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

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As is suggested in the Summary, the correlations found in the paper may be due to any number of artifacts, most notably due to biases in the retrievals of the aerosols and cloud properties. One would not want climate modelers to simulate correlations in data sets that result from artifacts of the retrieval schemes. Here, the greatest problem is the focus on monthly mean and large spatial scales to establish "correlations" that somehow show cloud-aerosol interactions when such interactions are virtually instantaneous and the aerosols and clouds have to be collocated for the interactions to take place at all. Among the fallacies in the study that come to mind is the following: a) Aerosols are detected when clouds are not present and vice versa. b) Large anomalies in both aerosol optical depths and cloud cover fractions occur for regions with large monthly mean aerosol optical depths and cloud cover fractions. c) Correlations in the anomalies could simply reflect regions that are aerosol burdened and pretty cloudy, principally the storm track regions of the northern hemisphere and the dusty incursions into the ITCZ in the tropics. d) But the large aerosol burdens occur when the clouds

are not present, and thus don't interact with the clouds, and vice versa. A much more ambitious study was undertaken by Sekiguchi, et al., J. Geophys. Res., 108(D22), 4699, DOI:10.1029/2002JD003359, in which instantaneous (as well as time-averaged) aerosol and cloud properties were compared within relatively localized regions of varying scales. Nonetheless, the Sekiguchi et al. study is likewise prone to biases in the retrieval schemes. They also find increasing cloud cover correlated with increasing aerosol optical depths. The problem, however, is that such correlations might simply reflect cloud contamination in the pixels used to derive the aerosol optical depths. As regions fill up with clouds, the possibility that pixels identified as being cloud-free are, in fact, cloud contaminated increases. Little cloud cover, essentially undetectable amounts of cloud cover, could exist within these pixels identified as cloud-free and thus give rise to the enhancement in the retrieved aerosol optical depths.

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