

Review report

The objective of the present study is the intercomparison of various spaceborne retrievals which are widely utilized in aerosol studies. The analysis has been performed at different spatial scales and for a long-term period thus increasing the robustness of the obtained findings. Nevertheless, the major weakness is that the interpretation of the results is poor without providing insight and sufficient answers about the potential reasons which can explain the apparent differences. More specifically, throughout the manuscript the authors are restricted just to a description of the figures which can be easily done by a reader without reading the text. Therefore, I strongly believe that the manuscript needs a major revision before it can be acceptable for publication in ACP. Below are listed my comments/questions which I hope will help the authors to improve their work.

1. Which version of the AERONET data is utilized?
2. You have to provide a better description of the satellite datasets (version, spatial resolution, temporal resolution, temporal availability, where these data are stored, literature etc.).
3. **Page 6 – Lines 177-179:** This sentence is confusing for me. Are you using monthly means or daily retrievals which are used in order to calculate the monthly averages? What do you mean “...with sufficiently high-quality...”? Are you applying any quality assurance flag or are you using the raw data as is?
4. **Page 6 – Lines 180-181:** Please rephrase this sentence.
5. **Figure 2:** I cannot understand why the comparison versus AERONET is made for the periods where each dataset is available and not for the common period (Table 2 and 3). In the scatterplots, the EE dashed lines are common for all satellite data. This is not correct since each satellite sensor has different uncertainty limits (which are not stated in the text).
6. **Page 8 – Lines 228-244:** Is there any interpretation for these results? The authors must consider previous evaluation analyses in their discussion.
7. **Section 4.2:** You have to repeat the analysis for EE using the corresponding limits for each satellite sensor. Moreover, you have to compare your results with other existing works.
8. **Section 5.1:** There are several points which must be discussed in Figure 7. For example, the differences among AATSR-ORAC, AATSR-SU, MODIS and SeaWiFS recorded across N. Africa. Likewise, in E. Asia, it seems that there is a strong diversity, in terms of AOD values, among the datasets. In AATSR-ORAC, there is an abrupt change of AODs between maritime and continental areas in the eastern tropical Atlantic Ocean as well as in the Arabian Sea. Finally, it would be useful to reproduce the maps by considering common points in all datasets

separately over land (exclude AATSR in order to have available observations over Sahara and in the Middle East) and sea.

- 9. Figure 9:** For the computation of the regional means based on the satellite observations are used all the grid cells of the domain of interest or only the pixels in which AERONET stations reside? Why there is an increasing trend for MODIS data in EAA as well as in EUR? On the contrary, in SAA the agreement between MODIS and AERONET improves gradually. Why this is happening?
- 10. Section 6.4:** Are your results in agreement with other similar studies? In the global map, there are clear signals over wide areas of the planet which are not discussed appropriately in the text. Which factors regulate (meteorology, emissions, teleconnections, land use, etc.) the obtained pattern?
- 11. Figure 1:** First of all, there are mistakes on the region names. Please correct the European Coast as well as the South Africa (it is not in Asia!). Which is the domain for the European Coast? Replace Atlantic Ocean with South Atlantic Ocean.
- 12. Figure 11:** Replace 2017 with 2010.
- 13. Page 3 – Lines 64-77:** In this part of the manuscript the authors are stating only studies representative for China. Satellite observations have been also used for other regions of the planet such as the Mediterranean, Europe, Atlantic Ocean etc.