

## ***Interactive comment on “Trends and trend reversal detection in two decades of tropospheric NO<sub>2</sub> satellite observations” by Aristeidis K. Georgoulas et al.***

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The manuscript “Trends and trend reversal detection in two decades of tropospheric NO<sub>2</sub> satellite observations” presents, in a well-written and well-developed manner, the analysis performed on a long term space-based tropospheric NO<sub>2</sub> dataset. A comprehensive discussion on how these satellite observations appear to follow closely the socio-economic factors that affect air quality levels is also given. The manuscript is a very good example of how scientific results should be presented, with a clear goal and a clear path towards the goal. The findings are significant and fit well in the topics covered by ACP. For a full length review [with both specific as well as wording comments]

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Discussion paper



please see attached annotated pdf.

In summary, I have three major suggestions to make to the authors which, I believe, will improve the visibility and dissemination of their findings greatly:

1. Consider my suggestions and alter the Figs as discussed in the annotated pdf, both in presentation style and also the choice of which findings to present [and where.]
2. Methodology Section: even though the authors mention that they chose to have the equations and such like in the appendix so that the text quickly enters the results section, I find it very hard to follow the methodology since it is a constant back and forth to the appendix and the supplement. I strongly suggest that they re-think this strategy, that they add the equations in the main text, and also include an example of how the GOME [for e.g.] VCD alters between the nominal and the corrected levels for the three corrected VCDs. The annual CFs [shown] may not be so important, especially since the authors simply give the plot without discussion, but for the reader [and potential user of this new dataset] it is important to see how the original satellite data are altered.
3. Methodology Section: I have a major concern regarding the methodology provided, which I am sure stems from the fact that the authors have not wished to increase their article in length by explaining in detail but I consider it paramount. Since they already work on monthly mean gridded data, i.e. on a 0.25x0.25 deg grd, how do they justify in post-correcting for the different pixel sizes of the original instantaneous measurements? isn't this correction already taken care of by the original gridding where "When averaging, the observations were weighted by the size of the overlapping surface defined by the pixel and the corresponding grid cell." [verbatim from page 4, line 22.]

Yours truly, MariLiza Koukoulis

Please also note the supplement to this comment:

<https://www.atmos-chem-phys-discuss.net/acp-2018-988/acp-2018-988-RC1-supplement.pdf>

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