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Atmospheric Chemistry and Physics Discussions

Interactive comment on "How small is a small cloud?" *by* I. Koren et al.

Anonymous Referee #1

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This paper addresses the cloud contamination problem in estimating an aerosol radiative effect estimate by a different approach. The authors used Landsart-7 30 m resolution data collected over 5 different regions. They degraded the resolution to 1 km and showed that the background reflectance increases because of the cloud contamination in 1 km pixels. They estimated that the cloud contamination accounts for 0.8 W mˆ-2 in a 24-hr averaged forcing. They used a power-law analysis and showed that cloud size distribution obeys a power-law and small size clouds contribute the reflectance most. Because of this power-law relation, they argue that no matter how high the resolution is, it is difficult to eliminate the cloud contamination from aerosol forcing estimates. The analysis used in this manuscript is interesting. I suggest publishing the manuscript with a minor revision.

Minor comments: I believe that MODIS uses more than a threshold method identify clear pixels. It uses spatial variability of radiances. If the variability is large, it does not

use as clear pixel. If small clouds are uniformly distributed (i.e. statistically spatially uniform), this method does not help identifying cloud contaminations. But the authors did not address if this spatial variability test reduces the clod contamination. In other words, how often are clouds spatially uniformly distributed? It is not the size of cloud alone affecting cloud contaminations. Because of this, 0.8 W mˆ-2 error might be over estimated. In fact, if this spatial variability test is included and if the objective of the paper is to estimate the effect of cloud contaminations in aerosol retrieval, the question becomes how large a cloud free area is instead of how small a small cloud is. Can we find cloud free areas larger than 1 km exist? If so (I believe they do), and if MODIS can find them, which I do not know, the aerosol radiative aerosol forcing can be properly estimated. If screening works, because it screens aerosols close to clouds, which might have a larger radiative effect, it might be underestimated. So I suggest that the authors either focus on the question indicated by the manuscript title and drop the part arguing the effect on the aerosol forcing or add a further analysis of the size of clear areas.

Interactive comment on Atmos. Chem. Phys. Discuss., 8, 6379, 2008.

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Interactive Comment