

Interactive comment on “Long-term multi-source data analysis about the characteristics of aerosol optical properties and types over Australia” by Xingchuan Yang et al.

Anonymous Referee #1

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This study uses ground-based and satellite-based remote sensing observations, the re-analysis data, and the HYSPLIT transport model to fully investigate the spatiotemporal distributions of aerosol optical properties and major aerosol types, along with the vertical distribution of major aerosol types over Australia. Valuable and interesting results have been shown, particularly the spatial distributions of aerosol types and temporal variations of aerosol optical depths. These precious findings can help the science community better understand the aerosol characteristics over the Australia regions, which may be potentially used for improvement of both weather and climate models in future. The paper is well organized. I would recommend its acceptance for publication after a minor revision.

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General comments: Section 2.2 on pages 6-7. I would recommend the authors make a table to list the data information including the sources, time period, time resolution, and so on. Also, it is necessary and useful for authors to provide the accuracy of the observation data used in this study based on previous literatures.

Specific comments: Line 10, please spell out AERONET for this first time appearance Line 53, “There have been” should change to “There are” Line 54, Since the dry season is not clearly defined, I would suggest the authors directly show the months instead of using “dry season”, or they need define the dry season here. Line 63, please just keep one for “In addition” and “also”. Line 85-90, some references are needed. Line 92, “it” can be deleted. Line 95, “are exactly” should be “is exactly” Line 102-103, I would suggest mentioning the AOD source using “The uncertainty of the AOD from AERONET is ...” Line 111-112, “Levy et al. (2013) showed that the expected errors of the L2 MODIS AOD product are about $\pm(0.05+15\%)$ ”, it is the MODIS DT AOD, not the data used in this study (i.e., “Deep_Blue_Aerosol_Optical_Depth_550_Land_Best_Estimate”). Please delete this sentence and add the relevant reference. Line 121, “includes” should be “include” Line 124, “AODs” should be used instead of “AOD” Line 160, I wonder what method is used for the trend analysis in this research? Linear analysis? The authors need indicate which method was used. Line 169, “investigated” might be more suitable than “discussed” Line 172, “the size of aerosol particles” is more reasonable Line 188, “zone” should change to “zones” Line 208, “lead to” should be “led to” Line 254, “suggest” should change to “suggested” Line 269, “compared to other sites” should change to “compared to Birdsville” Line 270, delete “the” from “the their” Line 323, “are” should be “were” Line 344, “was” should be “were” Line 430, “is” should be “was” Page 43, Please enlarge the label in Figure 13(a) Page 44-45, “Seasalt” should be “Sea salt” in Figures 16 and 17