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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Evaluating and constraining ice cloud parameterizations in CAM5 using aircraft measurements from the SPARTICUS campaign" *by* K. Zhang et al.

Anonymous Referee #1

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Review of "Evaluating and constraining ice cloud parameterizations in CAM5 using aircraft measurements from the SPARTICUS campaign", by Zhang et al.

This paper analyzes two ice nucleation parameterizations in a global GCM against observations for a single campaign of mid-latitude cirrus. The paper is appropriate for ACP and generally well written, with decent images and figures. It should be publishable in ACP subject to some important revisions.

I have several concerns. Mostly I worry that the single campaign focus and recommended parameter choices may not be generally applicable globally. The authors do not state this quite well enough in the conclusions as noted below. The paper is not

overly long, and so perhaps a figure with some of the other observations mentioned (Kramer et al 2009) would be appropriate to see if the results here hold up in different regions, particularly since these other observations have a different slope of the temperature v. ice number concentration relationship. You already have the data from the simulations, and the Kramer et al observations are easily accessible.

Page 1204, Line 13: Where and when was the campaign?

Page 1204, Line22: What are the parameters? Mentioned fmax and deposition coefficient already.

Page 1205, Line 12: Note where the ARM SGP site is.

Page 1206, Line 11: How is anvil defined?

Page 1206, Line 18: Somewhere you should mention recent similar work by Gettelman et al 2012 (Gettelman, A., X. Liu, D. Barahona, U. Lohmann and C.-C. Chen, Climate Impacts of Ice Nucleation, J. Geophys. Res. Atmos. , 117, D20201, doi:10.1029/2012JD017950), who looked at BN and LP in CAM5, focusing on the ice nucleation and the radiative effects of anthropogenic aerosols on cirrus. The study also looks at temp v. ice number

Page 1211, Line 18: This should be Gettelman et al 2012, see earlier comment.

Page 1211, Line 20: It is not so different: most ice nucleation of the pure ice phase is probably occurring in cirrus.

Page 1212, Line 25: concentrations ... are dominated

Page 1213, Line 1: Would it be better to make zonal mean plots of one or both of the quantities from figure 4, hom and het in the same simulation.

Page 1218, Line 14: But it may result in over fitting a parametization to a particular circumstance which is not generally applicable. What about looking in other regions to see if these relationships hold or look more like the Kramer et al data.

Page 1219, Line 1: Is the regime you are looking at dust dominated or not? How can you apply to other regions.

Page 1219, Line 10: But what about other regions? Is this better or not?

Page 1219, Line 21: But there are observations available: you even cite them. The Kramer et al observations are well used in the literature: perhaps you should add a figure comparing to them to see if the results hold up between models and observations.

Interactive comment on Atmos. Chem. Phys. Discuss., 13, 1201, 2013.