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One year of Sentinel-5P TROPOMI nitrogen dioxide observations

Henk Eskes (1), Jos van Geffen (1), Folkert Boersma (1,2), Maarten Sneep (1), Mark ter Linden (3), Kai-Uwe Eichmann (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) Bremen University, Bremen, Germany

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 successfully launched on 13 October 2017. 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. Operational data products, including NO_2, have become available July 2018 (doi: 10.5270/S5P-s4ljg54).

The Nitrogen Dioxide (NO_2) tropospheric columns are retrieved using the DOAS algorithm 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, including OMI NO_2. More information can be found at http://www.tropomi.eu/data-products/nitrogen-dioxide.

In our contribution we will provide an overview of the TROPOMI NO_2 retrieval with a focus on recent developments and plans. An assessment of the quality of the NO_2 product will be provided, and the stability of the NO_2 product since launch will be reported. Comparisons will be presented with surface remote sensing observations (e.g. MAX-DOAS), the OMI QA4ECV NO_2 products, and with CAMS global and regional air quality models.

At the time of the EGU, TROPOMI will have accumulated a full year of nearly continuous observations (April 2018 - March 2019). The benefits of the high-resolution TROPOMI NO_2 observations for the monitoring of sources and air quality will be demonstrated.