

Dear Author:

I have read manuscript "Capability of multi-viewing-angle photo-polarimetric measurements for the simultaneous retrieval of aerosol and cloud properties" by O. P. Hasekamp

My impression is that it is an interesting manuscript dealing with a complex problem. The author makes the commonly-accepted (maybe somehow simplified) assumption regarding to the microphysics of the aerosol. The usage of lognormal distribution for clouds should be more justified since it has a "long tail" resulting in greater large particle contribution in comparison with more accepted gamma distribution.

For the homogeneous type of scene, the author confirms the most known results (see cited papers in the manuscript).

The most interesting part is related to the broken cloud scene. However, the author has selected an oversimplified approach for the forward modeling which is an independent pixel approximation which makes his results less accurate. It has been demonstrated that this approximation can lead to a significant retrieval error with respect to cloud microphysics (Gabriel, P., et al., Statistical approaches to error identification for plane-parallel retrievals of optical and microphysical properties of three-dimensional clouds: Bayesian inference. *J. Geophys. Res.*, 2009. 114(D6): p. D06207; Evans, K.F., A. Marshak, and T. Várnai, The Potential for Improved Boundary Layer Cloud Optical Depth Retrievals from the Multiple Directions of MISR. *Journal of the Atmospheric Sciences*, 2008. 65(10): p. 3179-3196) . It would be of greater interest to estimate the effect of realistic 3D effect on the retrieval approach suggested by the author rather than use the same forward model for the reflected radiance simulation and during retrieval process and it would result in more realistic estimation of the retrieval error. Of course, the author's retrieval error estimation can be considered as a lower limit.

Overall impression is the author has written a good paper clearly indicating the capabilities of the considered techniques and can be recommended to publication.

A particular comment which I recommend to correct in the manuscript:

The author mentioned the use of water cloud without indication whether it is "ice" or "liquid"

This rises an additional question what happens to the aerosol retrieval if the cloud particle state would be misinterpreted: "ice" instead of "liquid" or the otherwise. Can the polarized multiangle measurements guarantee that it never happens?

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