

German Aerospace Center DLR Earth Observation Center EOC

Missions, Technology and Inuvik Satellite Station Facility ISSF

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International Ground Segment, Earth Observation Center EOC

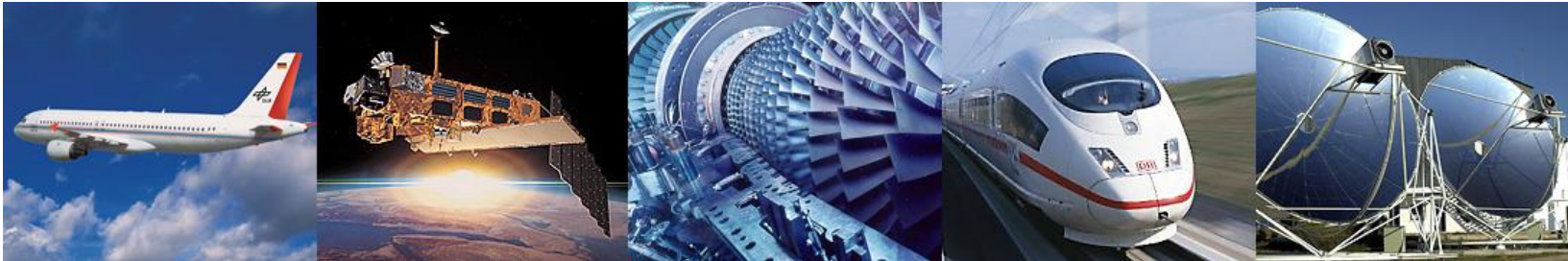
Inuvik, Arctic Development Expo 2023

Knowledge for Tomorrow



DLR

German Aerospace Center



- Research Institution
- Space Agency
- Project Management Agency



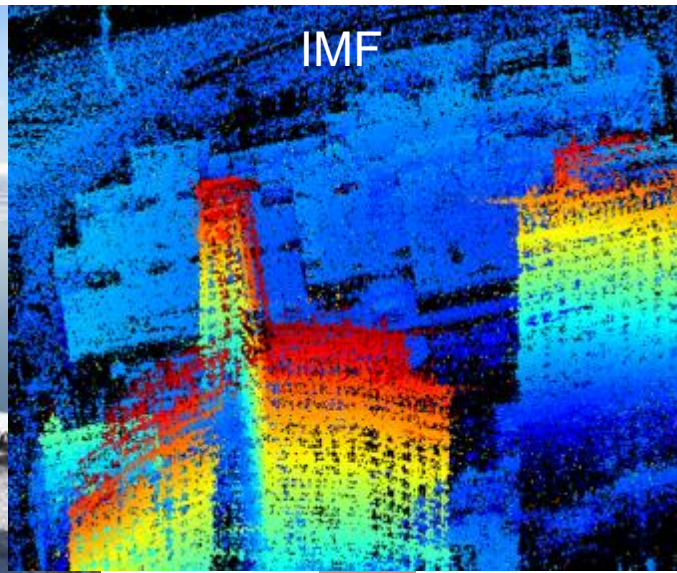
Earth Observation Center - Core Duties

Ground Segment



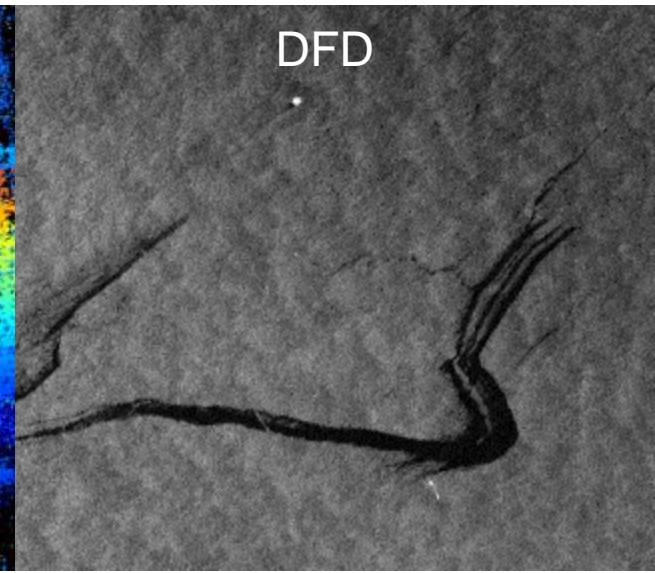
Data acquisition, big data processing, archiving, distribution of Earth observation data and derived Information

Algorithms & Processors



R&D on algorithms and processors to derive and improve geophysical parameters from satellite data in 2-, 3- and 4 dimensions

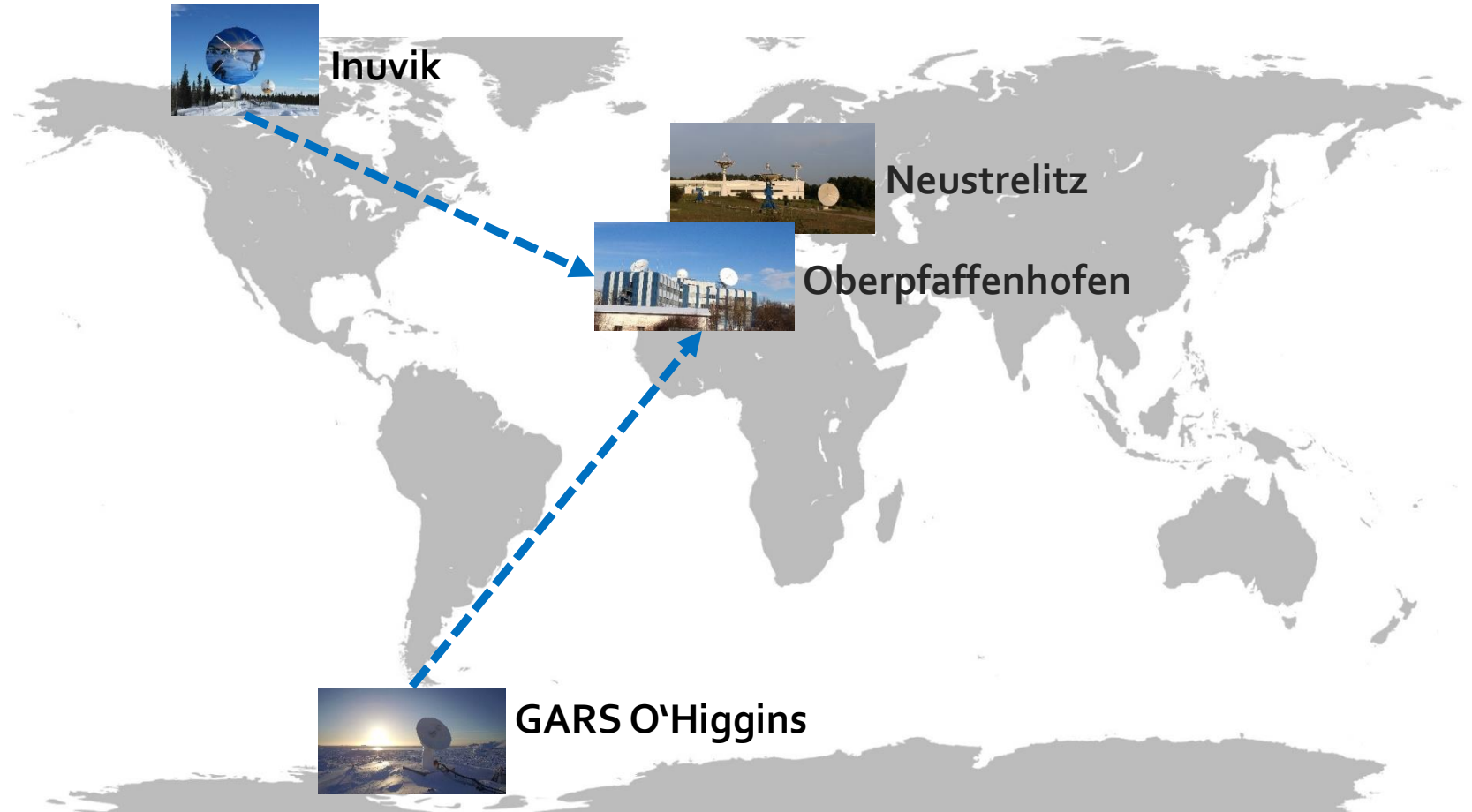
Science and Applications



Geoscientific research, development of ge-information products, research projects



DLR Ground Station Network for National and International EO Missions



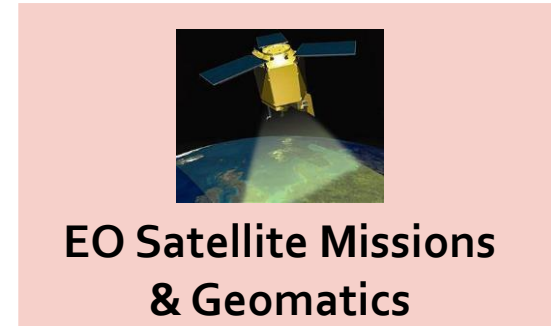
The German Aerospace Center DLR at ISSF

- DLR together with the Swedish Space Corporation SSC explored the possibility to establish a satellite ground station in Inuvik from 2007 on
- Partnership with the Canada Center for Mapping and Earth Observation CCMEQ led to the concept of the Inuvik Satellite Station Facility ISSF
 - With first satellite dish established in 2009 by DLR
 - Full in service for various satellite missions for more than 13 years

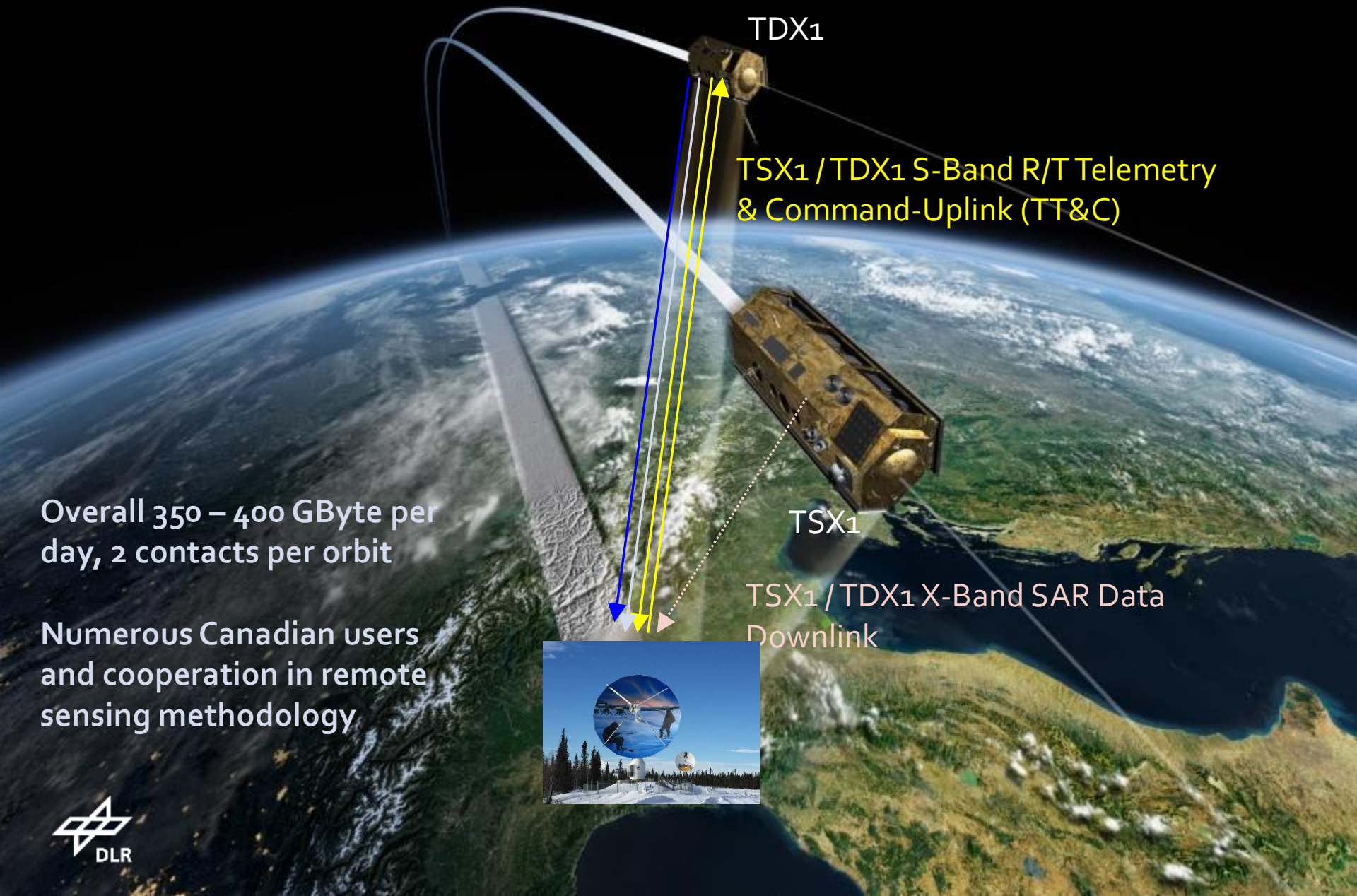


Mission Portfolio at ISSF

- **TerraSAR-X / TanDEM-X** from 2010 on
- Different missions LEOP support (recent example see below)
- **EnMAP** launched 1. April 2022, supported since then
- **Copernicus Sentinel 5 Precursor** in scope of ESA contract in cooperation with KSAT (Svalbard) and SSC (ISSF)
- Future Copernicus mission in the scope of DLR
 - Side remark: daily and significant usage of Copernicus data (S1 and S2) in the **Maritime Awareness Information System** in Tuktoyaktuk



TerraSAR-X 16 Years in Orbit / TanDEM-X 13 Years in Orbit



TDX₁

TSX₁ / TDX₁ S-Band R/T Telemetry & Command-Uplink (TT&C)

TSX₁

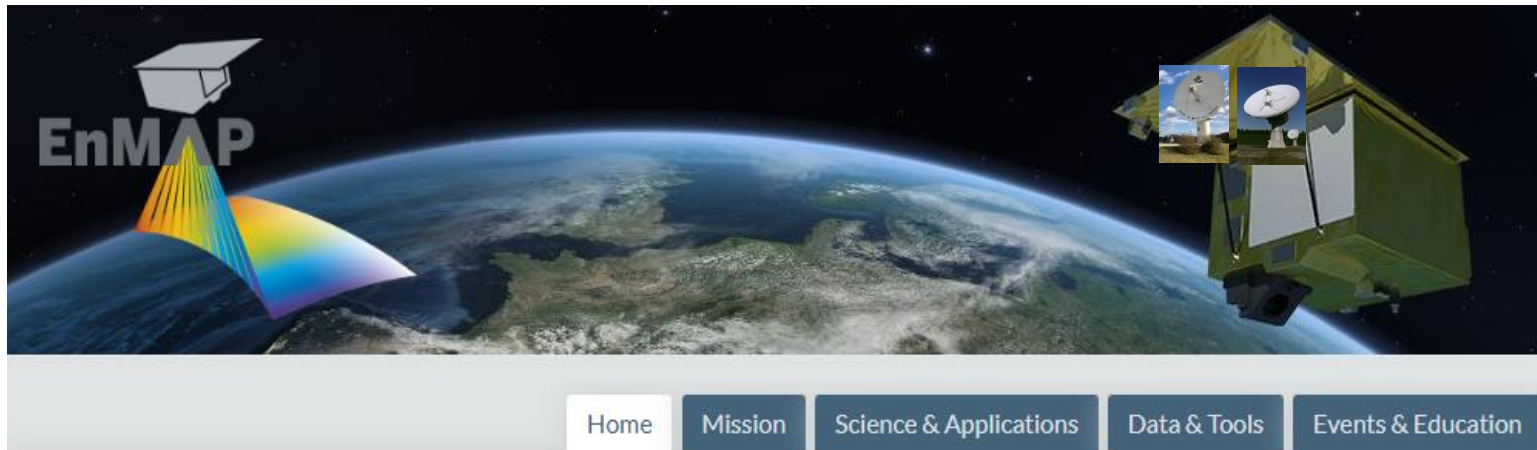
TSX₁ / TDX₁ X-Band SAR Data Downlink

Overall 350 – 400 GByte per day, 2 contacts per orbit

Numerous Canadian users and cooperation in remote sensing methodology



Environmental Mapping and Analysis Program EnMAP



[Science Plan](#) ↗

[Brochure \(english\)](#)

[Brochure \(german\)](#)

[Flyer](#)

[Video \(german\)](#) ↗

Welcome to EnMAP

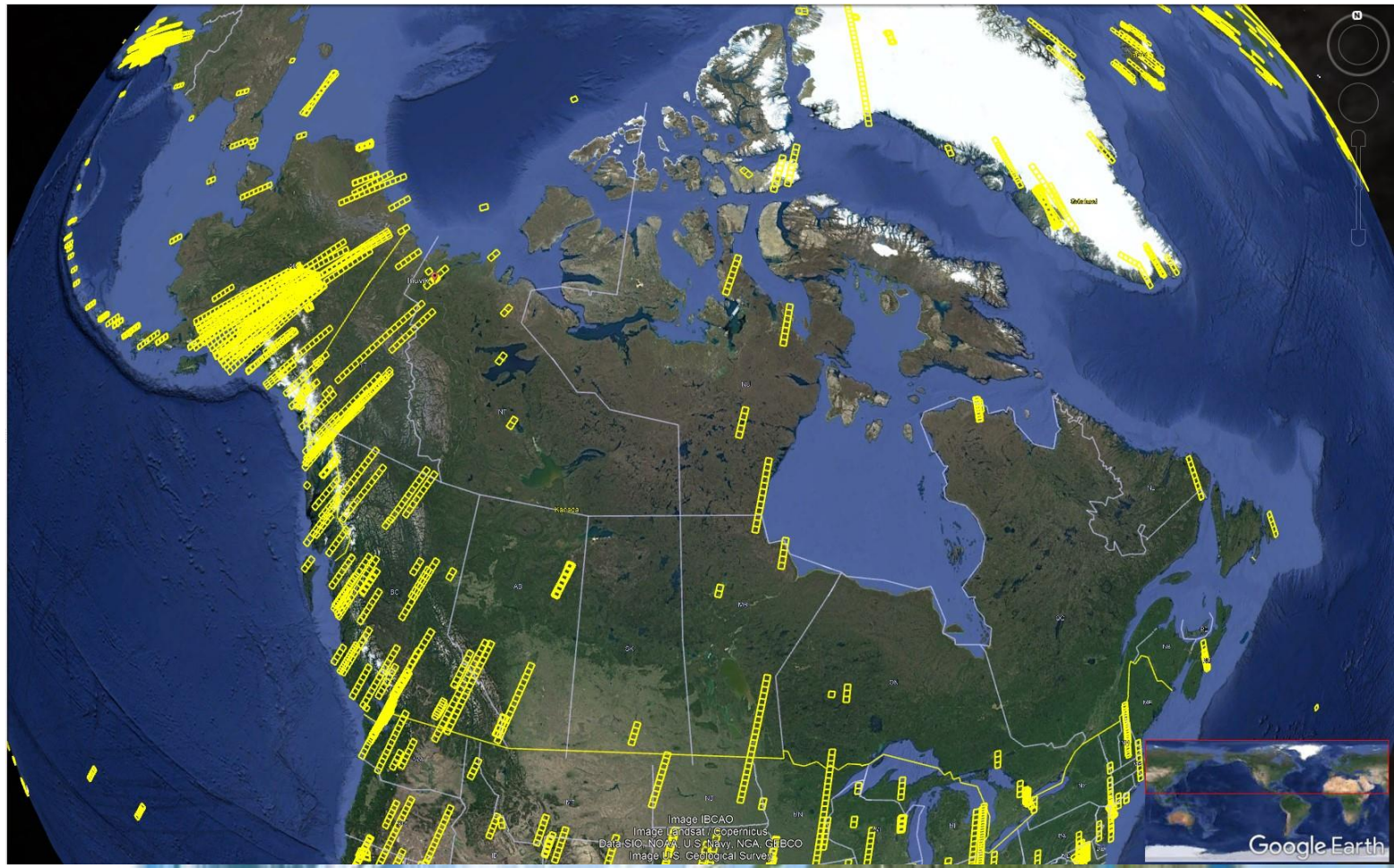
The German Spaceborne Imaging Spectrometer Mission

The Environmental Mapping and Analysis Program (EnMAP) is a German hyperspectral satellite mission that aims at monitoring and characterising Earth's environment on a global scale. EnMAP measures and models key dynamic processes of Earth's ecosystems by extracting geochemical, biochemical and biophysical parameters that provide information on the status and evolution of various terrestrial and aquatic ecosystems. For more information about the main objectives and the status have a look at the [mission page](#).



EnMAP Usage in and for Canada

- 45 registered Canadian EnMAP Users
- Around 1200 data acquisitions in Canada and Arctic



EnMAP Usage in and for Canada

– 12 approved Canadian proposals from Canadian scientists

EnMAP | IPS Portals | Proposal Portal | Observation Request Portal | Calibration Request Portal | User Portal

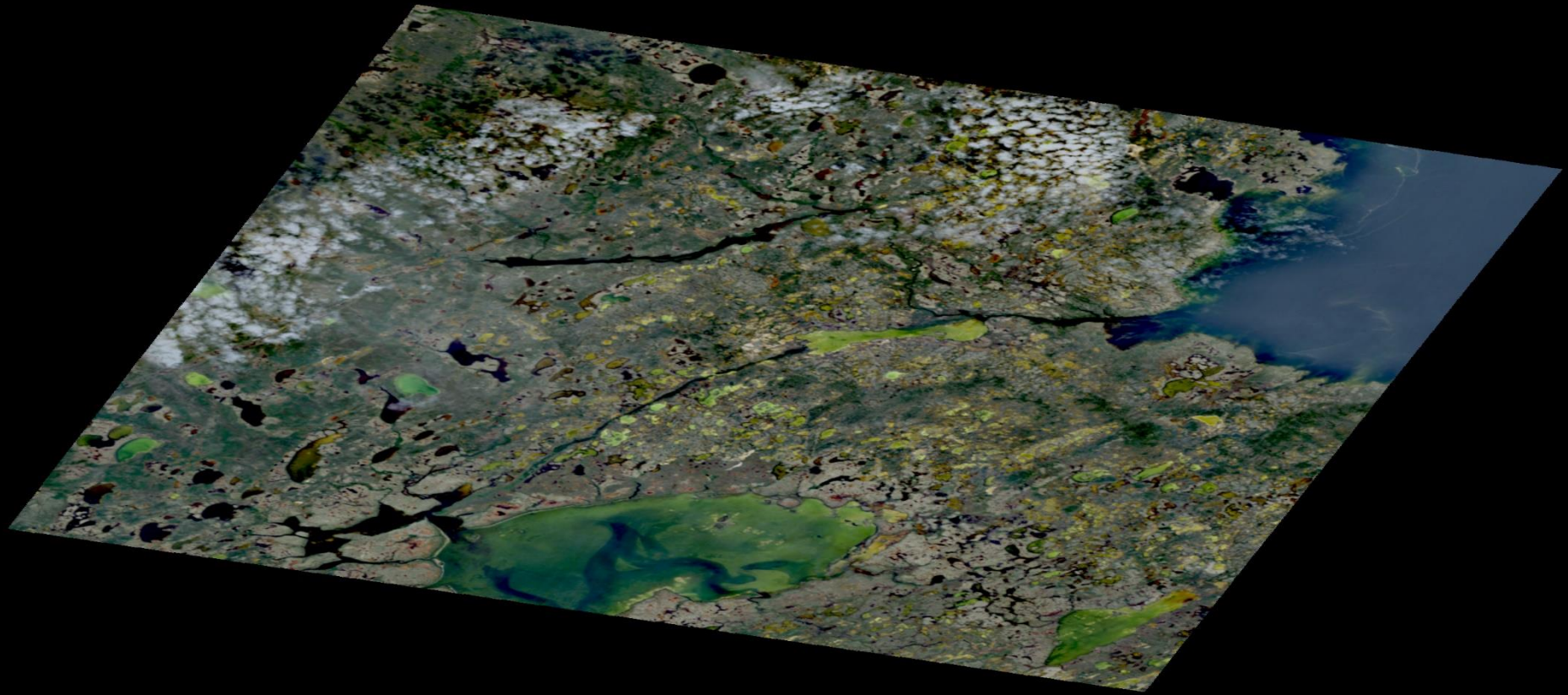
enmap_en applicationSupport Help Exit

Q	Topic	Id	Title	ST
•	WATER	A00001-P00074	Remote Sensing Tools to Monitor Biophysical...	REL
•	VEGETATION	A00001-P00092	Wetland classification from hyperspectral...	REL
•	SNOW/ICE	A00001-P00117	Examining seasonal snowpack, snow...	REL
•	VEGETATION	A00001-P00122	Modeling functional leaf traits across Canadian...	REL
•	GEO/SOIL	A00001-P00130	Application of EnMAP hyperspectral data in...	REL
•	VEGETATION	A00001-P00171	Integrative Remote Sensing Approaches to...	REL
•	VEGETATION	A00002-P00012	Test Migration IPS to OE	OSC
•	VEGETATION	A00002-P00073	Enhanced mapping and monitoring of aquatic an...	REL
•	GEO/SOIL	A00002-P00122	graduate	OSB
•	VEGETATION	A00002-P00152	Crop residue mapping using SWIR hyperspectra...	REL

Showing 10 / 365 Proposals



Example: Lac La Martre (and Clive Lake)

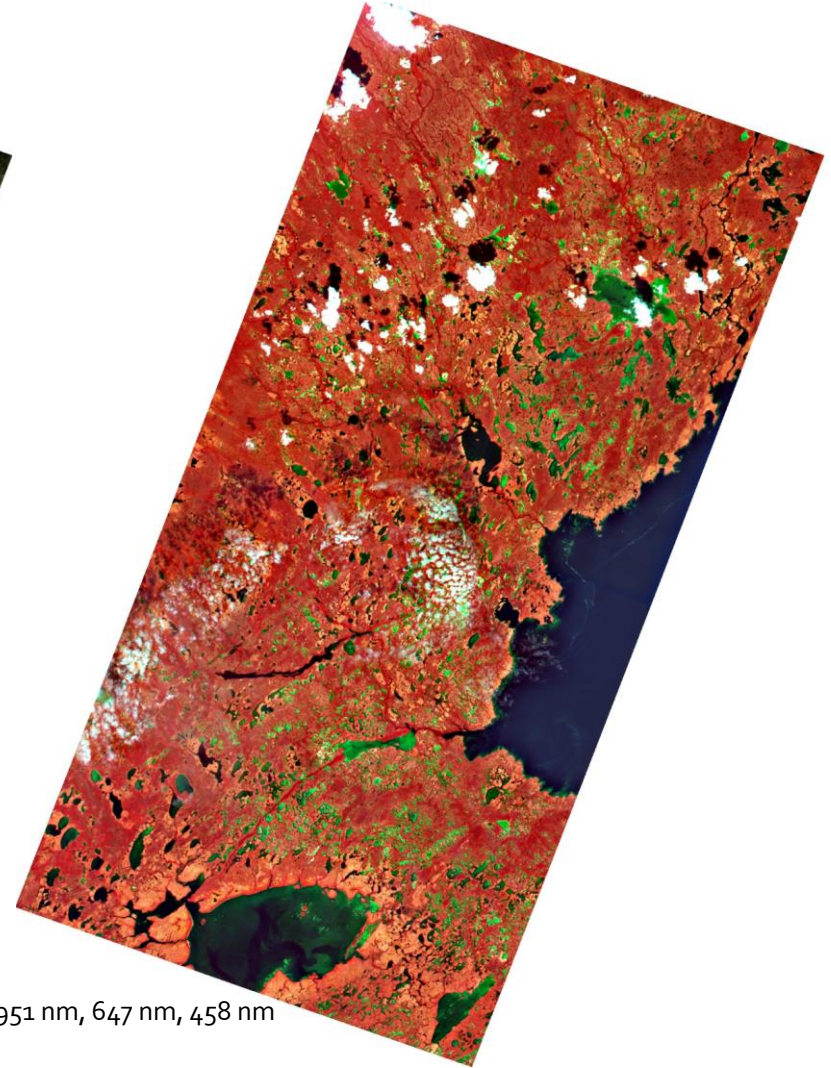


Lac La Martre, Canada
22.06.2022

EnMAP data ©DLR [2022/2023]



RGB 641 nm, 550 nm, 458 nm



RGB 951 nm, 647 nm, 458 nm



Lac La Martre, Canada 22.06.2022

EnMAP data ©DLR [2022/2023]



RGB 641 nm, 550 nm, 458 nm



RGB 2282 nm, 1707 nm, 540 nm

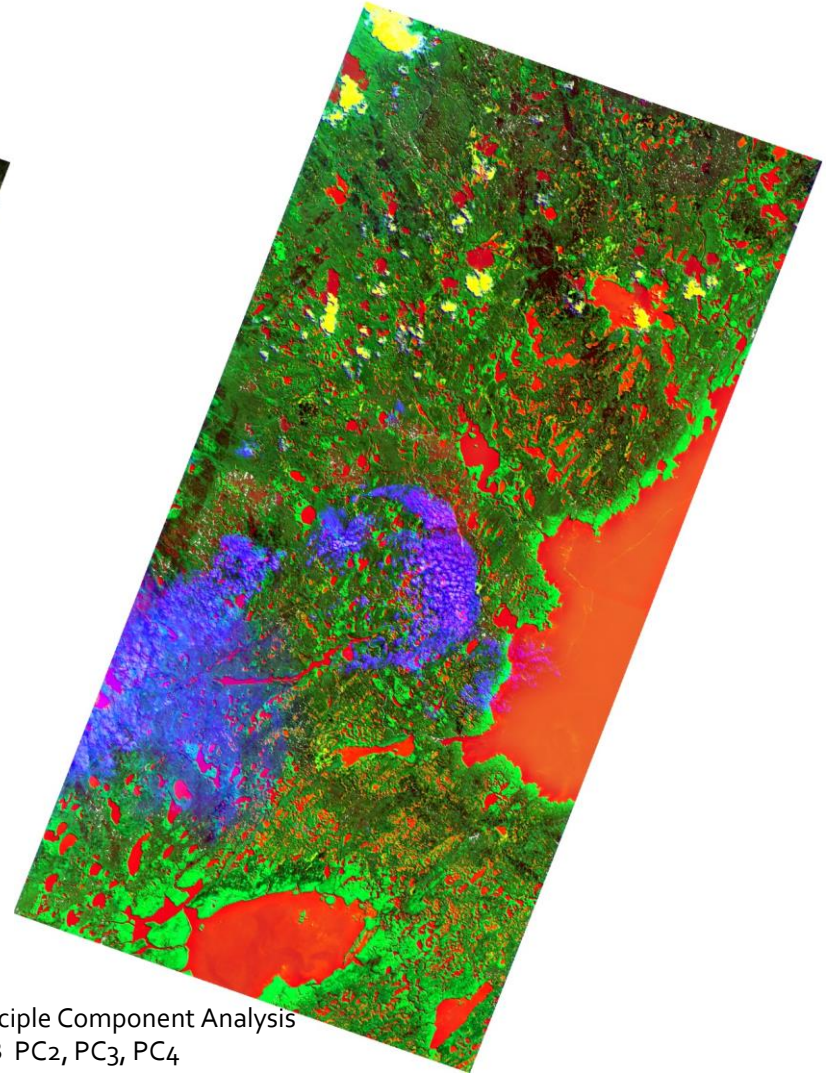


Lac La Martre, Canada
22.06.2022

EnMAP data ©DLR [2022/2023]



RGB 641 nm, 550 nm, 458 nm



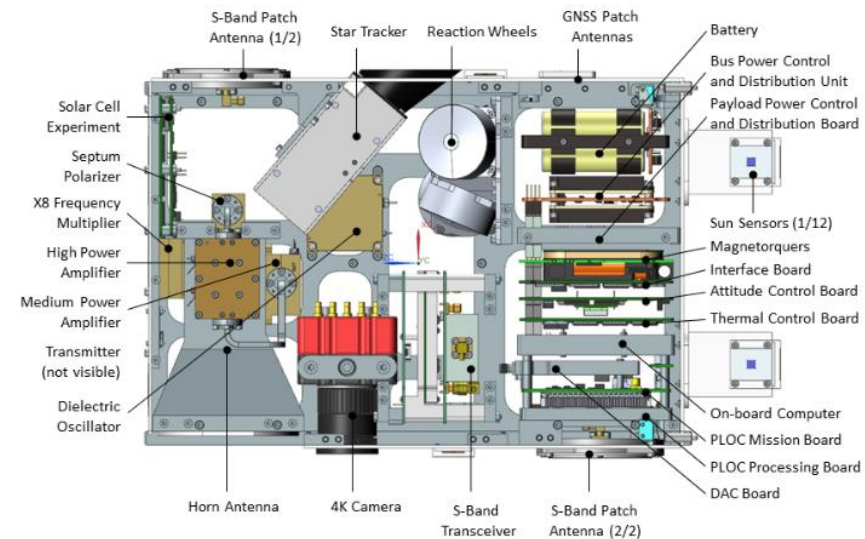
Principle Component Analysis
RGB PC2, PC3, PC4



EIVE LEOP



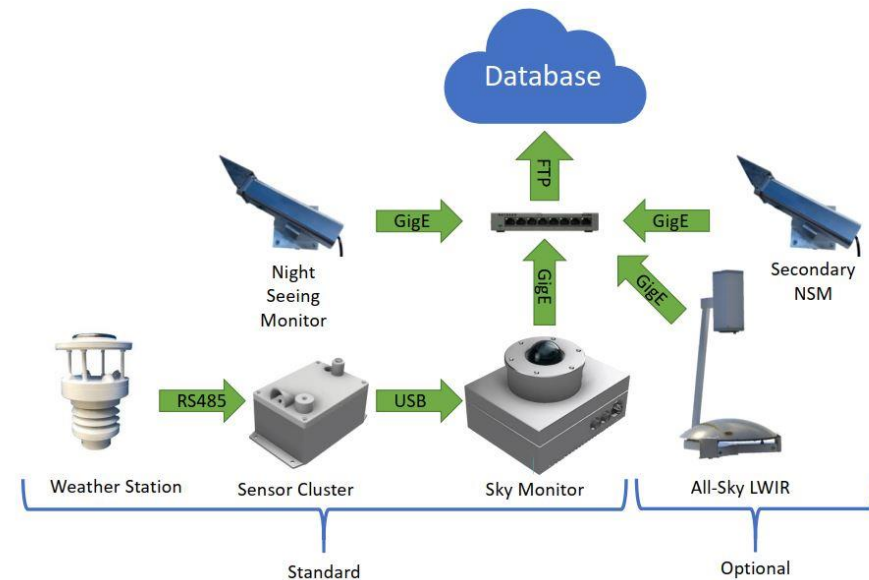
- Exploratory In-Orbit Verification of an E/W-Band Satellite Communication Link
- Cooperation with the University of Stuttgart
- 6U Cubesat
- Launch: 12.06.2023
Space-X Falcon 9 Transporter 8
- LEOP TT&C support via DLR network:
Inuvik ISSF, GARS O'Higgins,
and Weilheim, Germany.



Miratlas - Integrated Sky Monitor

- Global network of instruments
- Detailed arctic site survey at ISSF
 - Measuring parameters relevant for link budgets especially for high frequencies
 - Characterization of optical atmospheric conditions / modelling Optical Turbulence
 - Cloud Coverage via Sky Camera
 - Calculation atmospheric attenuation in other bands (Ka/Q/U/V-Band)
- Low maintenance effort

→ Potential for science project with local students



Ongoing: Co-operative Work in Inuvik and Oberpfaffenhofen/Germany



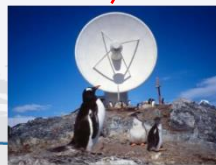
Ground Infrastructure
in Inuvik

• INUVIK



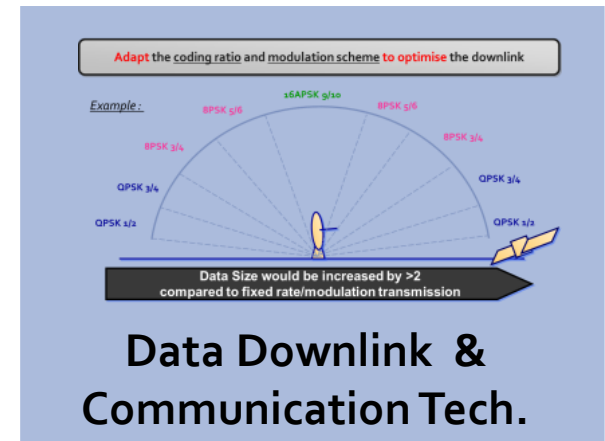
• NEUSTRELITZ
• OBERPFAFFEN-
HOFEN

- Persons are active at both sites at the same time
- Several import and very successful recovery actions performed



Upcoming: DLR second system at ISSF

- Increase of EO data volume
- Higher frequencies, higher bandwidth, higher data rates in data transfer
- **Second DLR system with capability in Ka-Band**





Thank you for your attention

**Prepared by the team of
International Ground Segment**

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