

**Decision and comments on ms. acp-2015-558 entitled “Mediterranean desert dust outbreaks and their vertical structure based on remote sensing data”, by A. Gkikas et al.**

By François Dulac, 17 March 2016

Thank you for your efforts in improving the initial version of your manuscript. I recommend that you submit a revised version considering the new comments made by referee #2 (see initial report #4), and the additional comments in my initial report that were not yet considered.

I share with this referee the feeling that a number of clarifications given in your reply letter in response to our comments on the initial version would be useful to the readers and need to appear in the paper itself. One example concerns your reply on the use of the cloud fraction (CF) test. The main text (line 342) still presents the use of this test as an improvement of the methodology, when your reply indicates that this filter is only performed for a sensitivity test. Please clarify.

I also believe an effort must be made on the structuration of the paper which is long, trying to decrease the number of sub-titles levels. I invite you to reconsider the referee and my own initial comments on the structure of the paper. For instance, I recommend that the methodological points that I listed in my initial report are not left in the results section. For instance what concerns AERONET can come in the description of AERONET data (e.g., derivation of AERONET AOD at 550 nm) or in a small additional paragraph at the end of section 3 (e.g., the detection of dust episodes with AERONET data). I also follow the referee suggestion to present first in section 4 the comparisons/“evaluation” of the algorithm before going to main results on the horizontal and vertical distribution of dust episodes. For this, I think that the section 4.2 would better come as a sub-section of present section 3 or make a distinct section (4) before the Results section (5) itself. Furthermore, I suggest to have two distinct main sections discussing results, a first one (5) made of the geographical distributions (present section 4.1) with 2 sub-sections on frequencies and intensities, and a second one (6) on the vertical distribution including present sub-sections 4.3 and 4.4, the last one being presented as a series of case studies without reference to PM in its title.

I also follow referee 2 on the fact that the PM stuff has no major input for the main purpose of this study and could be removed for shortening and better focusing the revised paper.

Results on the horizontal distribution need to appear in the abstract.

Other technical remarks:

- Fig.1 is almost identical to Fig. 2 published in the same journal by Gkikas et al. (2013). Please specify “(after Gkikas et al., 2013)” in the figure legend.
- Please check the systematic use of the italic style for abbreviations, especially SSA and AOD.
- add missing doi numbers in the reference list (especially verify J. Geophys. Res. papers).
- Abbreviate “Remote Sens. Lett.” in line 1189, “Ocean.” in line 1347, “Technol.” in lines 1400, 1463 and 1609, “Trans. Inst. Br. Geogr.” in lines 1433-1434, and “Adv. Meteorol.” in lines 1442-1443.
- Also check missing or incorrect journal name in the references Matthias et al., 2004 (“J. Geophys. Res.”), and Papayannis et al., 2014 (“Sci. Total Environ., 500-501,”...); check also the spelling of the 2nd author “Nicolae” in Papayannis et al., 2014).
- no italic in line 1521.