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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Distributions and radiative forcings of various cloud types based on active and passive satellite datasets – Part 1: Geographical distributions and overlap of cloud types" *by* J. Li et al.

Anonymous Referee #2

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Review of "Distributions and radiative forcings of various cloud types based on active and passive satellite datasets – Part I: Geographical distributions and overlap of clouds types"

Submitted to Atmospheric Chemistry and Physics

By J. Li et al.

General Comments:

This study analyzes the combined CloudSat radar and CALIPSO lidar cloud class data (2B-CLDCLASS-Lidar), focusing on the geographical distributions, seasonal variations and day-nigh differences of eight cloud types. The cloud fraction statistics from radar-lidar are compared with those from radar only, ISCCP and surface observations. Furthermore, the vertical overlapping of different cloud types is examined and the conventional random overlap assumption is tested against the real data.

Despite of the detailed description of each cloud type and appropriate literature review, this study does not offer any new insights into the global cloud climatology beyond what have been know from previous studies. The analysis results are limited to spatial maps, zonal-mean distributions and general knowledge of the association of cloud types with large-scale environmental conditions. Although quantitative differences between datasets are given with 75% of information repeated from Sassen and Wang (2008) in Table 1, the difference between radar-lidar combined data and radar-only is very much expected. Multiple panels of day-time and nigh-time cloud fraction distributions are quite redundant. It is not discussed how much of day-nigh differences is significant compared to the retrieval uncertainties for different cloud types. Given the limited diurnal sampling of CloudSat/CALIPSO, I don't think it is necessary to dwell on the day-night differences.

Lastly, the authors provide a survey of observed multilayered cloud fractions and estimated the discrepancies in total cloud fraction that would arise using random overlap assumption. They suggested a linear combination of minimum and random overlap assumptions in models to minimize the errors. This part of analysis is unique and should be focused on.

Overall, the current organization of the manuscript contains too much repetition of existing work. I would suggest Section 3 and 4 be greatly compacted, Section 5 be expanded and some figures (such as the separate day and night panels) be trimmed before consideration of publication with ACP.