

# ***Interactive comment on “Aerosol optical, microphysical and radiative properties at three regional background insular sites in the western Mediterranean Basin” by M. Sicard et al.***

**Anonymous Referee #2**

Received and published: 15 February 2016

Summary: Authors don't understand what to put in figure captions. All caption lack details to allow the figures to be understood.

I'm am confused about what microphysical properties are analyzed. Typically, microphysical properties is measurement of the aerosol size distribution not just a fit of the size distribution.

Captions need to define what is given in the figure and text provide interpretation. Paper need to be revised to do this. Caption do not define what is in the figure and text contains some of this information.

Conclusion states that the frequency and intensity increases along the NE-SW axis;

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## Interactive comment

however, paper does not present anything that address if it is the frequency or intensity that gives the gradient. Why is it both, why not just one of the other.

Conclusion states that AOD and ARF annual cycles are well correlated. How could this be otherwise. AOD is major factor in ARF so they have to be correlated. How is this a conclusion of the paper. It just follows from the equation to calculate ARF.

Page 37, line 27. "This result" be direct and state what is being talked about. Do not understand this conclusion.

Paper does not define what is needed for gradient in the summer means? Seems to be a decrease along all three sites. Looking at 18 parameters, and getting 6 to show this seems to be just the result of luck. Most parameters are within the standard deviation. How unlikely is it to get this result be chance assuming the values are randomly distributed?

Paper states repeatably that gradient is related to higher frequency and intensity. It would be nice to know how frequency and intensity contribute. Is the northerly site frequency of dust events that is important and the intensity the same or is the frequency similar and intensity less?

Paper really lack data for a long-term climate average. There is only the last half of 2012 where all three sites have data. This is where the trends need to be computed from. Don't mix data from different time periods, the data set is not long enough. For example, on Page 38, line 18, states that "we have observed a homogeneous spatial distribution (except during the month of March and April) of the fine particle loads over the three sites". How is this possible, figure 2 indicates the there is no data in March for one of the sites. Hence, the data does not support the conclusions of the paper.

Paper lacks focus, tries to confuse the reader with a lot of plots that don't contribute to the paper's conclusions. I see nothing in the paper that is not better supported by other papers; hence nothing new.

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I would suggest just focusing on the time period when there is data from all three sites and determining to what extent frequency and intensity contributes to different in AOD for dust events. Another option is just focus on two sites and the time period of them sites. It is confusing to include both.

The Solar Radaitive forcing comparison should be in it's own paper.

The pyranometer measurements don't seem to be openly available. Also, none of the software used in the analysis is openly available. The lack of data and software make it impossible to reproduce results. Furthermore, the method used is not fully described.

Figures and Captions: Figure 2: y-axis labels should have same accuracy. Hence 1.0 and not 1. 'Year' text is way too small, likewise 1.82 text.

Figure 3: Month font is too small. Use solid circles. Give y-axis labels to same scale.

Figure 4: All fonts too small. Can't read or understand figure.

Figure 5: All fonts too small. Either the label or the units are wrong on the figure. It is either  $dV/dr$  [ $\mu\text{m}^3/\text{um}^{-2}$ ] or  $dV/d\ln r$  [ $\mu\text{m}^3$ ]. How are these volume size distribution determined? What months make up the season? How are the averages determined?

Figure 6: All fonts too small. Use same accuracy of the y-axis values.

Figure 7: All fonts too small. The values are wrong. Can't be a values up to 10,000, must be  $10^{-3}$  not  $10^3$ .

Figure 8 All fonts too small.

Figure 9 All fonts too small.

Figure 10 All fonts too small.

Figure 11 All fonts too small.

Figure 12 All fonts too small.

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## Detailed Comments:

Page 5, Line 22-23: Please don't use acronyms WMB, just spell out.

Page 6, Line 6-21: Delete, no point in just stating what will be talked about. Section headers handle this and a well organized paper.

Page 6, Line 26: Sites are not on a North-South axis. Seems that you would want sites close to the North African desert region and one far away.

Page 8, Line 9: Official reference to Web sites should be given instead of http references in the text.

Page 8, Line 11: Author really don't understand the data they are analyzing as evident by saying, "the wavelengths at which the almucantar scans are performed." Scans are not done at a wavelength. Filters are used to get these wavelengths.

Page 8, Line 16, define SZA.

Page 8, Line 16-18. These restriction to AOD above certain values need to be given in the caption of figures.

Page 11, Line 1-6. Good to label the Azores, Bay of Biscay and Gulf of Lion in figure 1. There is wet and dry scavenging. Not clear what is being talked about.

Page 11, Line 26: Space between value and km.

Page 13, Line 1: "by the same authors, found in the same range that those for other suburban sites in Spain, suggests an important regional contribution of such aerosols" Be direct, state authors name, the range, what "such aerosol"?

Page 13, Line 15: Where does this dust event frequency come from? Paragraph is out of place.

Page 13, Line 20: Captions need to define the figure and text provide interpretation. Paper need to be revised to do this. This line is just one example of material that need

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to be in caption not in the text.

Page 13, Line 25: Can't see annual cycle in figure only the maximum values. Not sure why figure 1 is included. Can just state time period of analysis. No point in figure. Remove or provide some reason for time series figure.

Page 14, Line 2-3: it would be nice to have some analysis showing exactly how often and how much less the intensity differences between the slights. Seem this is a major objective of the paper.

Page 14, Line 16-18: What years are these summer averages over. One site only had one year of data. Should not the comparison be for the same time periods. Also, with the large standard deviations, I don't see how you can say there is a gradient. Taking into account the standard deviations, the values are the same.

Page 14, Line 22: I don't see how there is a difference in the seasonal cycle. Need to provide standard deviations. Cycle look the same to me.

Page 15, Line 1-2: Don't see the clear gradient. Large standard deviations. Again, is this for the same time period or different.

Page 35, line 10: If data from all three sites are required for the gradient, why not just look at the summer of 2012 so the data is comparable. Why includes additional summer values for two of the sites?

Page 35, line 15-20: The parameters analyzed are not independent. SSA and RRI/IRI are related for example. The percentage of parameters that are intensive and extensive are not useful because the parameters are not independent. Also, none of the parameters show a gradient above the standard deviation of the measurements. I suggest that a randomly generated data set would give gradients by looking at parameters using this analysis.

Figures and Captions:

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comment

Figure 1: Figures are independent of text so all acronyms need to be defined. What is WMB? Define SW and NE. Give credit that this image was made using Google Earth.

Figure 2: N is number of points but for what? Define AOD and give what time period the measurement is over. Is it an instantaneous measurement or an average? Can only tell the maximum values from plot. Box-and-whisker plots for a week or month would give far more information. Easy to make plot that does not show much information.

Figure 3: Define acronyms. Monthly average of what time period measurements?

Figure 4: Define acronyms. Define better what the box-and-whisker represent. Minimum and maximum values are defined twice. Season in legend should start with capital letter.

Figure 5: Need to provide more caption information.

Figure 6: Don't understand what is the "Same as Figure 4:.. Finally, a acronym that is defined RRI, why define this one and not all the others. Where do these measurements come from? How are they determined?

Figure 7: Don't understand what is the "Same as Figure 4:.. Please just provide the information in the caption. Why confuse the reader?

Figure 8: More details to describe what is in the figure.

Figure 9: More details to describe what is in the figure.

Figure 10: Define what a data point is on this plot. How large of an area is the CERES data? What time duration of AERONET data.

Figure 11: Monthly data is given, not seasonal as stated in caption. Define acronyms. Again, how is the data determined?

Figure 12: Define what time period summer is. Define acronyms.

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Interactive comment on *Atmos. Chem. Phys. Discuss.*, doi:10.5194/acp-2015-823, 2016.

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