Response to Reviewers

The one remaining comment to address is:

I have consulted with the reviewer who suggests that 'the paper be published but for the authors to present a summary of the in-cloud temperature analysis and offer an explanation as to why their device did not get significantly wet when the evidence is that others do (e.g Heymsfield et al, 1979, Lawson and Cooper, 1990 and Wang and Geerts 2009 even though the latter is for the better reverse-flow housing and not the Rosemount).'

We have expanded the discussion to include both a summary of the analysis and the explanation. The paragraph discussing wetting of the Rosemount probe is now about one manuscript page (see lines 182-202 of the revised manuscript). For convenience, the new paragraph is copied below verbatim:

In-cloud wetting of the aircraft temperature probe does not appear to be a significant issue during GoMACCS (Small et al. 2009). Further analysis was done for this study to confirm this result. We see no statistically significant bias in clear-air temperature prior to entering a cloud and after leaving the same clouds as would be expected for a wetted temperature probe; $\Delta T = T_{exit} - T_{entry}$ has values of 0.18 K, 0.20 K and 0.20 K when comparing the 1 s, 3 s and 5 s intervals prior to cloud entry and after departure from the same cloud, which are smaller than the 1σ values of ΔT of 0.35 K, 0.35 K and 0.34 K, respectively. The biases are also smaller than the probe accuracy of 0.4 K. Wetting of the Rosemount probe has been found to result from impaction of drops on the probe housing, which leads to liquid water build up and eventually drops spraying in random directions, some of which reach the probe sensor (Lawson and Cooper, 1990). Wetting biases have been found to depend on cloud LWC and aircraft speed. In the case of GoMACCS, cloud LWC is generally below 0.8 g m^{-3}, from which a typical bias of 0.4 K would be deduced based on clouds sampled by Lawson and Cooper (1990). However, in this study the aircraft speed is about half of that from Lawson and Cooper (1990), which will reduce drop impaction to the probe housing. Impaction also depends on drop size, and during GoMACCS drops are small due to the large aerosol concentrations, with typical sizes much less than 20 μm (Small et al. 2009). Lastly, wetting also depends on the cloud width. GoMACCS clouds exhibit widths between 1 and 2 km, which are on the small side for cumuli. We attribute the lack of any statistically significant wetting of the Rosemount during GoMACCS to the combination of all of these factors.