

Interactive comment on “Impact of synthetic spaceborne NO₂ observations from the Sentinel-4 and Sentinel-5p platforms on tropospheric NO₂ analyses” by Renske Timmermans et al.

Anonymous Referee #1

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The submitted manuscript deals with the very timely issue of making the best possible use of new upcoming Sentinel satellite products related to air quality. I found the manuscript very clear, concise and informative. It is basically ready for publication on ACP, I only have a very few requests for clarification/improvement:

- Regarding the estimation of ground-based observational uncertainties, I wonder if this work could be useful: Thunis et al. "Model quality objectives based on measurement uncertainty. Part I: Ozone", *Atm. Env.* 79, November 2013, Pages 861-868.
- Models description in sec. 2.1 and 2.4: it would be useful to add information on the method/source of emission splitting/speciation, which is currently missing. E.g. how

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NO_x emissions are split in NO/NO₂ or other nitrogen compounds? How the total VOCs emissions are speciated and then lumped in the model specific chemical mechanism? Also the information on chemical mechanisms used would be a useful to be added.

- On the EnKF corrections: in sec. 2.5.2 are briefly explained the "parameters" that are optimized by the assimilation procedure. However, in the rest of the manuscript, only the correction to emissions is shortly discussed (Fig. 16 and related text). What about the other parameters, e.g. ozone deposition velocity and boundary conditions (or others)? A brief mention to these would be also informative.
- Fig. 13: I suggest to revise the lines in the figure for improved readability. Indeed, on print the black, blue and purple look quite similar. Perhaps adding also a variation to the line style (e.g. dashed, dotted, etc.) would help.

Interactive comment on Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2018-1360>, 2019.

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