**Atmospheric
Chemistry
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Discussions**

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

Y. Qin and R. M. Mitchell

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APCD 8, 18803-18842, 2008l Characterisation of episodic aerosol types over the Australian continent” by Y. Qin and R. M. Mitchell

Response to anonymous Referee #2

1. The reviewer is concerned that the class 3 or ‘super absorbing’ aerosol may arise from an instrumental artefact or non-aerosol atmospheric effect. The authors addressed the same issue during data analysis, and hence conducted additional tests as detailed in section 4.3, p.18816. In view of the reviewer’s concerns, we propose expanding this section slightly. In brief, we note that a. Instrumental artefacts such as calibration drifts cannot explain the low single scattering albedo of this class, since on several occasions class 3 inversions were seen to oc-

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cur on the same day as class 1 events. This raises the possibility, not covered in the discussion paper, that the single scattering albedo may be related to combustion conditions as well as fuel type. A note covering these points has been added to section 4.3. b. Thin cirrus contamination will tend to boost the coarse mode and reduce the Angstrom exponent, neither of which help explain the low single scatter albedo of the class 3 inversions. c. An error in gaseous absorption would lead to anomalous optical depths (or single scattering albedo) in specific channels. For example, the ozone correction at 670 nm is typically 0.01 in optical depth, about 0.001 at 440 nm, and negligible at 870 and 1020 nm. However there is no evidence of any anomaly at 670 nm. We do not correct for NO2 because typical optical depths are <0.002 at 380 and 440 nm and <0.001 at other wavelengths. d. In summary, while the source and characteristics of this aerosol require further investigation, we have been unable to find reasons to withhold the publication of this result. 2. The labelling of the classes from 0 to 3 was followed for consistency with the clustering algorithm in which the first class was labelled 0. We chose to adopt this convention in the paper to avoid possible confusion that could arise from carrying two different numbering systems. We accept that this convention is a little unusual. 3. Thanks for pointing out the radiative forcing results available through AERONET. We were aware of these, but assumed that they were unlikely to be representative of Australian conditions in terms of latitude and surface reflectance. We'll certainly pay closer attention to these in future.

Yi Qin and Ross Mitchell 26 February 2009

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