Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2020-166-RC2, 2020 © Author(s) 2020. This work is distributed under the Creative Commons Attribution 4.0 License.





Interactive comment

Interactive comment on "Measurement report: Statistical modelling of long-term atmospheric inorganic gaseous species trends within proximity of the pollution hotspot in South Africa" by Jan-Stefan Swartz et al.

## Anonymous Referee #2

Received and published: 12 May 2020

Swartz, J.-S., Van Zyl, P. G., Beukes, J. P., Galy-Lacaux, C., Ramandh, A., and Pienaar, J. J.: Measurement report: Statistical modelling of long-term atmospheric inorganic gaseous species trends within proximity of the pollution hotspot in South Africa, Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2020-166, in review, 2020

South African Highveld area is a heavily industrialized pollution hotspot with a significant regional impact and an area which demonstrates the impacts of growing urban population. There are only limited number of air pollution observations from this kind of areas, and long-term observations are even more scarce.



Discussion paper



The limitation of the method (observations) applied in this paper is the monthly time resolution, which prevents the use of the method on e.g. AQ observations required by the legislation. In addition, due to the regional circulation pattern, the applied measurement sites are often upwind of the most polluted region, so they do not necessarily represent the highest regional concentrations in the Highveld area, which is also clear when Figures A4 and A5 are compared with the maps in Figs 1 and 2.

As the manuscript is well-written and provides a rare data set with regional / global scientific importance, I recommend the publication of the manuscript, after the following minor issues are addressed.

1) Abstract: please provide some numeric values for average monthly SO2, NO2 and O3-concentrations observed.

2) One of the basic principles in ACP is the open-access data following FAIR principles. Please include the obligatory "Data availability" paragraph and provide the data, with necessary metadata, shown in Figures A1, A2 and A3. Extracting the data from these figures is in any case very straightforward process, so having it directly in numeric format will save some time for co-scientists using the dataset e.g. as ground-truth for remote sensing observations, or reference data for global models. If the data are not provided, please give a proper justification.

3) Please indicate AF, LT and SK sites in the figures A4 and A5, as this comparison provides information on regional significance of the observations (i.e. what are the concentrations at these sites compared to areas with highest concentrations in the area).

4) In several parts of the manuscript, results/trends are explained to be due to the changes in economy and/or population. Annual data on GDP, population and energy production is easily available on IEA and World Bank www-pages (and potentially also from Statistics South Africa). To support the explanations in the manuscript, please include a figure showing these three societal variables for the period 1995-2015, and

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refer to this figure in the text.

5) For clarity, if possible, please change color axes in Figs A4 and A5 to include less decimals

Interactive comment on Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2020-166, 2020.

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