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Tropical Tropospheric Ozone from Sentinel-5P TROPOMI data: Synergy of CCD/CSL retrievals

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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 (versions up to 2.1.4) of OFFL GODFIT ozone and OCRA/ROCINN CRB (fraction and height) are available. Using these datasets, we derive tropical tropospheric ozone using the convective CCD cloud differential method for tropical tropospheric column ozone (TTCO) [DU] and the CSL 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) by adjusting it in time and latitude space in order to reduce data gaps in the daily ACCO vectors. Daily total ozone gridded data with a latitude/longitude resolution of $0.5^\circ/1^\circ$ are used to minimize the error from stratospheric ozone changes.

The CSL algorithm (CHOVA: Cloud Height induced Ozone Variation Analysis) was developed to fully exploit the S5p instruments characteristics. The data is spatially sampled to a 2° latitude/longitude grid. A temporal sampling of cloud/ozone data is not necessary anymore due to the high amount of S5p measurements. Comparisons with NASA/GSFC SHADOZ ozone sondes show good agreement (low bias and high dispersion) for both methods taking into account the principal differences between sonde point measurements and satellite sampled mean value. The CHOVA results from the pacific sector are now used as input for the CCD method to adjust the height dependent columns to a fixed pressure level.

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