

Atmos. Chem. Phys. Discuss., referee comment RC1
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Comment on **acp-2020-1155**

Anonymous Referee #1

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-RC1>, 2021

The paper investigates the spatial distribution and temporal evolution of aerosols over the western Mediterranean using the 8.5-year data record of POLDER-3/PARASOL aerosol relevant parameters like AOD, AOD fine and coarse fractions, the Angström exponent (AE), spherical and non-spherical fractions. On top of confirmation of known features (i.e. seasonality and geographical trends) the impact of NAO and AQ trends are also revealed. The paper is well written and constitutes a valuable, yet not unique in terms of new knowledge, contribution to know literature, also supplementing Formenti's paper that focused on the evaluation of the data set. The following comments could be taken into account before publication to ACP.

L 68-78: A brief literature review and basic comparison of the respective conditions met in the eastern part of the Mediterranean basin would be useful to highlight the particularities of this work.

L 170-175: The AE exponent has been traditionally used in the past as a proxy for particle size. Now that we are having the fine and coarse mode do you see any difference in the patterns observed? Is there any added value deriving from both types of information to justify their combined use? (a correlation map of AE with AOD_f and AOD_c might be interesting in this aspect.

L 185-188: You may also wish to see Hansson et al., (2021)
<https://doi.org/10.3390/atmos12040445>

L 215: If only common days are used in Figure 3, would there be any substantial change in the sub-regional comparison?

L 344: In Fig. 7 the y-scale does not allow for discriminating details in the time series. I would suggest an axis break so that the data populated lower part of the plots occupies more surface (like 60% or more).

L 399: Have you investigated to what extent do the trends in Fig .9 (AOD_f) might relate, in excess to global brightening, also to the economic crisis and the respective cutting

down of many anthropogenic activities in the region? Could the Barcelona case be used as a proxy to support this assumption and further delineate/decompose the trends? (see L 428-432)