

## ***Interactive comment on “Optical, physical and chemical properties of aerosols transported to a coastal site in the Western Mediterranean: Focus on primary marine aerosols” by Marine Claeys et al.***

### **Anonymous Referee #1**

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#### General comments

The ground-based observations at the Ersa site, as part of the ChArMEx-ADRIMED campaign, were used for characterization of aerosol chemical, physical and optical properties and quantification of the short wave radiative forcing. The study focuses on marine aerosols, providing also the opportunity to compare the aforementioned properties for cases of dust originated and biomass burning transported particulates at the area. The role of aerosol ageing, in conjunction with the prevailing meteorological conditions (air masses origin and velocity), on size distribution and PMA sources was

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investigated. A significant variability of chemical composition was encountered for each one of the three periods, whereas the different types of aerosol was depicted on the size and optical/radiative properties. Additionally, the results are well interpreted and cross-referenced. I recommend this manuscript to be accepted for publication after considering the following comments and suggestions.

#### Specific comments

Despite the fact that the instrumental set up has been described in details, providing also information for calibration and quality control where necessary, it is not clear if the MAAP was sampling through a PM1 (P.5, l. 7) or PM2.5 (P.7, l. 9) inlet. This information could be addressed along with the first reference to MAAP (P.4, l.1-3).

Information about the levels of aerosol (and constituents) or other parameters variability is provided in several sections of the manuscript. The readers would easier read the manuscript if additional or adjusted plots were available. For example, a full description of PM1 and PM10 was provided at P. 7, l. 22-28. The addition of the TEOM PM10 and TEOM PM1 plot as part of Figure 2 or as supplementary material would be substantial. The reconstructed PM10 could also be included, since all these parameters are examined thoroughly in the manuscript (section 3.1). Also a description of AOD at 500 nm is described (P. 15, l. 1-5) related to Figure 12a presenting the AOD temporal variability during the campaign at 440 nm and 870 nm. These two wavelengths are useful for the demonstration of the spectral dependence; nevertheless the authors could consider including the AOD time series at 500 nm also and indicate the different color code in the caption of the figure.

In accordance with the previous comment, the means and standard deviation for each parameter concerning the total period could be added to the summary on Table 4.

A diurnal variability of AE for the second part (July) of the campaign was revealed under the impact of biomass burning (P. 17-18). Nevertheless, an explanation or references of similar variability are not provided. Were the factors controlling the observed diurnal

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pattern investigated?

Which is the contribution of nss-ions on the total ionic level overall and for each period independently? Increased nss-ions during dust and biomass burning comparatively to marine influenced period could be additionally used as indication for the presence of other sources at the site apart from marine.

P 14, l. 5: taking into account that the PMA is analyzed in that section it would be more appropriate to comment the low or high marine aerosol concentration instead of the presence or not of marine aerosol. Unless the comment refers to all periods.

Technical corrections

P. 5, l. 27-31: The information about the nephelometer is duplicated. It has already been described in pages 3-4. The comment about the scattering coefficient relation to aerosol size and concentration could be transferred in that point.

Figure 2: I would recommend to authors to check the plots a-k. Please pay attention on the caption and axis labels as well, especially for plots i-k. Namely: Plot i demonstrates very low wind speed. Under my opinion it is not valid. In P.10, l. 3-4 the authors refer that "At the Ersa site, during the dust outbreak, around 19 June, the wind speed reached  $15 \text{ m s}^{-1}$ ". Plot j is probably wind speed instead of wind dir (according also to figures 7 and 8, wind speed is up to  $20 \text{ m s}^{-1}$ ). Please indicate what is monitored in plot k. It seems to be wind dir. Furthermore, according to P.8, l. 23-24, BC highest concentration encountered on July 5 was equal to  $0.75 \mu\text{g m}^{-3}$ . Based on Figure 2g the maximum BC concentration was at the range of  $2.5 \mu\text{g m}^{-3}$  (same date) or BC is actually depicted in Figure 2h. Plots e and g seem to be the same.

Typing errors:

P. 13, l.6: in function instead of "in fonction"

P. 18, l.31: SW DRF at TOA is depicted in Figure 13 a, not b.

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