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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Evaluation of OMI operational standard NO_2 column retrievals using in situ and surface-based NO_2 observations" *by* L. N. Lamsal et al.

Anonymous Referee #3

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General comments:

This manuscript evaluates the OMI NO2 Standard Product using a variety of data sources, including aircraft, MAX-DOAS, and in-situ measurements and an emissions inventory, allowing a detailed evaluation of several of the factors that govern the uncertainties in the retrieval algorithm. They generally find good agreement between OMI observations and measurements and find that day-to-day variability in NO2 profiles largely influences the retrieved daily columns. Overall, I believe it is a strong and well-written paper that provides interesting new insights into the factors governing retrieval validation and accuracy, and feel that the manuscript is suitable for publication in ACP

after the following minor comments are addressed.

Specific comments:

While the use of different types of datasets (aircraft, in-situ, etc) for validation is clear, it is unclear how the data were chosen. It seems the authors intended to cover a variety of geographical regions and capture seasonal variation but I suggest further discussion of these choices and clearly stating throughout the document and perhaps also in the title that the conclusions were drawn from several specific regions and may not be representative elsewhere or under certain conditions given the limited spatial and temporal coverage.

It may be worth mentioning the updates to the standard product in Section 2.1 and elsewhere when comparing results to previous studies that used earlier versions of the standard product.

Please clarify whether all OMI cross-track pixels were used for comparisons.

Page 14531 Line 17-18: Please explain what is meant by "Day-to-day variations in aircraft NO2 shape factors are up to a factor of two".

Page 14532 Line 10-14: The author suggests that "inaccurate removal of stratospheric NO2 on July 2" may have contributed to the discrepancy between measurements but earlier provide an uncertainty of only 2E14 molecules/cm2 for the stratospheric subtraction step of the retrieval. I suggest omitting the reference to the stratospheric subtraction here.

Page 14543 Line 3-6 and Page 14545 Line 18-20: The author's discuss the importance of surface reflectivity and its potential influence on retrieved NO2 columns. I suggest mentioning results from previous studies that have attempted to reduce AMF uncertainties related to surface reflectivity.

Technical corrections:

Page 14523 Line 19-20: Is there a typo in “This study takes advantage of state-of-the-art NO2 measurement technique. . .”?

Page 14548 Line 23: Typo, should be SCIAMACHY

Interactive comment on Atmos. Chem. Phys. Discuss., 14, 14519, 2014.