

Interactive comment on “On the importance of small ice crystals in tropical anvil cirrus” by E. J. Jensen et al.

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Received and published: 22 May 2009

We appreciate the helpful referee comments. Specific responses are provided below.

Major comments:

1. The corrections for out-of-focus images were applied to both the CIP and 2D-S datasets. We have indicated this fact in the revised manuscript.
2. We agree with the possibility that only one particle from the ensemble of shattered fragments may pass through the probe sample volume, in which case it would not be identified as a shattering artifact by the interarrival time analysis. Although we believe such events are uncommon, we have acknowledged the possibility of their occurrence in the revised manuscript. In any case, if the 2D-S small-crystal concentrations are

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substantially contaminated by such events, it would mean that the natural concentration of small crystals is actually smaller than what we present in the paper. Thus, our fundamental conclusions (that the CAS measurements have a serious problem with shattering artifacts and that small crystals contribute very little to the radiative properties of anvil cirrus sampled during TC4) will not be changed.

3. We agree that, given the substantial uncertainty in the 2D-S measurements in the smallest few size bins, it makes sense to include a comparison between the CAS and 2D-S probes in liquid clouds where large raindrops are absent and splashing should not be a significant problem. We have included such a comparison in the revised manuscript, and the agreement between the probes is reasonably good.

4. We are not sure what part of the manuscript the referee is commenting on here.

Minor comments:

1. The CIP pixels resolution (25 μm) is indicated in the revised manuscript.

2. We have been unable to find a complete citation for the Cooper (1977) document. Since this manuscript is not intended to provide a detailed description or justification for the interarrival time approach, we have chosen to not include an incomplete reference to the Cooper document.

3. The area-to-mass conversion used is described by Baker and Lawson (J. App. Met., 2006). We have mentioned this in the revised manuscript.

4. Arctic is now capitalized throughout the manuscript.

5. The extra "about" has been deleted.

6. The sentence seems clear as it is.

7. The extra "during" has been deleted.

8. Although the ice density does decrease with particle size, the definition used for

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effective radius here (with a constant ice density) is the standard definition (see McFarquhar and Heymsfield, JAS, 1998). Therefore, by using this definition, we are being consistent with numerous other studies.

9. We have changed "no reason" to "no known reason".

10. The units have been corrected.

11. The units in Fig. 6 have been corrected.

12. As indicated in the revised manuscript, we did assume spherical ice growth.

13. We are following the convention of showing MAS images with time running along the vertical axis. Perhaps the figure was inadvertently rotated when viewed with some pdf viewers.

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 5321, 2009.

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