Referee #1

We appreciate the reviewer's final comments. His/her comments are addressed below in red.

The text reads:

Lastly, we note that the algorithm for deriving satellite r_e differs from the RSP algorithm, in that satellite-based r_e relies on the dependence of shortwave-infrared unpolarized reflectance on r_e (and an assumed value for effective variance, **with reflectance monotonically decreasing with r_e**), whereas RSP is based on the dependence of the polarized reflectance on the scattering angle, r_e, and effective variance near the rainbow."

The phrase highlighted in bold suggests that reflectance monotonically decreases *as r_e decreases*. Do the authors confirm that they meant the opposite, i.e. "*as r_e increases*"? Perhaps also specify "mid-infrared" reflectance?

Response: The sentence is correct, near-infrared reflectivity decreases with r_e. We now specify that we are referring to near-infrared reflectivity instead of visible reflectivity.

2) Line 270: => should be "(Figure 10, red)".

Response: The sentence was modified accordingly, thanks.

Referee #3

We appreciate the reviewer's additional comments. Our responses are highlighted below in red.

I wish that the authors had commented more on the known differences between polarimetric and bi-spectral retrievals. While is is true that the two retrievals have different vertical weighting sensitivities to the cloud vertical profile this is not the only source of difference when comparing them to one another - especially due to differing sources and causes of bias for each retrieval technique which vary significantly with pixel size [Miller et al. 2018]. At high spatial resolution the two retrievals behave quite similarly, even in spite of their vertical weighting differences (refer to figure 6 of the previous paper).

In addition to the collocated analyses shown in this work, it is also useful to look at how retrievals using both of these techniques behave when made from the same platform and at high spatial resolution - because those are the two biggest sources of bias in the comparisons presented here. It is worth exploring because the pixel growth from RSP to MODIS to GOES-13 introduces a significant source of bias for bispectral CER retrievals. However, RSP produces multiple retrieval products - one based on a nadir-viewing bi-spectral retrieval similar in heritage to the Nakajima & King heritage retrievals, and several other polarimetric based on algorithms described in Alexandrov et al. 2012a,b (cited in this study). A comparison of the two RSP products for low-level liquid water clouds during the ORACLES field campaign (Figure 2 of Miller et al. 2021) revealed similar statistical biases ranging from 0.5-1 micron higher for the bi-spectral CER - similar to what was shown in Miller et al. 2018. The overall bias shown shown here for NAAMES fits into the context of the comparison from ORACLES, so I think it is valuable to mention that results comparing MODIS and RSP fall only slightly larger than the results shown for a RSP-only comparison of retrievals. One could also do this same analysis for NAAMES, but it is perhaps outside of the scope of the authors work presented here.

R: Regarding the modest impact of the vertical structure (weighting function), we added the following sentence:

"The modest impact of the cloud vertical structure in explaining polarimetric and bi-spectral r_e differences is also supported by 1-D theoretical results in Miller et al. (2018) for retrievals derived at the same pixel resolution."

Regarding the ORACLES results reported in Miller et al. 2021, it is difficult to interpret their results (more specifically their Figure 2), because the analysis shows a negative bias in bi-spectral cloud effective radius, that is, bi-spectral r_e is smaller than its polarimetric counterpart. If our interpretation of Miller et al. is correct, then the ORACLES analysis contradicts our analysis and several papers that arrive to the same conclusion, that is, MODIS overestimates r_e. Another aspect that makes the analysis in Miller et al. (2021) difficult to link to our study is the fact that at the typical resolution of the RSP footprint (~ 50 m), 3-D radiative transfer effects will be a dominant source of uncertainty in bi-spectral r_e, whereas at 1-km pixel resolution of MODIS, 3-D radiative effects are ameliorated (e.g. Zhang et al., 2011). We agree with the reviewer in that more efforts should be devoted to better characterize uncertainties in MODIS retrievals, but such analysis is beyond the scope of our study.

Zhang, Z., Ackerman, A. S., Feingold, G., Platnick, S., Pincus, R., and Xue, H.: Effects of cloud horizontal inhomogeneity and drizzle on remote sensing of cloud droplet effective radius: Case studies based on large-eddy simulations, *J. Geophys. Res.*, 117, D19208, doi:10.1029/2012JD017655, 2012.