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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Aerosol effect on the distribution of solar radiation over the clear-sky global oceans derived from four years of MODIS retrievals" *by* L. A. Remer and Y. J. Kaufman

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We have responded to all of the reviewers' comments in the previous submission of the author's comments during the discussion phase. We are submitting a revised manuscript as promised in that discussion.

There are a few points that have arisen in the past 4 weeks as we worked on refining the uncertainty estimates.

(1) We didn't answer Reviewer 1's concern about the possible correlations between aerosol properties and scattering angle. I didn't understand at the time that the Reviewer was slightly confused about what we were doing. We are not using the variety

of angles in a month to calculate the flux in the same way that CERES constructs ADMs. We could do this work with only one angle. We are using the varied geometry in a month to decrease our error. This is explained in the text and in the new Fig. 2. (2) We felt that we needed to illustrate the advantage of using radiance to calculate flux vs. AOT to calculate flux. We've added Fig. 1 to enhance the illustration. (3) We worked on the uncertainty estimates a great deal. There is a new sensitivity study in Table 2. (4) One of the parameters that we tested in the sensitivity study is sea surface albedo. Using empirical and theoretical work from Jin et al. we could estimate the range of sea surface albedo as a function of solar zenith angle. In doing our calculations we held sea surface albedo constant. This will introduce error for regional and monthly flux calculations. It will also introduce error to the global annual mean calculations, but much less if we choose the correct value. The value we used corresponded to a solar zenith angle about 5 degrees off from the global mean in our data set. We have since adjusted all the annual mean values found in Table 1 and throughout the text. This is clearly described in the text. (5) It became apparent that quantifying the error for individual region and monthly estimates would become a great burden. Therefore, the error estimates and the perturbations in the sensitivity study are applicable to how well we know global mean values of the parameters. This is important in estimating error on the assumptions of calculating the 24 hour average from the instantaneous values. Before the uncertainties were 8% and 10% for making the estimate for any particular region or month, but we know the global mean aerosol optical thickness and average aerosol type much better. The global uncertainties for calculating the 24 hour average are only 2% and 3%. (6) In the end, putting all the uncertainties together, our error bars for the global mean aerosol effect estimate is about twice what we estimated previously. (7) We put back the color bar in the plot that was missing it, changed the title, fixed the caption on one of the figures that was incorrect. (8) In the revised manuscript, all changes are in blue font.

Interactive comment on Atmos. Chem. Phys. Discuss., 5, 5007, 2005.

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Interactive Comment