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The S5P Product Algorithm Laboratory Helping to develop new L2 products

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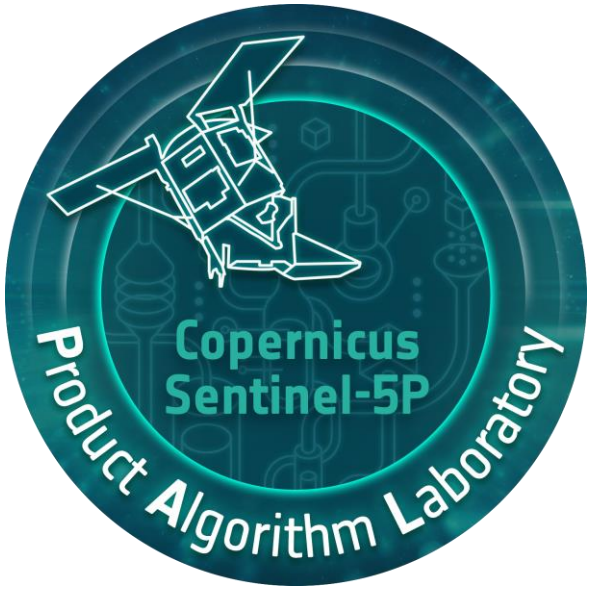
- **Service** for ESA/Copernicus by S[&]T
- Goal: Provide a service that **facilitates L2 processor developers to prepare their algorithm for operations**



- Link to **S5P+ Innovation** projects (targeted users of the service)
- Two innovation products as part of S5P-PAL contract
  - BrO (BIRA)
  - TCWV (DLR)

S5P-PAL

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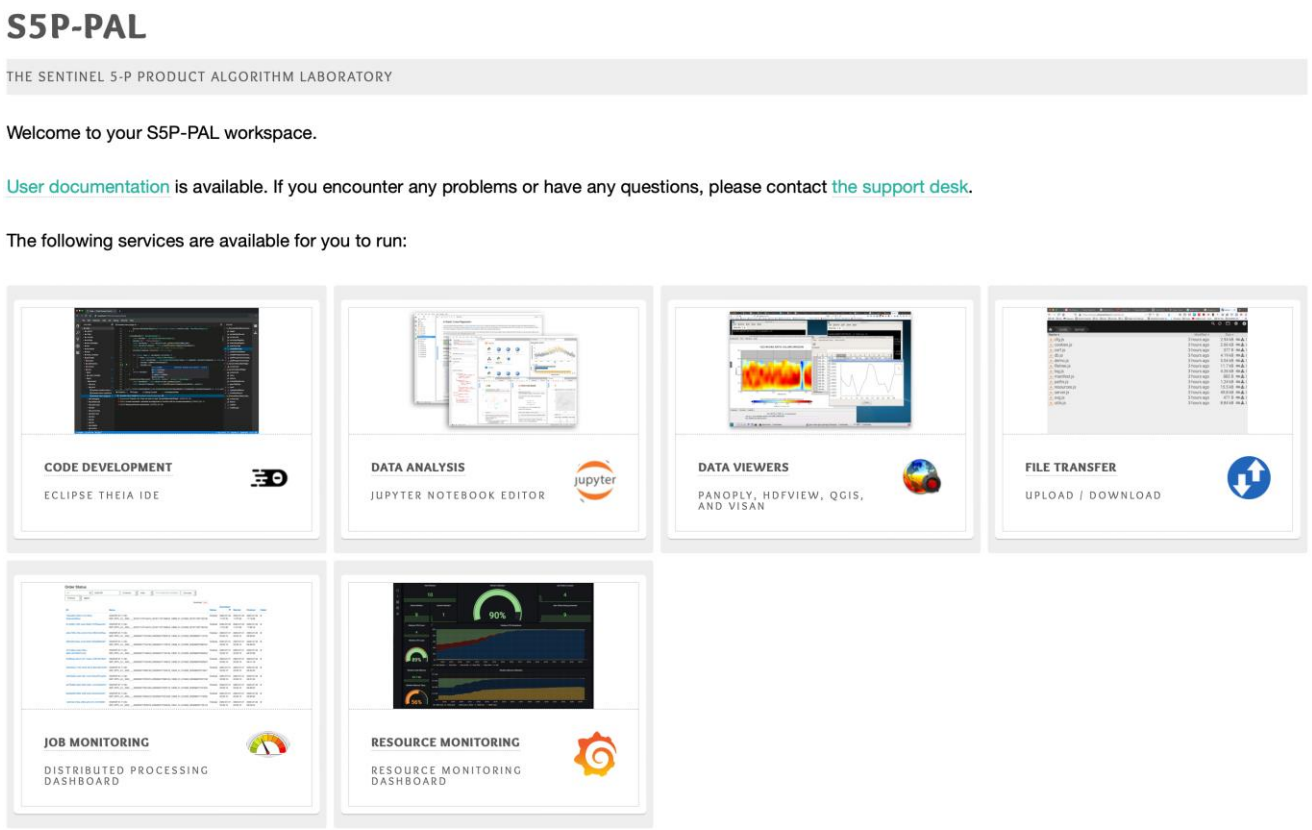
- **Cloud environment**
  - DIAS/Mundi
  - Private **workspace** area
  - Algorithm Execution Function for **large scale batch processing**
  - All S5P L1B+L2 already available
  - Host Aux and Validation data
- User support
- Processor Qualification



- Dec 2019 – Dec 2021

S5P-PAL – Mapping Portal

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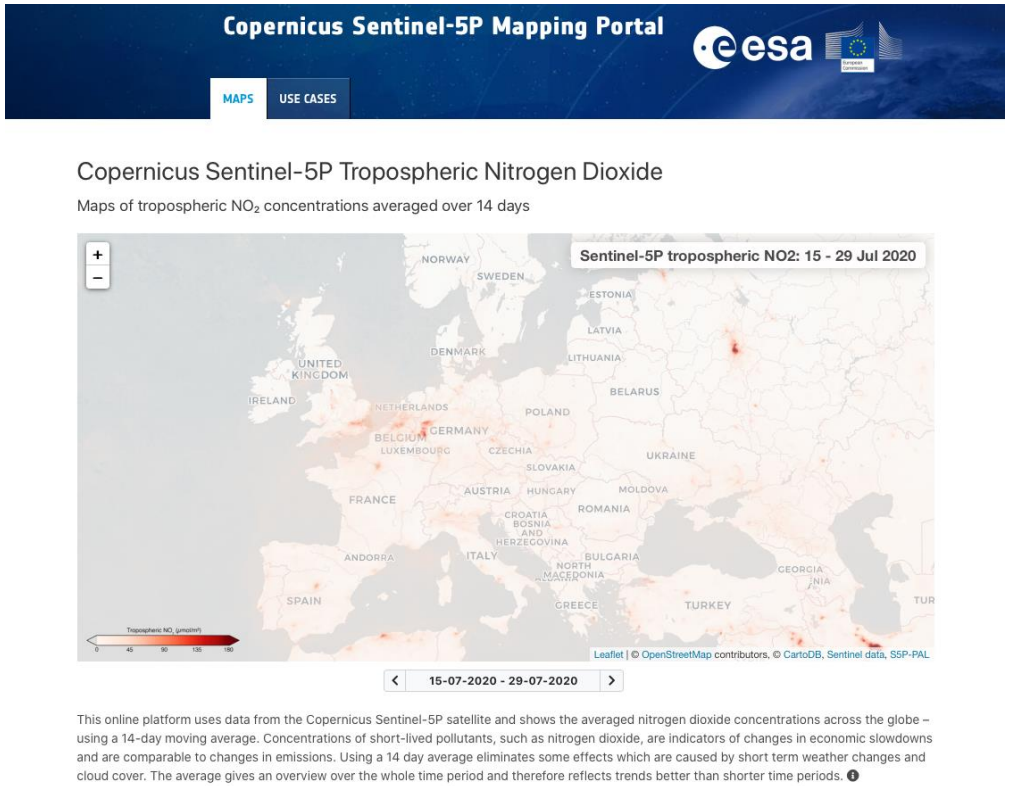
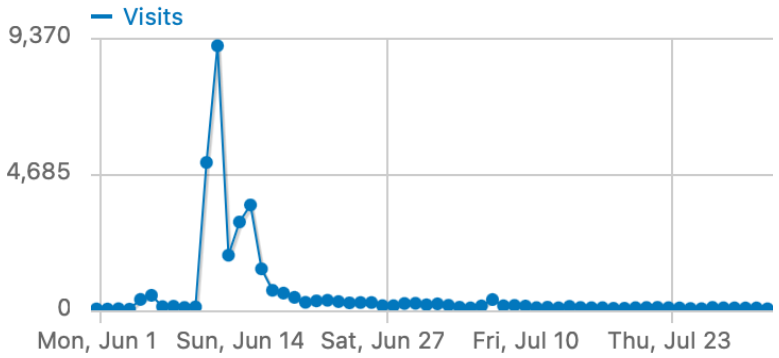
May 2020 (during Phase-In)

Need for up-to-date S5P NO2 visualizations for COVID impact analysis



https://maps.s5p-pal.com/



Used in RACE-Dashboard
https://race.esa.int/

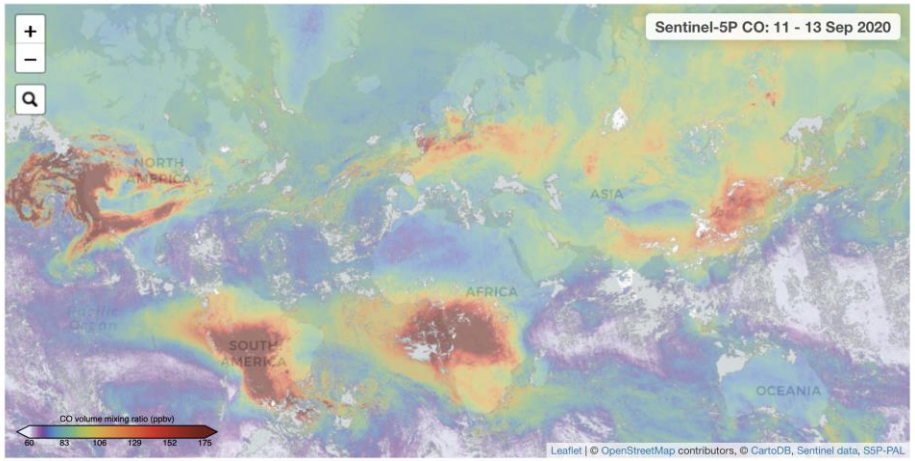
S5P-PAL

Aug 2020 – Start of operations

First users:

- BIRA – BrO, DLR – TCWV
- Bremen – CH4
- Noveltis/UPV – SIF
- **KNMI – (D)LER/AOT**

Sep 2020 Added CO maps



Many S5P+ Innovation projects still ongoing in 2020/2021, but little time/budget to use S5P-PAL

S5P-PAL – NO2 repro + DDS4

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Early 2021

- L2 Processor release in Nov 2020 introduced discontinuity
- Need for harmonized dataset to analyse COVID impact before official release of full reprocessed L1+L2 S5P dataset
- PDGS did not have capacity for reprocessing and prosEO was not yet available

-> Investigate integration of NL-L2 + TM5

S5P-PAL – Mundi -> OTC

May 2021

- Mundi was providing full timerange of L1b + L2 data but had to move back to last 1 year only (due to budget constraints)
- S5P-PAL project had enough infrastructure budget to host data itself
- Open Telekom Cloud (OTC), the IaaS of Mundi, just opened NL data center, which was cheaper than their DE data center (used by Mundi).

-> Move from Mundi to direct contract with OTC and fully migrated environment from DE to NL in July 2021 (with no impact to users)

S5P-PAL – NO2 repro + DDS4

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Q2/Q3 2021

- Integrated NL-L2 NO2+AAI+FRESCO + TM5 in S5P-PAL
- Integrated TROPL01B + TROPICAL in S5P-PAL
- Retrieved DDS4 L0 from PDGS
- Retrieved full AUX_METTM5 timeline from KNMI

Q3/Q4 2021

- Generation of DDS4 L1b + L2 (NL-L2) (<1 week processing)
- Reprocessing of NO2 for COVID19 impact analysis (< 2 weeks processing) -> PAL NO2 dataset

Verification of datasets performed within PAL environment by several people

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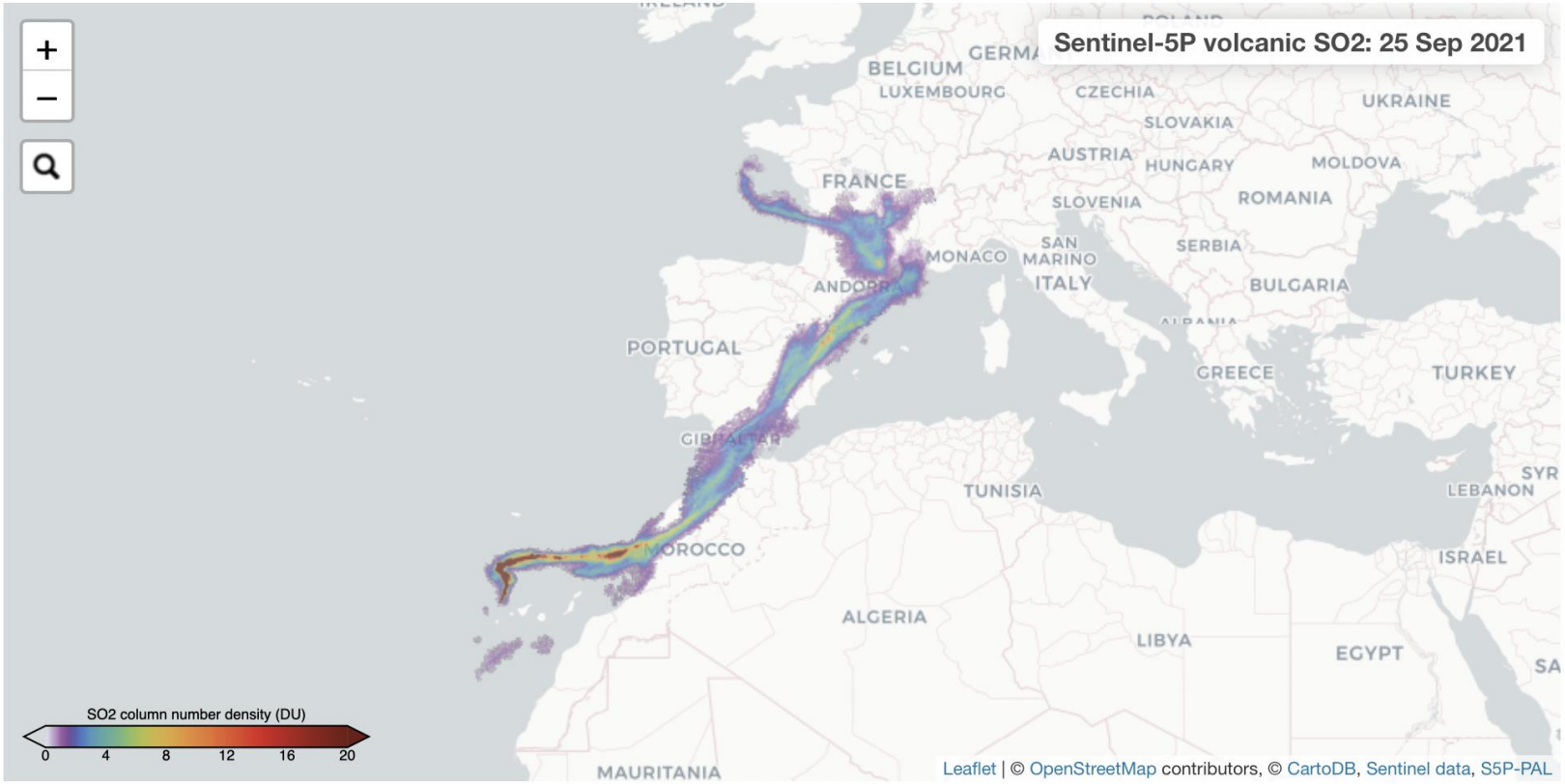
Sep 2021 Added SO2 maps



S5P-PAL – AGDE

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Q4 2021

- Extension of existing contract into 2022
- Additional Automated Generation and Dissemination Extension through ESA budget
  - Perform routine generation of pre-operational products (after successful integration
  - Allow downloads of reprocessed NO2 data and pre-operational products
  - Provide funding for users to integrate processors into PAL (and support pre-operational routine generation)

S5P-PAL – Data Portal

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NO2 download factor **52x** between Dec 2021 – Sep 2022

S5P-PAL Data Portal

This is the dissemination site for data products generated by Sentinel 5P processors running in S5P-PAL.

Products

The following products are currently made available publicly via this portal:

product	description
NO2	reprocessed NO2 data from April 2018 - September 2021 using a consistent version of the official L2 processor

Browse S5P-PAL products

API info

Discovery and access

Product file discovery and access is provided by S5P-PAL in the form of web services that implement the SpatioTemporal Asset Catalog (STAC) open standard. These endpoints can be accessed programmatically.

S5P-PAL also exposes the browsing interface more conveniently through a graphical **Interactive Product Browser**.

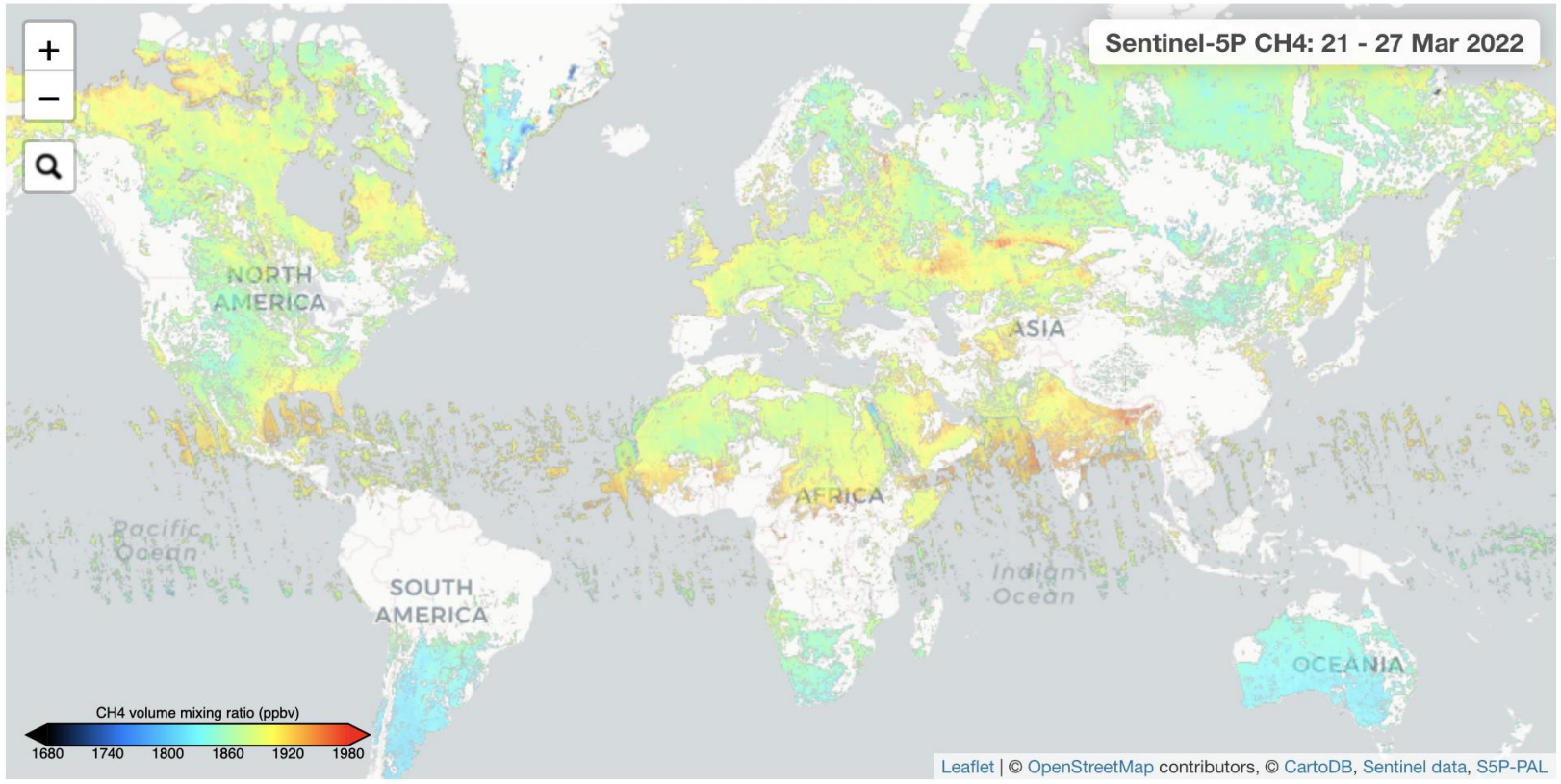
Support

This service is provided as part of the Sentinel-5P Product Algorithm Laboratory (S5P-PAL) and contains modified Copernicus Sentinel data processed by S[&]T.

Questions regarding this service can be send to the ESA EO Support Helpdesk.

https://data-portal.s5p-pal.com

Mar 2022 Added CH4 maps (from IPF 2.3.1 – Nov 2021)



S5P-PAL – Users

- Currently available online
  - BrO – BIRA
  - TCWV – DLR
  - AOT – KNMI (+ DLER in PDGS)

- Available online soon
  - Glyoxal/CHOCHO – BIRA
  - SO2 COBRA – BIRA
  - SIF – UPV

https://data-portal.s5p-pal.com

- New extension candidates:
  - AOD/BRDF – GRASP/Cloudflight
  - CH4 – BREMEN
  - OCLO – BREMEN
  - SO2LH – DLR
  - Ocean Color – AWI/Postdam
  - H2O-ISO – Leicester
  - …

Includes all Innovation+ projects
Some already active in PAL

S5P-PAL – Future

- Current contract ends end of this month
- Extension contract in the pipeline, but likely won't start Nov 1st due to programmatic reasons. Hopefully still before end of this year.
  - 5 year extension
  - Continue providing platform for algorithm developers
  - Includes similar funding for integration+support for algorithm developers
  - Routine generation of pre-operation products, including past mission timeline
  - Hosting of new operational reprocessed L1b+L2 data
  - Mapping portal extension:
    - L3 maps for all operational and pre-operational L2 products
    - Download of L3 grid files via S5P-Pal Data Portal

S5P-PAL – Links to other projects

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- ATM-MPC: PAL environment for DDS generation
- SAR-MPC: S1QC -> Expert Collaborative Environment (ECE)
- BIOMASS-MPMF: SAR-MPC ECE approach for BIOMASS Earth Explorer
- CEM-PAL: PAL for Copernicus Expansion Missions (all, except CO2M)

- AVL: Atmosphere Virtual Lab deployed in S5P-PAL and ATM-MPC PAL

S5P-PAL – Questions?

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