

Atmos. Chem. Phys. Discuss., referee comment RC2
<https://doi.org/10.5194/acp-2021-456-RC2>, 2021
© Author(s) 2021. This work is distributed under
the Creative Commons Attribution 4.0 License.

Comment on acp-2021-456

Anonymous Referee #2

Referee comment on "Impact of the COVID-19 pandemic related to lockdown measures on tropospheric NO₂ columns over Île-de-France" by Andrea Pazmiño et al., Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2021-456-RC2>, 2021

Review of „Impact of COVID-19 pandemic related to lockdown measures on tropospheric NO₂ columns over Île-de-France" by A. Pazmiño et al.

In this manuscript, the authors report on an analysis of NO₂ measurements in and close to Paris during the first Covid related lockdown period in March – May 2020. Measurements from two SAOZ instruments as well as from several stations of the AIRPARIF are evaluated together with TROPOMI tropospheric column data. All measurements are filtered for wind directions when the background station is affected by pollution transport from Paris. Differences between the NO₂ levels during the lockdown and in earlier years during the same time are compared considering the long-term trend in NO₂ and large and consistent reductions were found in all data sets, in agreement with other studies.

The topic of the manuscript (effects of lockdown measures on atmospheric NO₂ levels) fits the scope of ACP. The manuscript is mostly well written and gives a clear description of the study with maybe a few more details needed on the methodology. The measurements reported and the analysis done is interesting and leads to reasonable results. However, there are two major questions that the authors need to answer convincingly before this study can be published.

Major comments

The main question to be answered is: What is new in this study? There have been hundreds of studies on Covid impacts on tropospheric NO₂, using all kinds of instrumentation, and several of them even cover in-situ and TROPOMI measurements over Paris. To make this manuscript relevant, it needs to add new information and conclusions on the existing knowledge, and to me, it was not really clear what the new aspect of this study is. Please make this very clear in the revised manuscript.

The second point I'm struggling with is the logic behind the choice of wind directions for the two groups of stations (Paris centre and background). If I have understood the approach right, situations are selected for which Guyancourt is downwind of Paris, but why is that a good choice? I would have understood a selection where such wind directions are excluded in order to contrast city and background values, but this is not what the authors did. I really fail to see what the authors are trying to achieve with this set-up. Please explain the motivation for this choice and what we can learn from this particular set-up.

Minor comments

Line 39: Not clear what these percentages refer to

Table 1: Please add a map with the locations for those not so familiar with the geography around Paris

Line 100: In the discussion of the TROPOMI NO₂, it would be good to also add a reference to van Geffen et al., 2020

Line 114: Typo Bawens

Line 132: The statement about 24-hour averages is contradicted on the next page and if used, it should be explained why as this is then a different sample than the SAOZ measurements which do not cover night observations.

Line 135: last => latest

Figure 1: I would suggest using the same range for x- and y-axis in the left panel, to include the 1:1 line, to use consistent colours for fitting line and points (green, blue, red) and to provide numerical values for slope and RMS

Figure 1: Why was the fit forced through zero – I could imagine that there is a higher NO₂ background in the city centre

Figure 1: Why is the correlation for SAOZ so much poorer than for the in-situ observations? I would have expected the opposite – columns should be more conserved during transport than surface values. Please discuss.

Line 197: bleu => blue

Line 228: Please provide more details on how the TROPOMI data were selected – which radius, which quality filter? How were the errors computed for TROPOMI and for SAOZ?

Figure 5: In some years, SAOZ observations in Guyancourt are higher, in some lower and sometimes they are very similar to those in Paris. Please discuss.

Figure 5: Why are uncertainties in 2020 so much smaller than in other years?

Line 273: What is meant by “reweighted least squares with the bi-square weighting function”?

Line 281: funding => finding

Table 2: Non => No

Line 321: I do not understand the reasoning about the lack of O₃ for conversion of NO to NO₂. While this may be the case close to large emission sources, I am not aware of a downward trend in O₃, which could explain a difference in trends. In addition, as NO_x emissions have reduced quite a lot over the last decade, this effect should be smaller now than 10 years ago. The similarity in trends at different altitudes of the Eiffel Tower is also not supporting the idea of slow conversion of NO to NO₂.