Geophysical Research Abstracts
Vol. 15, EGU2013-5806, 2013
EGU General Assembly 2013

Evaluating the dependence of OMI NO_2 slant columns on retrieval settings

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Satellite observations of nitrogen dioxide (NO_2) in the atmosphere are widely used for both stratospheric and tropospheric applications. In particular in the troposphere, NO_2 observations can be used to infer NO_x emissions, their spatial distribution and their temporal changes. Depending on the application, data from different instruments (GOME, SCIAMACHY, OMI, GOME-2) can be used, either alone or in combination. A prerequisite for such multi-instrument applications is excellent consistency between the results from the individual sensors.

The best spatial resolution and coverage for tropospheric NO_2 retrievals is currently provided by the OMI instrument. While the usefulness of OMI NO_2 data has been demonstrated in many studies, and comparisons between OMI tropospheric columns and results from other sensors have been executed, so far relatively little attention has been paid to the consistency of the basic product, the NO_2 slant column.

In this study, NO_2 slant columns have been retrieved from OMI spectra using different spectral regions, fitting parameters and soft calibration assumptions. It is shown that the absolute values of the NO_2 slant columns have a considerable dependency on the details of the retrieval, with important implication for the interpretation of the results. By carefully choosing the settings, very good consistency can be found with the results from simultaneous GOME-2 retrievals, facilitating the combined use of these two data sets.