

Paper: acp-2015-823

Title: Aerosol optical, microphysical and radiative properties at three regional background insular sites in the western Mediterranean Basin

Authors: M. Sicard, R. Barragan, F. Dulac, L. Alados-Arboledas, and M. Mallet

Editor: Natascha Töpfer

Science Significance:

Scientific Quality:

Presentation Quality:

The Manuscript should be: Major Revision

Summary:

The latest version is a significant improvement over the first version. The authors did a lot of work on the revisions.

Page 1 Line 27-28: "AERONET solar radiative fluxes are validated .." AERONET does not measure solar radiative fluxes; hence, they can not be validated using other measurements. What the authors does is to use AERONET measurements to model radiative fluxes. Hence, it is closure study, not an instrument (measurement) validation. Page 23, line 6 indicates it is a AERONET model. Where is this AERONET model described? Did the author's write the model?

Page 2 Line 3-5: "The main drivers of the observed annual cycles .. dust outbreaks ... and pollution episodes in autumn". This statement is for all annual cycles so includes AOD. AOD fine peaks in July, pollution effects the fine mode, pollution is a source of aerosols, hence if pollution drives the annual cycle, the cycle should peak in the fall not in July. Therefore, this conclusion is clear incorrect.

Page 2 Line 4: States that there is a gradient in course more AOD away from Africa which is a source of dust. Dust aerosols are large and fall out, hence there should be a decrease away from the source. This conclusion is not new or surprising. Likely, the conclusion that fine mode is homogeneously distributed is not new.

The paper uses the term pollution and pollution event, for example, Table 2 caption. What is the definition of this term? Is it just $AE > 1$? Background aerosols have $AE > 1$ so I don't see how this alone can define pollution.

What the point of the "Short summary"? Just repeats the conclusions of the abstract.

The author's reply explaining the units on the particle volume size distribution (see for example Figure 5) is complete and misses the point. The point is that $dV/d\ln(r)$ should have units of μm^3 not $\mu\text{m}^3 \mu\text{m}^{-2}$ as given if this is a particle volume size distribution. What is given is the particle volume size distribution in THE ATMOSPHERIC COLUMN. Therefore the μm^{-2} normalization. The paper should clearly state that the parameter given is the particle volume size distribution in the atmospheric column or normalized by the atmospheric column. See note in Inversion document at

[https://www.google.com/url?](https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=0ahUKEwjko5q86fDMAhUQdIIKHWzmDXEQFgdMAA&url=http%3A%2F%2Faeronet.gsfc.nasa.gov%2Fnew_web%2FDocuments%2Finversions.pdf&usq=AFQjCNGWYjI8KbNGVX1nPPxbTCO2JTW4VQ&cad=rja)

[sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=0ahUKEwjko5q86fDMAhUQdIIKHWzmDXEQFgdMAA&url=http%3A%2F%2Faeronet.gsfc.nasa.gov%2Fnew_web%2FDocuments%2Finversions.pdf&usq=AFQjCNGWYjI8KbNGVX1nPPxbTCO2JTW4VQ&cad=rja](https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=0ahUKEwjko5q86fDMAhUQdIIKHWzmDXEQFgdMAA&url=http%3A%2F%2Faeronet.gsfc.nasa.gov%2Fnew_web%2FDocuments%2Finversions.pdf&usq=AFQjCNGWYjI8KbNGVX1nPPxbTCO2JTW4VQ&cad=rja)

The paper needs to provide references to data sets used. Such references give credit to the data set creators and enables others to repeat the project.

The paper needs to use present tense when discussing items that are first done (published) in this paper and past tense for items in previously published work. Author switches back and forth. For example, page 22 needs to be in present tense since this is new work.

Figures and Tables:

While more acronym are defined in the tables and figure caption, not are acronyms are defined, why? There is no reason to limit the length of a caption. The caption length has to be as long as necessary to explain what is giving in the figure/table. Seems the authors want to do enough to “get by” and not be complete. Please define all acronym in the captions.

Captions do not define what a point represents in the figures. Number of points is given but what makes up the point.

Detailed Comments:

Page 4: Line 16- I understand that many papers give an outline; however, just because other authors do this is not an explanation for why this paper choose to do it. Again I see no point in such an outline and the authors provide none expect that other authors do it. While not a major issue since the reader can skip the paragraph; hence, such paragraphs are acceptable but not good writing. Much better to clearly state the paper's objective. Paper states that analysis of AERONET is to done and that ChArMEx has a goal (objective) of improving knowledge of impacts of aerosols in the Mediterranean, exactly what knowledge does to paper aim to provide to improve this knowledge. For example, determine the frequency of “pollution” events? Paper needs a specific objective that should be stated. Much better to provide a exact objective instead of paper's organization.

Page 8 Line 8-22. Sentences that talk about what is done in this paper should be in present tense not past tense. Past tense is for talking about previously published work. With this paragraph mixing tense it is not clear what is in the previous paper and what is the method of this paper.

Page 11: Line 28-30. What is the “aerosol classification”. Is “dust” and “pollution” events being classified? The method sections does not provide a definition (method) for determine classifications. The method section presents how delta AE is calculated but not how delta AE is used to classify aerosol types.

Tables and Figures:

Table 1: The superscripts on the volume median radius and the volume concentration represent the fine (f) and course (c) modes so suggest caption text revised to “The superscripts of f and c indicate fine and coarse modes, respectively. State directly what is given in the caption instead of providing a title (summary of season variations), what is given is the Seasonal and annual means with standard deviations and number of hourly observations (given in parentheses). Typically, the number of observations is given after the mean and standard deviation; hence, please change tables to use this

convention. Stating the parameters directly in the caption eliminates the need for the '(N) Mean +/- label in the header, which is confusing since not sure what it applies to. What symbol is 'the particle volume size distribution'?