

Interactive comment on “Ground-based validation of the Copernicus Sentinel-5p TROPOMI NO₂ measurements with the NDACC ZSL-DOAS, MAX-DOAS and Pandonia global networks” by Tijl Verhoelst et al.

Anonymous Referee #1

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This paper thoroughly covers the various aspects of comparisons with both MAX-DOAS and Direct-Sun ground-based instruments. In addition, it discusses differences with a previous data set derived from OMI. All the algorithms are described or referenced. The paper is well written and easy to understand if some time is spent carefully reading through all the abbreviations. The figures and their meaning are clear. The paper will serve as a good reference paper for TROPOMI details in future science papers.

A consistent theme in the validation process is the underestimate of column NO₂ com-

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pared to ground-based measurements, both MAX-DOAS and direct sun. The main effect causing the differences is area averaging over the TROPOMI pixel compared to the very local observations from ground-based instruments. Agreement when pollution effects are small or zero is quite good because the stratospheric component of NO₂ is much more spatially homogeneous. The disagreement increases as the pollution level increases along with spatial inhomogeneity. In the present document, the authors treat the spatial averaging effect as uncertain. A comparison of TROPOMI with the larger OMI area averaging effect from its larger pixel size should be convincing. The paper should include a stronger statement about the effect of area averaging on ground-based validation of TROPOMI. Line 27: nitrates, which are Line 30: local national regulations limiting boundary Line 47: on a global scale Line 51: Onwards Line 109 processor versions to which this corresponds Line 294 the referenced site does not contain all the data that were used in this paper. This should be fixed

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