

Aerosol characterization in the Subtropical Eastern North Atlantic region derived from long-term AERONET measurements

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Referee Report #RC1

The paper describes and summarizes the columnar aerosol optical characteristics of air masses passing over Tenerife island toward Europe in a long period, ranging from 2005 to 2020. The measurements, taken in the 4 sites located at different levels from the surface, allow a good characterization of the atmospheric layers. Although the paper doesn't present novel concepts or ideas, the produced results are very important for climate studies and also to understand how optical characteristics of air masses coming from Africa modifies during their passage toward Europe.

Authors: We acknowledge the referee's positive and constructive comments.

The analysis is well structured and clearly explained and the substantial conclusions are reached. The week part, on my opinion, is the section 3.3: Long-Term trends. The supplementary material contains not the trends but the time behavior of AOD -total, fine and coarse- at IZO (between 2005 and the end of 2020, please correct the caption) and AOD -total and coarse at SCO (between 2005 and the end of 2020, please correct the caption). The time behavior of AOD -fine is shown only in Figure 10, together with its trend. It would be better showing AOD -fine in the supplementary plot too. From the analysis it seems that only SCO shows a trend in AOD-fine. Would it be possible to analyze for both SCO and IZO what happen to the absorption capabilities (Absorption Aerosol optical Depth, or SSA) and refractive index? Is there any trend in these parameters in both the sites?

Authors: Thank you very much for your comments.

- The captions have been corrected.
- We have added the AOD -fine time series in the supplementary at SCO.

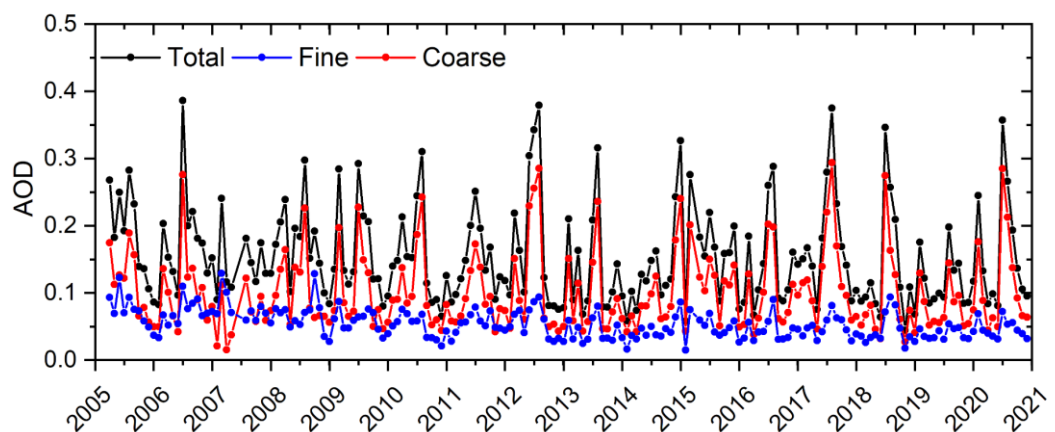


Figure S2.- Series of monthly mean values of total (black), fine (blue) and coarse-mode AOD (red) at SCO between 2006 and 2020.

- *We have not analysed the trends in the SSA and refractive index time series at SCO and IZO because we do not have enough data in Level 2.0 to do this study (SSA and refractive index at SCO: 293 days, SSA and refractive index at IZO: 45 days).*

I also have some minor corrections:

Abstract:

line 4: "this site is can ..." please correct;

Authors: *Done*

line 16: "and fine mode fraction <0.35" correct with " volume contribution of the fine mode fraction $V_f/V_t < 0.35$ "

Authors: *Done*

Introduction:

Line 50-51: state somewhere the site is Tenerife:

Authors: *We have added the following information in the text:*

*"In this study, we describe the long-term seasonal evolution of atmospheric aerosols by using AERONET observations at four different sites at different altitudes **in Tenerife**, in the Subtropical Eastern North Atlantic region."*

Line 56 define and provide a ref for "dust belt"

Authors: *The authors have provided in this sentence (Alonso-Pérez et al., 2007, 2011, 2012; Rodríguez et al., 2011; Cuevas et al., 2015) a suitable number of references for this "dust belt", as the region affected by the mineral dust transport from North Africa. These papers are able to define this region and also the marked seasonal evolution of the dust transport at these latitudes.*

Section 3.1:

Line 152 What about the minimum visible in May?

Authors: *We agree with this comment. We have changed the values included in the text as follows:*

*"SCO (Fig. 2 (a)) and LLO (Fig. 2 (c)) display low AOD_{500nm} values **in May (0.12 ± 0.09 at SCO and 0.09 ± 0.07 at LLO) and between October and February, with values of 0.12 ± 0.03 at SCO and 0.10 ± 0.03 at LLO."***