

Interactive comment on “Evaluating Models’ Response Of Tropical Low Clouds to SST Forcings Using CALIPSO Observations” by Gregory Cesana et al.

Anonymous Referee #1

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The authors compared observed low cloud cover (LCC) by active remote sensing instrument, CALIPSO lidar, and simulated LCC in CMIP5 models and two versions of GISS model with CALIPSO simulator implemented in those models. Then they classified the models into two groups based on vertical profiles of LCC and dLCC/dSST compared with the observations. The authors identified that the “constrained” model group tends to show larger decrease of LCC in response to SST warming than the remainders. The analysis, methods, and results are carefully described. The reviewer thinks that the results obtained here are worthwhile publishing as a research paper in this journal. However, I also have a major concern and a few minor comments. This paper’s quality will be greatly improved if the authors take these comments into

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account.

Major comment

In figures 3a and 4, inter-model relationships between present-day LCC and dLCC/dSST (or dLCC/dSST and dCRE/dSST) should not be simplified too much. The negative correlations are clearly found when MIROC5 (in the upper-right corners of these panels) is set aside. However, physical reasons why MIROC5 can be omitted from discussion here are not clearly explained. The authors should extend their notes here to physics-based discussion. Why is MIROC5 so unique among the 14 models? Is there any unique physics scheme implemented in that model? To obtain any physical explanations, the authors can contact the model developers and/or developers of CALIPSO simulator and discuss with them.

Specific comments

Page 2 line 2: You should combine the first and second paragraphs into a single paragraph

Page 9 line 14 “the radiative effect of increased CO₂ on cloud-top turbulence”: Any appropriate citations needed here. Any LES or GCM studies?

Page 13 line 6-12: Figure 7 of Su et al. (2013; doi:10.1029/2012JD018575) may be relevant to discussion here

Page 13 line 22, 33: “Finally” repeated

Figure 1 caption: “is greater than 10 h Pa/d” should be “equal to 10 h Pa/d over ocean”. Please also check supplementary figure caption.

Interactive comment on Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2018-1008, 2018.

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