**Atmospheric
Chemistry
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Discussions**

Interactive
Comment

## *Interactive comment on* "Retrieving global sources of aerosols from MODIS observations by inverting GOCART model" *by* O. Dubovik et al.
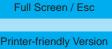
**O. Dubovik et al.**

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Letter to the Editor

Dear Sir,

In the revised version of the manuscript we have tried to address appropriately all comments of the referees. Although, most of the comments were rather minor of mainly editorial character we believe all of them were very useful for improving the manuscript. We particularly thankful to referee 3 whose comments encouraged us to include several useful illustrations into revised version of the paper. The detailed list of corrections is given below.

1. We have changed title as suggested by the reviewer 2.

2. English. As suggested by the referee 3 and 2 we have put a significant effort in

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improving level of English in the manuscript. First, we have included all corrections suggested by the referees 2 and especially 3 (that are quite many). Then we have we have asked highly qualified native English speaker to read over and correct the manuscript.

3. As suggested by the referee 3, we have added the figure 2 that illustrates formulations of aerosol transport modeling using vector formalism.

4. We have added several diagrams (Figs. (3-7)) that illustrate the main logical concepts of the inverse modeling methodological developments. We expect that should be helpful for going through Section 2. (We gave more explanation of this in response to Referee 3).

5. We have corrected and clarified Eqs. (5) and (57a-b). We also have added the explanations and clarifications for these equations as suggested by the reviewer 3.

6. Following detailed comments by reviewers 2 and 3 we have added many clarifications and explanation in description of the numerical tests (Section 3.1) and the inversion of the MODIS data (Section 3.2).

7. We have added Fig. 26 illustrating the desert dust and sea salt sources assumed in GOCART model. This figure was missing.

8. We have removed some details from the abstract (as suggested by referee 2).

9. In the beginning of Section 2.3 we have added some introductory paragraph explaining usage of smoothness constraints for aerosol emission retrieval (as suggested by referee 2).

10. We have included description of the variables in Eq.(28) (as suggested by referee 2).

11. As recommended by the referee 2, we have added introductory paragraph explaining steepest descent method (see the text after Eqs.(39-40)).

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12. We have clarified the number of size bins (7) used for modeling desert dust in GOCART.

13. Section 3.2. As suggested by the reviewer 2 we have clarified terminology (i.e. we have used suggested terms "test aerosol" and "synthetic measurements"). We have also clarified some settings of the transport model used in the inversion algorithm.

14. As recommended by the referee 2, we have specified the size bin used for the coarse mode aerosol. Also we added some discussion of retrieval convergence differences for retrieval of desert dust compare to the retrieval of fine aerosols.

15. In Section 3.3.2, we have added the discussion of the effect of subpixel cloud contamination on our retrieval results in Section 3.3.2 (as recommended by the referee 2).

16. As recommended by the reviewers 1 and 2 we have included (in Section 3.4.1) statements outlining the potential of including CALIPSO and APS data in global emission retrievals.

17. As recommended by the reviewer 2 we have included (in Section 3.4.1) brief discussion of the potential possibilities of retrieving of sub-daily aerosol emissions.

18. As suggested by reviewer 1, we have broken some long paragraphs (Section 3.2 and 3.3.) to several shorter parts.

19. We have added Appendix D: List of Acronyms and Abbreviations.

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Interactive comment on Atmos. Chem. Phys. Discuss., 7, 3629, 2007.

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