



The Copernicus S5P Mission Performance Centre / Validation Data Analysis Facility for TROPOMI operational atmospheric data products

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Sentinel-5 Precursor (S5P), to be launched in 2017 as the first atmospheric composition satellite of the Copernicus programme, carries as payload the TROPOspheric Monitoring Instrument (TROPOMI) developed by The Netherlands in close cooperation with ESA. Designed to measure Earth radiance and solar irradiance in the ultraviolet, visible and near infrared, TROPOMI will provide Copernicus with observational data on atmospheric composition at unprecedented geographical resolution. The S5P Mission Performance Center (MPC) provides an operational service-based solution for various QA/QC tasks, including the validation of S5P Level-2 data products and the support to algorithm evolution. Those two tasks are to be accomplished by the MPC Validation Data Analysis Facility (VDAF), one MPC component developed and operated at BIRA-IASB with support from S[&]T and NILU. The routine validation to be ensured by VDAF is complemented by a list of validation AO projects carried out by ESA's S5P Validation Team (S5PVT), with whom interaction is essential.

Here we will introduce the general architecture of VDAF, its relation to the other MPC components, the generic and specific validation strategies applied for each of the official TROPOMI data products, and the expected output of the system. The S5P data products to be validated by VDAF are diverse: O₃ (vertical profile, total column, tropospheric column), NO₂ (total and tropospheric column), HCHO (tropospheric column), SO₂ (column), CO (column), CH₄ (column), aerosol layer height and clouds (fractional cover, cloud-top pressure and optical thickness). Starting from a generic validation protocol meeting community-agreed standards, a set of specific validation settings is associated with each data product, as well as the appropriate set of Fiducial Reference Measurements (FRM) to which it will be compared. VDAF collects FRMs from ESA's Validation Data Centre (EVDC) and from other sources (e.g., WMO's GAW, NDACC and TCCON). Data manipulations on satellite and FRM data (format conversion, filtering, co-location, regridding and vertical smoothing) are performed by the open source software HARP, while more specific manipulations apply in-house routines. The paper concludes with a short description of expected outputs of the system.