Ozone in the Tropical Troposphere from Sentinel-5P TROPOMI data: CCD and CSL results

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The TROPOspheric Monitoring Instrument (TROPOMI), on board the Sentinel 5 precursor (S5p) satellite, was launched in October 2017. The TROPOMI instrument has high spatial resolution and daily coverage of the Earth. About two years of level 2 data (version 1.1.5/1.1.7) of ozone and cloud properties (fraction and height) are available. Using the OFFL GODFIT ozone and OCRA/ROCINN CRB cloud dataset, we derived tropical tropospheric ozone using the convective cloud differential method for tropical tropospheric column ozone (TTCO) [DU] and the cloud slicing method for upper tropospheric ozone volume mixing ratios (TUTO) [ppbv].

The CCD algorithm was optimized for TROPOMI with respect to the reference sector Above Cloud Column Ozone field (ACCO). It was adjusted in time and latitude space in order to reduce data gaps in the daily ACCO vectors. Also, daily total ozone maps were used to minimize the error in stratospheric ozone differences.

The CHOVA algorithm (Cloud Height induced Ozone Variation Analysis) was developed to fully exploit with the S5p instruments characteristics. A temporal sampling of cloud/ozone data is not necessary for the high amount of S5p measurements. The spatial sampling is 2° latitude/longitude grid boxes. CHOVA results are quality checked based on the statistical properties of cloud, ozone and retrieval parameters to exclude unreliable TUTO values.

Comparisons with ozone sondes show a good agreement for both methods taking into account the principal differences between a sonde point measurement and a satellite sampled mean value.

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