



Satellite observations: status & data access points and digital tools

part 1: ESA introduction

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IR0000032 – ITINERIS, Italian Integrated Environmental Research Infrastructures System
(D.D. n. 130/2022 - CUP B53C22002150006) Funded by EU - Next Generation EU PNRR-
Mission 4 “Education and Research” - Component 2: “From research to business” - Investment
3.1: “Fund for the realisation of an integrated system of research and innovation infrastructures”



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ESA Intro and Missions

ESA/Copernicus DATA Access

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Cal/Val activities: EVDC and DIVA

Part 2

Exploring the platforms:

- Copernicus Data Space Ecosystem
- EVDC: OPOT, GEOMS tool, Processing
- DIVA - Validating AOD L2 from satellite using advanced ground based retrievals (Jupyter Notebook)

We are committed to the peaceful exploration
and use of space for the benefit of people,
society and our planet



WHO

22* Member States, 2500+ staff members and total workforce of 6000+

WHY

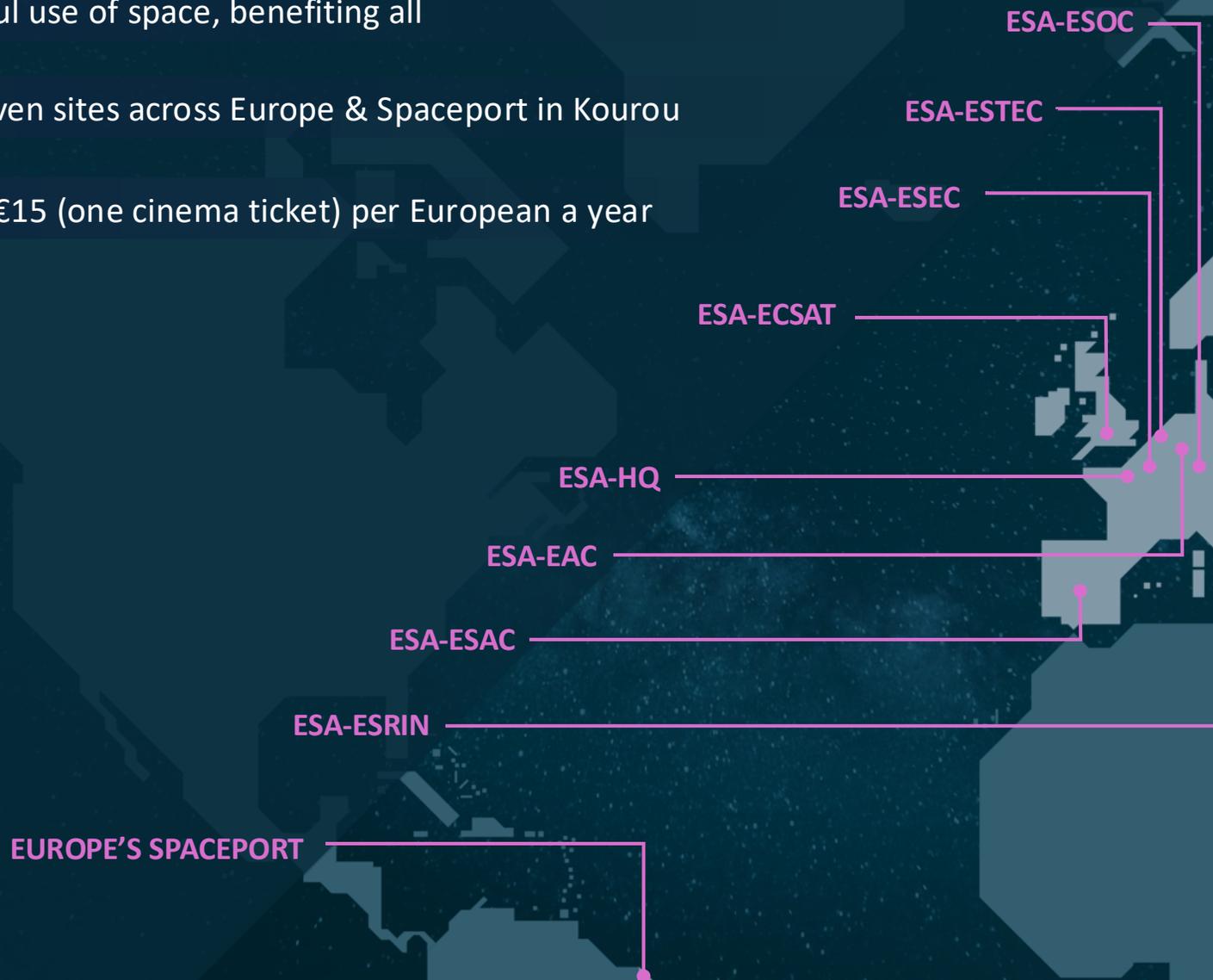
For the peaceful use of space, benefiting all

WHERE

HQ in Paris, seven sites across Europe & Spaceport in Kourou

BUDGET

€7.79 billion = €15 (one cinema ticket) per European a year



SCOPE

Active across every area of the space sector

EXCELLENCE

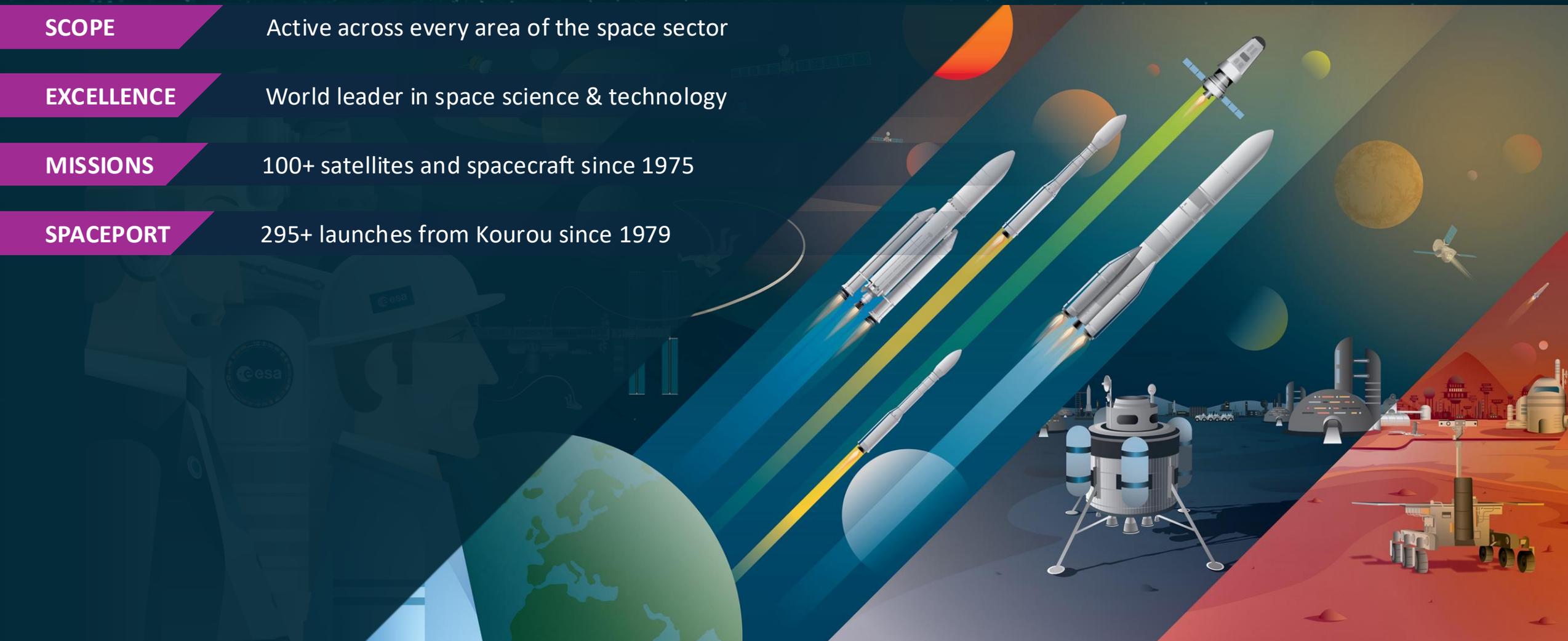
World leader in space science & technology

MISSIONS

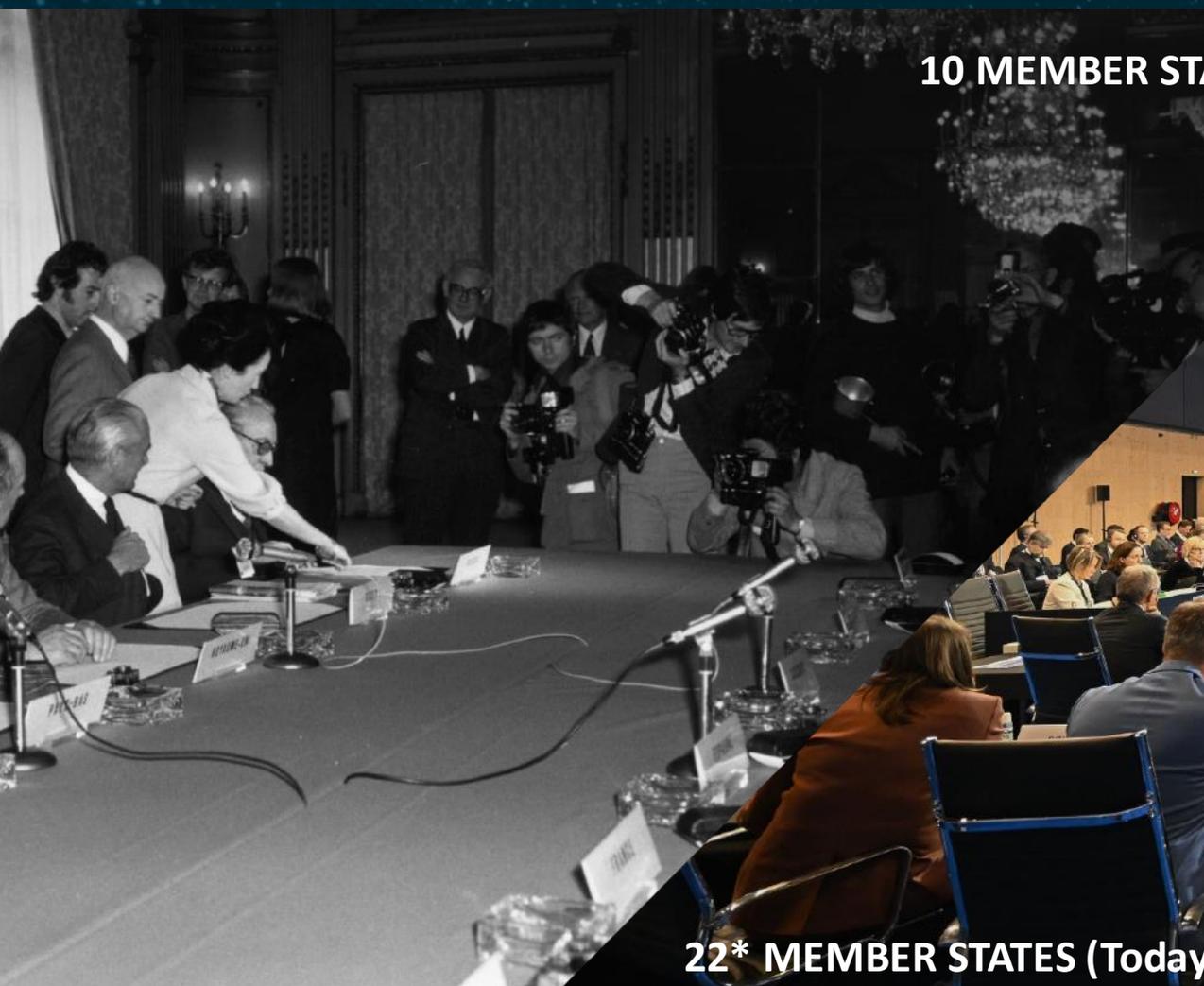
100+ satellites and spacecraft since 1975

SPACEPORT

295+ launches from Kourou since 1979



10 MEMBER STATES (1975)



22* MEMBER STATES (Today)



Who benefits?



YOU

OUR PLANET

OUR ECONOMY

OUR FUTURE

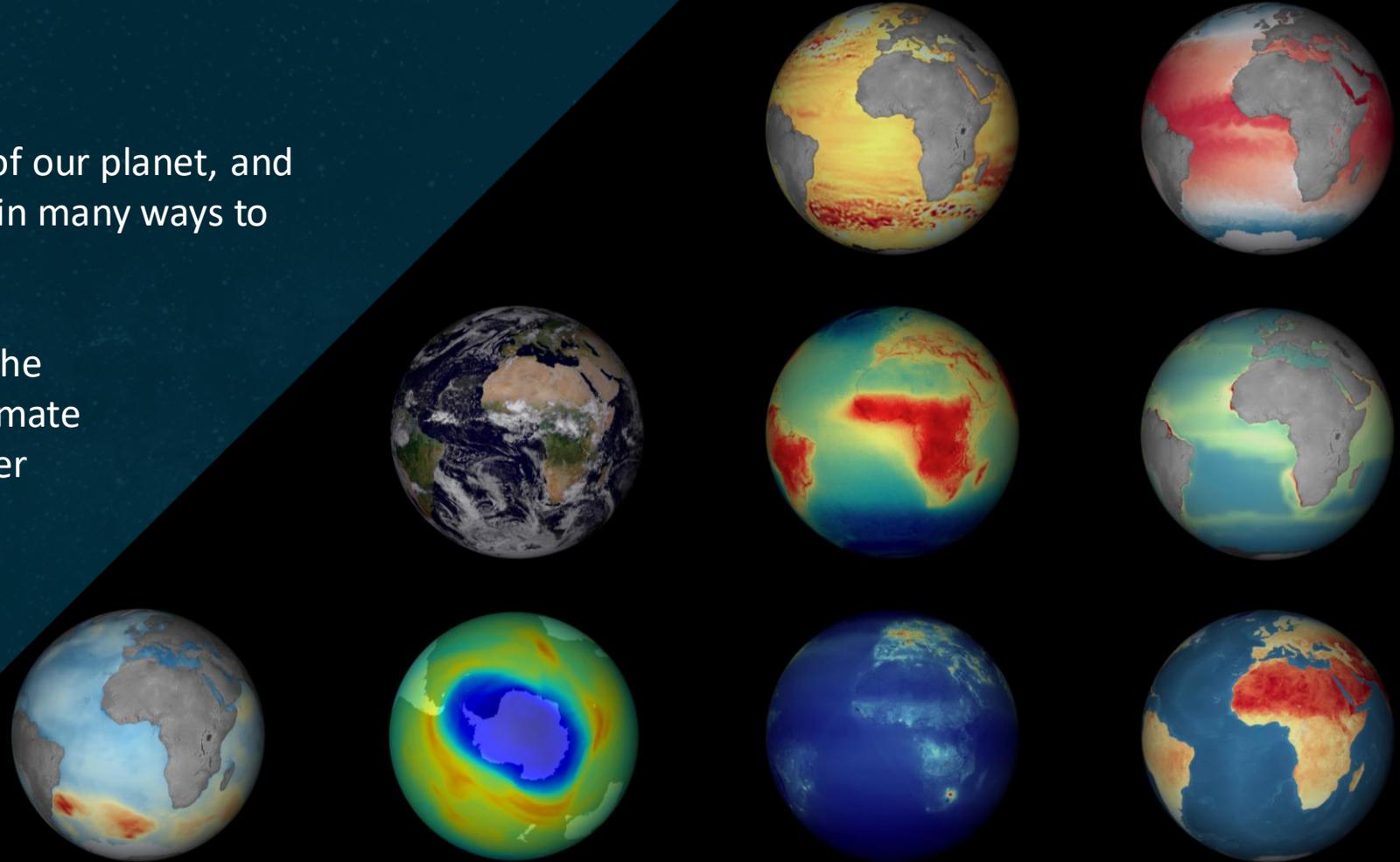
applications

EARTH OBSERVATION

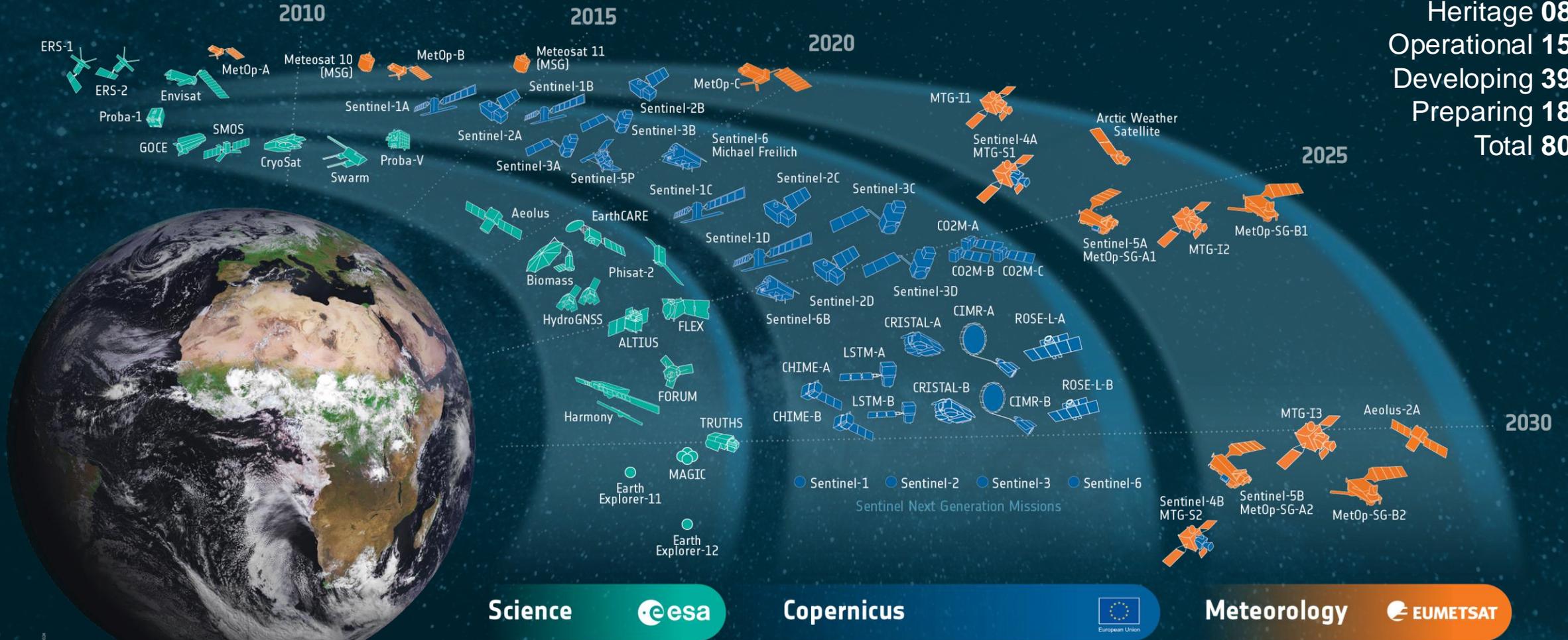
Understanding Earth, improving lives, and fostering sustainability through space technology

Satellites offer an unparalleled view of our planet, and enable us to observe and contribute in many ways to sustainable life on Earth including to:

- ◆ Provide essential information on the environment and our changing climate
- ◆ Help plan rescue and aid work after disaster
- ◆ Forecast weather patterns
- ◆ Answer important questions on Earth's systems

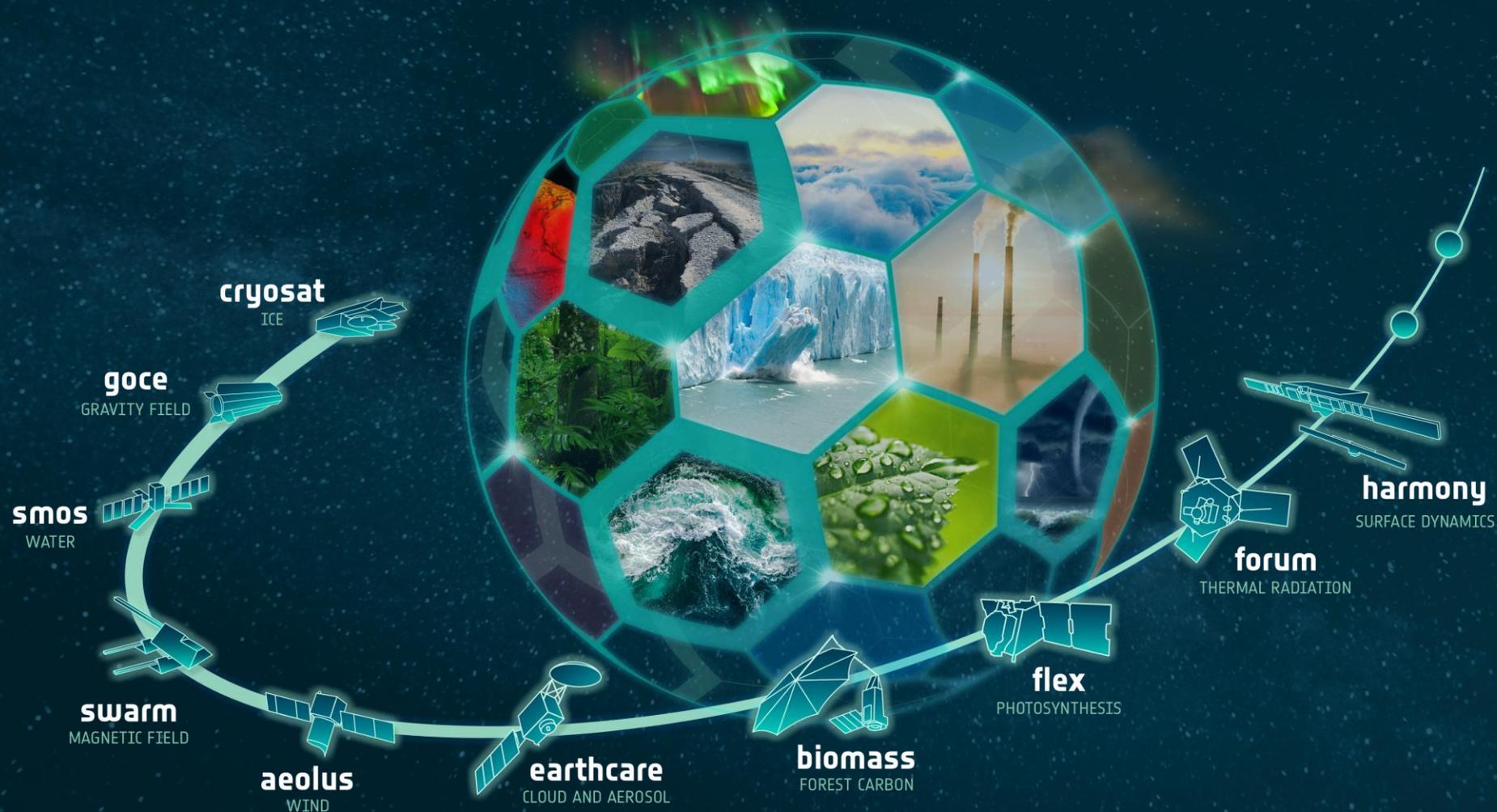


Satellites
 Heritage **08**
 Operational **15**
 Developing **39**
 Preparing **18**
Total 80



Earth Explorers

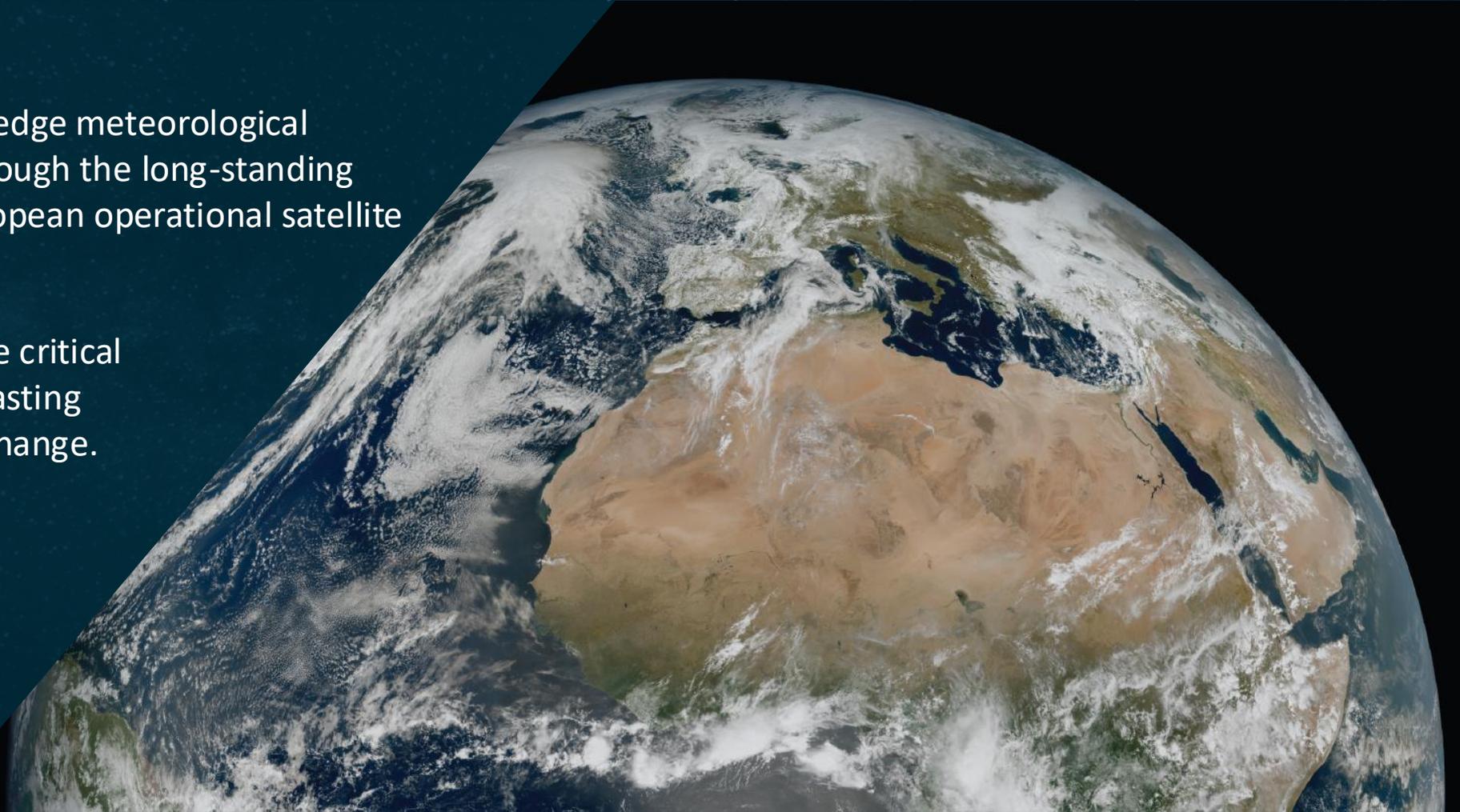
Earth Explorers are ESA-developed satellites that use cutting-edge technologies to help maintain European scientific and technological leadership. They are part of FutureEO, ESA's Earth observation research and development programme.



- ◆ The Earth observation component of the European Union's Space programme is the largest such programme in the world.
- ◆ The family of Sentinel satellite was developed by ESA to meet the operational needs of the Copernicus services.
- ◆ The technology of each mission, such as radar and multi-spectral imaging instruments, depends on the application requirement for land, ocean and atmospheric monitoring.



- ◆ Europe's fleet of cutting-edge meteorological satellites are enabled through the long-standing partnership with the European operational satellite agency (EUMETSAT).
- ◆ The resulting missions are critical for monitoring and forecasting of weather and climate change.



ESA delivers actionable climate and environmental information, as well as green solutions for society, while fostering disruptive innovations and business ideas.

- ◆ Support climate and environmental policies from local to international level
- ◆ Build strategic partnerships for space applications
- ◆ Enable understanding of impacts of policy actions using digital twin models of Earth's systems



Copernicus Data Access

First Generation Sentinels: a wealth of data for the users

Copernicus is the largest producer of EO data in the world

All global landmass is observed every 5 days at 10m resolution

>20 TB of Daily Data Production by Sentinels

~250 TB of Daily Sentinel Products Disseminated for Services to Society

> 750.000 Registered Users
(>180.000 since new CSDE)

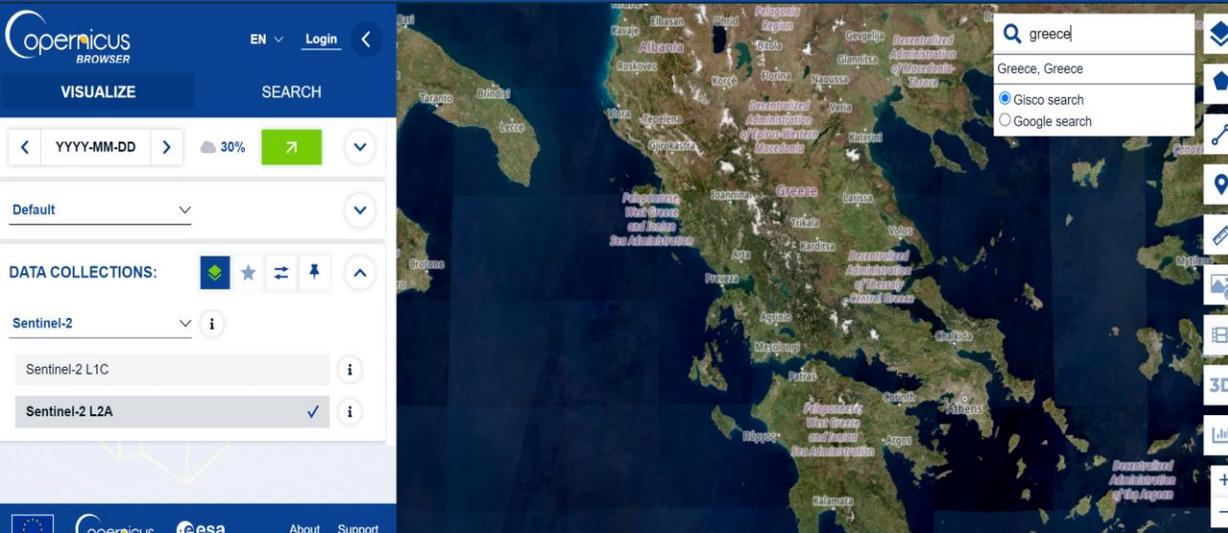
Supporting 6 operational services

 Land	 Atmosphere	 Ocean
 Climate	 Disaster	 Security



Copernicus Data Access

The Copernicus Data Space Ecosystem is now the principal entry point for Sentinel data




Downloaded volume
since the start of operations
725 PB


Total number of published products
since the start of operations
112.08M


Total volume of published products
since the start of operations
78 PB

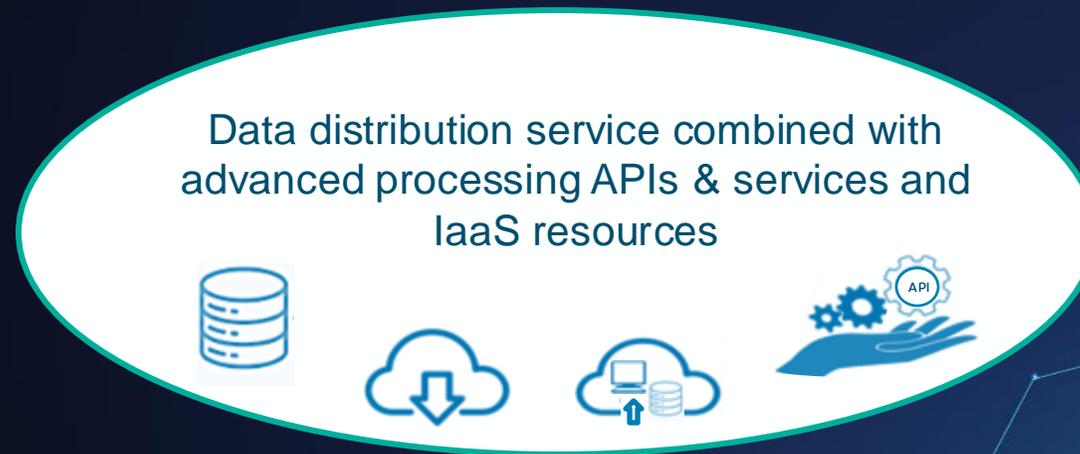

Total number of registered users
from January 2023
185 198

<https://dataspace.copernicus.eu>

Status 8 July 2024

CDSE Main Principles and Features

- Contribute to building an **efficient** and **attractive** European solution to access and process Copernicus Sentinel data
- Increase **user direct interaction** with the data – processing the data directly in the Ecosystem
- Provide a long-term perspective **building trust** with users and developers



- Open Ecosystem:
 - **Open and free** public services under fair use policy, adjustable capacity and performance
 - Capability to deploy **public** and **3rd party services** – one of the main Ecosystem goals

Sentinels: Immediately Available Data

>78 PB immediately available (>110 Million products)

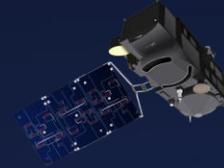
■ Sentinel-1

- GRD SAFE-COG
- GRD SAFE (last year)
- OCN
- SLC
- L0 RAW (Europe full, ROW last year)



■ Sentinel-3 Land

- OLCI L1/L2 NRT and NTC (NRT last year)
- SLSTR L1/L2 NRT and NTC (NRT last year)
- SRAL L1/L2 NRT, STC and NTC (STC last month, NRT last year)
- SYN L2 STC, NTC (STC last month)



■ Sentinel-2

- L1C
- L2A



■ Sentinel-5P

- Level-1B NTC
- Level-2 NRT and NTC (NRT last month)

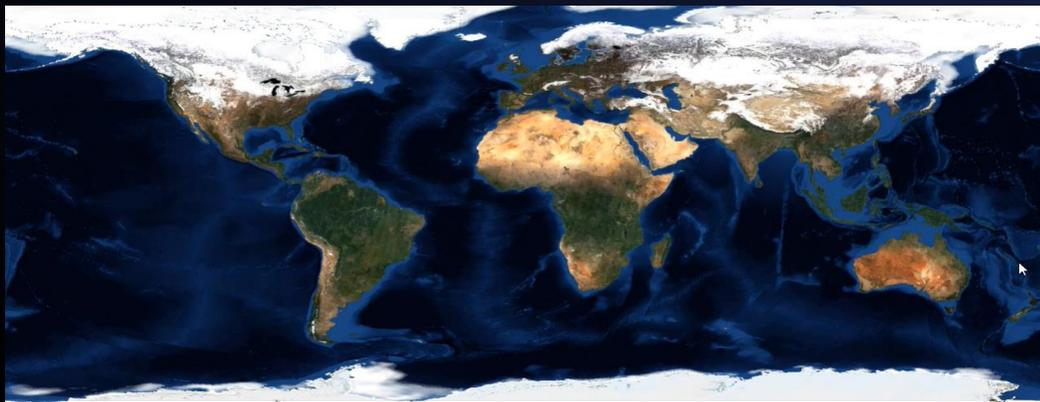
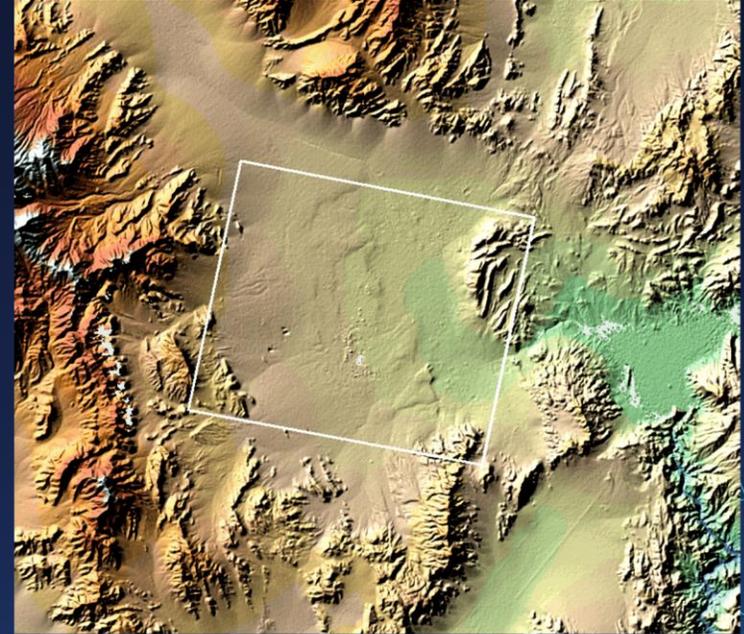


If not explicitly stated otherwise, worldwide coverage, full and up-to-date collection

Additional Data Offer

- Global Mosaics for Sentinel-1, Sentinel-2
- Copernicus Contributing Missions Data (e.g. VHR Europe, Copernicus DEM)
- Sentinel Auxiliary and Engineering Data
- Copernicus Services (CAMS, CEMS, CLMS, CMEMS)

and more...

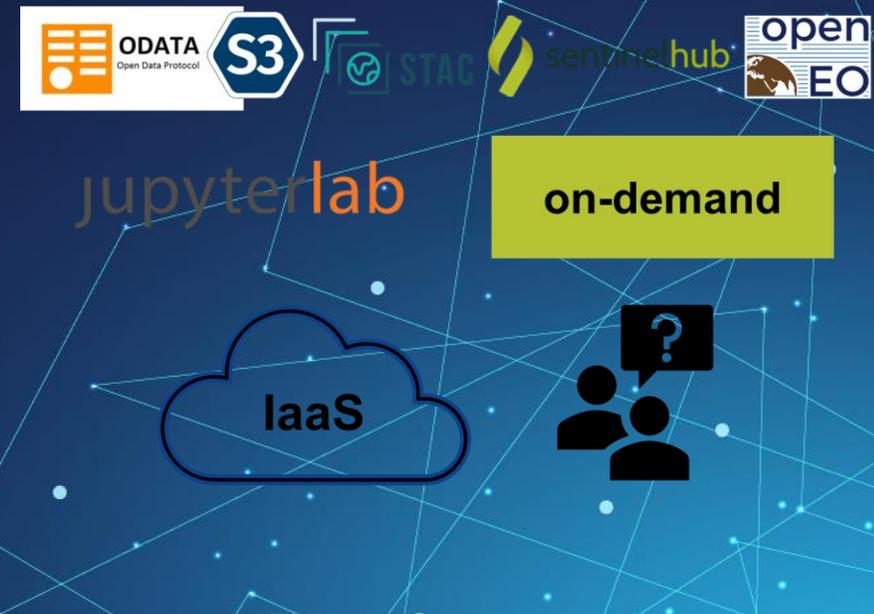
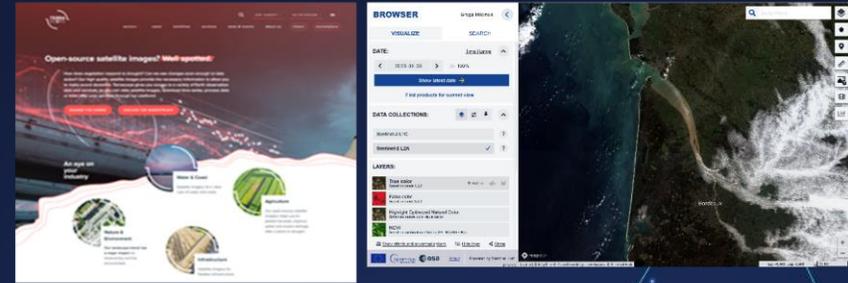


 Atmosphere	 Marine	 Land
 Climate Change	 Security	 Emergency

Large portfolio of data access interfaces and data exploitation services:

- **Copernicus Browser** for search, access and visualisation
- OData, STAC and S3 APIs for access to data files
- Sentinel Hub and openEO APIs for streamlined data access
- JupyterLab for hosted analysis and processing
- On-Demand Processing Service
- Traceability Service
- Infrastructure as a Service
- Public User Forum and Support Desk

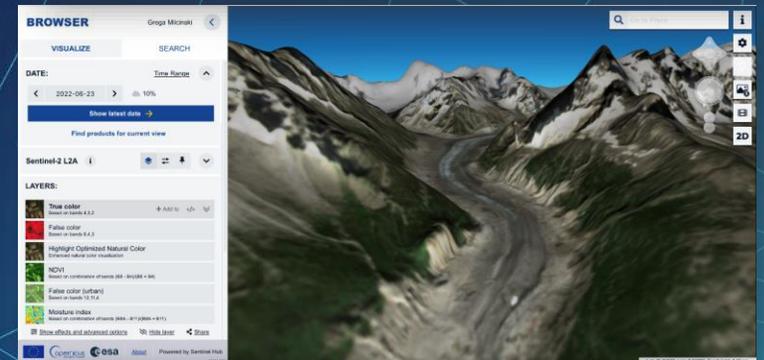
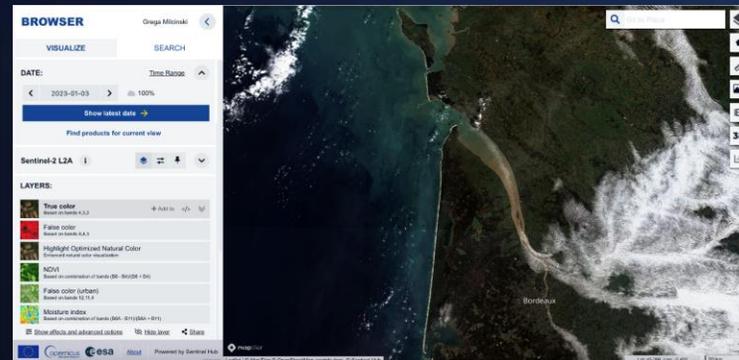
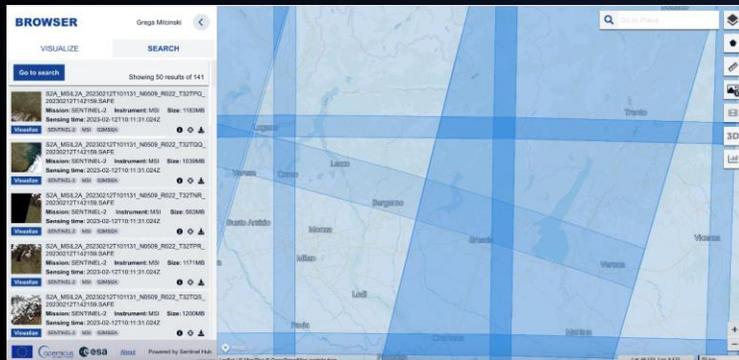
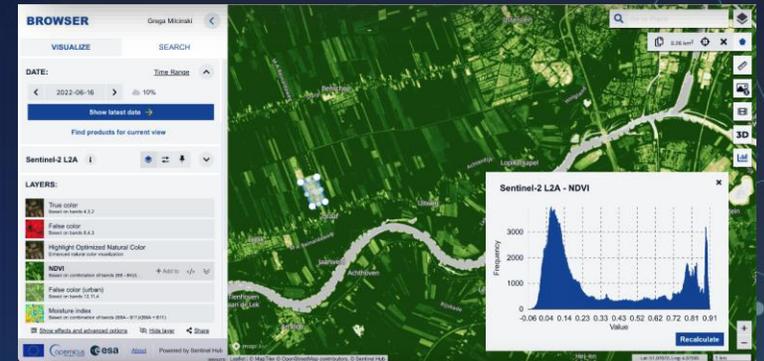
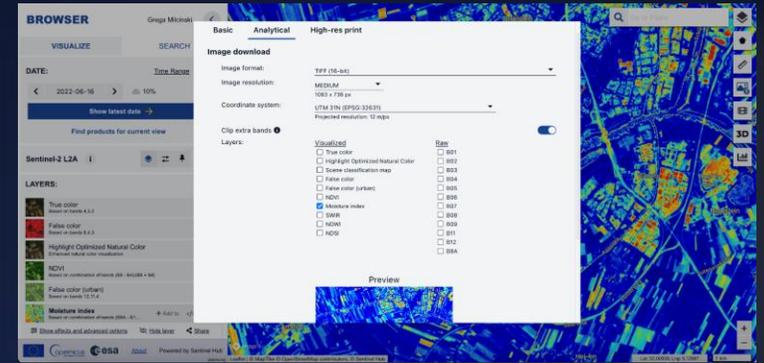
dataspace.copernicus.eu



Copernicus Browser



- Search, query and download all User Level Data
- Interactive visualisation and analysis of most important data collections
- Export subset of the data (also in print quality)
- Comparison, time-lapses, area analysis and more
- 3D exploration and visualization
- Built on APIs from Sentinel Hub (Processing API, WCS, WMS, WMTS)

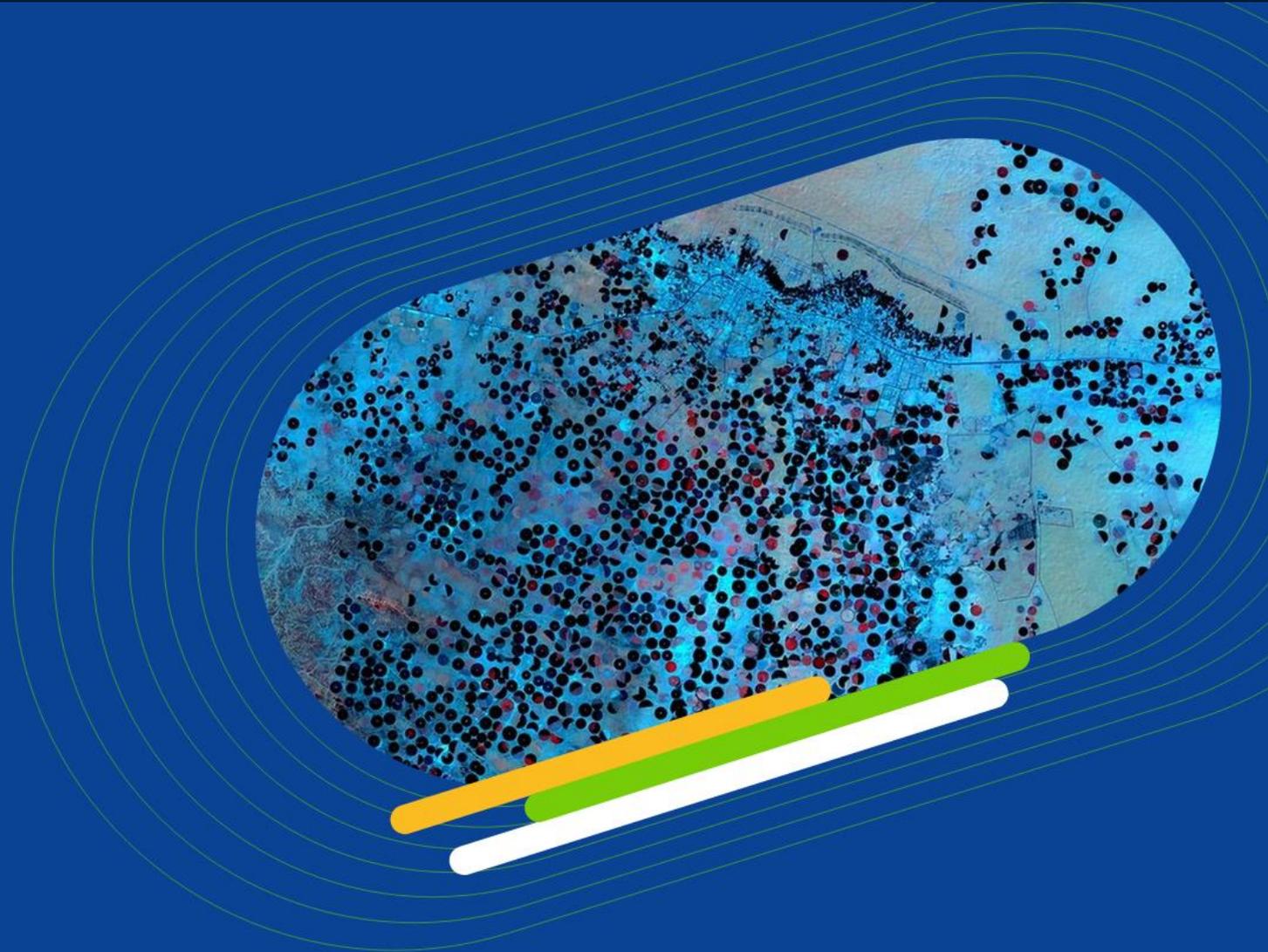


Explore the Copernicus Data Space Ecosystem

Welcome to the Copernicus Data Space Ecosystem, an open ecosystem that provides free instant access to a wide range of data and services from the Copernicus Sentinel missions and more on our planet's land, oceans and atmosphere.

The Copernicus Data Space Ecosystem not only ensures the continuity of the open and free access to Copernicus data but also extends the portfolio for data processing and data access possibilities.

LOGIN 



Sentinel-5P Mission Overview

Sentinel-5P: Copernicus Atmosphere Mission

- **Launched:** 13 October 2017, Plesetsk
- **Launcher:** Rocket
- **Main Payload:** TROPOMI (co-funded by The Netherlands and ESA) - Hyper-spectral push-broom imaging spectrometer, 4 spectrometers with 2D detectors with 4000 spectral channels
- **Orbit:** Altitude of 820 km, 227 orbit repeat cycle
- **Daily Global Coverage:** 13:30 ascending node crossing time
- **Spatial Sampling:** 5.5 x 3.5 km (mission requirement: 7 x 7 km)
- **Mission Control:** ESOC
- **TROPOMI Mission Planning:** KNMI
- **Ground Stations:** Svalbard (NOR) and Inuvik (Canada)
- **Operational Data Processing:** DLR (on behalf of ESA)
- **Mission Design Life Time:** ~7 years
- **National co-funding during Routine Operations** (e.g. on Algorithm Development/QA Monitoring): Belgium, Germany, and The Netherlands
- **Key User:** Copernicus Atmospheric Monitoring Service (ECMWF)



TROPOMI

- ▶ UV-VIS-NIR-SWIR nadir view grating spectrometer.
- ▶ Spectral range: 270-500, 675-775, 2305-2385 nm
- ▶ Spectral Resolution: 0.25-1.1 nm

Sentinel-5P: Mission Objectives

1. Ozone, Air Quality, and Climate Monitoring and Forecasting
2. Extending the time series of GOME, SCIAMACHY, OMI, GOME2 measurements
3. Precursor of the Copernicus Sentinel-4 and Sentinel-5 missions

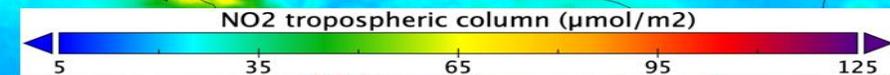


Sentinel-5P Products

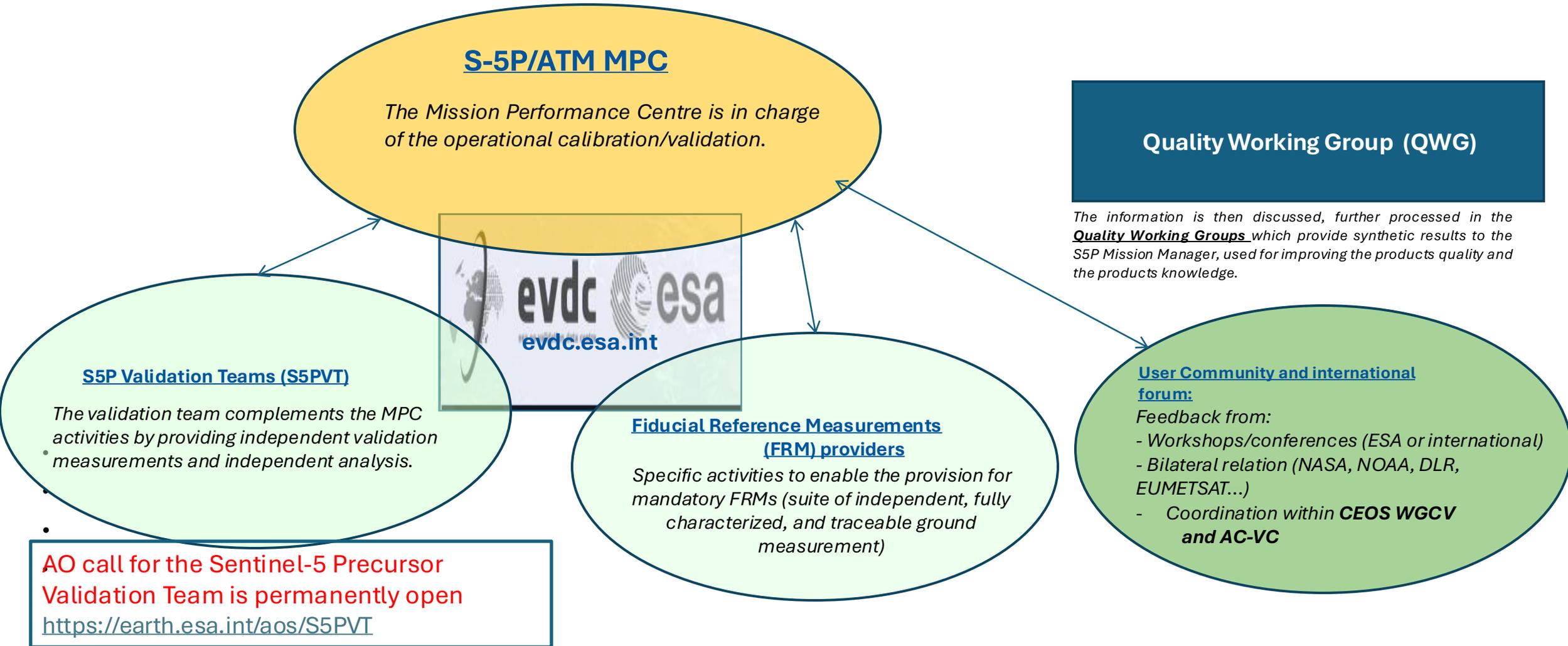
Sentinel-5 Precursor mission operations → in operations since April 2018 and in routine operations since March 2019

Sentinel-5P TROPOMI
NO₂ tropospheric column
April 2018 - March 2019

- Ozone Profile (O₃ Profile) – November 2021
- Aerosol Layer Height (ALH) - September 2019
- Methane (CH₄)
- Tropospheric Ozone Column (trop. O₃) - March 2019
- Sulfur Dioxide (SO₂)
- Formaldehyde (OCHO) - October 2018
- Total Columns of Ozone (O₃)
- Nitrogen Dioxide (NO₂)
- Carbon Monoxide (CO)
- Cloud information
- Aerosol information
- Radiances/Irradiances – July 2018



Sentinel-5P Cal/Val Organization



Latest ESA EO satellites

5 Satellites (4 Launches in 2024)



29 May *EarthCARE*



4 September
Sentinel-2C

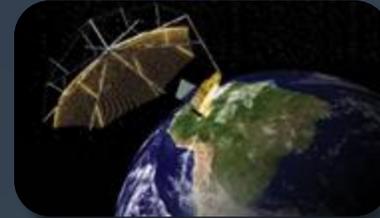


16 August Φ sat-2 +
Arctic Weather Satellite



Early December
Sentinel-1C

6 Launches in 2025 (TBC)



Q1: *Biomass*



Q1: *HydroGNSS*



Q3: *MTG-S1*



Q4: *MetOp-SG A1*

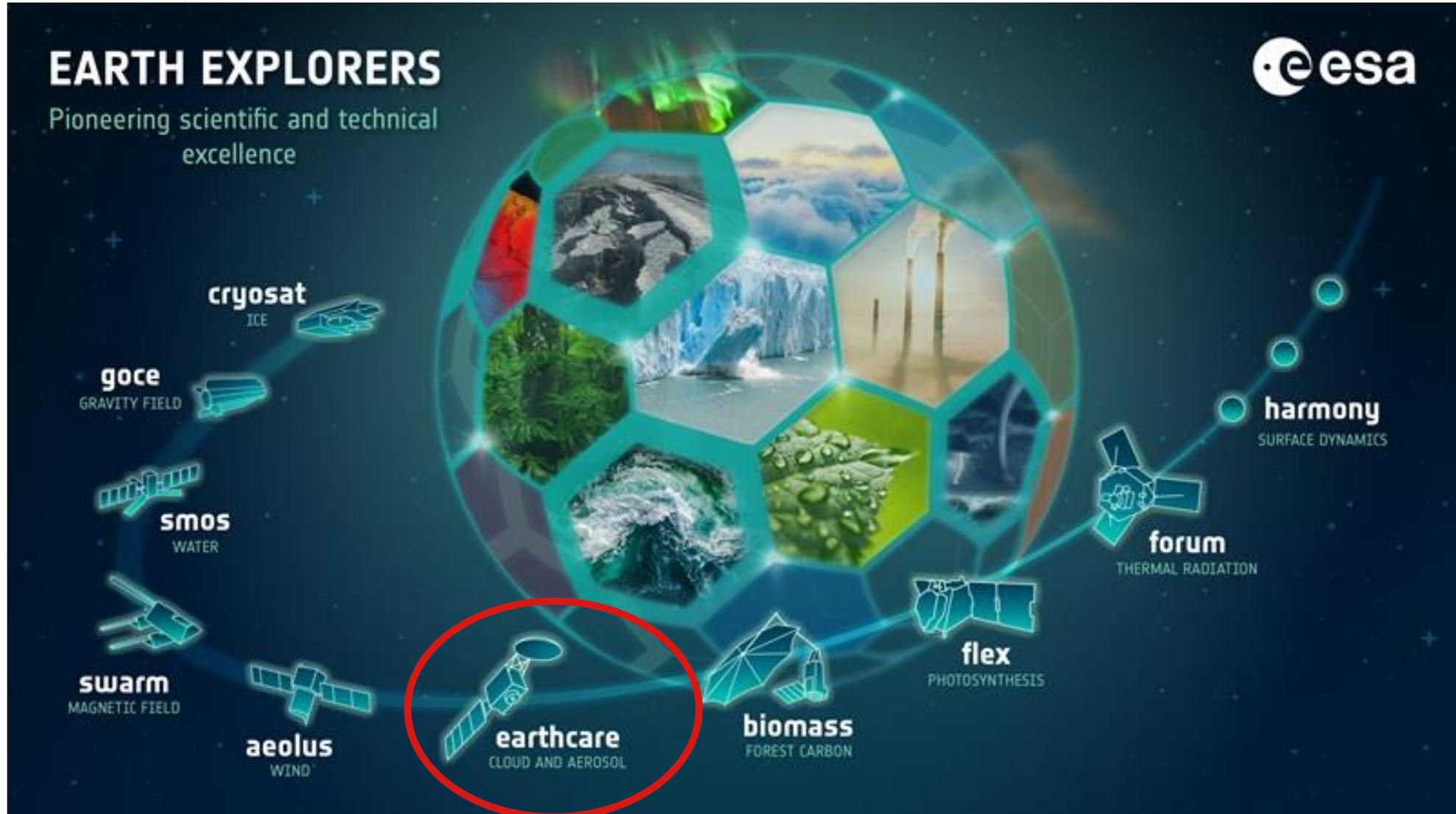


Q2: *Sentinel-1D*

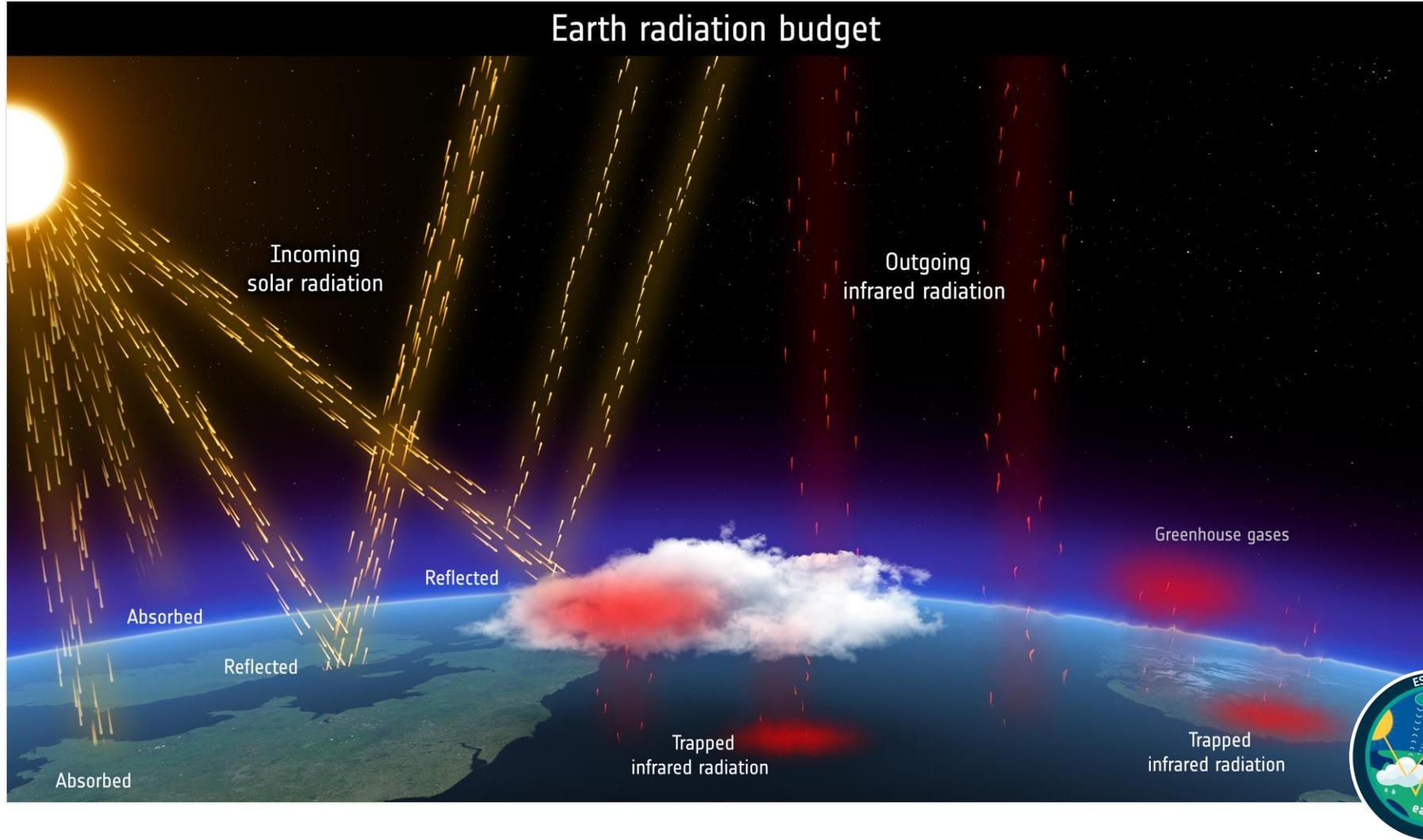


Q4: *Sentinel-6B*

ESA EOP vision: Earth Explorer



EarthCARE Mission Overview

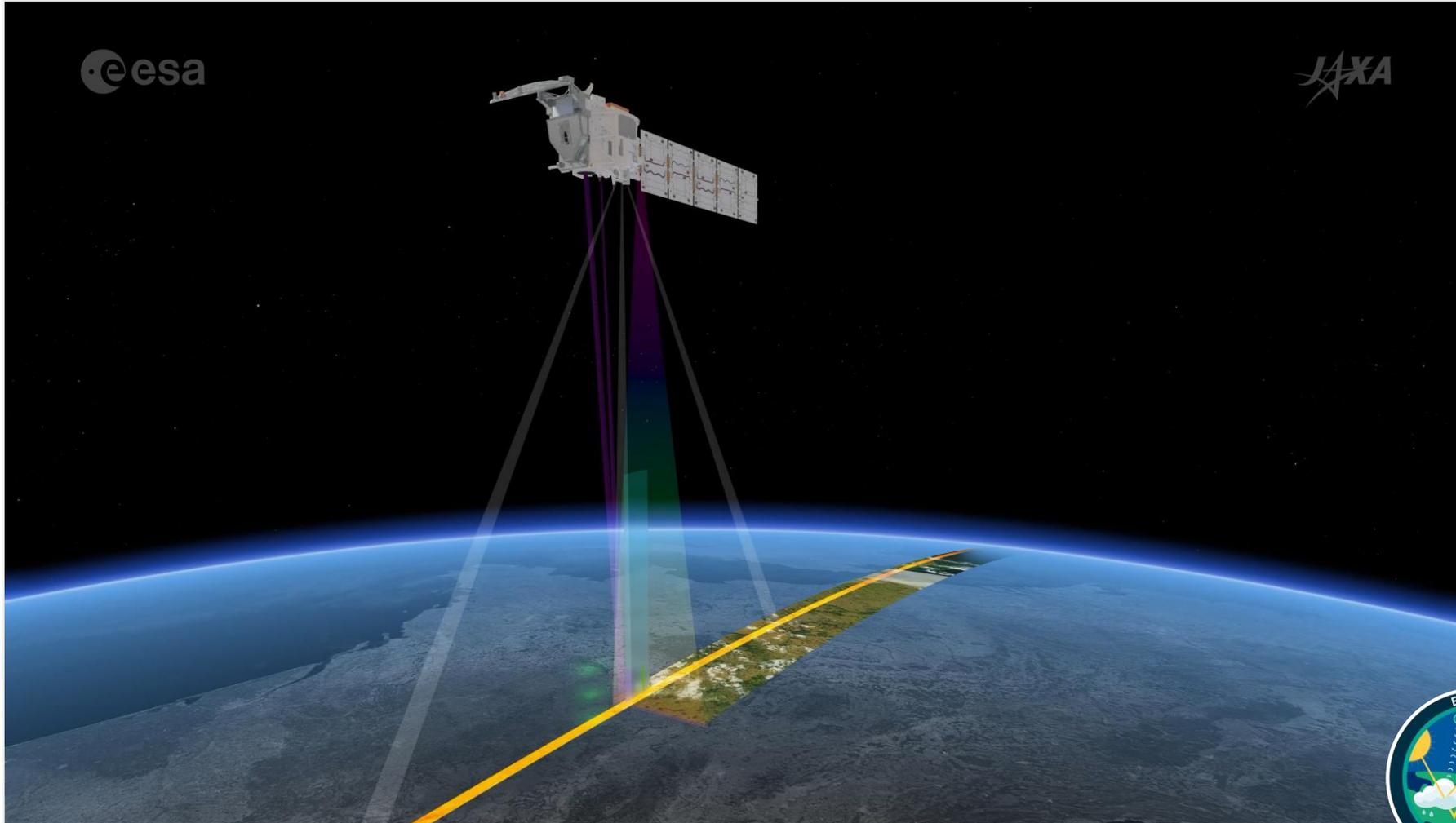


Largest uncertainty in projections of the future climate, to be addressed in order to improve numerical weather prediction and climate modelling, comes from cloud, aerosol and radiation interactions.

How do aerosols and clouds, heat or cool the Earth?



EarthCARE – Mission Objective



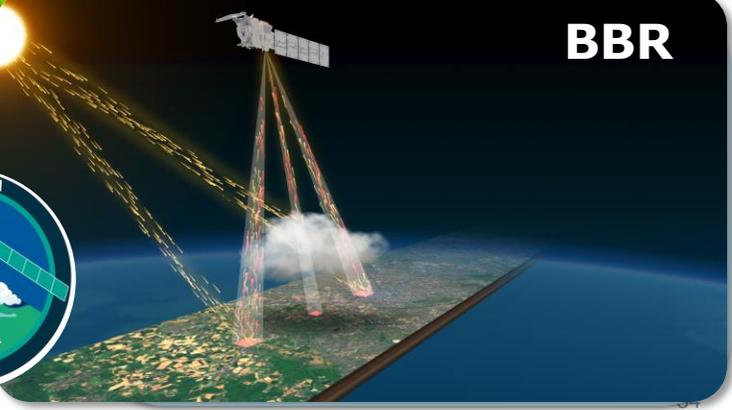
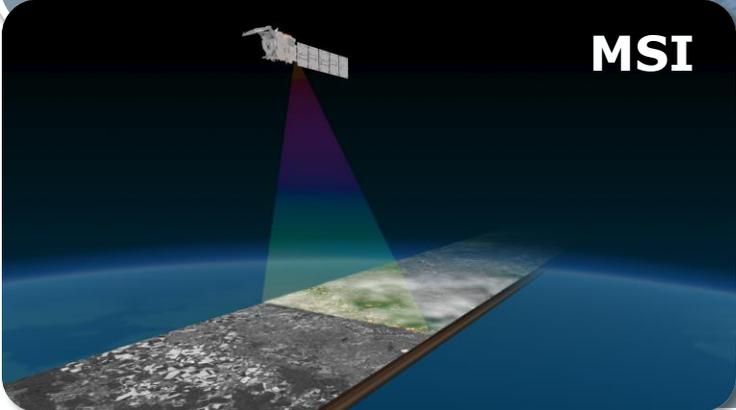
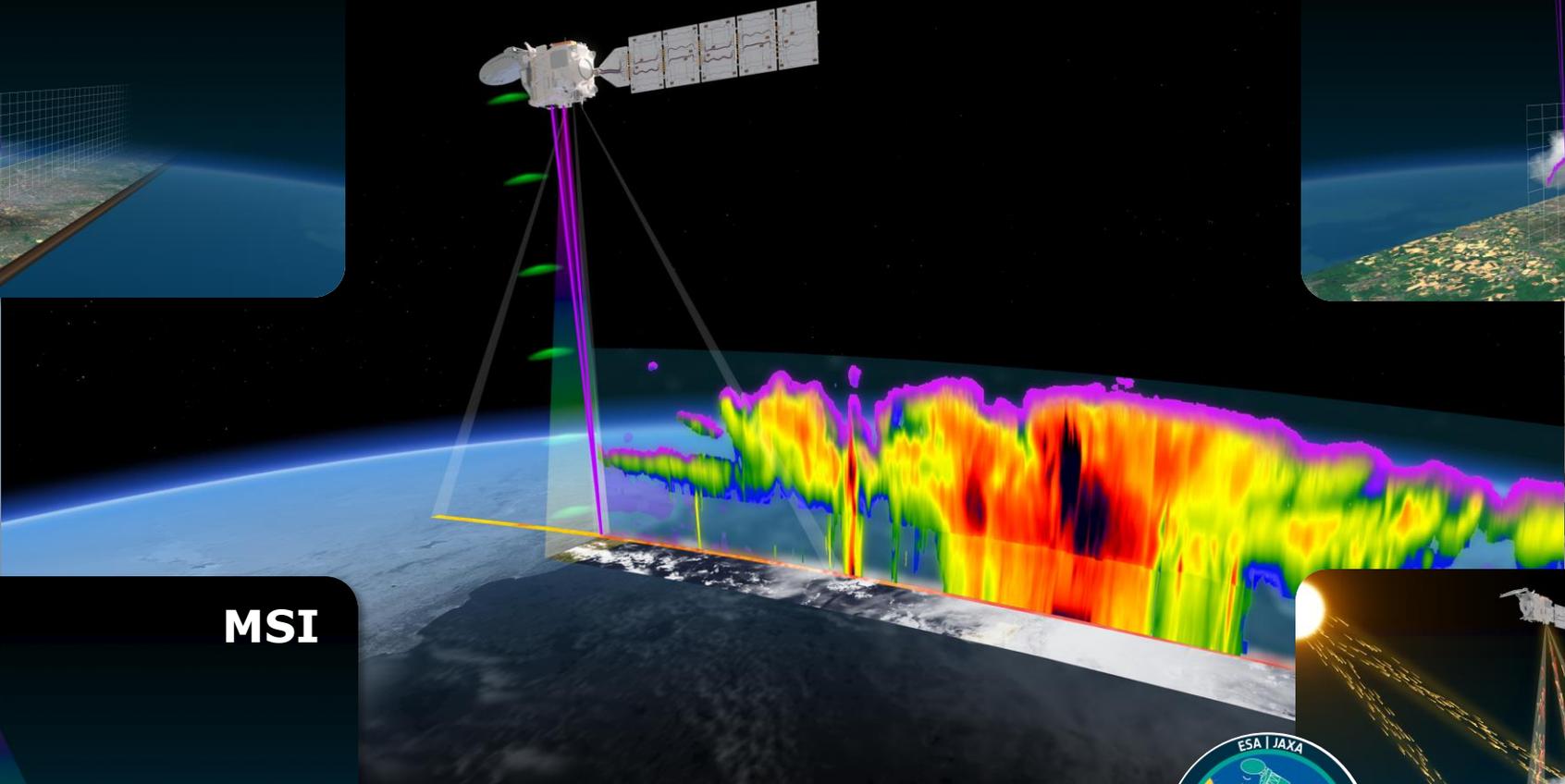
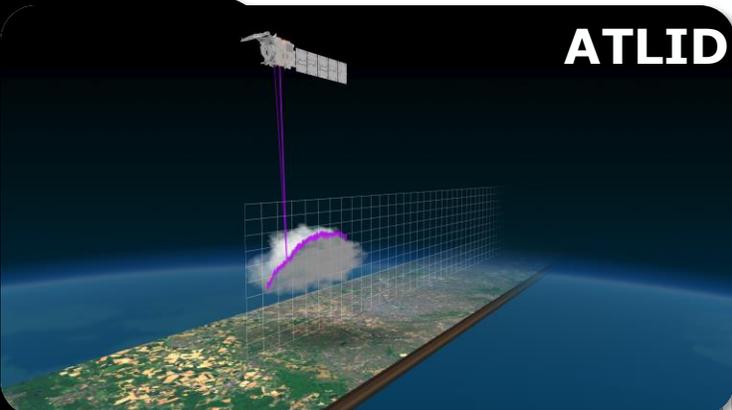
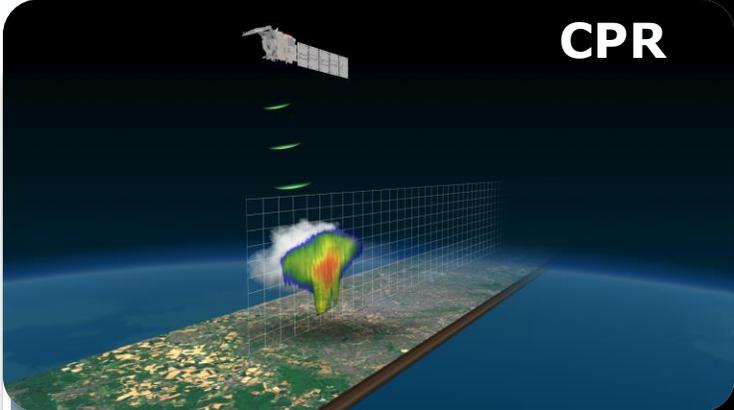
Systematic provision of vertical profiles of clouds and aerosols, collated with measurements of solar and emitted thermal radiation.

How do aerosols and clouds, heat or cool the Earth?

Direct vertical impact of clouds and aerosols on atmospheric heating rates and radiative fluxes.

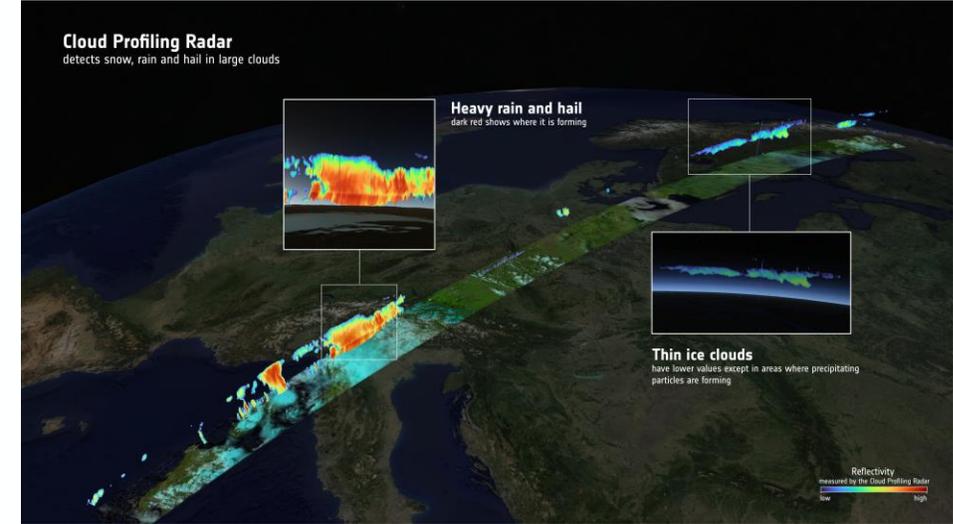
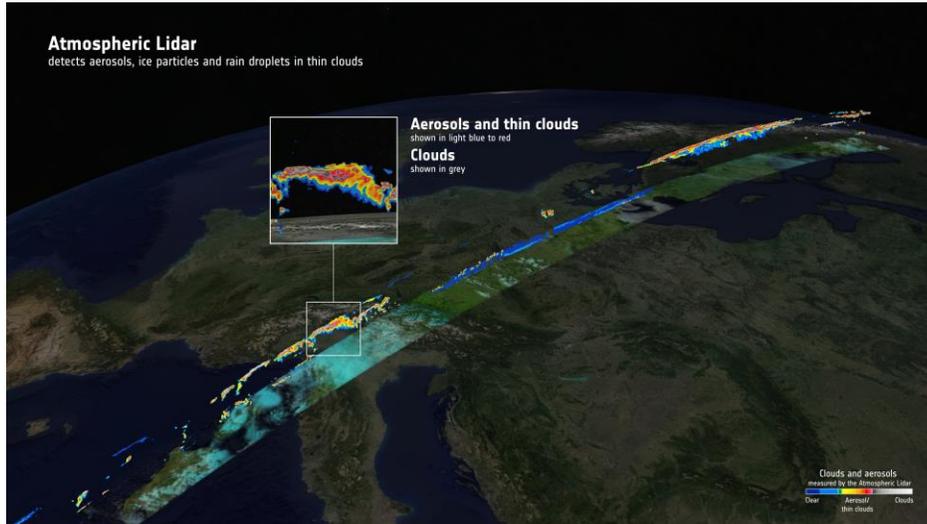


EarthCARE – Space Segment

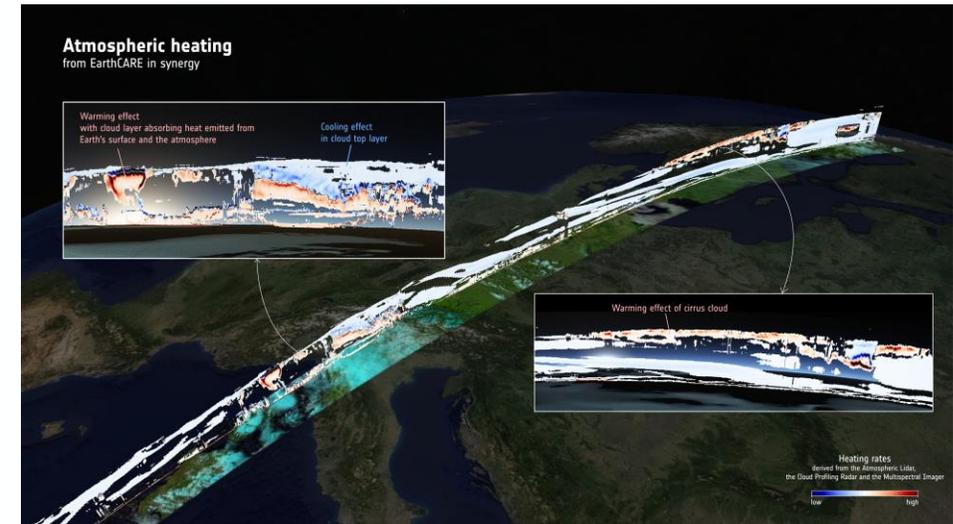
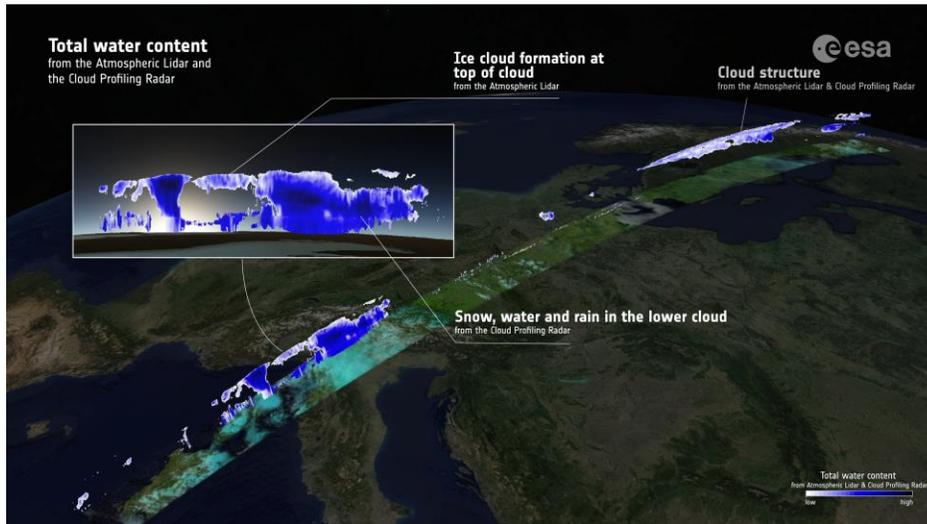


EarthCARE Synergy First Light

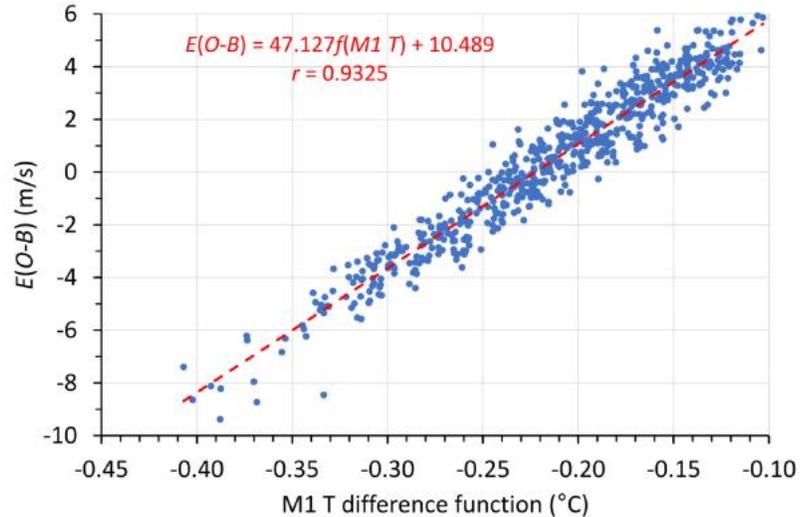
Single Sensor



Synergy



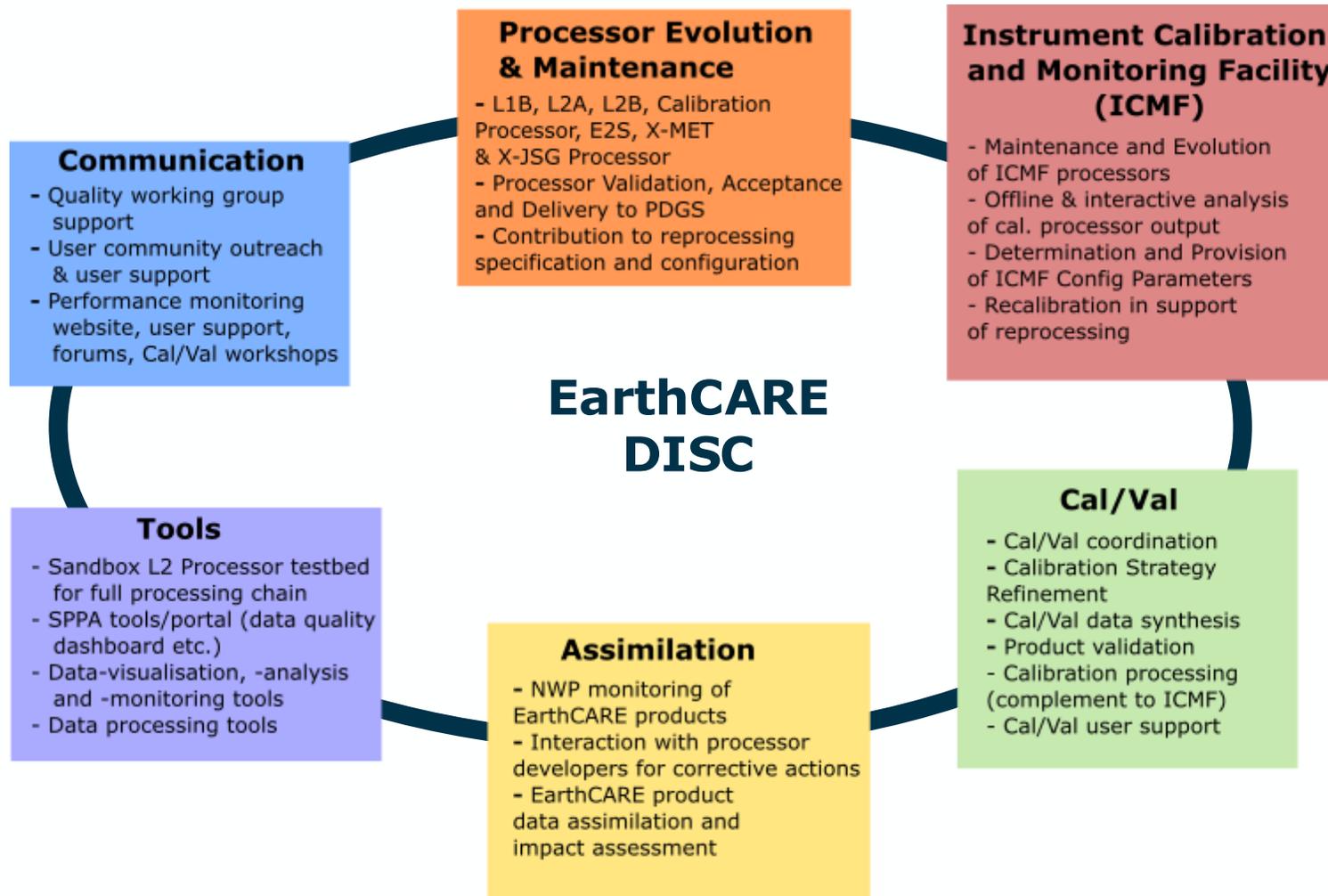
The Aeolus mission (as for others before) revealed the power of NWP monitoring for investigating systematic instrument anomalies and significant improvement of the Mission Data Quality



- Identification of instrument anomalies by correlation with NWP models.
- Major achievement by Mike Rennie (ECMWF) to find linear correlation between wind bias and M1-Temperature gradient (outer – inner T)

Rennie et. al (2021), QJRMS

- EarthCARE data quality will be continuously monitored and assessed by ECMWF NWP models
 - Cloud radar observations, Cloud lidar observations
 - Aerosol lidar observations
- Integral part of the Data Quality Framework for the EarthCARE

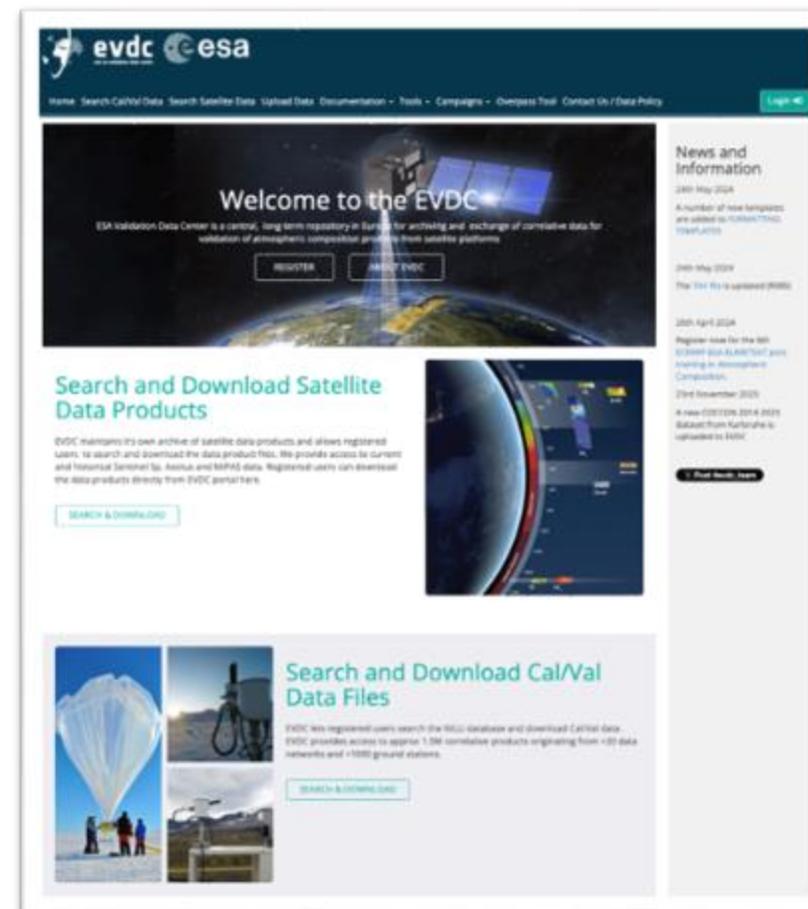


- Continuous improvement of EarthCARE product over the mission lifetime
- Algorithm and processor evolutions
- Data Quality Monitoring
- Cal/Val Synthesis
- EarthCARE product assimilation in NWP models
- Support and Interaction with User

The ESA atmospheric Validation Data Centre (EVDC)

- EVDC Overview
- EVDC and EarthCARE Mission
- EVDC Cal/Val database
- EVDC Satellite Element
- OPOT: Orbit Predictor and Overpass tool
- Collocation Reference Database
- The Workflow Builder
- Services and supporting materials

<https://evdc.esa.int>

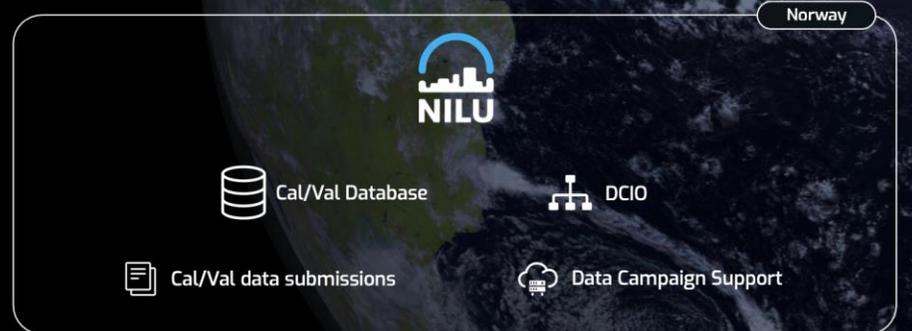


EVDC Overview

STARION



- The ESA atmospheric Validation Data Centre (EVDC) is the official ESA repository for correlative data in the atmospheric domain . It provides access to:
- Groundbased, aircraft and balloon Cal/Val files and **Fiducial Reference Measurements (FRMs)**
- Complete and up-to-date access of Sentinel 5P, Aeolus, MIPAS and the forthcoming **EarthCARE products**
- Tools, processes and documentation for data submitters (**GEOMS** standarization activities, data sharing agreements)
- Tools for data collection campaign planning (**Orbit Prediction and Overpass Tool - OPOT**)
- **Collocation Reference Database**
- Tools for processing data in the cloud (subsetting, merging, visualisation etc)
- CWL Based processing system with visual workflow builder, including EarthCARE tools (e.g.: CIS, MSI, Lidar, Radar tools)



EVDC and EarthCARE mission

STARION



- As a main European source of correlative data and supporting tools for atmospheric composition products, the EVDC team is actively involved in the EarthCARE mission support. It has been working closely with the EarthCARE Validation Team and liaising with the groups tasked with the development of processing tools for EarthCARE products validation.
- The involvement focuses on:
 - Providing access to the correlative data sets
 - Providing access to the EarthCARE products (including pre-operational data)
 - Liaising with PIs and data submitters
 - Supporting data submission process and data formatting to GEOMS standard
 - Tools and support for data submitters
 - Data Center Interoperability and specifically metadata harvesting for correlative products
 - DOI support via EVDC
 - Providing Cloud Processing capabilities for EarthCARE products and correlative data
 - Providing platform tools for subsetting, binning and collocating the data (Collocation Reference Database)
 - Providing a Workflow Builder to test and run Users Processing (Cal/Val modules)
 - Providing services, supporting materials and training to the users, PIs and data submitters



EVDC Cal/Val Database

STARION

skytek

ICHEC
Irish Centre for High-End Computing

nilu

esa

- ESA atmospheric Validation Data Center (EVDC), ESAs in-house Cal/Val database covering:
- Data from historical and ongoing campaigns
- Remote sensing and in-situ measurements from ground-based and airborne stationary and mobile platforms (aircraft, balloon, bouy, drone, ship)
- Operational data in near-real-time from research infrastructures in Europe and America such as ACTRIS (CloudNet, EARLINET), TOLNet, MPLNet, Pandonia Global Network.
- Links to other data archives and network e.g. AVDC, NDACC
- Data from 1965 until present
- More than 1400 users where more than 200 for EarthCARE Cal/Val

Search Cal/Val Data

Search our database of Cal/Val data. [Log in](#) to download the data products. Hover over the form fields to see more information about search criteria. Browse Documentation section of EVDC (see the menu above) to find out more about GEOMS standard and metadata.

Data	Other
Location: <input type="text"/>	Frameworks: <input type="text"/>
Data Source Type: <input type="text"/>	Principal Investigator: <input type="text"/>
Data Discipline Field: <input type="text"/>	AO ID: <input type="text"/>
Data Discipline Class: <input type="text"/>	DOI: <input type="text"/>
Data Originator: <input type="text"/>	
Data Supplier: <input type="text"/>	

Stations



Time and Location

Date Min:

Date Max:

Spatial Filter: Off
 Point
 Bounding Box

Variable

Variable Name:

Variable Mode:

Variable Descriptor:

Contact Information and Data Policies

How to register?
To become a registered user and be able to use full capabilities of EVDC platform such as downloading the correlative data and satellite data products and using the processing system to subset the satellite products please start from signing the following data protocols

How to register?
The EVDC data protocol, which is found [here](#)
The EarthCARE protocol, which is found [here](#)
The JATAC data protocol, which is found [here](#)

After reviewing the signed protocol we will issue the access credentials.

How to contact us and get support?
Please contact us on nadrieam@nilu.no or use the Support Facility by clicking the tab on the left edge of the screen.
EVDC Team is also active on twitter https://twitter.com/evdc_team - follow us for updates on open calls, projects, news, maintenance, and other relevant topics.

Data privacy policies
In EVDC we take data privacy seriously and understand the importance of protecting your personal information. EVDC collects your email and name solely for the purpose of setting up personal user accounts and for provision of user support and best possible service, and to keep you informed about our latest updates and developments. EVDC will only use your information for the purpose for which it was collected, and will keep it secure from unauthorized access or use, and not shared with 3rd parties. You have the right to control your personal information, and if you wish to delete your email and name from our records, you may do so by contacting us at nadrieam@nilu.no or use the Support Facility by clicking the tab on the left edge of the screen. We will promptly delete your information from our systems and confirm the deletion with you.

Data use policies
ACTIVATE Data Use Policy
The ACTIVATE Native Data Archive is at <https://www-air.larc.nasa.gov/missions/activate/index.html>. EVDC does not hold a local copy of the data, only the minimum required metadata is stored in EVDC. User are redirected to NASA LARC for download of data. DOI: 10.5067/5UB08B7ALACTIVATE/DATA001

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TCCON Data Use Policy:
<https://tccon-wiki.caltech.edu/Main/DataUsePolicy>

NDACC Data Use Policy:
<https://www.ndaccdemo.org/data/protocols/data-protocol-user>

CloudNet Data Use Policy:
<http://www.cloud-net.org/starpolicy.html>

Cal/Val search UI

Data Protocols

- **EVDC for EarthCARE Pis**
- All PIs are asked to establish contact with EVDC: nadirteam@nilu.no
- Access to databases, preliminary Cal/Val data from the (EarthCARE Validation Team) ECVT, and EVDC tools is only granted to those who have signed the data protocol.
- ECVT members are requested to read, sign the EarthCARE data protocol, and make use of this correlative data repository by sharing their data (upload) and working with others' data (download).
- ECVT members are expected to standardise the metadata of their measurements according to **GEOMS (Generic Earth Observations Metadata Standard)**. To support the standardization, there are **GEOMS tools** and **templates** available and **support from the EVDC team**.
-

EVDC GEOMS Tool : <https://geoms-tool.nilu.no/>

GEOMS Tool



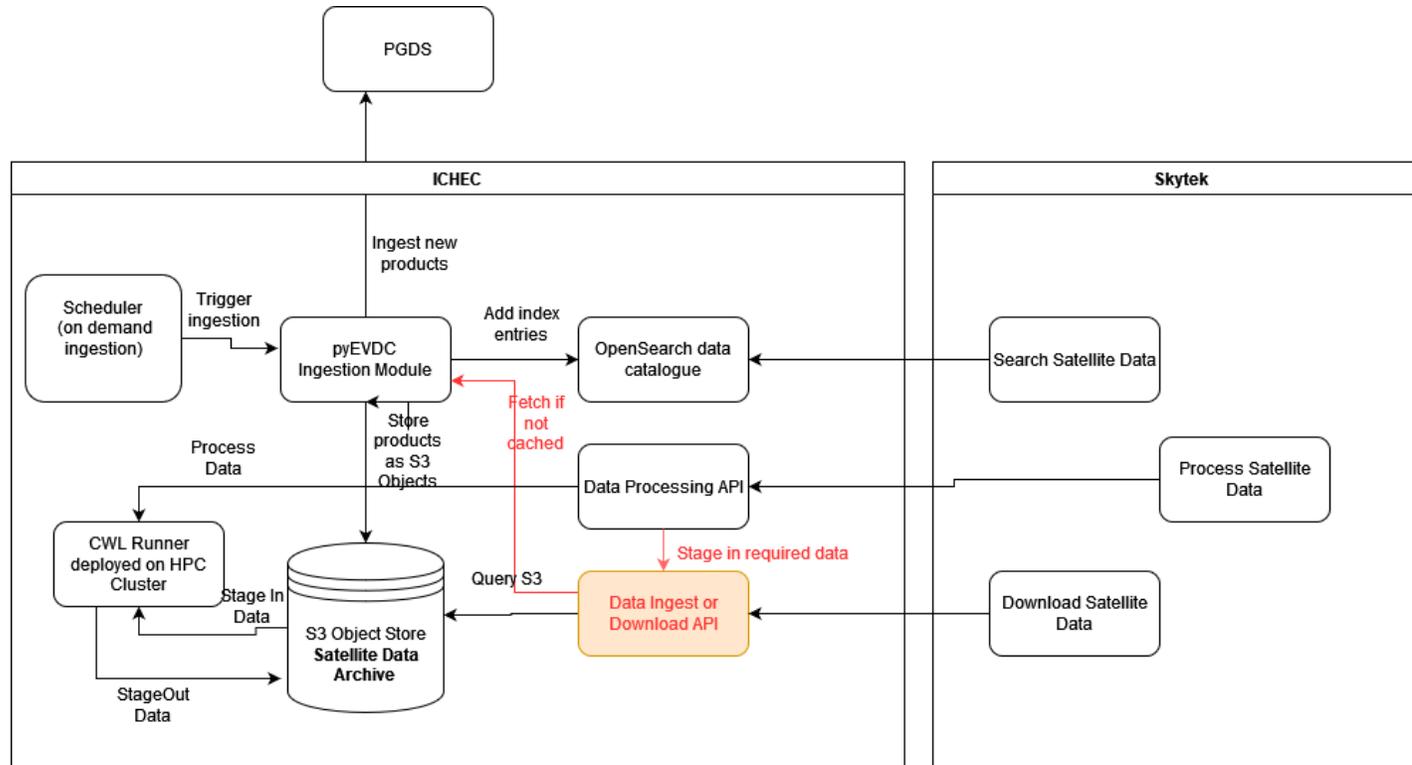
The GEOMS online tool is a set of functionalities to support data submitters with the data upload to [EVDC](#). The tool is easy to use and self-explanatory, but documentation and "how-to" documents are made available at <https://evdc.esa.int/documentation/geoms/>.

Metadata Creation	Existing GEOMS templates Create Metadata/header Request a new Metadata template Request a new EarthCARE Metadata
GEOMS File Creation	Create GEOMS compliant files from a set of ascii metadata and data Create HDF4 Create HDF5 Create netCDF
GEOMS File Format Checker	Check GEOMS file format (HDF4, HDF5 or netCDF) QA checker

Example files for metadata (.meta) and data (.data) can be found at the bottom of the template page <https://evdc.esa.int/tools/data-formatting-templates/>.

Current status at:

<https://ecvt.csde.esa.int/confluence/display/ECAOPI/EVDC+GEOMS+METADATA>

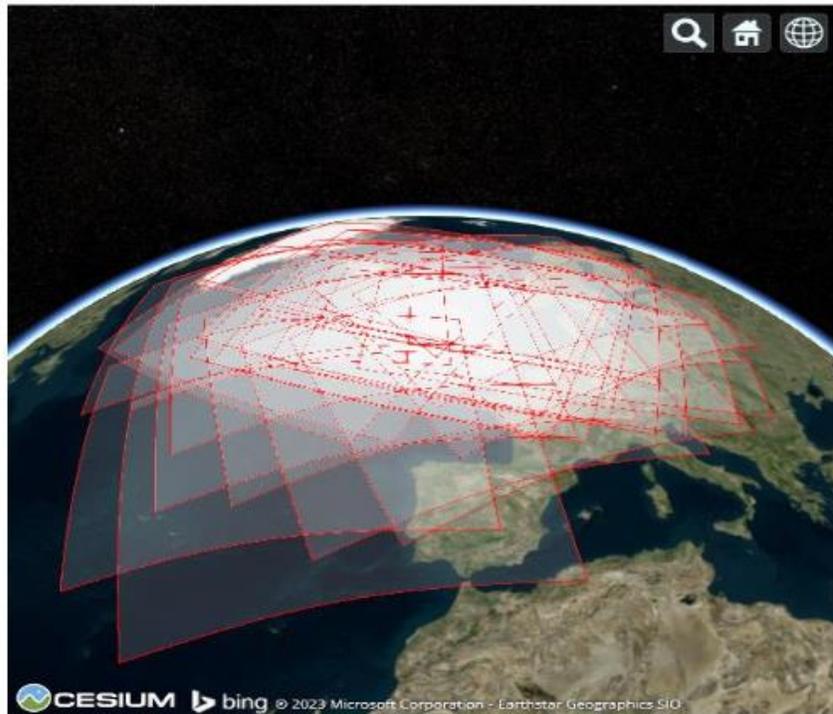


The EVDC system also provides access to satellite data for specific missions, namely Sentinel-5P, Aeolus, ENVISAT/MIPAS and soon, EarthCARE.

The access to the EarthCARE data on the EVDC platform will be provisioned by direct link to the primary data source (PDGS) and all users provided with access to pre-operational data would be able to access the data also via EVDC platform to use EVDC tools according to their permissions.

EVDC – Satellite Data Search UI

World View of Search Results



Satellite Search Form

Satellite	Sentinel-5p	▼
Instrument	TROPOMI	▼
Timeliness	-----	▼
Product Type	SSP_NRTI_L2_O3_	▼
Processor Version	-----	▼
Start date	01 / 01 / 2023	📅
End date	27 / 06 / 2023	📅
Longitude	-7.107275,-5.238902,-5.249893,-7.085294	
Latitude	53.842481,53.842481,52.898631,52.739285	

★ Submit

Select Point or Polygon



Satellite Element and processing

- A set of basic operations are allowed over the satellite product: **visualization, selection, download...**and processing as **subsetting and merging.**
- **Saving** files – a mechanism for grouping and tagging the files for further processing.
- The processing system is deployed on **High-Performance-Computing** infrastructure supplied by ICHEC.

Page 1 out of 6 (132 Results)

1 Save the search results to access the data proce

<input type="checkbox"/>	Thumbnail	File Name
<input type="checkbox"/>		SSP_NRTI_L2_SO2___20230613T134849_20230613T135349_29356_03_02040...
<input type="checkbox"/>		SSP_NRTI_L2_SO2___20230613T120849_20230613T121349_29355_03_02040...

SSP_NRTI_L2_SO2___20230613T134849_20230613T135349_29356_0 44s left — 44.4 of 113 MB (1.6 MB/sec) X

SSP_NRTI_L2_SO2___20230611T...03_020401_20230611T043403.nc Completed — 11.8 MB

SSP_NRTI_L2_SO2___20230611T142849_20230611T143349_29328_0 51s left — 51.3 of 112 MB (1.2 MB/sec) X ent

SSP_NRTI_L2_SO2___20230613T...020401_20230613T040321(1).nc Completed — 14.9 MB

SSP_NRTI_L2_SO2___20230613T...03_020401_20230613T040321.nc Completed — 14.9 MB

Show all downloads

File Name	Size	Downloaded	Downloaded
2023-06-13T12:15:50Z_Sentinel-5p_TROPOMI			

My Saved Searches

Page 1 of 5. [next](#)

Label	Search Date	Satellite	Instrument	Timeliness	Product Type	From	To	Location		
test	June 27, 2023, 12:26 p.m.	Sentinel-5p	TROPOMI	Any	SSP_NRTI_L2_CO___	Jan. 1, 2023, midnight	June 27, 2023, midnight	POLYGON((21.583900 -52.676793, 12.176826 -38.609044, -3.197549 -45.642918, 1.019486 -70.261480))	<input type="button" value="Settings"/>	<input type="button" value="Delete"/>
earthcare_sample	June 14, 2023, 9:42 p.m.	EarthCARE	Any	Any	Any	Jan. 1, 2023, midnight	June 14, 2026, midnight	POLYGON((62.738631 -81.472634, 62.087434 -54.040522, 37.968459 -44.896485, 34.568104 -66.701497))	<input type="button" value="Settings"/>	<input type="button" value="Delete"/>
new res	May 23, 2023, 7:20 a.m.	Sentinel-5p	TROPOMI	Any	Any	Jan. 1, 2023, midnight	May 23, 2023, midnight	Any	<input type="button" value="Settings"/>	<input type="button" value="Delete"/>

OPOT: Orbit Prediction and Overpass Tool

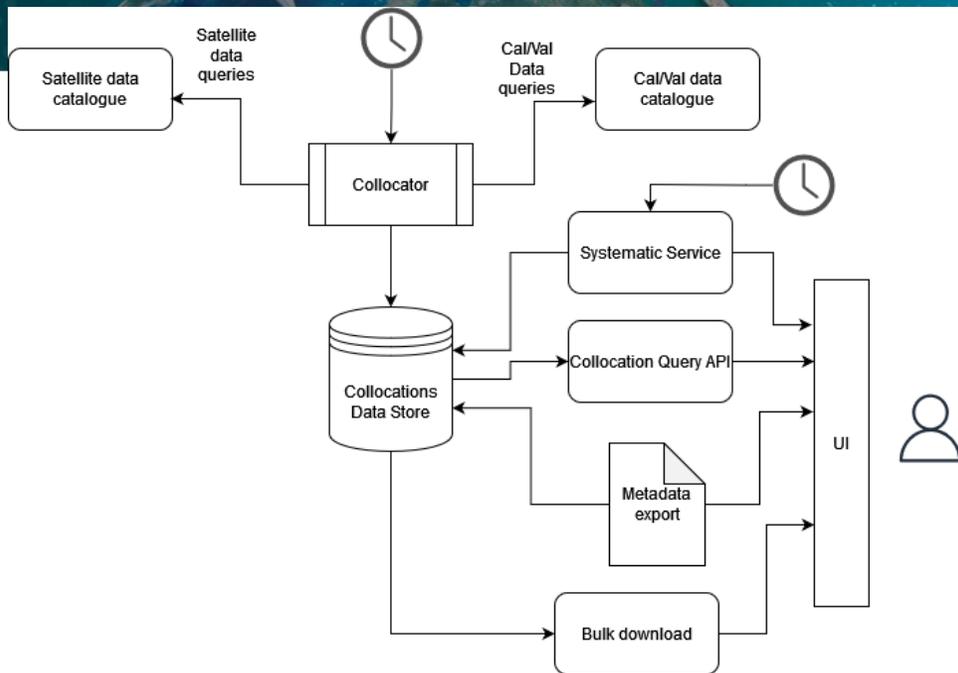


The screenshot shows the OPOT web application interface. At the top, there are logos for evdc and esa. Below the logos is a navigation bar with links: Home, Search Cal/Val Data, Search Satellite Data, Upload Data, Documentation, Tools, Campaigns, Overpass Tool, and Contact Us / Data Policy. A Login button is also present. The main content area is titled "Orbit Prediction Tool" and contains a description of the tool and its capabilities. Below the description is a progress indicator with five steps: 1. Select Operation, 2. Select Satellites, 3. Select Instruments, 4. Pick time range and location, and 5. Visualise. The "Select Operation" step is currently active, showing three options: "Predict Orbits", "Find Spatial Overpasses", and "Find Temporal Overpasses". A "Next Step >>" button is also visible. Below the operation selection is a "Query Actions" section with "Choose Data File" and "Upload" buttons. The main visualization area shows a 3D globe of Earth with a network of satellite orbits overlaid. A sidebar on the left lists various satellite networks: All, NDACC, SHADOZ, TCCON, TOLNA, and MJDUC. At the bottom, there is a search bar for "Search Satellite Data" and a footer with contact information: Skytek • NILU • ESA and Contact: nadirteam@nilu.no.

The Orbital Prediction and Overpass Tool (OPOT) generates and visualizes satellite's spatial overpasses. An overpass is when the field of view of a satellite's instrument passes over an area of interest (AOI). With OPOT you can:

- Predict Orbits
- Search for spatial overpasses by satellite/instrument (in a time range)
- Temporal Overpasses: i.e. joint overpasses between two satellites
- Download overpass data as CSV, KML or JSON
- Cal/Val Networks overlay and info
- Plan campaigns for satellites which have yet to launch by defining virtual satellites

Demo available =><https://evdc.esa.int/orbit/>



The Goal:

- Automate the collection of broad collocations between satellite and correlative products
- Provide users with tools to interact with the archive of pre-collocated data
- Allow automated data deliveries based on custom (narrower) collocation criteria

The Architecture:

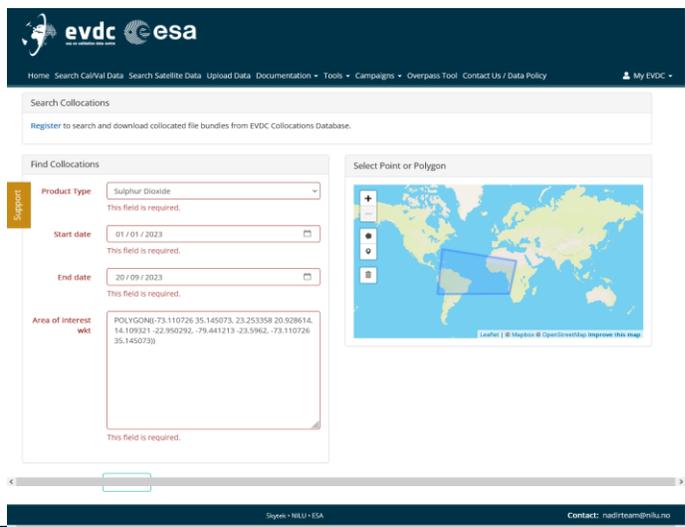
- Collocator as a scheduled service searching for new collocations daily
- Data store holding indexed metadata fields of both files (sat and cal/val file)
- Query service for interacting with collocation data store

Configuration, variable mapping

- Manual config for referencing satellite product variables to correlative variables
- Common naming
- Possible to configure more detailed mapping details (units, scaling, conversion formulas)

Collocation Query API

- The purpose is to filter the broad collocations to stricter collocation criteria.
- It exposes a few endpoints: product type, start and end date, area of interest (e.g. polygon), max time difference (minutes)

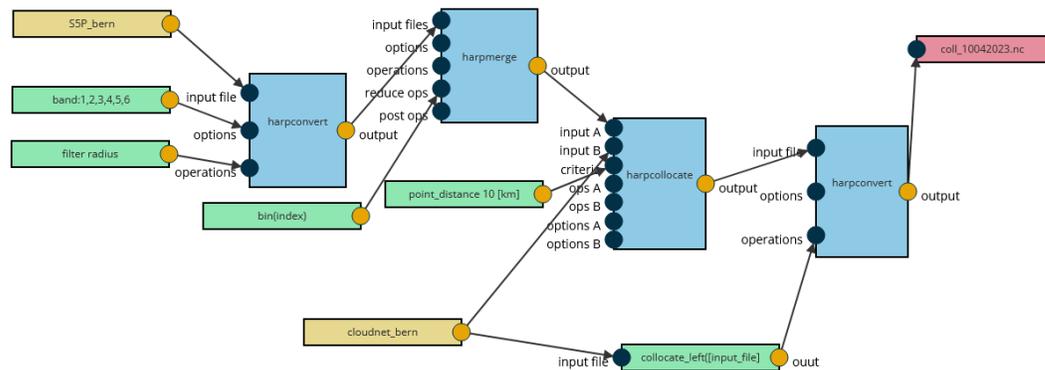


Workflow Elements and Tools

Add Input Data + Add Workflow Step + Add Value + Add Output +

Select Data Select Tool define value... define output name...

Workflow: test_workflow



The **Workflow Builder** module allows creating processing graphs out of processing modules available in the system. Users can exploit a workspace for defining the connections between inputs and outputs of the modules or steps of the workflow. The module specifically allows users to:

- Create/Save new workflow and export it as CWL script
- View the list of available processing modules
- Add workflow steps based on either processing modules or ad-hoc python or javascript scripts.
- Add input data blocks based on saved search results
- Add value blocks that set statically or dynamically the value of input parameters
- Define outputs
- Draw connections between inputs and outputs of processing modules
- Select from product inputs available in the system by assessing:
 - Satellite query results, Cal/Val query results
 - Specified locations in the User File Storage
- Specify locations of final outputs as locations in User File Storage
- Test running individual components with provided inputs
- Test running the processing workflow on singular inputs
- Schedule operational processing workflow run – either as once off run or as a scheduled service.

Example of workflow visualization: several modules for **EarthCARE cal/val activities** are available (e.g.: CIS, MSI, Lidar, Radar tools)

DOI and Landing Pages

The EVDC team has developed a new API that allows users to get a DOI for data made available in the data centre. This API generates landing pages automatically from xml input. Landing pages are essential for coining DOIs.

To coin a DOI for your dataset and to learn how to use the API, please contact the EVDC team at nadirteam@nilu.no. The EVDC team will assist you with the coining process and support you with setting up the landing pages.

Training Materials (pdf)

[Introduction to the EVDC Cal/Val database](#)
[Data Formatting and Data Submission to EVDC](#)
[EVDC For EarthCARE. Processing tools for Cal/Val.](#)
[Webinar slides](#)
[Data Search, Workflow Processing system, Collocation Database. Tutorials](#)

Video Tutorials

A set of video tutorials that cover most important functionalities and workflows in the EVDC platform:

- [EVDC Platform overview](#)
- [How to search for Cal/Val data?](#)
- [How to search and process the satellite data?](#)
- [How to use Orbit Prediction Tool?](#)
- [How to format Cal/Val Data?](#)

Tutorials on using orbit tool and satellite data search based on real-life scenarios:

- [Exploring Sentinel 5P and Aeolus data covering US west coast wildfires in 2020.](#)
- [Exploring Sentinel 5P SO2 data for Fuego volcano eruption](#)

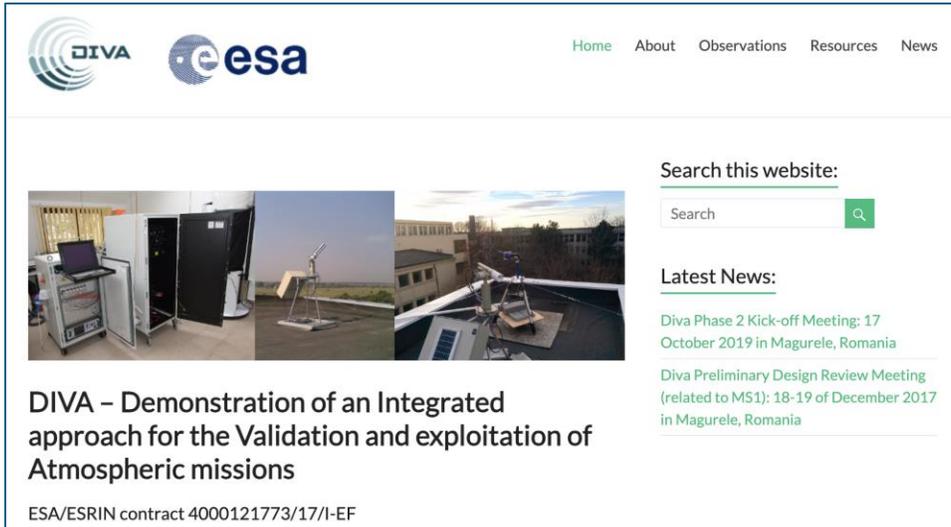
DIVA: Demonstration of an Integrated approach for the Validation and exploitation of Atmospheric missions

DIVA: Demonstration of an Integrated approach for the Validation and exploitation of Atmospheric missions

DIVA Consortium

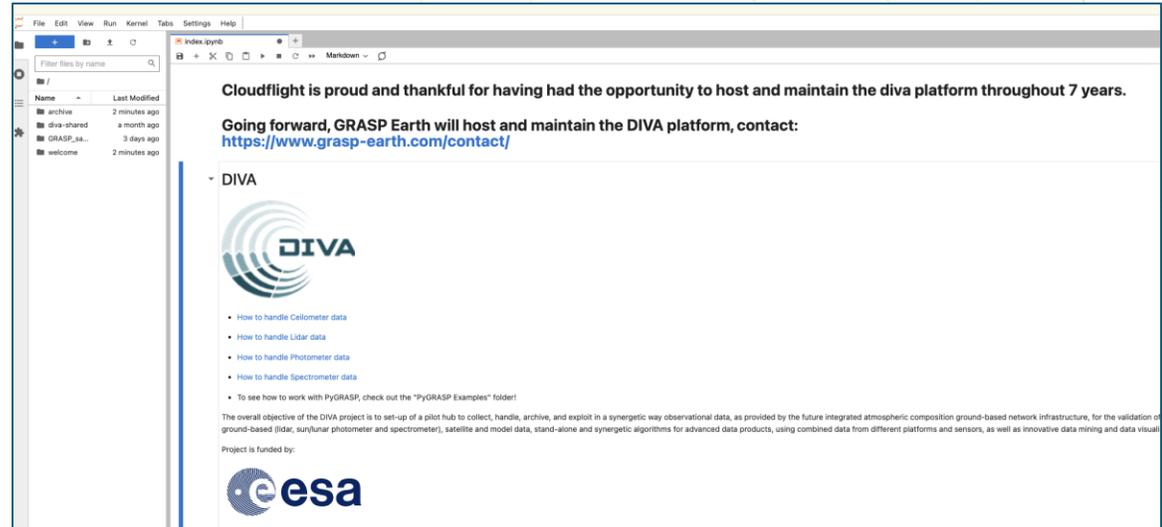


Website: <https://diva.inoe.ro/>



The screenshot shows the DIVA website homepage. At the top left are the DIVA and ESA logos. A navigation menu includes Home, About, Observations, Resources, and News. Below the navigation is a search bar with the text "Search this website:" and a search button. A "Latest News:" section features two news items: "Diva Phase 2 Kick-off Meeting: 17 October 2019 in Magurele, Romania" and "Diva Preliminary Design Review Meeting (related to MS1): 18-19 of December 2017 in Magurele, Romania". A large image shows laboratory equipment and a satellite. At the bottom, the text reads "DIVA – Demonstration of an Integrated approach for the Validation and exploitation of Atmospheric missions" and "ESA/ESRIN contract 4000121773/17/I-EF".

DIVA platform: <https://cloud.grasp-sas.com/>



The screenshot shows the DIVA platform cloud interface. At the top, a message states: "Cloudflight is proud and thankful for having had the opportunity to host and maintain the diva platform throughout 7 years. Going forward, GRASP Earth will host and maintain the DIVA platform, contact: <https://www.grasp-earth.com/contact/>". Below this is a "DIVA" section with the DIVA logo and a list of links: "How to handle Cellometer data", "How to handle Lidar data", "How to handle Photometer data", and "How to handle Spectrometer data". A note mentions "PyGRASP Examples" folder. At the bottom, the text reads "The overall objective of the DIVA project is to set-up of a pilot hub to collect, handle, archive, and exploit in a synergic way observational data, as provided by the future integrated atmospheric composition ground-based network infrastructure, for the validation of ground-based (lidar, sun/lunar photometer and spectrometer), satellite and model data, stand-alone and synergic algorithms for advanced data products, using combined data from different platforms and sensors, as well as innovative data mining and data visual". The project is funded by ESA, with the ESA logo at the bottom.

Goals of the project

- **Set-up of a pilot hub to collect, handle, archive, and exploit in a synergetic way observational data**
 - Integrated ground-based networks: AERONET, EARLINET, PGN
 - Synergistic algorithms: GRASP, NATALI
 - Data mining and visualization tools: Jupyter platform
- Coordinated development of synergistic ground-based measurements techniques and algorithms for:
 - Validation of the European EO missions and payloads
- Challenges:
 - Separate sources
 - Different data formats
 - Difficult access
- **DIVA = a pilot with selected & well-instrumented observation stations**

DIVA Sites

Station	Latitude	Longitude	Contact	Lidar	Photome	Spectrom
Bucharest	44.348°N	26.029°E	livio@inoe.ro	X	X	X
Cluj	46.766°N	23.583°E	miky.ajtai@gmail.com	X	X	
Hohenpeißenberg	47°N	11°E	Ina.Mattis@dwd.de	X	X	
Leipzig	51.35°N	12.43°E	ulla@tropos.de	X	X	
Warsaw	52.21°N	20.98°E	iwona.stachlewska@fuw.edu.pl	X	X	
Lille	50.6117°N	3.1417°E	Philippe.Goloub@univ-lille.fr	X	X	
Granada	37.1666°N	3.6°W	alados@ugr.es	X	X	
Thessaloniki	40.67°N	22.95°E	balis@auth.gr	X	X	
Potenza	40.601°N	15.723°E	aldo.amodeo@imaa.cnr.it	X	X	
Rome	41.840°N	12.647°E	gianpaolo.gobbi@artov.isac.cnr.it	X	X	X
Innsbruck	47.2640°N	11.3854°E	martin.tiefengraber@luftblick.at			X
Izaña	28.3°N	16.5°W	npratasp@aemet.es		X	X



THANKS!

IR0000032 – ITINERIS, Italian Integrated Environmental Research Infrastructures System
(D.D. n. 130/2022 - CUP B53C22002150006) Funded by EU - Next Generation EU PNRR-
Mission 4 “Education and Research” - Component 2: “From research to business” - Investment
3.1: “Fund for the realisation of an integrated system of research and innovation infrastructures”

