

Atmos. Chem. Phys. Discuss., author comment AC2
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Reply on RC1

Ranjeet S. Sokhi et al.

Author comment on "Advances in air quality research – current and emerging challenges"
by Ranjeet S. Sokhi et al., Atmos. Chem. Phys. Discuss.,
<https://doi.org/10.5194/acp-2021-581-AC2>, 2021

This manuscript presents a deep and extensive review of the research and developments that have emerged during approximately the last decade with respect to 'Advances in Air Quality Research'.

All topics considered are appropriate, timely and well targeted.

The document addresses relevant scientific questions, its content represents a successful review of the key elements of the subject under consideration.

The manuscript correctly presents the review of ideas, tools and data.

The conclusions are timely and substantial.

The analysis carried out clearly supports supporting the interpretations and conclusions.

The authors give appropriate credit to the related work.

The title clearly reflects the content of the article.

The abstract presented is a concise and complete summary.

The language is precise and correct, although there are sections that are difficult to read.

The number and quality of the references, in general, are adequate and reflect well the review carried out.

AC - We are grateful to the Reviewer for his/her kind words and appreciation of quality of the review manuscript.

The document really represents an in-depth review of the state of the art, especially those developed in Europe. But it is too long, there are certain topics that are treated, and this is indicated in the text, several times. It is considered that a revision of the text would be necessary to make it more compact. Despite its interest and the good structure of the different sections, its length makes its reading really hard and heavy, resulting in its loss of interest.

AC – We thank the Reviewer for his/her reflections on the length of the manuscript. Firstly, given the depth and breadth of the review we are of the view that the length is appropriate and it will be difficult to reduce the length of the paper without curtailing the depth of the review. Secondly, we have very carefully selected only the most relevant and upcoming subtopics of air quality research and omitting any one of these or further reducing the critical analysis, will inevitably lead to diluted conclusions or will weaken the evidence that support the final recommendations. Thirdly, the review has been structured so that each section is self-contained. This has the advantage that readers have the option to select sections that are most relevant to their interests. Reviewer 2 also has commented that there not 'many repetitions that can be reduced to make the manuscript shorter'. In conclusion, we ask the editors to keep the length of the manuscript as it is for the reasons given above. If, however, the editors wish us to reduce the length we will abide by their decision with the proviso listed above.

line 80. The manuscript should be updated in reference to the new WHO '2021 guideline values.

AC – We have made reference to the updated WHO 2021 air quality guidelines in lines 88-90.

line 225, what is indicated is totally opportune, it could be complemented by the following references.

- WHO, 2006. Health risks of particulate matter from long-range transboundary air pollution. 113 pp. World Health Organization http://www.euro.who.int/__data/assets/pdf_file/0006/78657/E88189.pdf.
- Lenschow, P., Abraham, H.-J., Kutzner, K., Lutz, M., PreuB, J.-D., Reichenbicher, W., 2001. Some ideas about the sources of PM10. *Atmos. Environ.* 35 (1), S23-S33. [doi.org/10.1016/S1352-2310\(01\)00122-4](https://doi.org/10.1016/S1352-2310(01)00122-4) (2001).
- Baldasano J.M. (2020) COVID-19 lockdown effects on air quality by NO2 in the cities of Barcelona and Madrid (Spain). *Science of the Total Environment*, STOTEN-140353 doi.org/10.1016/j.scitotenv.2020.140353

AC – We welcome the suggestions from the reviewer however, we feel that the first two are very old and not representative of the current state of the art. We have added the reference of EEA 2020c which describes the long-range air pollution contributions and is up to date (see line 226 and Reference list). We have also included the third reference in line 2687 which is more relevant to support the discussion on air quality and covid in Section 9.5) on challenges related to pandemics.

Line 595. The reference on HERMES should be complemented with:

- Baldasano JM, LP Güereca, E. López, S. Gassó, P. Jiménez-Guerrero (2008) Development of a high resolution (1 km x 1 km, 1 h) emission model for Spain: the High-Resolute Resolution Modeling Emission System (HERMES). *Atmospheric Environment*, 42: 7215-7233 [doi: 10.1016/j.atmosenv.2008.07.026](https://doi.org/10.1016/j.atmosenv.2008.07.026)
- Guevara M., F. Martínez, G. Arévalo, S. Gassó, J.M. Baldasano (2013) Improved system for modeling Spanish emissions: HERMESv2.0. *Atmospheric Environment* 81: 209-221 [doi: 10.1016/j.atmosenv.2013.08.053](https://doi.org/10.1016/j.atmosenv.2013.08.053)

AC – We are grateful to the reviewer for alerting us to these publications. These references have been included in line 583 along with more up to date work.

Subfigures a) and b) of figure 1 should be in the absolute values of the pollutants emitted, not in relative%, since this would more clearly show the reduction effort made. Subfigure c) already relativizes the contribution of the different emission sources.

AC – As suggested by the Reviewer, we have made the changes to Figure 2 (a, b and c) as described below.

Figure 2. EU-28 emission trends in absolute and relative numbers for a) the main gaseous air pollutants, and b) particulate matter. Panel c) shows the share of EU emissions of the main pollutants by sector in 2018 (EEA, 2020c)

The entire References section and the corresponding citations in the text should be reviewed in detail. There are citations that are not included (eg Niemeyer 1960), others are not ordered correctly.

AC – We thank the Reviewer for alerting us to the issues on References. We have carefully examined all references and checked that they are cited and referenced properly.