparison in the last row. We also rearranged the table for better clarification and switched the row showing the  $pec$  values with the one showing  $\frac{b_s, \text{hyd}}{b_s, \text{hyd} + b_s, \text{drop}}$ . We added the following discussion to Section 4.3: "For comparison, the ratio of  $\frac{b_s, \text{hyd}}{pec}$  is also presented in Table 2. The mean value (0.46) is somewhat lower than the mean value (0.69) of  $\frac{b_s, \text{hyd}}{b_s, \text{hyd} + b_s, \text{drop}}$ . This can be attributed to experimental uncertainty and the fact that the WELAS is undercounting the largest activated droplets with  $D > 10\ \mu\text{m}$ , thereby resulting in a low bias of  $b_s, \text{drop}$  and a high bias of  $\frac{b_s, \text{hyd}}{b_s, \text{hyd} + b_s, \text{drop}}$ , when large droplets are present. Nevertheless, the conclusion that the hydrated but non-activated particles give a significant contribution to the visibility reduction remains valid also when considering the ratio  $\frac{b_s, \text{hyd}}{pec}$ ."

*Figure 4: Please change either the color of the curves in figures b and c or then the background colors indicating the type of the fog events. This would make the figure clearer as now the colors are too similar.*

We changed Figure 4 according to the reviewer's suggestion and replaced the colors

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from the fog events. See also next comment for further adjustments of the colors.

*Figure 8: The background colors indicating the type of the fog events could be a bit lighter, thus making the figure clearer.*

We changed the colors for the fog events in Figure 8. To be consistent we changed the colors for the fog events in Figure 4, too.

### Technical corrections

*Page 9478, row 21: please check the years.*

Thanks. We replaced 1998 with 1994.

*Page 9494, rows 4-5: combine this one sentence with the following paragraph.*

We merged the sentence with the following paragraph as recommended.

*Some typing errors etc.: Page 9483, row 12 Page 9485, row 12 Page 9490, row 14 Page 9493, row 4: should be Figure 7c. Page 9494, row 4: Fig. 8c*

We corrected all of the above stated typos.

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Interactive comment on Atmos. Chem. Phys. Discuss., 14, 9475, 2014.

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