

Interactive comment on “African mineral dust sources: a combined analysis based on 3D dust aerosols distributions, winds and surface parameters” by Sophie Vandebussche and Martine De Mazière

Anonymous Referee #2

Received and published: 30 November 2017

The authors present the distribution of North African dust source regions from a combination of IASI measurements with information on winds, land cover, vegetation and soil moisture. The results are of interest to the scientific community but are presented in a poor way and with little reference to the wider field. The manuscript requires major revisions before it can be considered for publication in ACP.

Major issues

- It is not common to have sub-sections in the Introduction. I would also suggest

C1

to shorten the Introduction to the relevant information. The details presented in Section 1.3 could be moved to Section 2 where instruments and methods are being described. Also, please provide the details on MAPIR in the main text rather than the Appendix. I found it confusing to read about results without any description of the used algorithm.

- I suggest to find a better name for what you call "surface layer" right now to avoid confusion with the actual surface layer. The lowermost kilometer or lowermost layer would do.
- From reading Section 2.1.1 it is not clear what quality control measures are being used. Overall, this section is not very focused and could be shortened.
- Section 2.1.2 also is not very focused and does not provide crucial information: Which region is being compared? What is meant with best comparison statistics? What is meant with dust detection for CALIOP and IASI. Is it only based on AOT or would CALIOP, for instance, need to show dust or polluted dust in the feature mask? The information in Figures 1, 2 and 4 would be much better presented in a Table that gives the percentage of the respective detection. Altogether, it is not clear what value is provided by the comparison between MAPIR and CALIOP surface dust detection if it is not quantitative. It is my impression that the information provided in this section could easily be conveyed in a paragraph. Figures 3, 5 and 6 should be omitted or moved to the supplementary material.
- Section 2.2.1: Do you check in any way that the days of increased wind speed are the same as the days with MAPIR dust detection in the lowermost layer? Could there be a bias due to a mismatch of high-wind-speed days and dust days? Figure 7 seems unnecessary as your criterion is fulfilled throughout most of the study region.
- Figures 7 to 12 should be omitted or moved to the Appendix or the Supplement

C2

as they are hardly being referred to in the text, and thus, seem unnecessary. It would be better to go straight to the findings for the full time series rather than focusing on a single year.

- At some point in the paper, it would be good to provide an overview map of known dust sources (could be combined with the information in Fig. 13) and a discussion on how dust sources are being defined in dust transport models. This would then allow to compare these source locations to your findings and point out possible impacts of your work.
- I don't see the point of Section 3.1. The discussion doesn't seem to be within the scope of the paper. Also, not a single reference is being provided regarding circulation pattern over north Africa. I suggest to omit this section and the related Figures 15 to 17.
- Section 3.2 provides an overview of the dust sources. I am missing discussion of what makes those regions good dust sources. Also, a schematic map of the commonly known sources and new sources identified in this study would be good.

Minor issues

- please avoid colloquial language such as good agreement or good representation.
- page 2, line 1: I have heard of a semi-direct effect but not of semi-indirect ones.
- page 2, line 3: Do you mean the dust particles act as cloud condensation nuclei (CCN) and affect cloud droplets or as ice nucleating particles (INP) and affect cloud ice?
- page 2, lines 7-9: This paragraph could be omitted.

C3

- page 3, line 4: Replace first six words in line with Below
- page 4, line 13: change exploited to operated?
- page 14, lines 3-7: Please contact the authors to clarify instead of writing a speculative paragraph.
- page 22, line 18: What are FAO and IIASA?
- page 28, line 18: What is meant with a global study of that area?
- page 28, line 23/24: You are contradicting your own work and it would be worthwhile to investigate the effect of not accounting for soil type in your analysis.
- Author contributions: From the description it seems to me that S. Vandebussche should be the sole author of this paper. Supervision and reading a manuscript don't warrant co-authorship.

Interactive comment on Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2017-809>, 2017.

C4