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Atmospheric Measurement Techniques
Discussions

Interactive comment on "A two-channel, tunable diode laser-based hygrometer for measurement of water vapor and cirrus cloud ice water content in the upper troposphere and lower stratosphere" *by* T. D. Thornberry et al.

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Whilst the choice you make of a value of 0.7 g cm^{-3} is reasonable based on Cotton et al. (2013), it is nevertheless taken from cloud data sampled at higher temperatures and pressures. It would be of interest to see what is the sensitivity to choice of this density value, for example to a choice of solid ice spheres with a bulk density of 0.9 g cm^{-3}.

We would like to thank Mr. Brown for his thoughtful comment on our manuscript. We

initially did perform the inlet calculations for an assumed particle density of 0.9 g cm^{-3} before opting to use the 0.7 g cm^{-3} from Cotton et al. as a reasonable, if imperfect, estimate. We have added curves for 0.9 g cm^{-3} density particles to Fig. 6 and added a subplot to the figure of the ratio of the two EFs to show the difference this assumption makes. For particles larger than 7 μm, the difference is less than 1%, while for particles near 1 μm, the differences peak at 35-45%. In terms of the evaporation of ice particles within the inlet, the increase in assumed density decreases the maximum size of particles that would evaporate within the heated region, but similarly decreases the maximum diameter of particles that would avoid impaction at the 90° bend. Text has been added to section 2.5.2 discussing the difference in both the EF and evaporation of ice particles from the assumption of the two densities.

Interactive comment on Atmos. Meas. Tech. Discuss., 7, 8271, 2014.