Geophysical Research Abstracts
Vol. 20, EGU2018-12435, 2018
EGU General Assembly 2018

High-resolution nitrogen dioxide retrievals from the Sentinel-5P TROPOMI sensor

Henk Eskes (1), Jos van Geffen (1), Folkert Boersma (1,2), Maarten Sneep (1), Mark ter Linden (3), Isabelle De Smedt (4), and Pepijn Veefkind (1)

(1) KNMI, R&D Satellite Observations, De Bilt, Netherlands (eskes@knmi.nl), (2) Wageningen University, Wageningen, The Netherlands, (3) Science and Technology Corporation, Delft, The Netherlands, (4) Royal Belgian Institute for Space Aeronomy (BIRA-IASB), Brussels, Belgium

The TROPOspheric Monitoring Instrument (TROPOMI) is a spectrometer measuring in the UV, visible, near-infrared and short-wave infrared, which allows the retrieval of trace gas species like O_3, NO_2, HCHO, SO_2, CO, CH4 and aerosol aspects like the aerosol index. The Copernicus Sentinel-5P satellite, with TROPOMI as payload, was succesfully launched on 13 October 2017. Operational data products are expected to become available after April 2018. TROPOMI has a full global coverage each day, but with a much improved resolution (3.5 x 7 km2) compared to the Ozone Monitoring Instrument (OMI) which is providing measurements since 2004. Because of the fine resolution, the TROPOMI observations are expected to be of great importance for estimating pollutant concentrations and emissions at the scale of smaller towns, individual power plants, wildfires and major infrastructures.

The Nitrogen Dioxide (NO_2) tropospheric columns are retrieved using an improved version of the OMI DOAS algorithm developed at KNMI (van Geffen et al., 2015) combined with an integrated modelling-retrieval-assimilation approach to derive the air-mass factors and to estimate the stratospheric column. This latter component is based on the TM5-MP chemistry-transport model operated at a resolution of 1x1 degree. Developments from the EU QA4ECV project (www.qa4ecv.eu) have been included in the retrieval software to ensure consistency with the datasets from this project. The near-real time NO_2 data will be available from the S5P operational processor at the German Aerospace Center (DLR). The off-line data product is produced at KNMI.

In our contribution we will summarize the components of the TROPOMI NO_2 retrieval. Our experiences with the TROPOMI observations during the E1 phase, comparisons with retrievals using the QDOAS software of BIRA, and a preliminary assessment of the quality of the NO_2 product will be discussed. Comparisons will be made with the OMI NO_2 retrievals and QA4ECV NO_2 products. Candidate future improvements to the operational algorithm will be indicated. The benefits of the high-resolution TROPOMI NO_2 observations for the monitoring of sources and air quality will be demonstrated.