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Comment on acp-2020-1155

Anonymous Referee #2

Referee comment on "Aerosol optical properties derived from POLDER-3/PARASOL (2005–2013) over the Western Mediterranean Sea – Part 2: Spatial distribution and temporal variability" by Isabelle Chiapello et al., Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2020-1155-RC2, 2021

This paper describes the spatiotemporal aerosol distribution over the Western Mediterranean (hereafter: WM), based on 8.5-year (2005-2013) POLDER-3/PARASOL aerosol data records. Namely, the total, fine, and coarse AOD at 865 nm, the Angström exponent (670/865 nm), and the spherical and non-spherical contribution of coarse mode AOD is explored. In addition, in order to further support the observed interannual variability of coarse mode AOD, the North Atlantic Oscillation trends have been investigated. The novelty of this work is that the POLDER-3/PARASOL aerosol products is used to study the WM. Having said that, however, the paper mainly confirms already known AOD-relevant patterns in the region.

While the paper is well written and understandable, the authors should definitely revisit the manuscript, try to shorten sections that are too descriptive and summarize better the key findings.

Thus, the following comments should be addressed prior to publication to ACP.

General comments:

- The authors have extrapolated the aerosol relevant parameters from 865 nm to 550 nm, a wavelength much more common in satellite retrievals. However, the discussion e.g., in lines 180-188 (and in general throughout the manuscript) would be more insightful if instead of comparing the known differences of these two wavelengths (e.g. higher AOD at shorter wavelength) the authors provided a comparison with other satellite based retrievals (literature based).
- The paper is too descriptive, and unnecessarily long in some parts (e.g. Sec. 3.3.2). Consider shortening some parts, avoid repetitions and draw meaningful comparisons (e.g. with previous studies).

Specific comments:

- The introduction should be extended, including major findings from previous studies in the study region.
- Discussion of Fig. S2 (lines 197-213) can be reduced.
- L 218-219: The authors should elaborate more on the two maxima observed.
- Fig. 7 is very difficult to read at its current form. The authors could consider moving this figure to the supplement, and include another visualization of the daily values in the main manuscript (e.g. histogram).
- A few typos, grammatical and syntactic mistakes need to be corrected.