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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Characterisation of episodic aerosol types over the Australian continent" *by* Y. Qin and R. M. Mitchell

Anonymous Referee #2

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"Characterization of episodic aerosol types over the Australian continent"

Y. Qin and R. M. Mitchell

The paper presents the classification of Australian continental aerosol types resulting from episodes of enhanced source activity, such as smoke plumes and dust outbreaks. The classification is carried out via cluster analysis of microphysical properties obtained from inversion of sky radiance distributions at Australian aerosol ground stations using data obtained over the last decade. The cluster analysis distinguishes four significant classes, which are identified on the basis of their optical properties and provenance as determined by satellite imagery and back-trajectory analysis. The identified four classes are planed to use for enhancing performance of aerosol satellite remote sens-

ing and improving estimates aerosol radiative forcing over Australia. In my opinion the presented data analysis provides an important inside for better understanding of the optical aerosol properties of aerosol over Australia and supplies scientific community with useful extract of aerosol information that can greatly serve for improving assessments of climatic changes over Australia and globally. The paper is well written and clearly presented. Therefore I recommend the paper for the publication in the journal of Atmospheric Chemistry and Physics. At the same time, below I have written detailed comments with an intention to help the authors to identify possibilities for further improvements of the paper.

I RECOMMEND a minor (optional) revision for this paper before its publication.

Detailed comments:

1. I find the authors have conducted very convincing analysis of the AERONET retrievals over selected Australian sites. Nonetheless, I feel somewhat uncomfortable to accept the existence of the super absorptive class 3. I agree with the authors, that none of measurements or algorithm errors allowed in AERONET processing could cause such high error in the retrieved single scattering albedo that could explain such super absorption. I see only two reasons for this class appearance: (first) it is real or (second) it is caused by some unaccounted strong abnormalities in measurements or atmosphere. Under possible abnormalities I could assume any non aerosol phenomenon that could decrease the measured optical thickness. For example, I can think of strong miscalibration of sun-photometer sun channels, appearance of very fin homogenous (hard to detect) cirrus clouds, strong errors in modeling gaseous absorption or molecular scattering. The text of the paper suggests, that the authors have done substantial efforts for assuring the high quality of the presented results. Nevertheless, I encourage the authors to think of any possible unaccounted anomalies in the data and if they can find any slight sign of such anomalies to mention those possibilities in the discussion.

ACPD

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Interactive Comment

2. I find somewhat surprising the numeration the authors use for the classes: 0,1, 2, 3. Is there any good reason for not using 1,2,3,4?

3. (optional) I wonder if the authors aware that now AERONET also provides the rather accurate estimates of broad-band fluxes and radiative forcing calculated from the retrieved aerosol properties. I do not insist of using those products in this paper since the author have already made their own calculations, but they may consider some comparisons or use of this new AERONET product in future studies. The evaluation of AERONET fluxes can be, for example, found in the recent papers:

O. E. Garca A. M. Diaz,F. J. Exposito,J. P. Diaz, O. Dubovik, P. Dubuisson, J.-C. Roger, T. F. Eck„A. Sinyuk, Y. Derimian, E. G. Dutton, J. S. Schafer,B. N. Holben, and C. A. Garcia;Validation of AERONET estimates of atmospheric solar fluxes and aerosol radiative forcing by ground-based broadband measurements,8221;, J. Geo-phys. Res., 113, D21207, doi:10.1029/2008JD010211, 2008.

Derimian, Y., J. -F. Leon, O. Dubovik, I. Chiapello, D. Tanré, A. Sinyuk, F. Auriol, T. Podvin, G. Brogniez, and B. N. Holben,8221;Radiative properties of aerosol mixture observed during the dry season 2006 over M'Bour, Senegal (African Monsoon Multidisciplinary Analysis campaign)”, J. Geophys. Res., 113, D00C09, doi:10.1029/2008JD009904, 2008.

Interactive comment on Atmos. Chem. Phys. Discuss., 8, 18803, 2008.