Atmos. Chem. Phys. Discuss., 6, S7373–S7375, 2007
www.atmos-chem-phys-discuss.net/6/S7373/2007/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Aerosol single-scattering albedo and asymmetry parameter from MFRSR observations during the ARM Aerosol IOP 2003" *by* E. I. Kassianov et al.

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Received and published: 29 March 2007

The authors would like to thank the referees for the constructive criticism. Their comments and suggestions are well taken. Below we provide our replies.

"Similar work has been done extensively in the past studies"
- Agree. The first paragraph (page 3) addressed this issue.

"I suggested authors to highlight the new idea or technique in the current method."
- The main objective of the paper is to increase the flexibility the MFRSR retrieval and better understand its strengths and weaknesses by performing additional sensitivity studies and/or independent measurements (Page 4, lines 2-5 from the bottom)

"The method is not well described."
- Paper is deeply revised. In particular, Figure 1 is extended; four new tables, two new figures and related text are added, two new Appendixes (A and B) are included. New section “Improved version of the MFRSR retrieval” is included as well.

"I have to first read K05 paper, which gives me confusions also. I don’t see how two parameters N and R can constrain the 3-mode size distribution? In total there are 9 unknowns."
- Our previous paper (K05) was not aimed to estimate 9 unknowns. We took observations at two wavelengths (415 and 870 nm) and estimated two parameters N and R only (please take a look at sections [13] and [16] from K05].

"In the current method, there are 4 unknowns for the size distribution, why the look-up speed is increased by factor of ten?"
- Since pre-calculated tables are used in the matching scheme, there is no need to calculate model aerosol optical depth (as function of 4 parameters) for each iteration. As a result, look-up tables speed-up (by a factor of 10) the aerosol retrieval. Explanation is added (page 6, line 7-9 from the bottom).

"Is your retrieval sensitive to the variance assumed? Some sensitivity analysis seems necessary"
- Great suggestion. Our retrieval is not sensitive to the variance assumed. Sensitivity analysis is included (Appendix B).

"The different combination of Nf, Rf, Nc and Rc can give the same agreement between the calculated and the observed spectral optical thickness."
- Agree.

"How do you avoid multiple solutions in the retrieval?"
- We expect that the size distributions derived from MFRSR data are plausible (page 7, lines 8-9 from the top).

ACPD
6, S7373–S7375, 2007

Interactive Comment

EGU

"Why in the paper, there are no comparison between your retrieved size distribution with those in situ observations?"
- Such comparison is added (Figure 3).

"Site these references and avoid 'may be'"
- Done. Page 8 (lines 1-5 from the bottom) and page 9 (lines 1-2 from the top).

Interactive comment on Atmos. Chem. Phys. Discuss., 6, 13367, 2006.