**Atmospheric
Measurement
Techniques
Discussions**

Interactive comment on "Remote sensing of aerosols by using polarized, directional and spectral measurements within the A-Train: the PARASOL mission" *by* D. Tanré et al.

Anonymous Referee #1

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General comments:

This paper presents a review on the PARASOL retrieved aerosol. This manuscript provides a nice description of the PARASOL/POLDER mission, aerosol retrieval algorithms and their accuracy, spatio-temporal summay, and a little comparison. However, larger context such as technical parts including sensitivity and/or results of retrieval is somewhat absent. The aerosol retrieval from space is well-known and reported from the other references–please give detail information on polarized, directional, and spectral measurement technique. Also, more discussion on retrieval results to generalize aerosol properties (i.e. how frequent? at what geographical region? how important

compared to climatological aerosol loading from local sources?), this study would be more compelling. The paper can be improved from careful editing for language. I recommend that relatively major revisions have to be made in the paper before acceptance.

Some additional comments are included below.

Specific comments:

Abstract; Current abstract does not give a concise and it seems to be a part of introduction. The abstract has quite general explanations and lacks of explanation on new tehnique and findings. Please rewrite.

P2038, Line 2: The first aerosol remote sensing from space has reported in 1970 not 1980.

P2039, Line 8: 0.1-0.2um means effective radius?

P2039, Line 27: give a full name of PARASOL, MODIS. Hereinafter use an acronym throughout the text. Many are not converted.

P2040, Line 4: delete "( )"

P2040, Line 6: give a reference of Myriade series. What is CNES ?

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P2042, Line 8-10: rewrite "The present – demonstrated"

P2042, Line 14: the terms, AOD and AOT, are used together. Please choose only one term. "The spectral dependence of AOT"

P2042, Line 17: With its polarized and directional signatures from the POLDER,

P2043, Line 4: plane-parallel

P2043, Line 6: Ocean is not dark surface for shortwave visible bands.

P2044, Line 25: Apendix A. This is not the aerosol model but aerosol size distribution. Aerosol model must include size, refractive indices, and correlating light extinction, SSA, phase function, etc.

P2045, Line 2: the AOD derived from space needs validation with ground truth data.

P2045, Line 4: give a reference for each network campaign.

P2045, Line 8-10: Author mentioned that POLDER-AERONET comparisons were performed over ocean only. Considering AERONET sites are mainly located over land, how to do this comparison over ocean?

P2045, Validation: Author reviewed validation results from the former publications. If this study has not explain it's own validation results, the originality of this study is questionable.

P2046, Line 2: Basically, angstrom exponent (spectral slope of AOT) is not a function of absolute value of AOT. Why author used "Obviously"?

P2046, Line 13: what is the "several factors"? list them.

P2046, Line 28: remove "different" and "ocean or land" Remote sensing -> retrieval

P2047, Line 23: Fig. or Figure ?

P2048, Line 2: Sea-salt is a non-spherical particle over ocean. Any discussion on this?

P2048, Line 13-14: How can authors approve the absence of misinterpretation?

P2048 : Additional discussion on Asian dust outbreak is needed.

P2050, Line 3: How can derive LUT? Given a data flow chart, more detail explanation of retrieval procedure is appropriate.

P2050, Line 13: elevated UV-non absorbing aerosols (i.e. smoke or dust).

P2050, Line 27: single scale height of aerosol (2km) may not enough to derive elevated

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aerosols.

P2051, Line 2: red and NIR channels (or bands) P2051, Line 3: blue channel (or band)

P2051, Line 26: I agree to unknown retrieval accuracy in smaller AOT regime. However, error in the small AOT range is negligible if the error is not relative but absolute value.

P2053, Line 16-19: The sentence "It is the $\sim$ as PARASOL" is confusing, please elaborate it.

P2053, Line 20: Discrepancies among the three different CTPs are not $\sim$.

Figre 1. The figures are too small to see anything useful. I suggest reduce the number of figures and increase their size to illustrate a specific point. For example, showing four different seasonal mean AOTs is useful to support author's explanation on text.

Figre 4(a). This figure is the same as Fig 20 of Dubovik (2011). Who has originality of this figure?

References: Torres et al (2002) and Waquet et al (2010) are listed but are not cited in the text.

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