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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Variability of aerosol optical properties in the Western Mediterranean Basin" *by* M. Pandolfi et al.

Anonymous Referee #2

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General comments:

The paper presents one year of continuous scattering, backscattering, total particle number concentration and PM measurements, as well as, some aerosol properties derived, in northeaster Spain. The variability of these aerosol optical properties in the Western Mediterranean Basin is discussed by the air mass origin and by the regional transporting pollutants.

The topic of the paper is suitable for ACP, the results are interesting and logically interpreted and the manuscript is well written. Then, I can recommend the paper to be published in ACP.

Specific comments:

Abstract

- How SSA and Angstrom exponents were estimated should not be described in the abstract.

- MAAP instrument measures the absorption coefficient but no BC.

Section 2.2 – Measurements

- Page 14095, Line 24 – some references about the correction of the truncation errors should be included.

- From Page 14095, Line 25 to Page 14096, Line 22 – These sentences are very confused to understand the process to the data correction. The presentation should be improved and consider shortening it a bit.

- Page 14096, Lines 23:25 – Briefly explain why it is necessary to measure with a RH less than a certain threshold. Some references should be also included.

- Page 14097, Line 1 – MAAP measures the absorption coefficients and the BC is derived from MAAP data. But the authors talk about 'Black carbon (BC) mass concentrations at 637 nm was measured with MAAP,. . .'. It can cause confusion to the reader and therefore it should be corrected in the manuscript (abstract and diverse sections).

- Page 14097, Line 4 - information about the CPC model and about the D50 should be included.

- Page 14097, Lines 6:10 – the inlet description should be more detail (flows, Reynolds number, humidity control, etc).

Section 2.3 – Data processing

- Page 14098, Lines 1:20 – I have some troubles going through this section. It is very confused and should be improved. I would suggest the following structure but I leave this choice to the authors: begin with the explication about how the SSA is estimated

(from scat–neph and absor–MAAP). After that, discuss how BC is obtained from absor-MAAP and absorption cross section, which was estimated from absor–MAAP and the concentrations of EC in the collected PM10 filters. Finally, the improvement of the BC values obtained with respect on those derived from MAAP manufacturer can be described.

- Definitions of aerosol parameters. (backscattering fraction, scattering to back-scattering ratio, mass scattering cross section,. . .) should be described in this sections. A physical interpretation of each of them should be also discussed.

Section 3.1 – General features

- Page 14099, Lines 12:15 – Consider including a brief discussion of the skew-ness parameters obtained.

- Page 14101, Lines 14-16 – This sentence should be deleted. It was mentioned previously in Sect. 2.3.

- Page 14101, Lines 16:25 – Consider moving the relation between PM and Angstrom parameter to other better location.

- Page 14102, Lines 13-14 – The mean PM10 and PM1 concentrations, as well as PM2.5, should be indicated in Page 14101, Line 16. A brief comment about the comparison with other sites should be also mentioned (or at least some reference of previous studies in northeaster Spain).

- Page 14102, Lines 15:17 – In page 14096 Line 27, the measured detection limits of the nephelometer were exposed, being about 0.2 Mm-1. But In Fig. 5, if the measured extremely negative Angstrom exponents were due to instrumental noise, the detection limits look like about 10 mM-1. What could be the reason?

- Page 14103, Lines 8:9 – Some references should be included.

- Page 14103, Lines 20:24 – Some references about the process of adsorption of

SO2 and the formation of coarse SO42- could be included. Is it possible to include quantitative information on the reduction of SO2?

- Page 14104, Line 5 – “Mass” scattering cross sections for fine. . .

- Page 14104, Line 12 (Fig. 7) – About the frequency counts of aerosol scattering coefficients, I suggest to use the frequency in percentages. It is more visual.

- Since aerosol SSA depends on the absorbing part of the extinction and then on the chemical species, the mean aerosol mass concentrations and chemical species as a function of the observed SSA should be a goal to obtain in this manuscript. This new information should be included in conclusions accordingly.

References

- Pereira et al., 2010 has been published in 2011.

- Sciare et al., 2005 was published in ACP in 2005.

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 14091, 2011.