

Review of paper:

Global survey of aerosol-liquid water cloud overall based on four years of CALIPSO-CALIOP data

by N.Devasthale and M.A.Thomas

Positives

- useful satellite data-analysis
- nice presentation of data
- well written

Conce

- stratification in 6 zonal band stratification seems a bit coarse ... but is it a start

General comments

The paper explores cases, when active remote sensing from space detects aerosol layers above clouds. These cases are quite interesting, as aerosol retrievals usually are not possible over clouds with passive remote sensing and absorbing aerosol elevated above the highest cloud layer have a dimming potential for solar reflection from clouds to space. The presentation via global distributions (it is interesting that the overlaps cases are mainly over oceans) and via histograms and joint histograms is quite intuitive. I also like the brief nature of this contribution. Well done.

There is potentially for much more data-mining with the CLOUDSAT-CALIOPE data. And the authors indicate this in their last sentence as well. For instance, as we are now able to detect aerosol above clouds do we have to recalibrate aerosol global distribution and strength from passive remote sensing? Also focused studies would be quite interesting with respect to particular regions, aerosol types or low level cloud types. What can be said about the optical depth of elevated aerosol? Can we explore cloud edge statistics to see, if elevated aerosol extends into the cloud layer? I encourage the authors to continue their studies.

specific comments

Page 22114 just for clarification ... only cases where aerosol above clouds are investigated. So I assume that aerosol in between clouds are not counted as the aerosol type defining lidar cannot penetrate if cloud-optical depth reach 2. But how are cases handled when there is optically thin cirrus at higher altitudes?

Page 22116 I am a bit puzzled about the overlap peak for DJF west of Africa and the suggested link to biomass burning aerosol of western Africa which usually moves in a SW direction instead of S. Possibly it is only the case, because of the lack in low level cloud frequency at the west African south coast (see Figure 1) and because the ITZC is probably at its most southern location to allow southerly winds...?