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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

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 #1

1. p18804, L4: accepted, changed "microphysical" to "optical"

2. p18808, L24-26: The value of 0.03 was taken from analysis of the aerosol climatology at Tinga Tingana, one of the sites used in the present paper, being prepared for separate publication (Mitchell et al 2008). This shows very low and stable aerosol optical depth during the months of May, June and July. For example, the June ten-year mean aod at 440nm is 0.027 with a standard deviation of 0.003. The threshold value of 0.2 was a compromise between retaining a high enough minimum aod to ensure

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that inversion errors do not become too large, and the need for as many inversions as possible to increase the statistical significance of the classification. The text in this section has been clarified to reflect this, with the insertion of the following sentence after P 18808, L3: "This choice increases the sample size to 4559 records, allowing better statistics in the classification, at the cost of increased uncertainty in the inversion. The increase is illustrated by calculating the relative uncertainty in single scattering albedo". The paragraph beginning on L 26 containing a reference to the unpublished result has been deleted.

3. The outliers and small clusters were eliminated because they could not be assigned to a statistically significant class. While there may be instances of unusual aerosol types there, the goal of this work was to identify significant groupings of aerosol type. It is also possible that uncertainties present in the inversion procedure play a role in these records. Removal of outliers seems to be necessary in aerosol classifications of this type as shown by the similar studies of Omar et al. (2005) and Levy et al. (2007); see text for citations.

4. p1809, L 21-25: The reasons for the parameter choices have been clarified by replacing the text on p 18810 L2-6 with "These parameters were chosen because they best combine a close relation to the measured radiance fields, with direct relevance to aerosol radiative forcing and satellite aerosol retrieval. Following preliminary analysis, the single scattering albedo ratio was included to discriminate between aerosol types with varying degrees of absorption in the blue spectral region."

5. P18811, L 11 and Table 3: Table 3 has been revised to include aerosol optical depth and asymmetry parameter. The accompanying text has also been revised.

6. P18811, L 11-13 and Table 3: Absolute spatial variability is now displayed in Table 3, and defined in the text. The significance of the generally low variability is mentioned (i.e., the applicability of the derived aerosol properties across widely separated parts of the continent).

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7. P18820, L21: Replace sentence with "The column water vapour loading was set to 4.2 g/cm2, typical of the dry season conditions over the tropical stations where the majority of the biomass burning episodes were recorded. A lower value would be more typical of the arid zone stations."

8. Table 5 amended accordingly, including change to figure caption .

9. P18822, L28- .Discussion of the relevance of this work to climate modelling in the Australian region has been added. Note that this includes an additional reference (Rotstayn eta al., 2009, Int. J. Climatol, submitted ms).

I will be happy to provide a revised manuscript when requested.

Ross Mitchell 2 December 2008

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