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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Relationship between low-cloud presence and the amount of overlying aerosols" *by* C. E. Chung et al.

Anonymous Referee #2

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This manuscript compares statistics of the CALIPSO derived aerosol optical depth (AOD) above low level clouds to that in cloud free scenes. Results are presented for both daytime and nighttime retrievals of AOD. The work illustrates that there are some differences in the AOD above low cloud and the AOD in clear skies in the daytime retrievals e.g. over the southeast Atlantic in SON. These are however not apparent in the nighttime retrievals. This is very suggestive of a bias in the satellite retrieval of AOD during the daytime.

The authors clearly have some ideas as to why the retrieval scheme could have issues during the daytime (detection threshold in the feature detection algorithm, underlying surface albedo effects etc). The paper would be strengthened significantly if these were explored further and perhaps investigated on a case-study basis e.g. a CALIPSO track in the southeast Atlantic with significant biomass burning AOD above low level

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Discussion paper

cloud and in cloud free scenes.

My judgment is that for the paper to be suitable for publication in ACP, additional work that examines the retrieval scheme in more detail to better understand where the day-time differences originate from are required.

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