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Interactive comment on “A methodology for in-situ and remote sensing of microphysical and radiative properties of contrails as they evolve into cirrus” by H. M. Jones et al.

Anonymous Referee #2

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I fully agree with the general comments given in the review by Darrel Baumgardner. Furthermore, the special comments given in Darrel's review cover most of the notes I made while reading the manuscript. In addition to these comments the following comments and suggestions should be addressed by the authors before submitting a revised version of the paper.

Radiation measurements: The reported radiance measurements from above and below the contrails are not very sensitive to the properties of the contrail, its age and spreading. Therefore, these measurements are presented and discussed only qualitatively in terms of "there was something". The contrail orbits and their horizontal and

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vertical distribution were much better located by the lidar measurements. These data were used to validate the NAME contrail location predictions as well as to monitor the spreading and fall streaks. So, I suggest to omit the radiance measurements for the sake of conciseness.

Size distribution measurements: The size distributions presented in Figs. 3, 9, and 13 show that the bin between 1 and 2 μm of the CAS instrument is systematically increased. This is very likely an instrument artifact which should be discussed. For the discussion of the differences observed in the size distribution measurements for the different contrail passes in Fig. 3, it would be useful to indicate the standard deviation on the measured bin number densities by error bars.

Particle habit discussion: Page 7851, lines 2 to 18. The authors report that they found almost no change in the ice crystal habit for the different passes and with location of the pass within the contrail. The majority of the ice crystals detected by the CIP instrument was classified as hexagonal plates. By looking at the examples given in Figs. 6 and 10 I got the impression that most of these particles possess a "donut-like" shape which is a strong hint for out-of-focus particles. So any other particle shape especially quasi-spherical particles might result in a similar image when captured out-of-focus. Furthermore, the authors cite the laboratory work by Bailey and Hallet (2004) which shows that the ice crystal habit is a function of the supersaturation with respect to ice saturation and temperature. I couldn't find a single temperature record in the whole manuscript.

Section "Extinction measurements", page 7848: I suggest to rename this section to "Determination of the extinction coefficient and ice water content" since these quantities are actually not measured. The authors note that care must be taken when comparing extinction and IWC results from different works. They argue that the determination of these quantities is dependend on the particle number concentration and the size range covered by the utilized particle sizing instruments. Since the extinction (for larger particles) is a function of the particle cross section whereas the IWC is a function of the

particle volume, the determined quantities are dependend on how the effective particle size is defined. This of course has also taken into account when comparing the results from different works.

Interactive comment on Atmos. Chem. Phys. Discuss., 12, 7829, 2012.

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