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Interactive comment on “Ice particles in the upper anvil regions of mid-latitude continental thunderstorms: the case for frozen-drop aggregates” by J. L. Stith et al.

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We thank Professor Shcherbakov for the helpful comments on our manuscript. Our responses to the individual comments are listed below.

Specific Comment. The authors need to include relative humidity with respect to ice in the paper. We now include a plot of relative humidity and have included the results in our discussion. Basically, these humidity measurements are in accord with our suggestion that there was insufficient supersaturation to support significant depositional growth before the FDAs were sampled in many of the regions we studied. We also add

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a reference for the instrument used for the humidity data (Zondlo et al. 2010).

Fig. 3. The reviewer suggests we consider overlaying a GOES-13 infrared satellite image. Due to the lower resolution of the infrared imagery and the small size of the anvils we sampled on 6 June, these images do not resolve the anvils well enough to add much of value to the paper.

Page 27031. Future work should include some analysis of IWC-Z relationships. This is an excellent suggestion and we will consider adding this type of analysis to the next phase of our studies.

Page 27036. The reference Cotton et al (2012) is not correct. We have made the correction. The error seems to have arisen due to the difference between the online and print versions of the reference.

Page 27037. It would be convenient for a reader if the Lawson et al. (2003) reference were added to the SPEC web site. We have added this to the SPEC web site. It is worth noting that copies of this reference are available at some libraries.

We also note that, since the discussion paper was written, CLH-2 data have been updated to reflect an improved understanding of the particle enhancement factor based on a recent series of technical flights of the instrument alongside the NCAR counterflow virtual impactor (CVI). This resulted in a slightly lower computed effective density for the FDAs, but does not change the paper significantly otherwise. We have added a short note to point out that the inlet enhancement factors used to convert water vapor signals into IWC (and which assume spherical particles) may return somewhat low values for the highly non-spherical FDAs observed in this study. Future studies will investigate this possibility, although it does not alter the basic conclusions of this study.

References. Zondlo, M.A., M.E. Paige, S.M. Massick, and J.A. Silver (2010), "Development, flight performance, and calibrations of the NSF Gulfstream-V vertical cavity surface emitting laser (VCSEL) hygrometer", *J. Geophys. Res.-Atmospheres*, 115,

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Interactive comment on Atmos. Chem. Phys. Discuss., 13, 27019, 2013.

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