Interactive comment on "Low-level liquid cloud properties during ORACLES retrieved using airborne polarimetric measurements and a neural network algorithm" *by* Daniel J. Miller et al.

Anonymous Referee #2

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This study introduced a neural network method to retrieve cloud optical thickness and effective radius efficiently from RSP especially when aerosol layer lies above clouds. To improve the unreasonable importance of input vector (total reflectance and polarized reflectance) suggested by PCA in training network, this study adjusted the weighing of total reflectance and polarized reflectance based on their uncertainty to assure the constrain of uncertainties. The application and test of the algorithm show good agreements with traditional LUT cloud retrievals for optically thick clouds but not very well suitable for thin, inhomogeneous or broken clouds. The paper is easy to read and well organized.

1. In section 2.3, the author introduced different characteristics of NJK and PP methods, given the high angular and spatial resolution of RSP measurements, I am not convinced that adding NJK method in the NN training might improve the accuracy. Even using more measurements generally lead to more reliable estimates about the unknow parameters, the measurement uncertainties between the total reflectance and DOLP is too large, which means introducing the total reflectance can also lead to uncertainty. 2. Regarding to the pre-processing of the input total reflectance and DOLP, the authors modified the calculation method of the inputs for the NN, using the measurement uncertainty to replace the standard deviation. The concern to assign different weighing for the total reflectance and DOLP is reasonable. However, I feel confused about the sentence "We found that the range of our standardized training set values for DoLP is roughly four time larger than that of RI. This means that, relative to measurement uncertainty, DoLP is approximately that much more sensitive to the parameters we vary in our training set than RI." My question is how to understand the four times difference for the two kinds of measurements. I guess the ratio can be further changed by adjusting the way to calculate the inputs (for example, further increase the weighing for DOLP measurements in equation 11 by introducing another factor). 3. Another thing is how to understand the comparison between PP, NKJ and NN results, which one is the truth? If the PP result is considered as truth, again the question is maybe only using DOLP to train the NN can get better results.

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