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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Advection patterns and aerosol optical and microphysical properties by AERONET over south-east Italy in the central Mediterranean" *by* M. Santese et al.

Anonymous Referee #3

Received and published: 10 January 2008

General

The paper presents an analysis of aerosol optical and microphysical properties, and advection patterns of aerosols over south-east Italy, making use of AERONET measurements.

The goal of the paper is important since aerosols are a major climate change agent and their climatic effect is largely determined by the analyzed properties. Moreover, the study region is located in the Mediterranean basin, which is a climatically sensitive area. Therefore, the findings of this study are interesting, for example the different characteristics that were found between the central and eastern Mediterranean. The

authors use a thorough analysis, sufficient aerosol parameters and robust statistics to achieve their aim. The scientific approach and the applied method are valid based on quality measurements.

The paper is worth to be published in ACP, but there are two points that have to addressed before, apart from some minor comments which are given below.

First, the study period may be problematic and affect the results, since it does not encompass two complete years. Specifically, it extends from March 2003 to October 2004. Given that aerosol properties have a seasonal dependence, this may affect the computed aerosol parameters whenever those are given on an annual basis. This problem should be addressed. It appears that Perrone et al. (2005) have performed such an analysis for the same region, and for a complete year (March 2003 to March 2004). So, the authors could rely on the findings of that study to address the above issue.

Second problem is the paper structure and length. I do not find the structure very attractive, especially the division of paper in sections using the different sectors as a criterion. The authors can actually follow the suggestion of the anonymous Referee 1. Besides, the length of the paper can be reduced by omitting repetitions throughout the text, while the number of Figures can be substantially decreased by combining Figures (see below).

Specific

Abstract

When referring to sectors, better name them based on their geographical spatial coverage rather than utilizing the symbols A, B, C and M, to which the reader is not familiar from the beginning.

1. Introduction

1. Page 16073, line 12: Replace 'classes' by 'types'.

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2. Page 16073, line 19: Delete 'of its'.

3. Page 16075, lines 19-20: The study period does not cover complete years (see general comment).

4. Page 16075, line 23: Replace '... Ionic ...' by '... Ionian ...'.

5. Page 16075, line 24: Replace '... Balkan peninsula ...' by '... western Balkan peninsula ...'.

2. AERONET sun/sky radiometer measurements and retrievals

1. Page 16076, line 12: How far from the coast is located the instrument (building)?

2. Page 16076, line 20: Please, provide uncertainties for AERONET aerosol parameters used in the study.

3. Aerosol source regions by 5-day backtrajectories

1. Page 16079, 2nd paragraph: Since sector A is associated, based on your results, with fine-mode aerosols, it should be justified why Middle-East, which is also found within the sector A and includes desert areas, does not contribute essentially.

2. Page 16079, lines 21, 24, 27: which levels exactly out of the four available?

3. Page 16080, lines 3-4: please, provide a few words on how sensitive can be the results on the selected criteria.

4. Page 16080, lines 17-18: The sentence is not clear, please explain better.

5. More information can be obtained by performing the analysis on a seasonal basis. Then, the unclassified cases would be probably reduced.

4. Aerosol properties and source regions

1. Page 16081, lines 22-24: Sentence 'Latter observation ... Sector A, B, and C' awkward.

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2. Page 16082, line 1: Replace 'Sector C and B, respectively.' by 'Sectors C and B, respectively.'.

3. Page 16082, line 25: the upper limit of the range 0.08-0.96 cannot be seen.

4. Page 16082, line 25, 'yearly': it is not correct to use the term 'yearly' since winter is missing.

5. Page 16083, lines 18-19, '... the contribution of fine-mode particles is larger for the aerosol affected by biomass burning particles': this is hardly seen in Fig. 10.

6. Page 16083, lines 19-26: you may want to provide yearly average SSA and g values for BB and not-BB cases (Figs. 11, 12).

7. Page 16085, lines 15-16: Replace the sentence 'In addition, these air masses ... burning aerosol' by 'In addition, during summer, these air masses are responsible for rather high aerosol loads (AOD $>$ 0.5) contributed by biomass burning aerosol'.

5. Sector B: aerosol parameter analysis

1. Page 16085, line 25, 'The larger contribution ...': larger with respect to what?

2. Page 16086, line 13: Please, explain what do you mean exactly by 'spheroid model'.

3. Page 16086, line 20, '55+/-13 sr': Table 1 reads '56+/-13 sr'; make these values consistent.

4. Page 16086, line 20: Replace 'Last results ...' by 'These results ...'.

5. Page 16086: In the discussion you refer to peak lidar ratio values, but you do not talk about its physical meaning.

6. Page 16087, line 10: Replace '... being south-east Italy more away from desert ...' by '... since south-east Italy is at a larger distance from desert ...'.

7. Page 16088, line 8: make the value '0.3+/-0.2' consistent with '0.27+/-0.2' given in Table 1.

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8. Page 16089, line 27: Replace '... area and the Mediterranean' by '... area in the Mediterranean'.

6. Summary and conclusion

1. Page 16091, line 24: Replace 'were used to ...' by 'were also used to ...'.

2. Page 16093, 2nd paragraph: the percentages make me to believe that they refer to the total number of classified measured data. Is this correct? If so, please correct the text making this clear.

References

1. Page 16096, line 18: Replace 'Hatzianzstassiou' by 'Hatzianastassiou'.

Tables

1. Page 16100, Table 1: why no large differences are seen in g and SSA values between the sectors (especially A and C)?

Figures

1. Figure 6 can be probably omitted.

2. Figure 9: Remove 'classes' from y-axis title.

3. You may combine Figures 10-11-12-13 and 14-15-16-17 as well.

Interactive comment on Atmos. Chem. Phys. Discuss., 7, 16071, 2007.

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