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Atmospheric Chemistry and Physics Discussions

Interactive comment on "In-situ constraints on the vertical distribution of global aerosol" *by* Duncan Watson-Parris et al.

Anonymous Referee #3

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In-situ constraints on the vertical distribution of global aerosol by Watson-Parris et al. evaluates the size-and altitude-resolved aerosol number concentration produced by the ECHAM-HAM global model. The evaluation uses as reference dozens of airborne experiments carried out in the past two decades.

While modeled vertical profiles have been studied in the past, the large volume of observation and the focus on aerosol number size distribution make this study unique. The figures are clear. There are a couple of statements that need more explanations. I recommend publication after the authors consider the following items.

Page 2, line 2. The indirect forcing also depends on ice nuclei.

Page 2, line 12. Suggest also citing Kacenelenbogen, M., M. A. Vaughan, J. Rede-

mann, R. M. Hoff, R. R. Rogers, R. A. Ferrare, P. B. Russell, C. A. Hostetler, J. W. Hair, and B. N. Holben. 2011. "An Accuracy Assessment of the CALIOP/CALIPSO Version 2/version 3 Daytime Aerosol Extinction Product Based on a Detailed Multi-Sensor, Multi-Platform Case Study." Atmospheric Chemistry and Physics 11 (8): 3981–4000.

Page 2, line 34. Insert "in situ" between aircraft and measurements.

Page 9. Line 25. omponents should read components.

Page 10., line19. VOCALS also did repeated sampling. Cite Wood, R., C. R. Mechoso, C. S. Bretherton, R. A. Weller, B. Huebert, F. Straneo, B. A. Albrecht, et al. 2011. "The VAMOS Ocean-Cloud-Atmosphere-Land Study Regional Experiment (VOCALS-REx): Goals, Platforms, and Field Operations." Atmospheric Chemistry and Physics 11 (2): 627–54.

Page 13, line 1. Clarke and Kapustin (2002) discuss the high number concentrations at >8 km altitudes in the tropics. Refer to it.

Page 15, line 11. Explain why the uncertainty in DMA charging results in erroneous counting but not sizing.

Page 17, line 14. "reduced negative bias" is taken to mean an increased number from the model. Explain why the slower condensational ageing shows this for larger particles.

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