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Interactive comment on "Satellite-based estimate of the variability of warm cloud properties associated with aerosol and meteorological conditions" *by* Yuqin Liu et al.

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Editor's review

After a long series of let-downs by referees, the editor has supplied a review, below, from the point of view of an atmospheric science generalist. The review is provided without reference to the available referee's report. The editor wishes to apologise to the authors for the long delay in processing their manuscript.

This is a nuanced study of the change of cloud properties between morning and afternoon satellite overpasses, comparing clouds formed over land and sea. This 'compar-

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Discussion paper

ison of comparisons' approach can be tricky to follow (e.g. "[the] behaviour of cloud cover as a function of AOD for different aerosol loadings (low or high)", where AOD has previously been defined as a proxy for aerosol concentration) but, in the main, the paper manages to make clear what is meant at each stage of the analysis. That said, some clarification in distinguishing section 4.2 from 4.3 would help. It is important that the reader grasps the added value of each of the stages in the analysis, and this is not always the case for this reader, as described below.

Comments

P4L20ff. How is the possibility of vertical segregation of cloud andosol accounted for? For example, the presence of a lofted aerosol layer in the same scene as the low clouds?

Section 3.2. Should this not include a sentence on how the significance of results is to be determined? The results table speak of statistical significance but I'm not clear how this is measured.

Section 4.1. I was under the impression from section 3.1 that the difference in cloud properties at time=0 had been removed by re-sampling the data. I think the relationship between sections 3.1 and 4.1 needs to be developed with the lay reader in mind.

P9L31. I'm not sure what this sentence means – either the ECS is your marine study area or it isn't. I would caution against using parentheses in the way used in this sentence, because it is well-recognised to make the sentence much harder to comprehend whilst reading. The writer should be aiming to help the reader assimilate the information at normal reading speed, not to slow them down with internal opposites that require going back and forth over the sentence repeatedly.

P10L1ff. is the other "significant difference" one or two differences? The sentence seems to suggest that CF and CTP co-vary, which in turn suggests they need not have been studies separately.

Figures 3-5: might it be possible to shade the graphs on the right-hand columns of these figures to show when changes are self-consistent from a microphysics or cloud dynamics point of view?

Section 4.3 and Figure 6. This reader is left feeling that there is very little added value in this section. The statistics all look close to zero and noisy and the text doesn't make any very strong statements over and above those from previous sections. Is this section really necessary?

Section 4.4 is too definitive considering the uncertainty shown in Figure 7. I also missed a tie-back to basic cloud physics – how is the reader to interpret the effect of aerosol concentration on cloud parameters when the air is descending and cloud formation therefore suppressed? Some context is required here to help the reader who is not familiar with such analyses.

Minor comments

P2L36: delete 'desperately'

Figure 2: would plotting on log axes help the differences to be visible? For the caption: presumably this is an example of a PDF of CF?

P6L12 "Cloud_X (where X=CF, COT, CWP, CDR or CTP)" – just for extra clarity.

P6L13-16. "ΔCloud_X[High AOD]" should be overbarred in text as in equation.

P9L27 plot should be plotted

P15L12 "when PVV is positive" is more consistent.

P17L1: the statistical methods are not described anywhere that I can see.

Interactive comment on Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2017-1227, 2018.