

***Interactive comment on* “Long range and local air pollution: what can we learn from chemical speciation of particulate matter at paired sites?”** **by Marco Pandolfi et al.**

Anonymous Referee #1

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General Comments:

This manuscript deals with the evaluation of the relative contribution of rural and urban sources for the urban aerosol measured in 5 countries of Europe, by using PMF source apportionment of aerosol samples collected in parallel in rural and urban areas. The evaluation methodology and the results are interesting and the results merit to be published.

Unhappily the manuscript is not well written. It is too long and with several sections too descriptive, making the paper difficult to follow and repeating the reasoning and conclusions in various sections. The data has the problem of being taken from sev-

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eral research initiatives with methodologies of sampling, analysis and data treatment that are different, which makes more difficult to intercompare the results between the various European regions. For some of the sites and data the source apportionment results have already been published and it is not worthwhile to repeat the simple source apportionment results and discussion. There is also an important fraction of the text that mostly repeats the information that already is given in figures and tables.

In my opinion the present manuscript should concentrate and put most of the effort in the spatial increments using the Lenschow's approach to evaluate in each country the incremented contributions of urban areas in relation to regional contributions, of the aerosol mass and aerosol source groups. Sections such as Section 3.3 should be reduced and if possible integrated in the Spatial increments approach sections.

Specific Comments:

Line 28- Abstract- The Abstract is too long and too descriptive of results- reduce and concentrate in the more prominent outcomes from Spatial increment conclusions.

Line 133 and following- Quite different methodologies were used for calculating uncertainties in the data base used for PMF in each country. Which is the influence of these variable approaches in the uncertainty of the final results? This subject should be discussed in the manuscript. How were estimated the uncertainties for EC, OC and sugars?

Line 281 and following- The description of sampling sites characteristics is too long. Try to reduce the length of the text referring to other publications where these descriptions have already been done.

Line 413 and following- Most of the discussion presented here is repeated in the following sections.

Line 456- WISC (water insoluble carbon; sum of EC and WISC). ??- The second WISC shouldn't be WIOC (water insoluble organic carbon)?

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Line 491 and following- this subsection is difficult to follow because it is the result of previous studies and possibly not all information is provided here. For example “Cooking” can’t be characterised only by WISC and WSOC.

Line 543- Table 1- Why in Spain the “Sea Salt” source is not considered “Aged Sea Salt”? Even in Barcelona more than 50% of the CL- has already been evaporated and substituted by SO₄/NO₃-.

Lines 589-590- Did not understand the objective of this sentence.

Line 592- Here the theme of ship emissions of sulphur and primary sulphate is initiated. This interesting theme is discussed in various parts of the paper which makes difficult to fully understand the relative importance of the emission source. If Ship emissions are so relevant in Europe why PMF could not separate a ship emission source, at least for coastal areas?

Line 699 and following – Here and throughout the text Figures and Tables in the Annex Section are used in the discussion of results. In my opinion Figures and Tables in the Annex should exist only as complementary information. If these figures and Tables need to be used to follow a discussion and to demonstrate a statement in the text they have to be added to the main part of the paper.

Line 729- “showed” instead of “slowed”?

Line 782 and following- Some information should be provided about the precision/accuracy of urban and regional estimations of aerosol mass and source classes.

Line 815 and following.- In the paper the word “increment” is used both for urban and regional/continental contributions to the aerosol. The use of the term for R+C is somehow confusing (increment in relation to what?). Substitute by contribution?

Lines 950-960- SSA does not need the NH₃ in order to be high! NH₃ merely neutralises the already formed sulphuric acid.

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Interactive comment on Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2019-493>, 2019.

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