

Interactive comment on “Microphysical Characteristics of Frozen Droplet Aggregates from Deep Convective Clouds” by Junshik Um et al.

Anonymous Referee #2

Received and published: 13 April 2018

1 Main Comments

The paper analyses 22k+ images of ice crystals within the upper anvil region of two storms over Colorado. They apply a circle Hough transform technique to identify the positions of element-frozen droplets, which appears to be a new and useful technique in this context.

In the abstract they talk about the relative frequency of occurrence of different habits depending on temperature and position within the anvil cloud. While this may be expected I did not see any results that supported this statement.

A statement that the CPI error in sizes is +/- 4.6 microns is given on page 9, line 15. I

C1

think this may underestimate the errors when particles are positioned away from best focus. What value of the focus parameter from the CPI processing software was used? Particles around 30 microns diameter can be oversized by a factor of 1.6 due to these effects.

Overall the techniques used and results presented are of a high quality; however, if the paper is to be published in ACP I feel more should be made of the relative abundance of single frozen and FDAs in these anvil clouds – this is the main scientific finding of the paper. Why is it important to know these, and how can the measurements / findings be used by modellers, etc. Could the aggregation indices in figure 5 help modellers understand the nature of the aggregation process for instance? i.e. whether electric fields are important, or whether it is more random. I think this may be the case. It may be worth presenting a discussion about the electric field-aggregation hypothesis, and then presenting these statistics as a way of testing it?

The methodology is innovative and very useful; however, when presented alone it would warrant publication in a techniques paper like AMT.

2 Specific comments

- BC not defined in the abstract. Assume you mean Black Carbon.
- Woodely should be Woodley page 3, line 18.
- Figure 2: a complicated habit recognition scheme is described in the figure caption, but the acronyms do not appear in the figure