

Interactive comment on “Detection of Saharan dust and biomass burning events using near real-time intensive aerosol optical properties in the northwestern Mediterranean” by M. Ealo et al.

Anonymous Referee #3

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The present paper propose to investigate the potential of detection of Saharan dust and biomass burning events at surface stations. The proposed set-up is based on optical measurements (scattering and absorption) made with multi wavelength nephelometer and aethalometer. More specifically the idea is to use the wavelength dependence of scattering and absorption of the aerosol as a function of their composition (i.e of their sources). The topic of the paper is really very interesting since the possibility of distinguishing the aerosol source and composition is a big challenge for air quality control also in relation with climate change. Moreover it can participate to improve our skills to exploit the data available at supersites that have been set-up in the last decade over Europe in the framework of infrastructure programs like ACTRIS. For these

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reasons, I think that this paper deserve to be published in ACP journal but some minor corrections and improvement are mandatory before publication. In general, i believe that a clear statement/summary about the possibility of detecting SDE and BB events is missing. What are the good conditions in which you can detect SDE event at the end? I have the impression that only almost “pure” SDE event are detectable and it is possible only at altitude/remote site. What is the best indicator to do that finally? I am not convince by SAE (a lot of overlap in scatter plots) and more by SSAE. This is the same for BB events. What are at the end the uncertainties and what do you propose to improve this? is the present instrumentation enough or is it mandatory to have additional instruments such like ACSM ? I also regret that you never present the global amount of aerosol to have an idea of the relative importance of the dust or BB aerosol.

I now detail other remarks following the order of the text:

Abstract

Line 18 : here and elsewhere, you never clearly define the “Angstöm matrix”.

Line 29 : at this stage FF has not been defined

This high number of acronym sometimes turn to madness, maybe it is useful to have somewhere the list of all acronym.

Introduction

Line 25 to 30 : I do not understand the logical link “as a consequence” between the two sentences and also I do understand the meaning of the following sentence “Given the huge ...”. I think that this part of the introduction as to be rephrase.

Line 12: Is Spain often having exceedances compare to other European countries ?

Chapter 3

P7 line 14 “assess”

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P7 line 19: Maybe you need to tell more about the results of Russel et al (2010).

Finally, and it is link to one of general remark, you would say that the methodology for SDE only works for altitude (very remote sites) ?

P8 line 7 "in this work" which one ? Minguillon et al ? then do no go to the line.

Chapter 5

P9 line 2 to 8 there is something confusing in these lines, you compare SAE at MSA (altitude) and MSY (near Barcelona) and you say that SAE is greater at MSA because it is often within the BDL but probably not as often as MSY I guess. In line 4 you have to give some elements about the fact that we have smaller and darker particles at mountain sites. Line 6-7-8 I do not understand your analysis, I do not know what is compared to what.

P9 line 9 : do you have an analysis to propose about relative SSA values at each sites ?

P9 line 17 : maybe define the "angstrom matrix" term.

P9 line 18 : I think you never define what is PM1-10 , even if I can guess it is better to define it .

P9 line 21: I would have prefer "situation" than "scenario"

P9 line 22-23 : the limits you are mentioning are not that clear, it seems to me that there is an important mixing of the different "scenario" even if some patterns are indeed emerging. It would interesting to have the statistics of the nb of points within the limits of SAE and AAE for SDE and also for other situations. A more quantitative way to evaluate this aspect.

P10 line 5-15 once more you are speaking of the fact that we have finer particles at mountains top for example for AA situations (you definitively have to explain why I think) and on the other hand you are saying that we also have finer particles during REG due

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to pollution. Is it meaning that we can not distinguish ? just PM concentrations help to decide this probably. You have to clarify the discussion and the objectives of the discussion

P10 line 7-8 what kind of aerosol concentrations are we speaking of?

P11 line 11-20 : the analysis of this episodes has to be reinforce. More than supposition, you must present facts of this recirculation event using meteorological information. You are speaking often of this case with strong conclusion then you have to give more evidence to readers.

P13 line 12 : also less VOC emissions during winter no ?

P13 line 4-7 : is there not a contradiction within this sentence ? I have the imprrsion you are saying one thing (low values of AAE during the day) and its contrary (increase of AAE during warmest hours of the day) . . .

P13 line 16 : "noted"

P15 line 3-5 : you suppose having less BB during night because of a thermal inversion above residual layer but is BB not also associated to domestic heating during colder hours i.e during the night which would imply that this BB would be trapped within the thin night BDL.

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