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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Experimental study of the aerosol impact on fog microphysics" *by* M. Mazoyer et al.

Anonymous Referee #2

Received and published: 24 June 2016

Rev. A Manuscript title: Experimental study of the aerosol impact on fog microphysics Date: June 24 2016 Decision: rejection

General comments: Overall objective of this work is to evaluate aerosol effect on fog microphysics based on observations and develop accurate estimation of Nd as a function of hygroscopicity parameter, size, and Sw. They state that high Na limits Sw, and activation is mainly function of aerosol size, not hygroscopicity. There are issues with text flow and organization that affects the quality of the work. Also, I found out it was difficult to follow the text because of issues related to proper use of definitions (activation of droplets) and missing info on the figs captions. Other point, authors should clearly show how different their findings compared to others.

Although a decision as rejection is given, this paper, based on corrections suggested

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Discussion paper

below, can be considered for a possible publication.

Major issues: 1. This paper is not organized properly, flow in the text for scientific steps are not clear, worst part of this manuscript is use of terminology that includes "activated droplet", and CCN, Nd, CN etc. Droplets are already activated. I suggest that authors prepare an abbreviation list and use the terms in the paper function of these definitions. Not easy to follow up with sentences if definitions are not clear. Pg 15; line 29, but also in many places. 2. Incomplete sentences are exist. 3. Need to clearly explain sensor differences and how do you use them. 4. Results are given in method section, and method is not clear. 5. Based on 1, you need to define CN, CCN, Na and their size ranges. 6. Nucleation happens usually >0.1 micron and up to 1-2 micron. Nd versus Na should represent this but I don't see a relationship on this. 7. Integration of WELAS and FM100 is a problematic, as seen from the plots (Fig. 1 and 2). They cant be integrated because of large differences in spectral distribution. 8. Did you compare LWC from gerber and FM device? This will show accuracy of FMD. 9. FMD and FMW should be compared for entire size range. 10. Fig. 2 shows clearly that FMD or WELAS Nd are really bad, no obs fit well into 1/1 line. How can use this data in an integrated way and make judgements. Better use them differently. 11. Your findings are very similar to previous studies, how different your work compared to others and why? 12. Fig. 3; why you use SMPS for entire size range? Activated Na are usually >0.1 micron? 13. Figs, should state which sensor, sampling rate, and size intervals and be consistent; for example Ndfmd and Ndw, NaSMPS etc. 14. Fig. 5; Nccn from CCN chamber; need to define this, when I look at the plots, I cant understand the trends because of definition issues. 15. Fig. 8; how did you get SSpeak? Explain in title or in an abbreviation list. 16. Fig. 7; why 1-hr time period is used? 17. Fig. 8; SSpeak increases, I expect Kappa increases, because more vapor in the air, aerosols should get more wet, why doesn't show this. 18. Fig. 9; SS=0.03; Nd=0????? Nact means what? Nact=Nd? Nact=CCN, what???? 19. Fig. 9c; kappa increases and Nact (CCN, Nd??) increases, it is ok, then, why kappa doesn't change with SS? 20. Fig10; b) Dd increases but not activation ratio?, I thought larger the size activation can

be more, am I wrong? 21. Fig. 10a; activation ratio doesn't change with SS, or very weak; I expect an increase, is it data analysis problem. 22. Fig. 11 is not clear, and Nact (is it CCN, or Nd). Why there is no correlation between N* and Nact? Why you expect a relationship? 23. Fig. 12; whose equations are given there??? 24. It is nice plot, probably you should focus on this plot, and reduce others. Nact means what it is Nd? Or CCN, you need to clarify your text, and use either Nact or Nd???? 25. Fig. 13; y axis now you say CCN (size range? >0.2 micron) and versus N* (<0.5 micron); this means CCN and N* have same channels; therefore, you see a correlation, explain this in discussions or correct the plot. 26. Fig. 15; now seen that Nd=Nact; then move this plot up and explain it. 27. Fig. 15b; Nd versus D; why you use 1 hr time period for this plot; be consistent with data analysis criteria. 28. Fig. 16a; shows Nd<Nact? You need to explain diff between these parameters in the method section. 29. Finally, conclusions should be short, listed, and importance be given.

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