

Interactive comment on “What does reflection from cloud sides tell us about vertical distribution of cloud droplet sizes?” by A. Marshak et al.

Anonymous Referee #2

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This study examines a novel way to measure the vertical evolution of the particle effective radius of convective clouds. It does so by a simulation feasibility study that shows convincingly that this is a viable methodology.

However, the authors do not provide sufficient background concerning the importance and significance of such measurements. For example, the temperature-effective radius ($T\text{-}r_e$) vertical profiles, which were inferred indirectly from ensemble of convective cloud tops reaching different heights, have been used extensively to infer the vertical microphysical zones and precipitation forming processes in convective clouds, with the methodology developed by Rosenfeld and Lensky (1998). The authors are advised to quote that paper and some of the papers that reference this paper, for establishing the incentive and worthwhileness of the methodology that they develop and test in their

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study.

A strong assumption is the unique relation between depth above cloud base and the effective radius. This has been best documented so far by Freud et al. (2005), which the authors are advised to reference.

A crucial component of the vertical profiles is the temperature. The model needs to simulate also the brightness temperature, assuming a known dependence of the temperature on the height that can be taken from a simple adiabatic parcel model.

The paper will be suitable for publication after the authors will address properly these major points.

Specific comments: 1. Page 7209 line 16: It should be mentioned here that TRMM also provides a vertical profile of 2.2 cm precipitation radar reflectivities.

2. Page 7212 line 12: Change "interpreter" to "interpret".

3. Some of the figures are extremely small, and require very large magnification on the screen. These figures should be enlarged in the ACP version such that when printed no detail will get lost.

References:

Rosenfeld, D., and Lensky, I. M., Satellite-based insights into precipitation formation processes in continental and maritime convective clouds: *Bull. Am. Meteorol. Soc.*, 79, 2457-2476, 1998.

Freud E., D. Rosenfeld, M. O. Andreae , A. A.Costa and P. Artaxo, Observed robust relations between CCN and vertical evolution of cloud drop size distributions in deep convective clouds. *Atmos. Chem. Phys. Discuss.*, 5, 10155-10195, 2005.

Interactive comment on *Atmos. Chem. Phys. Discuss.*, 6, 7207, 2006.

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