

The Copernicus S-5P Mission Performance Centre

Validation Data Analysis Facility for TROPOMI atmospheric data products

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Introduction

Sentinel-5 Precursor (S-5P), to be launched in August 2017 as part of the Copernicus programme, carries as unique payload TROPospheric Monitoring Instrument (TROPOMI). The S-5P Mission Performance Center (MPC) will ensure operational QA/QC of the S-5P L2 data products. Two MPC tasks, the geophysical validation of S-5P Level-2 data products and the verification of algorithm evolution, will be supported by the MPC Validation Data Analysis Facility (VDAF). This MPC component is developed at BIRA-IASB in collaboration with MPC partners and with support from s[&t] (server development) and NILU (FRM data provision).

Target data products

VDAF will provide operational validation of S-5P products over a selection of ground truthing stations.

- CO VCD
- CH₄ VCD
- SO₂ VCD
- HCHO trop VCD
- Cloud { fraction, height, albedo }
- Aerosol layer height
- NO₃ { profile, total VCD, trop VCD }
- NO₂ { total VCD, trop VCD }

Fiducial Reference Measurements (FRM)

S-5P validation is based on independent FRM data collected from monitoring networks (NDACC, TCCON, GAW...), with a central role played by ESA's Validation Data Centre (EVDC).

CAMS Atmosphere Monitoring Service

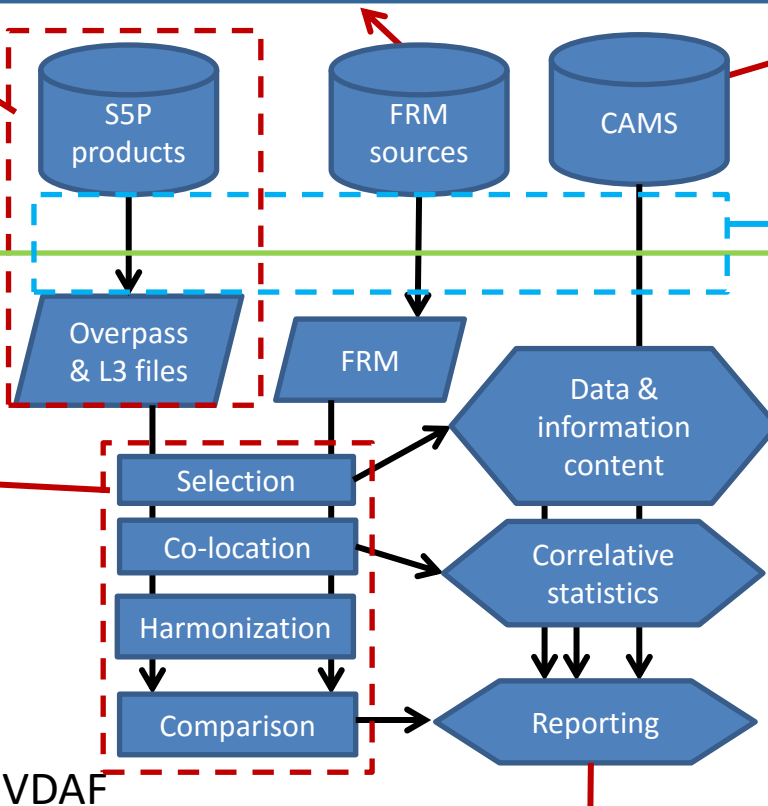
The Copernicus Atmospheric Monitoring Service at ECMWF will provide assimilated data for monitoring purposes.

File ingestion and formatting

The HARP toolset is used to ingest and transform the S-5P, FRM and CAMS data into a common data format.

Validation Protocol

The validation process follows the generic validation protocol in use by the QA4ECV, CCI and Multi-TASTE validation systems, from user requirements to reporting. *Specific* settings are tailored for each data product.



Data co-location and harmonization

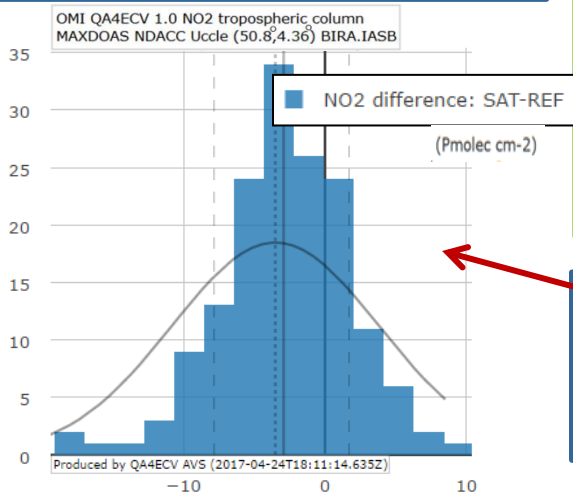
Several data manipulations of general nature (co-location, regridding, smoothing,...) are implemented using open source HARP tools, developed by S[&]T (<https://github.com/stcorp/harp>). Specialized and on-demand manipulations are done using *ad hoc* tools of the Multi-TASTE versatile validation system.

Reporting

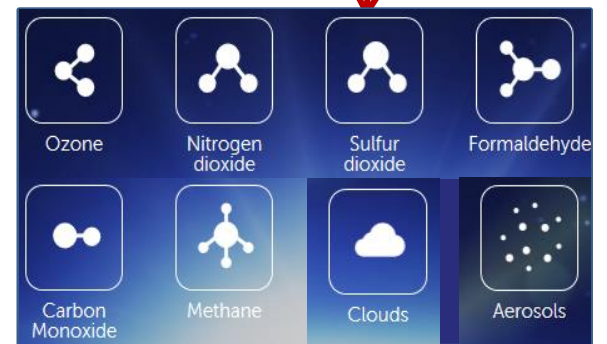
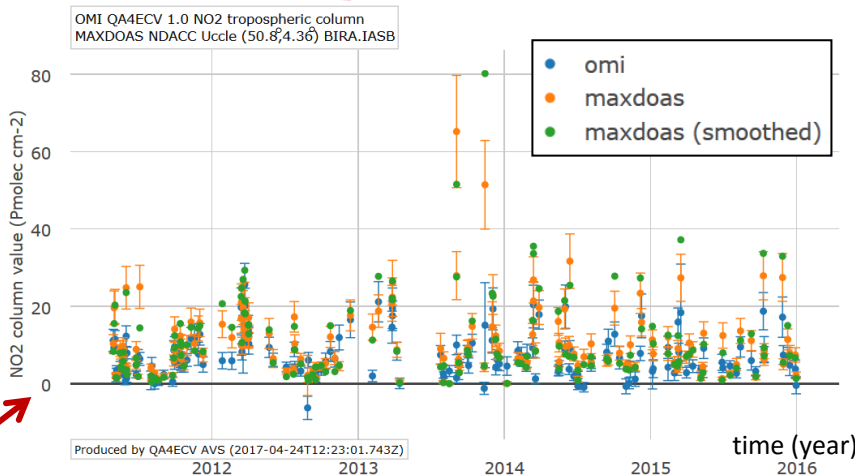
Reporting of validation results will be done through a near-real-time automated validation server and, after scientific analysis of the results, through dedicated pages of the VDAF website.

(i) NRT automated validation server

(ii) VDAF website



tropospheric NO2 column at Uccle



On the VDAF website, in-depth validation reports will be provided per data product on a regular basis.

Collaborative S-5P Validation activities

The operational work of VDAF is complemented by in-depth AO validation projects carried out by ESA's Sentinel-5 Precursor Validation Team (S5PVT).

Examples of dynamic plots taken from the on-line QA4ECV validation server (<http://qa4ecv-dev.stcorp.nl>, under development), a prototype of the VDAF NRT validation server.

Acknowledgement: MPC VDAF is co-funded by ESA MPC and by BELSPO/ProDEx TROVA.

See also:

Keppens, on S-5PVT CHEOPS-5p: EGU 2017 poster X4.257

Niemeijer, on HARP: EGU 2017 poster X4.256