Earthnet's Third Party Missions Programme

Overview of ESA Third-Party Mission Activities

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30/05/2024

ESA' Earthnet Programme – In a nutshell

1. Third Party Missions (TPMs):

- ✓ **Ensure** *free access* to Third Party Missions data for R&D purposes in ESA Member States (including access for other ESA programs, e.g. BICs, DPTD)
- ✓ **Quality benchmark** data from commercial & European NewSpace missions
- ✓ **Enable** as first buyer of *NewSpace EO data to be promoted to broader European scientific community* for research & pre-operational applications development

2. Charter: **Support** & **safeguard** the *International Charter of Space and Major Disasters*, through which satellite data are made freely available for disaster management activities worldwide.

3. International presence: **Guarantee** *coordination and leadership within international bodies* (e.g., CEOS, GEO) to support the growing demand for collaboration & specific international projects

Central component – Earthnet TPMs

About
THIRD PARTY MISSIONS PROGRAMME

What are TPMs?

Third Party Missions are earth observation missions that are not owned or operated by ESA. The agency has an agreement with these third parties to distribute data products from their missions to scientific users

History?

ESA's TPM arrangement has been operating for over

45 YEARS

providing EO data to users in **Europe** and **worldwide** for research and pre-operational applications development

How many?

TPMs currently include over 60 instruments on more than 50 missions

<60 INSTRUMENTS

50+ MISSIONS

- Atmospheric
- Optical
- Reflected Global Navigation Satellite System (GNSS-R) and Radio Occultation
- Gravity Field
- SAR

More than 14,300 research projects used TPM data since 2008 with over 2300 newly registered TPM users in the last 12 months

Benefits?

Data is offered from a large number of international missions through a single programme. One of the criteria for selecting new missions is that they utilise instruments that offer similar data to those acquired by ESA missions, contributing to a wide range of data that may be used together. Other criteria include degree of innovation, opportunity for new international collaboration and experience to be gained for future missions

TPMs data combined with the data from ESA missions, can exploit the synergy between all sources of data to meet the needs of user communities, from different sectors, for a growing range of applications

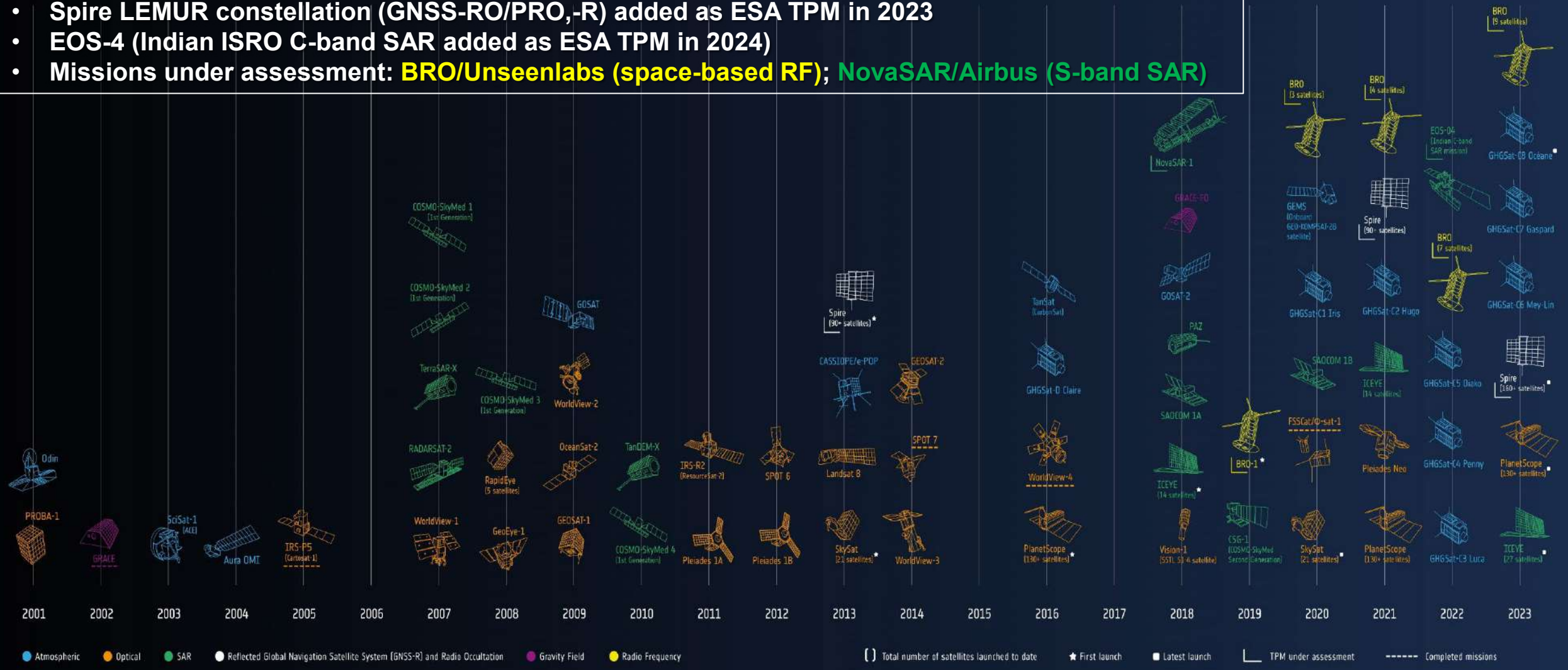
Data Access?

https://earth.esa.int/eogateway/missions/third-party-missions

THIRD PARTY MISSIONS
TIMELINE

SAR, Optical, Atmospheric missions approved as ESA Third Party Missions (for scientific use)

- Spire LEMUR constellation (GNSS-RO/PRO,-R) added as ESA TPM in 2023
- EOS-4 (Indian ISRO C-band SAR added as ESA TPM in 2024)
- Missions under assessment: BRO/Unseenlabs (space-based RF); NovaSAR/Airbus (S-band SAR)



TPM super high-resolution optical data

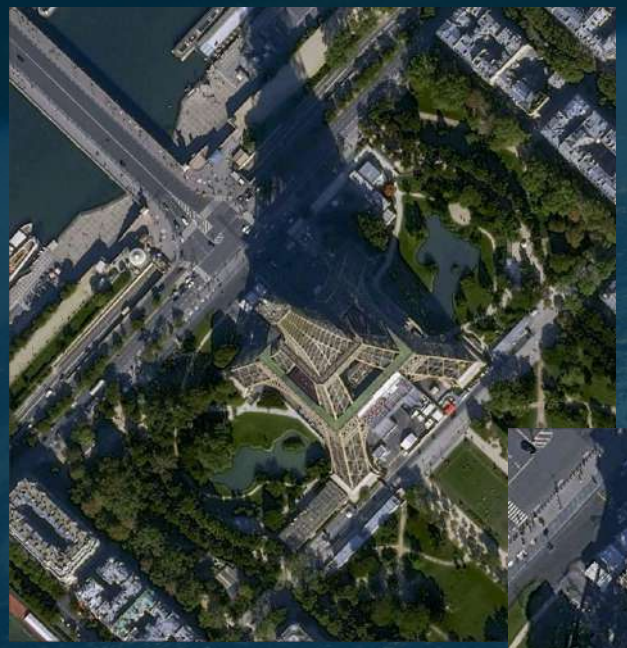
ESA/ESRIN (Frascati, Italy)
WorldView-3 30 cm vs
15 cm HD © (2022) Maxar

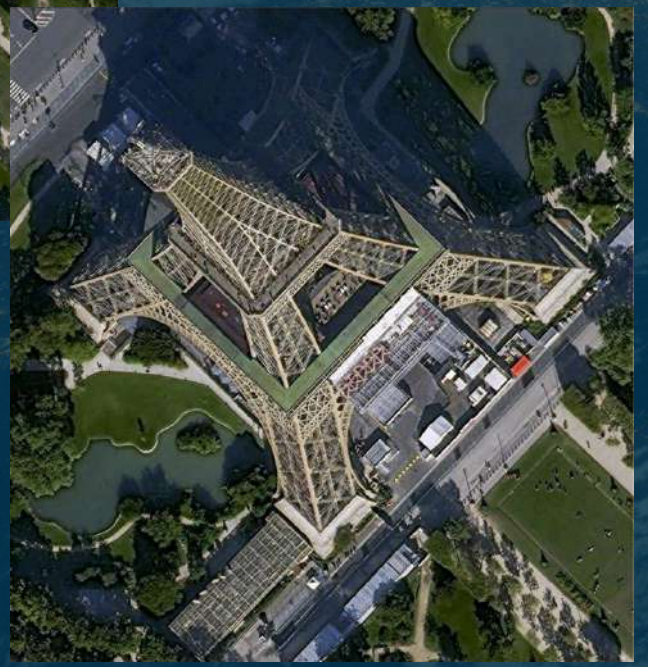
MAXAR's Worldview-3 30 cm HD is available for View-Ready (OR2A)and Map-Ready (Ortho) Products

High Res Optical: Panchromatic and 4-bands	**Standard(2A)/View Ready Standard (OR2A)**	15 cm HD, 30 cm HD, 30 cm, 40 cm, 50/60 cm
	View Ready Stereo	30 cm, 40 cm, 50/60 cm
	Map Ready (Ortho) 1:12.000 Orthorectified	15 cm HD, 30 cm HD, 30 cm, 40 cm, 50/60 cm

Native 30 cm and 50/60 cm resolution products are processed with MAXAR HD Technology to generate respectively 15 cm HD and 30 cm HD products: initial special resolution (GSD) is unchanged, HD technique increases the number of pixels and improves the visual clarity achieving aesthetically refined imagery with precise edges and well reconstructed details.

TPM super high-resolution optical data





Paris, France
Pléiades Neo 30 cm vs 15 cm HD © (2021) Airbus DS

Pléiades Neo 30cm Instrument Parameters

- **Spatial Resolution, GSD**: 30 cm for Panchromatic, 1.2 m for Multispectral bands
- **Swath Width**: 14 km at nadir
- **Geolocation Accuracy**: <5m CE90 at nadir. Expected: 3.5 m with refined data
- **Viewing Angle**: ± 52°
- **Pointing Agility**: Roll/pitch: 10° in 7 seconds, 30° in 12 seconds, 60° in 20 seconds

Athens, Greece
Pléiades Neo 15 cm HD © (2021) Airbus DS

Imagery collected with a native 30cm spatial resolution is processed using a proprietary algorithm that enhances the level of detail, while maintaining the native ground sampling distance. This allows for smaller objects to be detected in the image, without affecting the geolocation accuracy.

- Colors of the image are brighter
- Details are sharper

TPM super high-resolution optical data

San Francisco, CA, USA
GEOSAT-2 Pan-Sharpened 75 cm vs 40 cm
© (2020) GEOSAT

Burgos, Spain
GEOSAT-2 Multispectral 3,2m vs 1,6m
© (2022) GEOSAT

The objective of the SR development is to improve satellite imagery resolution making use of AI and machine learning techniques, while maintaining the radiometric value of the original data.

GEOSAT-2 super resolution products:

- PS3 - Pan sharpened (RGB Band) Natural Color
- PS4 - Pan sharpened (NRG Band) False Color
- PSH - Pan sharpened
- PSH with BOA correction
- PAN – Panchromatic

→ FROM 75CM TO 40 CM

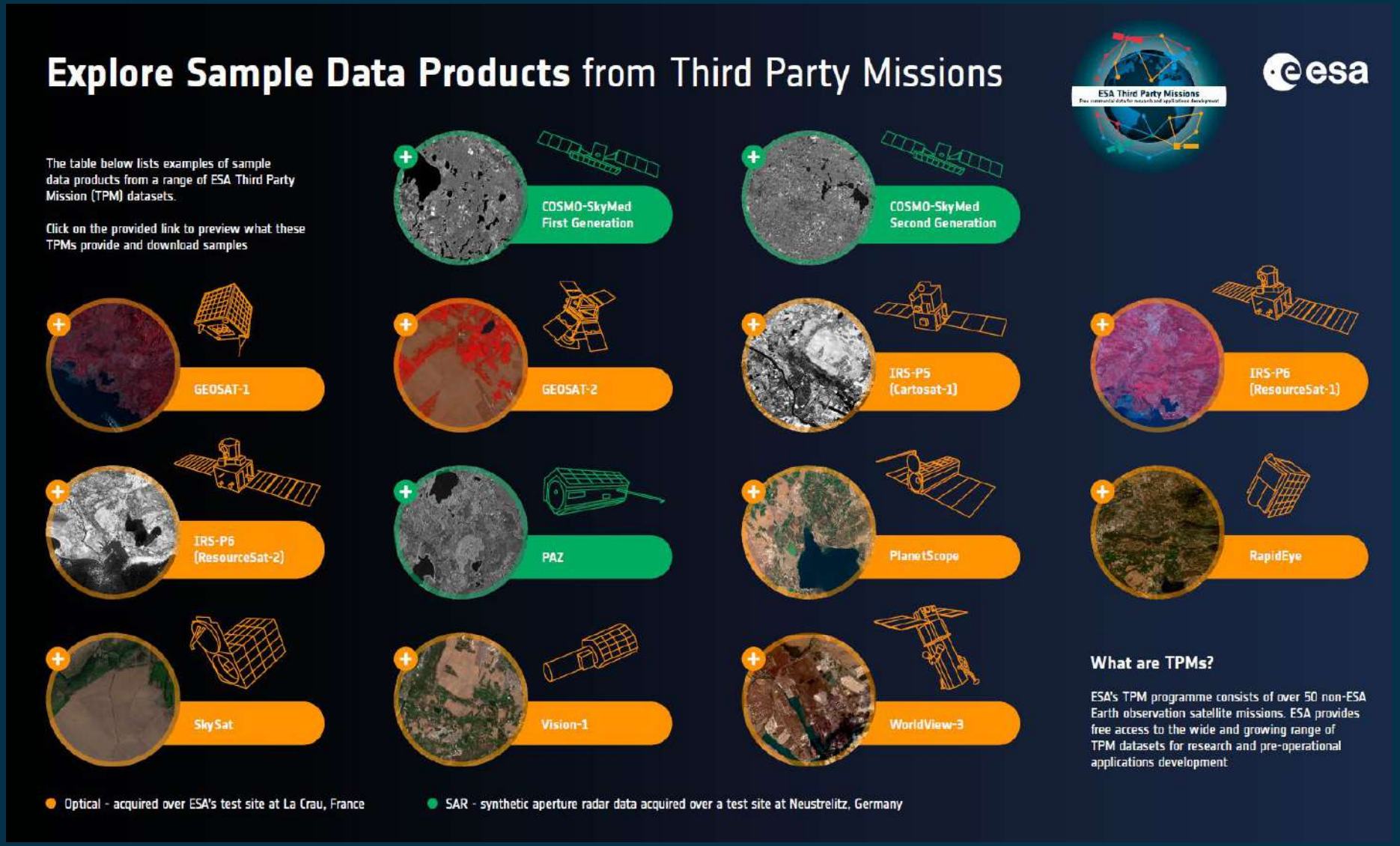
- MS4 – Multispectral (NRGB)

→ FROM 3.2M TO 1.6 M

The product preserves radiometric quality and can be used for:

- Characterization of change
- Precision agriculture
- Index calculation @ <2m
- Scientific purposes

TPM Data Sample products gallery

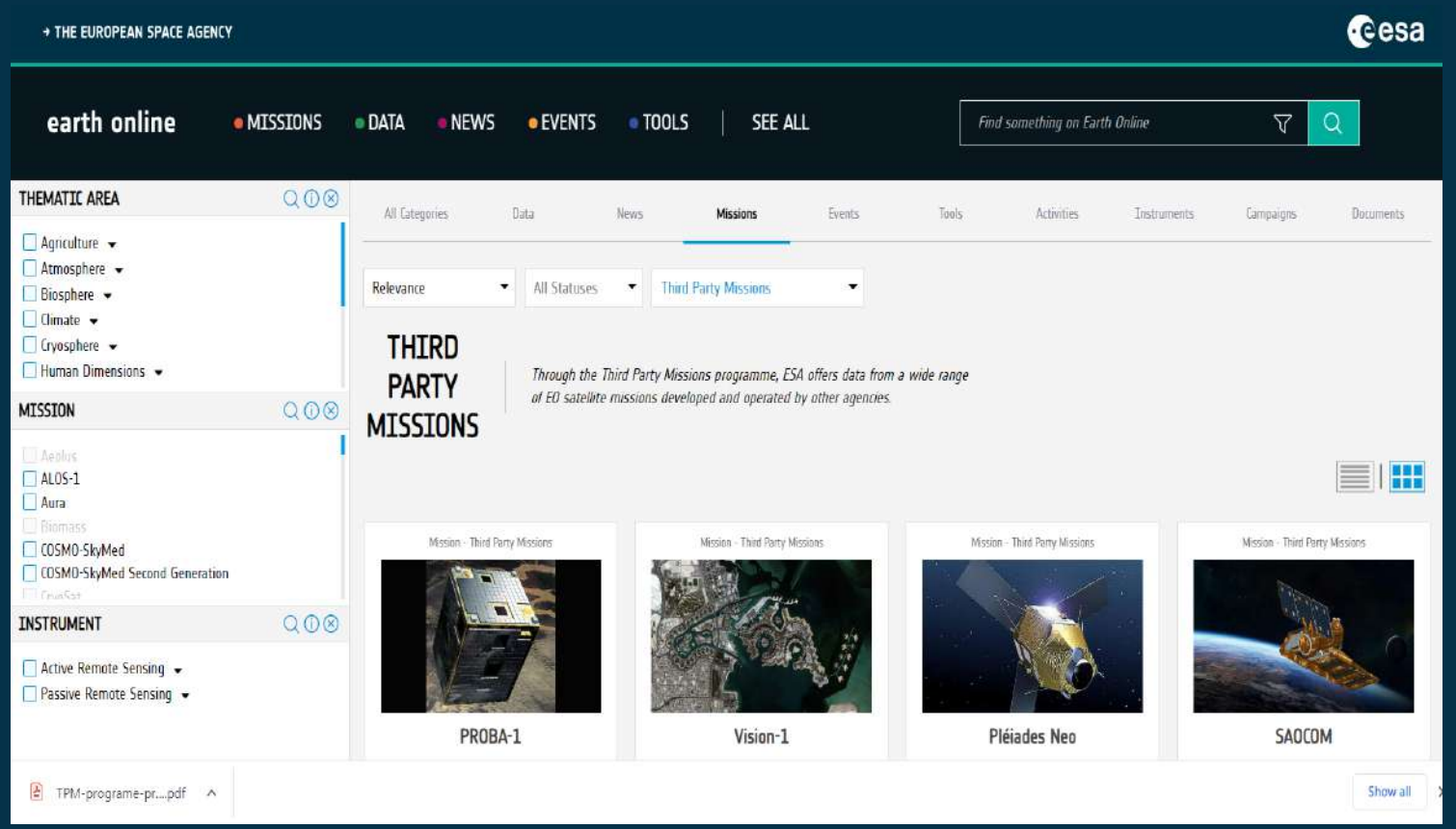


https://earth.esa.int/eogateway/news/explore-sample-data-products-from-third-party-missions

How to Access commercial TPM Data – Project Proposal

From the Earth Online mission description page:

https://earth.esa.int/eogateway/missions/third-party-missions



SELECT

1 You can search for data products for use in your projects by browsing the available collections

REGISTER

2 Once you have selected your mission and data collection, a Project Proposal must be completed. To complete the proposal, **you must log in or register an ESA EO Sign-In account**

PREPARE

3 Create and fill-out the proposal, which includes outlining the objectives, methods and deliverables of the project, the composition of the team of researchers and the region of interest. You may optionally add further data collections from different missions to the proposal

SUBMIT

4 **Once the proposal is complete, submit it to ESA for evaluation.** This process may take up to six weeks, after which the user is notified as to the outcome of the assessment and, if approved, provided with instructions on how to order the products from the data provider

PROMOTE

5 When the project closes, a final report should be submitted. Users are then encouraged to **contact the Earth Online editorial team so a success story about the project** can be prepared for the website. The editors can be reached at: **contentmatters4earthonline@ejr-quartz.com**

Where to find all this information?

ESA TPM DATA ACCESS GUIDE

https://earth.esa.int/eogateway

TPM Terms & conditions

Go-to guide to Third Party Mission data offering

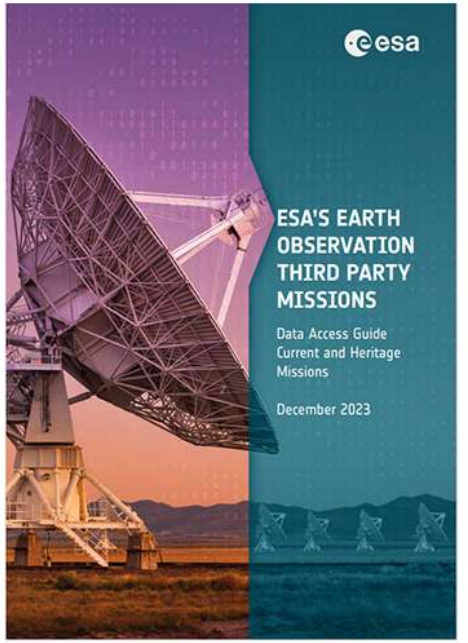
27 Feb 2024

ESA's latest Third Party Missions Data Access Guide has been published, providing technical details and information on available data collections for all current or past Third Party Missions.

The December 2023 version of ESA's Third Party Missions (TPM) Data Access Guide is now available for download. This is your go-to guide to the offering of TPM data (from current or Heritage missions), including the collection descriptions and how to access them.

The 2023 version of this guide has been revised with respect to the 2022 version, to include recently available data collections provided by new missions in the TPM portfolio – FSSCat, KOMPSAT-1, Landsat RBV, NovaSAR-1 and TanSat.

Featured Datasets - specific subsets of data collections that are freely available online via Immediate Access or Fast Approval - are the topic of one section in the guide. These open datasets provide data over a restricted area and/or with a limited time period and can be obtained following submission of a simple form.



ESA's Earth Observation Third Party Missions data access guide

The new featured collections are ALOS PRISM Level-1c European coverage cloud free, GEOSAT-2 Portugal coverage, GEOSAT-2 Spain coverage 2021 consisting of 1 m PAN and 4 m multispectral imagery, Landsat 5 TM European and Mediterranean countries cloud free collection, Landsat 7 ETM+ European and Mediterranean countries cloud free collection and finally, KOMPSAT-1 coverage of 50 European cities.

Other notable new collections, that are not included in the featured section, include Cartosat-1 Euro-Maps 3D, and ESA archives for ICEYE, PAZ, PlanetScope and SkySat.

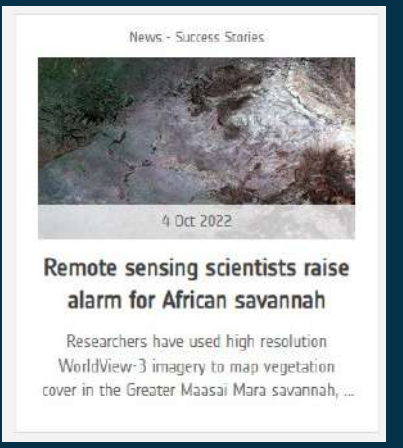
TPM data success stories

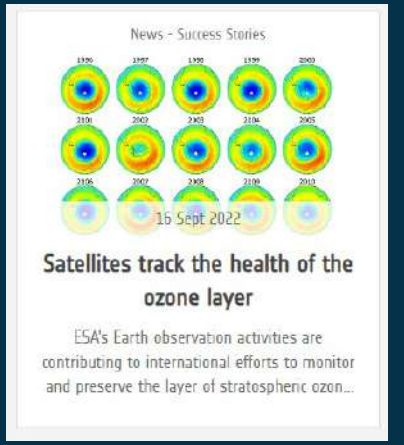
As part of Earthnet's outreach activities, articles about the use of ESA's Third Party Missions data within the scientific community are regularly published

https://earth.esa.int/eogateway/missions/third-party-missions

If you have interesting results to share, please contact the **ESA editorial team** to turn your experience of using ESA Third Party Mission data into a success story.

Please email the team at:
contentmatters4earthonline@ejr-quartz.com





Third Party Mission Success Stories

EARTHNET

Planetwide Dataset

UK (London)

SPOT 6 and 7

Commercial high resolution imagery combined with machine learning methods to develop a new worldwide open source dataset

New worldwide dataset captures the planet in fine detail

Monitoring Rock Glaciers

Scotland, UK (St. Andrews)

Pléiades

Very high resolution Pléiades data reveal long-term creep of rock glaciers in the Poiqu River Basin of central Himalaya

Pléiades unlocks information about rock glaciers in central Himalaya

Tracking Mountain Glaciers

Germany (Nuremberg)

TanDEM-X and SRTM

Volume and mass changes of mountain glaciers are derived from interferometric synthetic aperture radar (InSAR) data

Tracking mountainous glaciers using TanDEM-X

Savannah Biodiversity Loss

Denmark (Aarhus)

WorldView-3

High resolution WorldView-3 imagery maps vegetation cover in the Greater Maasai Mara savannah, a global hotspot for biodiversity

Remote sensing scientists raise alarm for African savannah

Geothermal Surveying

México (Querétaro)
Italy

GeoEye-1

High resolution optical data help geological mapping of the geothermal volcanic area of Cerro Domuyo, the highest mountain in Patagonia

High-resolution optical images improve geological mapping in remote geothermal areas

Predicting Crop Yields

UK (Southampton)
Malawi, Kenya and Ghana

PlanetScope

High resolution data help improve crop productivity in the drylands of sub-Saharan Africa

Predicting crop yield using Planet data

Detecting Methane Plumes

Spain (Valencia)
Netherlands

Landsat 8, WorldView-3

Earth observation data map industrial methane plumes from offshore platforms in the Gulf of Mexico

WorldView-3 helps to track offshore methane plumes from oil and gas

Maritime Surveillance

Italy (Naples)

COSMO-SkyMed, SAOCOM, Sentinel-1

Multi-frequency synthetic aperture radar data from different missions help identify marine vessels

SAR synergy data for maritime surveillance

Navigation Safety

Italy (Venice)
Netherlands

COSMO-SkyMed, ICEYE, TerraSAR-X

Optical and synthetic aperture radar data aid navigation risk modelling and provide near real-time updates on shipping routes

Earth Observation data to improve navigation risk modelling and shipping routes

Uncovering Waste Landfills

Hungary (Budapest)
Netherlands

GeoEye-1, WorldView

Very high resolution imagery is combined with advanced deep learning techniques to automate the detection of waste landfills

Meet a young researcher who combines remote sensing with deep learning techniques

Optical missions SAR missions

https://earth.esa.int/eogateway/news/third-party-mission-success-stories

Pyramids of Giza (Egypt)
Vision-1 © Airbus Defence and Space Limited (2020)

Angkor Wat (Cambodia)
Planet Labs © SkySat (2021)

Burned areas in Tunisia
WorldView-3 © (2023) Maxar

Thank you

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