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The Future Roadmap of the Copernicus Sentinel-5 Precursor Mission

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COVID-19 Impact



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- Sentinel-5P demonstrated well that **COVID-19 impact** worldwide can be monitored from space using mainly NO₂ measurements
- COVID-19 had **no impact on in-orbit operations/monitoring of the satellite and the TROPOMI instrument** (PLSO and FOS activities)
- COVID-19 had **no impact on the MPC operations**
- PDGS **reprocessing capabilities** could not have been upgraded as planned
- Recovery of this situation is currently ongoing (usage of cloud infrastructure by DLR)

Products: Process from experimental/scientific to operational



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Sentinel Product Evolution



Experimental/Scientific

PAL (Product Algorithm Laboratory)

Operational

Prototype products

Pre-Operational products

Core products

Prototype: Demonstrate the viability of the product (geographical or temporal subset).

Pre-Operational: generation of pre-operational products at least over 1 year - preferable instrument lifetime and test it against final users (e.g. Copernicus services). *The reason for doing this is to get a better understanding of how the product will be used and to refine the product.*

Core: official operational products

- Today all existing Sentinel core products are systematically generated
- New core products can only be implemented in agreement with the EC

Sentinel-5P Core (Operational) Products



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- With the release of the **Ozone Profile Product (late 2021)** all products that have been required by EC are being delivered to the User Community via <https://s5phub.copernicus.eu>
- Uncertainty Product Improvement: **2-3 PDGS upgrades** per year to constantly improve product quality
- Last Upgrade during **July 2022**: based on an upgraded Level 1 product upgrade all processors have been upgraded
- **Reprocessing** of all operational Sentinel-5P Products **by the end of this year**
 - Priorities on Level 2 products as defined by the key user CAMS
 - Level 1, Cloud products, Carbon Monoxide done
 - Total Ozone started
- Next major Product improvement planned : **SO₂ COBRA algorithm, SO₂ Layer Height**
- User interaction with **CAMS** is very important



The Sentinel-5P PAL (Product Algorithm Laboratory):

- **Support to the operational ground-segment** in the production of test data sets to be used for the evaluation of core products algorithm upgrades
- To allow users to perform consistent NO₂ trend analysis (COVID Impact monitoring) the **NO₂ product has been reprocessed** (will be replaced by the PDGS NO₂ product by the end of this year) - <https://data-portal.s5p-pal.com>
- 3 pre-operational products (H₂O, B_rO, and AOT) are being provided to the public via PAL
- Implementation of **6 other new Sentinel-5P pre-operational products** (CHOCHO, OCIO, H₂O-ISO, SO₂-LH, SIF, Ocean Colour)
- **COBRA** algorithm has been implemented and is being tested right now, the University Bremen **Methane** algorithm should also be implemented during 2023
- **The PAL Mapping Service has been extended** (maps.s5p-pal.com) to include beside NO₂ also CO, SO₂ (and CH₄ maps
- **PAL** can be used to demonstrate the pre-operational status of these new prototype products that could lead to new Sentinel-5P core products in the future

Solve the problem that the current **operational Methane** product is useless in case of missing S-NPP cloud information (S-NPP problem during this summer!)

- S-NPP data will not be there forever
- move Sentinel-5P satellite behind another NOAA satellite (e.g. JPSS2)
- are there any fuel restrictions to move the Sentinel-5P satellite?
- are there other data that might be used operationally beyond VIIRS cloud information for Sentinel-5P?
- develop/use an algorithm that is independent (not using VIIRS cloud information)?
- it is clear that specific studies are necessary – creation of an ad-hoc Methane Tiger team?



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thank you all for being here and your contributions

have a safe travel home