Atmos. Chem. Phys. Discuss., 4, S3265–S3267, 2004
www.atmos-chem-phys.org/acpd/4/S3265/
European Geosciences Union

Atmospheric Chemistry and Physics Discussions

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

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Received and published: 10 January 2005

Response to Referee # 1

1. We discussed error analysis in the section 2 of the paper. The error analysis shows that our correlation of these anomalies from two data sets is meaningful to the extent that standard deviation is larger than uncertainty of each retrieval. 2. Since the large scale forcing will be seasonally varying, we reduce the chance of this by using monthly anomalies from all months. That is why we used monthly mean anomalies to do the correlation. 3. Noting that aerosol optical depth are generally two orders of magnitudes smaller than cloud amount, it seems unlikely that aerosol optical depth cause significant artifact in cloud amounts. The cloud amount cause significant artifact in the aerosol optical depth is unlikely either. Since if cloud amount could cause significant artifact in the aerosol optical depth, we would expect to find significant correlation between distributions of aerosol optical depth and cloud amount. Comparing aerosol

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optical depth distribution (figure 1) and cloud amount distribution (figure 2), it didn't show up the significant correlations between two distributions.

Response to Referee # 2

1. Although we can't exclude our results could be due to correlative biases in the satellite retrieval datasets, since we use different datasets, this is reduced in likelihood. Same result has been gotten by using TOMS data and by model calculated aerosol and ISCCP cloud data (Chemides, et al., 2002). 2. Even the interaction of aerosol and cloud is instantaneously, there should be the information of aerosol and cloud interaction by monthly mean datasets also.

Response to Referee # 3

1.Although we can't rule out the cloud contamination in the pixels used to drive aerosol optical depth, different datasets used reduce the likelihood. The cloud amount cause significant artifact in the aerosol optical depth is unlikely. Since if cloud amount could cause significant artifact in the aerosol optical depth, we would expect to find significant correlation between distributions of aerosol optical depth and cloud amount. Comparing aerosol optical depth distribution (figure 1), and cloud amount distribution (figure 2), it didn't show up the significant correlations. Of course, for this explanation to be applicable, it would have to mean that both the satellite measured aerosol AOT and satellite measured cloud amount are reasonably accurate representations of the real atmospheric distributions. Satellite data validation show AVHRR AOT and ISCCP cloud show good agreement with ground base measurements (Ignatov et al., 1995; Ross and Schiffer, 1999).

Reference: Chameides, W.L., C. Luo, R. Saylor, D. Streets, Y. Huang, M. Bergin, Correlation between model-calculated anthropogenic aerosols and satellite-derived cloud optical depths: Indication of indirect effect? J. Geophys. Res., 107,10.1029/2000JD000208, 2002. Ignatov A., L.Stowe, S.Sakerin, G.Korotaev, Validation of the NOAA/NESDIS satellite aerosol product over the North Atlantic in 1989.

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