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Atmospheric Chemistry and Physics Discussions

Interactive comment on "A global satellite view of aerosol cloud interactions" *by* C. Luo

Anonymous Referee #1

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The topic of aerosols' role in climate, and specifically aerosol-cloud interactions, is clearly critical, and the use of long-term satellite datasets is promising, both as a means for gaining understanding of what's actually going on in the climate system and as an additional way of evaluating GCMs.

However, the chain of reasoning the author presents in the first paragraph of Section 3, ending with the sentence, "The results are also consistent with an interaction between clouds and aerosols, and next we explore the implications that these represent interactions between clouds and aerosols," on which the rest of the paper hinges, is just not convincing enough. The brief discussion in this paragraph is not enough to allow us to assume significant aerosol-cloud interactions, ruling out all other explanations, and move on. The bottom line is, the results may be consistent with aerosol-cloud interactions, but they may also be consistent with other factors, and in my opinion the author has not done enough to eliminate these other factors, at least not by what is written in

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the paper.

For example:

1. There is some discussion of error analysis (i.e., the potential contribution of random and systematic errors in the data to the correlations) at the end of Section 2, but it may be that this discussion should be expanded.

2. Over what timescales do the different aerosol-cloud interactions with which this paper is concerned occur? Is the use of monthly means sufficient to get at this interactions? Some discussion of these issues is needed.

3. In lines 11-14 of Section 3, the author rules out contamination of the cloud retrieval with errors in the aerosol retrieval as a source of correlation, due to the much smaller optical depths of the aerosols compared to the clouds. However, by the same argument, wouldn't we expect a much greater chance of clouds contaminating the aerosol retrieval? This seems to be a more serious issue, and it is not discussed.

4. I am also not sure I buy the argument that, since different satellite datasets are used for the aerosols and the clouds, the likelihood of correlative biases is reduced. For example, I don't think this would automatically eliminate the cloud contamination issue mentioned above.

Because of this uncertainty in the methodology and the interpretation of the results, at least in my view, the rest of Section 3 (i.e., the description of the correlations in different regions and their attribution to different cloud-aerosol interaction mechanisms) feels very speculative.

Interactive comment on Atmos. Chem. Phys. Discuss., 4, 6823, 2004.

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