

Interactive comment on “Aerosols over Continental Portugal (1978–1993): their sources and an impact on the regional climate” by A. L. Morozova and I. A. Mironova

Anonymous Referee #1

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The manuscript by A. L. Morozova¹ and I. A. Mironova, “Aerosols over Continental Portugal (1978-1993): their sources and an impact on the regional climate” focuses on investigating variability of aerosol content (both absorbing and scattering UV radiation) over two sites in Continental Portugal in dependence on aerosol sources and their role in the local climate variations (variations of temperature, sunshine duration and precipitation over Portuguese regions) for the 1978-1993 period. The two study zones include: i) a urban region around Lisbon, one of the most urbanized and industrial sites in Portugal with a relevant anthropogenic influence, and ii) a mountain region, affected by the anthropogenic pollution in a lower degree but frequently exposed to

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forest fire smokes and dust events). The volcanic eruptions, dust events, wildfires and anthropogenic pollution are the aerosol sources considered. This study is based on a developed modern multiple regression technique.

The manuscript is well writing, well-structured and the subject is of interest to the scientific community. However, the following comments should be taken into account before publication:

Page 31010, line 17. Abstract: The most significant finding is the decrease of the daily temperature (and diurnal temperature range) related to the decrease of sunshine duration observed during the summer periods of increased content of the absorbing aerosols in the atmosphere. Is this a new finding or has been observed by other authors elsewhere? Indicate the main implications of this finding.

Page 31011, Line 26: “The detailed analysis of the properties and time variations of the Portuguese aerosols can be found in Pereira et al. (2005, 2008, 2011, 2012), Santos et al. (2008, 2013), Catry et al. (2009), Calvo et al. (2010), Obregón et al. (2012).” The study carried out by Calvo et al. (2010) is developed in Spain and not in Portugal.

Page 31012, Line 5: “The present paper is dedicated to understanding of the local aerosol sources and the role of the local aerosol content played in variations of the climate of the Continental Portugal region for the 1978–1993 period”. Do authors considerer volcanic emissions as a local source? Furthermore, this sentence should be rewritten; it is not clear.

Page 31012- 31013: from page 31013, line 5 to page 31013, line 16: this section should be shortened. Too much information is given here. For example, it is not necessary to mention all the data sources used, they have already been described in section 2.

Acronyms should be described the first time they appeared. For example TOMS is mention by the first time in page 31012, line 11 and their significance in reported in

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page 31013, line 19.

Authors describe the study zones in section 2.1. “Aerosol parameters”. However, I would recommend including a new section entitled “Study zones” with this information.

Page 31014, line 13: Replace “For each of two sites and for each of the months. . .” by “For each site and for each month. . .”

Page 31015, line 15: Replace “Not only spatial and temporal distributions of aerosols are very variable but also their origin as well” by “Not only spatial and temporal distributions of aerosols are very variable but also their origin”.

Page 31016, line 13: Bourassa and Robock (2012) should be Bourassa et al., (2012).

For SO₂ concentration estimation, authors calculate a mean value from five EMEP stations. Since EMEP stations are mainly background stations, how can this fact influence the conclusions obtained?

Figure captions included in the manuscript and in the supplementary information should be checked. Sometimes the information in the figure caption is already indicated in the figure. For example Fig. 2: Figure caption should be shortened. The information: “. . .gray bars show data related to the site ID 082; red-white crossed bars show data related to the site ID 288.” is already indicated in the figures.

Page 31020, line 2: “The annual values of the SO₂ content are shown in Fig. 2f. As one can see, there is a strong dependence between the variations of the <Alneg> (shown in Fig. 2b) and the SO₂ content”. Please, indicate the correlation coefficient in the text.

Page 31022, line 20: write a comma between “SDEs” and “the wildfires”

Page 31023, line 3: “To our mind, this is a result of the different pollution and circulation conditions over the sites.” Please, rewrite this sentence trying to clarify what authors want to say.

Page 31011, line 8 and page 31024, line 3: IPCC 2013, is not in the reference list

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Page 31027, lines 6- 19: Conclusions. The first paragraph is an abstract of the study carried out, it is not a conclusion. Authors can include an introduction sentence, but not 15 lines.

Supplementary Material

Supplementary material should be shortened, and repetition with the main manuscript should be avoided. Thus, for example, the description of both studied zones or the description of the parameters analyzed is included in the main manuscript

Reference list: Sato et al., 1993. Write a point at the end of the reference

You can realize that the most important studies regarding emissions from wildfires have been carried out by the research team of the University of Aveiro. So, you can also include some references from this team: Evtugina et al., (2013), Vicente et al. (2012, 2013) Alves et al. (2011).

References:

1. Evtugina M., Calvo A., Nunes T., Alves C., Fernandes P., Tarelho L., Vicente A., Pio C. (2013) VOC emissions of smouldering combustion from Mediterranean wildfires in central Portugal. *Atmospheric Environment*. 64, 339-348.
2. Vicente A., Alves C., Calvo A.I., Fernandes A.P., Nunes T., Monteiro C., Almeida S.M., Pio C. (2013) Emission factors and detailed chemical composition of smoke particles from the 2010 wildfire season. *Atmospheric Environment*. 71, 295-303.
3. Vicente A., Alves C., Monteiro C., Nunes T., Mirante F., Cerqueira M., Calvo A., Pio C. (2012) Organic speciation of aerosols from wildfires in central Portugal during summer 2009. *Atmospheric Environment*. 57, 186-196.
4. Alves C., Vicente A., Nunes T., Gonçalves C., Fernandes A.P., Mirante F., Tarelho L., Sanchez de la Campa A., Querol X., Caseiro A., Monteiro C., Evtugina M., Pio C. (2011) Summer 2009 wildfires in Portugal: emission of trace gases and aerosol composition. *Atmospheric Environment*. 45, 641-649.

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