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Atmospheric Measurement Techniques Discussions

Interactive comment on "Ice Crystal Characterization in Cirrus Clouds: A Sun-tracking Camera System and Automated Detection Algorithm for Halo Displays" *by* Linda Forster et al.

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This paper introduces a new instrument and method for automated detection of ice cloud halo displays. The detection of a halo indicates the presence of smooth crystals in ice clouds. Such smooth crystals generally have a larger scattering asymmetry parameter than roughened crystals and thus studies on the presence of smooth crystals are relevant for constraining cirrus optical properties. Statistics on the presence of smooth crystals are scarce and the presented instrument seems very useful to improve such statistics when deployed around the globe.

The paper is very well written and relevant for publication in Atmospheric Measurement Techniques. I do have some suggestions to possibly improve the paper.

1. A visual inspection of the halo images is presented on page 5. Please indicate whether partial 22-degree halos are also counted in the statistics. Also, in my experience sundogs often appear much brighter than 22 halos, and therefor may be more easily detected. Could that have skewed the statistics?

2. The automated detection algorithm focuses on 22-degree halos. Could you please discuss whether and how the algorithm might be biased by the presence of other optical phenomena such as sundogs and tangent arcs? I can imagine that in case of a 22-degree additional sundogs present halo change the angular width of features seen in segments 3 and 5, which might lead to a false negative detection. On the other hand, the presence of a sundog without a 22-degree halo might lead to a false positive detection of a 22-degree halo.

3. Related to the discussion of influence of optical thickness of the visibility of halos, it would be good to include the follow paper: Kokhanovsky, A.: The contrast and brightness of halos in crystalline clouds, Atm. Res., 89, 110–112, doi:10.1016/j.atmosres.2007.12.006, 2008.

4. On page 17, percentages of the fraction of rough particles are estimated. Since these are based on the minimum percentage of smooth crystals needed for halo features, it seems to me that the deduced fraction of rough particles are maximum values. That is, a lower percentage of rough particles would of course also produce a halo, and probably a brighter one.

Minor corrections:

Line 13, page 15: Remove "are" from the final sentence.

Line 1, page 15: I suggest to refer to section 2.1 here