

Interactive comment on “The Climatology of Australian Aerosol” by Ross M. Mitchell et al.

Anonymous Referee #1

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This work on “The climatology of Australian Aerosol” is very useful and covers a very critical gap, thus aerosol long timeseries for the southern hemisphere are very rare. Authors had made a great effort to collect and organise long timeseries of aerosol optical depth, and this work would be very useful for the scientific community. A very important part of this work is the discussion on the uncertainties raised from the use of different instruments. Analysis on these timeseries included the calculation of climatological values, the spectral decomposition and the classification of stations accordingly. All the above provide a robust scientific approach to the dataset that provides substantial results for the community. Methods and tools used are generally presented in detail and this approach could be applied in other data-sets of comparable time periods.

Climatological tables are of great usefulness, for future works and reference. This is a very important work, in the interests of ACP journal and it should seriously be considered for publication, after some minor improvements.

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General comment: It is not clear how the stations is classified. It is only by figure 7 or it is primarily by the general climatology of each region. In 4.6 it is stated that “the grouping is based on figure 7”. In that case, in the paragraph of 4.2 that investigates the unclassified station, could not have statements as “Tenant Creek is clearly tropical station”. Even in case that geographical factors are considered, they should be indicated. Also, the discussion on 4.2 about the nature of each “unclassified” station, could not match up with the correlation found (table 7, discussion 4.7). Characteristics of each class is clearly stated only in the abstract section.

Section 2.1, line 20 page 6. “no statistically significant difference was found”. Please explain in detail, which statistical significant approach was used and present some results on that.

Section 3. Before describing the tools used for the analysis, it is important to mention the quality control procedures applied on the timeseries. On section 2, the differences on cloud screening algorithms among the two types of instruments, are mentioned. Also selection on which months are used in the statistics is described in section 2. Were there any other filtering criteria applied on the values?

Section 3.1, line 15, page 7. Interpolated intervals should be smaller than the frequencies that is examined, otherwise significant noise is added to the signal. It is not cleared which tests were performed by authors, but the confidence that no significant noise was added should be clarified.

Section 4.2- Figure 7. It is not clear how threshold values for the classification was selected. It is not clear why Rockhampton station is out of the Arid box (other than its coastal location). Could it have a similar to Adelaide behaviour due to dust transport? The same for Tennant creek, which is very close to the tropical box. I think a method to objectify threshold values is needed in order to strengthen the classification. Maybe to have a hybrid criterion using also cycles information from section 4.3, could be a more objective approach.

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Section 4.5. A useful addition could be a brief discussion on the four stations with statistical significant trends, and the nature of aerosols and emissions in their areas. Are all of them connected to AA emissions decline?

Figures 2-4. In cases of stations where statistical significant trends were recorded, these trends should be noted on timeseries plots also. Appendix, Climatological Tables: Angstrom exponent was calculated for different pairs of wavelengths at some stations. It should be noted on tables titles which pair was used on each station.

[Interactive comment on Atmos. Chem. Phys. Discuss., doi:10.5194/acp-2016-1021, 2017.](#)

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