

## ***Interactive comment on “Impact of synthetic spaceborne NO<sub>2</sub> observations from the Sentinel-4 and Sentinel-5p platforms on tropospheric NO<sub>2</sub> analyses” by Renske Timmermans et al.***

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Thank you for reviewing our paper, please find below our response to the comments

Anonymous Referee 2 - Note that the information provided about Sentinel-4 is still not at all clear or accurate in some aspects – it is referred to a satellite at one point when it is in-fact an instrument that will fly on the MTG-S platform. These issues need correction. Some recommendations are made below in the detailed comments.

Thank you for point this out to us, we have corrected the erroneous information, see reaction to detailed comments below.

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Detailed Comments 1) Page 2 Line 28: The nominal spatial resolution of GOME-2 is 40 (ALT) x 80 (ACT) km

Corrected.

2) Page 3 Line 5: information of -> information on

Corrected.

3) Page 3 Line 11: analyses -> analysis

Corrected.

4) Page 3 Line 18: Replace “will be followed up by the Sentinel-5 (S5) mission planned for launch in 2021.” -> will be followed by the Sentinel-5 (S5) mission to be flown on the EUMETSAT EPS-SG A satellite, planned for launch in 2022 (<https://www.eumetsat.int/website/home/Satellites/FutureSatellites/EUMETSATPolarSystemSecondGeneration/index.html>)

Corrected

5) Page 3 Line 21: insight on -> insight into

Corrected

6) Page 3 Line 22 & 23: “The satellite flies in an early afternoon sun-synchronous orbit with an equator crossing mean local solar time of 13:30 with a wide swath enabling” – the satellite does not have a wide swath, the instrument does. Please rephrase.

Rephrased. The satellite flies in an early afternoon sun-synchronous orbit with an equator crossing mean local solar time of 13:30 with a wide swath instrument enabling daily global coverage but limiting the temporal coverage to one or two daytime observations per day at mid-latitudes

7) Page 3 Lines 26-19: “The Ultra-violet/Visible/Near-Infrared (UVN) sounder as part of the Sentinel-4 (S4) mission on board the geostationary (GEO) Meteosat Third Generation Sounder (MTG-S) satellite (ESA, 2018a), with a planned

launch in 2021, will also provide similar resolution to TROPOMI, but with higher temporal resolution (hourly).” Should be replaced with “The Sentinel-4 mission (ESA, 2018a) is implemented as the Ultra-violet/Visible/Near-Infrared (UVN) sounder to be flown on the Meteosat Third Generation Sounder (MTG-S) satellite (<https://www.eumetsat.int/website/home/Satellites/FutureSatellites/MeteosatThirdGeneration/index.html>) with a planned launch in 2023. It will provide similar resolution to TROPOMI, but with higher hourly temporal resolution.”

Changed

8) Page 3 Line 14: overoptimistic -> overly optimistic

Corrected

9) Page 4 Line 27: influencing parameters for the observations -> parameters which influence the observations

Corrected

10) Page 5 Line 3: overoptimistic -> overly optimistic

Corrected

11) Page 5 Line 8: set-up -> set up

Changed

12) Page 5 Line 19: in accordance to -> in accordance with

Corrected

13) Page 6 Line 6: Sentinel-4 is not a satellite (see comment above). Please correct to be on-board the MTG-S satellite.

We have corrected it to: TROPOMI instrument on board the S5P satellite and the S4/UVN instrument on board the MTG-S satellite.

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14) Page 6 Line 8: wavelengths ranges -> wavelength ranges

Corrected

15) Page 6 Line 15: S4 orbit -> MTG-S orbit

Corrected

16) Page 6 Line 25: Sentinel-4 is not a satellite (see comment above). Please correct to be on-board the MTG-S satellite.

We have corrected it to: TROPOMI instrument on board the S5P satellite and the S4/UVN instrument on board the MTG-S satellite.

17) Page 6 Line 27: S4 orbit -> MTG-S orbit

Corrected

18) Page 6 Lines 29 & 30: Based on the location of the edges, we compute the coordinates of the individual observations assuming a spatial resolution of 7x7 km<sup>2</sup> at nadir for both instruments. This statement applies to S5P but not S4. There is no nadir for Sentinel-4. It is embarked on a geostationary platform (located in the equatorial plane) and the FOV is off nadir. The nominal resolution is 8 x 8 km at a nominal location within Europe. Please correct.

We have now focused the first part of the paragraph on S5p, to avoid the confusion, see also next comment.

19) Page 7 Line 1: "Note that normally the size of the footprints away from nadir increases roughly like 1/viewing angle." This should be clarified for Sentinel-4. This indeed is valid for Sentinel 5 and S4. We have added the following sentence: For S4 the viewing angle decreases with latitude, and pixels become stretched from roughly 7 km in north-south direction at 40N up to 25 km at 70N.

20) Page 8 Line 12: Please replace the Sentinel-4 and Sentinel-5 Mission Require-

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ments document with <https://sentinel.esa.int/documents/247904/2506504/Copernicus-Sentinels-4-and-5-Mission-Requirements-Traceability-Document.pdf>

Corrected

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

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