Response to Interactive comment on "A comparison of ship and satellite measurements of cloud properties in the southeast Pacific stratus deck" by Z. Wang

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1. Precipitation does not significantly affect the microwave retrievals like those from radar. Passive microwave retrievals become biased by rain only when the drop sizes become large enough for Mie emission. For instance, the Mie emission for rain drops of 100 μm is ~5% and that of 200 μm is ~20% (Petty, 1990). During EPIC (in the southeast Pacific), the mean drizzle drop size was 40 ± 20 μm (Comstock et al., 2004) which was worked out to lead to an overestimate within instrumental uncertainty in Appendix A of Zuidema et al. (2005). Because of this, almost none of the AMSR-E retrievals are flagged as being contaminated by precipitation in this region of interest. Also, only 0.6% of SSM/I retrievals have precipitation in this region. The effects of precipitation on the AMSR-E and SSM/I retrievals should be minimal and will continue to be ignored in the revised manuscript. Although, a few sentences justifying this will be added to the manuscript. Even so, we do acknowledge the difficulty in comparing the CloudSat profiles with the AMSR-E and SSM/I gridded products. This will never be a "perfect" comparison, because of the differences in footprints between the satellites. We had tried to partially account for the differences between the retrievals by only including non-zero values (for all retrievals) in the comparison in Figure 1a. We now recognize that this was not enough,

for we noticed that there were even 0 LWPs for profiles where there was cloud detected by CALIPSO. We will further exclude any profiles that have LWP where no cloud was detected by CALIPSO and only include LWPs where cloud top ≥ 1 km. This should eliminate most (if not all) of the false and missed detections. We do want to include cloud-free profiles in the averaging, as AMSR-E and SSM/I would include both cloud-free and cloudy regions in their averages.

2. We will include an extra line in Figures 2-4 of "precipitation-free" CloudSat LWP. We will also add a table detailing the statistics of various Z_{max} criterion (not just 18 dBZ).
3. The cloud base based upon adiabatic LWP will be added to the figures as another line. We will also make it clearer that the 2B-GEOPROF-LIDAR product is a combined CPR/CALIOP product.
4. The model set-up will be elaborated in the revised manuscript. We will also compare CAM4 results to those of CAM3.1.
5. Correct, but according to Winker and Vaughan (1997), cloud base is ambiguous in cases where precipitation is present. Also, the lidar signal would fully attenuate in thick low level clouds, so the cloud bases in these cases would be radar-based in the 2B-GEOPROF-LIDAR product. We unfortunately attributed this incorrectly to the lidar. We will clarify this in the abstract and in the body of the manuscript.
6. We will include a more accurate description of the CALIOP lidar wavelength in the revised manuscript.

References

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