



TROPOMI observations of HCHO and the comparison to GOME-2 satellite, ground based MAX-DOAS measurements and chemistry transport model simulations

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The TROPospheric Monitoring Instrument (TROPOMI) is a passive nadir-viewing satellite borne imaging spectrometer on board the Sentinel-5 Precursor (S5P) satellite which was launched on 13th October 2017. Compared to previous satellite instruments such as SCIAMACHY, GOME-2 and OMI, TROPOMI provides much higher spatial resolution with a ground pixel size of $\sim 25\text{km}^2$ ($3.5\text{km} \times 7\text{km}$) at nadir. The TROPOMI tropospheric formaldehyde (HCHO) operational retrieval algorithm has been developed to derive tropospheric vertical column densities (VCDs) of the TROPOMI formaldehyde (HCHO) level 2 product.

With the high resolution TROPOMI data we can compare satellite observations to other ground measurements and model simulations in a city scale for the first time. The operation TROPOMI tropospheric HCHO product is compared to the GOME2 observations. As TROPOMI and GOME2 are measuring at different time of the day, we used the results from chemistry transport model TM5 simulations to correct for the discrepancy caused by different overpass time of the satellites. The TROPOMI HCHO observations are also compared to ground based Multi-AXis Differential Optical Absorption Spectroscopy (MAX-DOAS) observations in Munich. In order to evaluate influences of a priori HCHO profiles in the satellite retrieval, MAX-DOAS observations HCHO vertical distribution were also used to recompute the air mass factors (AMFs) for satellite HCHO retrieval. In addition, we also compare TROPOMI observations to high resolution regional chemistry transport model simulations over the Munich and Augsburg areas in the Southern Germany.