

## ***Interactive comment on “Spatial distribution of cloud droplet size properties from Airborne Hyper-Angular Rainbow Polarimeter (AirHARP) measurements” by Brent A. McBride et al.***

### **Anonymous Referee #1**

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This paper analyses reflected solar radiance measurement, including its polarized and multi-directional properties, for an estimate of cloud droplet distribution. The retrieval algorithm is applied to airborne measurements. These allows to estimate the cloud droplet radius and cloud droplet variance at unprecedented spatial resolution. The results demonstrate the potential of the measurement for cloud process studies that may be applied to a forthcoming spaceborne instrument.

This paper is of very high quality. It is very clear, present original data, and has potential implications. It can be published with very minor corrections.

I would like the author to add some discussion on the vertical sampling of the technique.

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My understanding is that the technique measures up to 3 optical depth, although the majority of the signal comes from the first OD. Is this layer really representative of the cloud depth? In particular, I wonder how the modeling results that are shown in Figure 8 are integrated over the vertical for comparison with the radiometric estimate.

Also, I wonder why the authors have limited their analysis to the 670 nm band. The polarized radiance of the cloud shows large spectral variations that are sensitive to the droplet size and variance. Thus, it is unfortunate that the authors have not used this piece of information either to derive additional information, or to make a consistency check based on the variability between the various spectral estimates.

Page 7, line 34 : “in place of Qscat” should be “in place of -Qscat”

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