

Interactive comment on “The Cumulus And Stratocumulus CloudSat-CALIPSO Dataset (CASCCAD)” by Grégory Cesana et al.

Anonymous Referee #2

Received and published: 9 July 2019

This paper describes a new global cloud dataset built from active sensor CALIPSO and CloudSat observations. The distinguishing feature of the dataset is that cloud profile data is used to discriminate between stratocumulus and shallow cumulus, rather than relying on cloud-top altitude and optical depth derived from passive sensors. The motivation for this effort is nicely summarized in the introduction. The paper is well written and the work is a useful contribution to the field. The paper deserves publication but would benefit from some additional discussion and clarification of a few points.

1. The algorithm used to identify and discriminate cumulus and stratocumulus is described well, but the paper needs some description of the actual CASCCAD data set:

Is this a Level 2 or Level 3 dataset? What is the spatial resolution of the product? What parameters are reported – are cloud base and top altitudes included?

Section 5 says CASCCAD dataset is formed using both GOCCP and RL-Geoprof. How? Are these two datasets merged together somehow, or are they included as two separate elements of CASCCAD?

2. As reported here, classifications based on observed 3D structure appear to be better than classifications based on passive retrievals of cloud altitude and optical depth, which are subject to ambiguities. It would be useful to cite Mace and Wrenn (2013) who discuss a comparison in the eastern Pacific

Mace and Wrenn, 2013: Evaluation of the Hydrometeor Layers in the East and West Pacific within ISCCP Cloud Top Pressure-Optical Depth Bins Using Merged CloudSat and CALIPSO Data, *J. Climate*, doi:10.1175/JCLI-D-12-00207.1

3. Referee #1 dismisses the utility of CASCCAD for model evaluation for reasons which are not clear. CASCCAD appears quite useful for model evaluation to me. Some additional discussion of this would be useful, especially to clarify differences in using GOCCP (which is based on a simulator approach) versus RL-Geoprof (which is not).

4. Finally, I agree with Referee #1 that it would be interesting and useful for the authors to say something about the weaknesses and strengths of CASCCAD vs. weather state approaches to analyzing passive observations.

Minor points:

The last sentence of the first paragraph of the Introduction repeats an earlier sentence.

To document limitations of CloudSat in sensing shallow clouds it would be useful to cite: Liu, D., Q. Liu, L. Qi and Y. Fu, 2016: "Oceanic single-layer warm clouds missed by the Cloud Profiling Radar as inferred from MODIS and CALIOP measurements", *JGR*, doi:10.1002/2016JD025485.

"CALIPSO" is mis-spelled in the caption of Figure 6

Interactive comment on Earth Syst. Sci. Data Discuss., <https://doi.org/10.5194/essd-2019-73>,

2019.

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