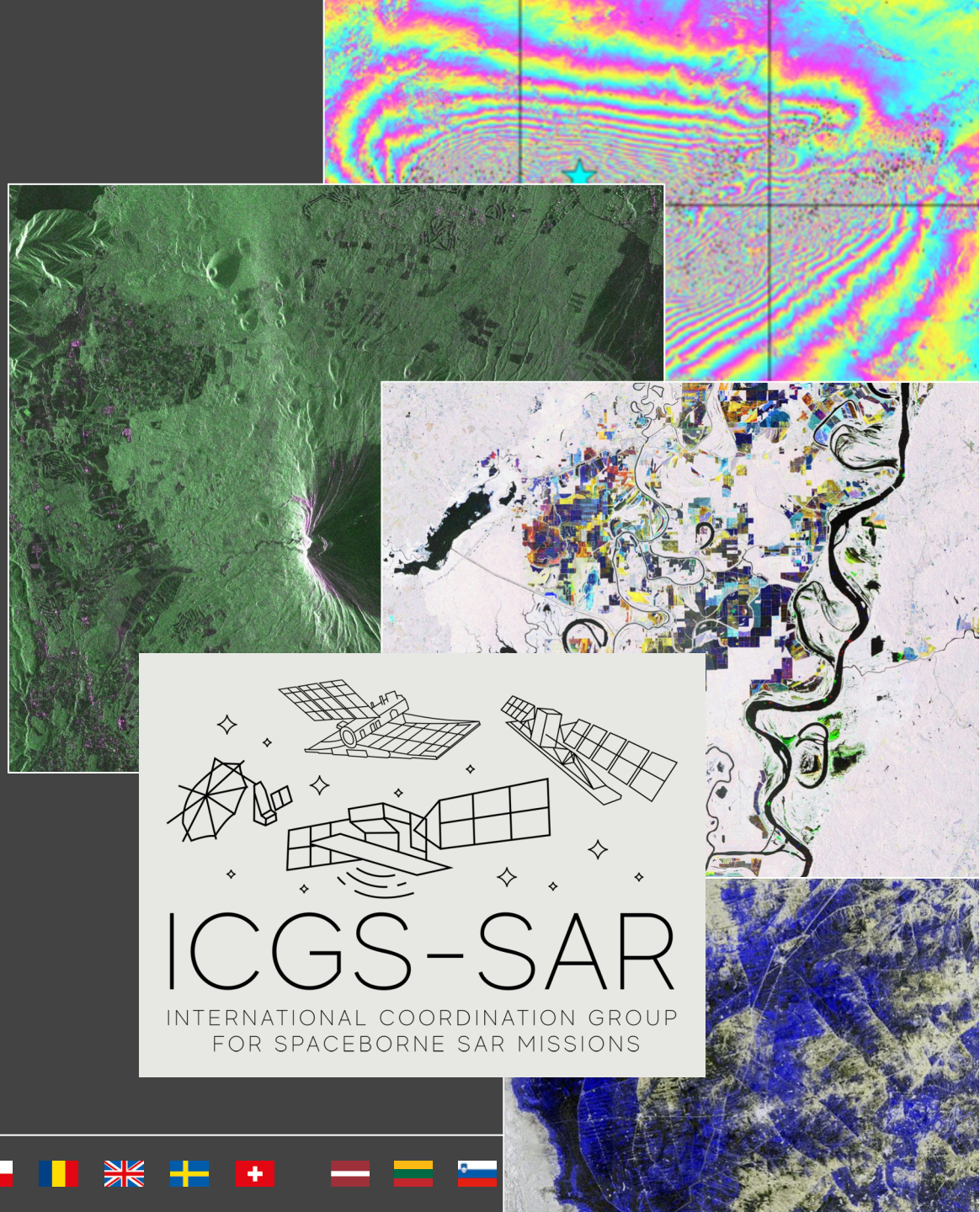


SENTINEL-1 Report

Working Group 1

Present and future data - Visibility and access

Nuno Miranda, ESA
Sentinel-1 Mission Manager
ICGS 2024

ESA UNCLASSIFIED – For ESA Official Use Only

WG-1 Area of Interest

DATA DISCOVERY need to increase the visibility of the diverse data discovery websites.

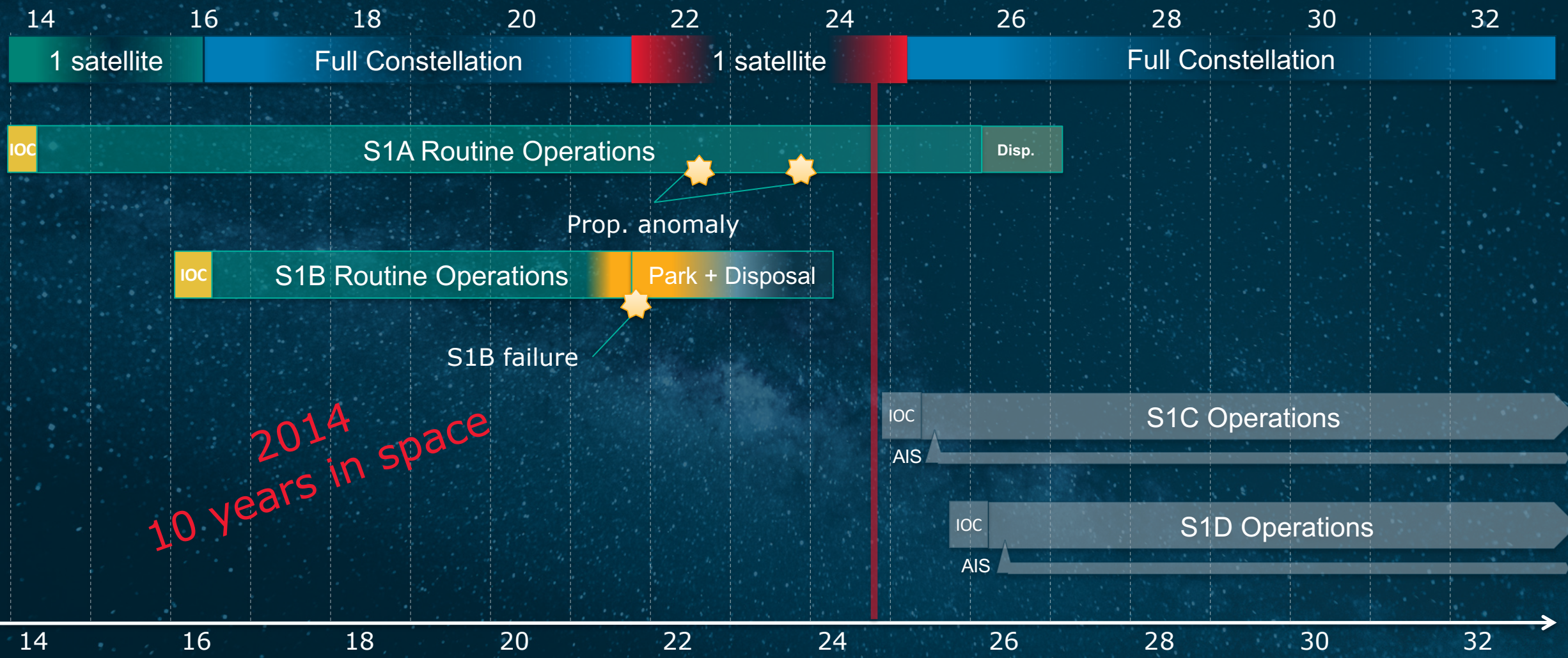
DATA ACCESS work towards free and open access to archival data subject to licence and other restrictions (e.g. low spatial resolution).

COORDINATION AND TASKING need to coordinate data acquisitions for change detection (globally), and encourage space agencies to coordinate missions to achieve long time series.

ANALYSIS READY DATA work toward simplified and common ARD standards.

DATA DISTRIBUTION EFFICIENCIES AND ROBUSTNESS the international InSAR community should agree to make mirrors of InSAR archives to improve data utilisation.

Sentinel-1 First Generation timeline



Sentinel-1C is GO for launch



Launch: 03/12/2024 @ 21:20 UTC

French Guyana

Vega-C Return to Flight

First images L+3 days

S-1C data will be made available starting March 2025

IOCR May 2025

Sentinel-1 observation scenario

COPERNICUS ■ is a “user driven” programme collecting and priotorizing requests from Cop. Services, MS, Scientific community, international partners and **consolidated** into the High Level Observation Plan **(HLOP)**

“HLOP ensures planning stability”

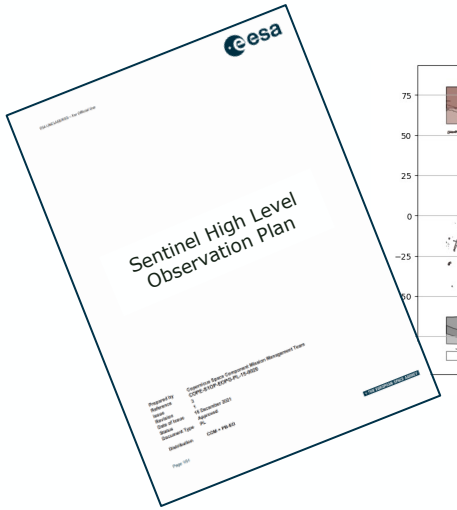
HLOP ■ is converted into “orders” and further processed to generate a long term, stable plan

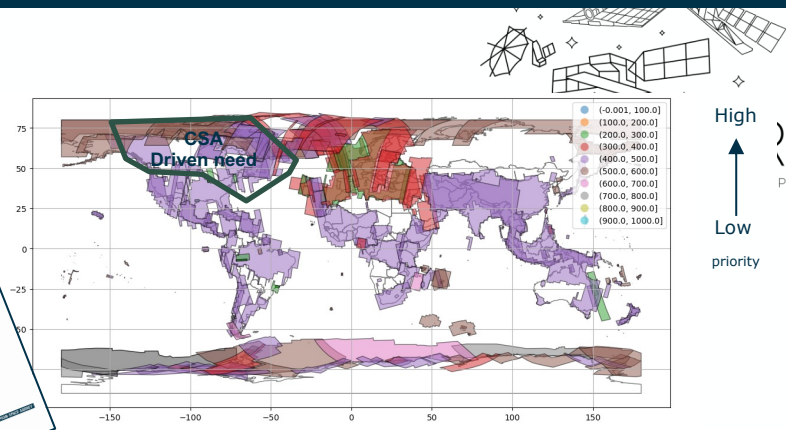
“Disturbed by emergency request (CEMS, Charter) & tropical cyclone”

S-1 PLANNING APPROACH ■ provides the stability needed to leverage services and science. Global mapping capacty is lost since the loss of Sentinel-1B

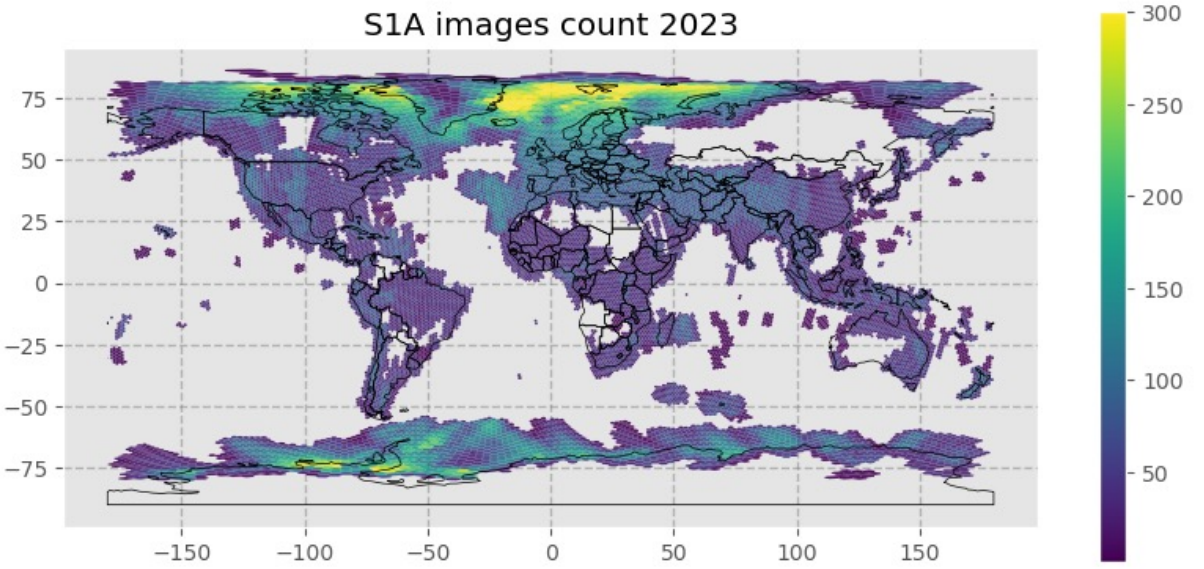
“S-1 is the largest provider of global & freely accessible SAR data”

S-1 PLANNING ■ is **PREDICTIBLE** and **VISIBLE.** Planning is made available through OGC standard product (KML) allowing users to easily access them





S-1A planning orders



Copernicus International Cooperation

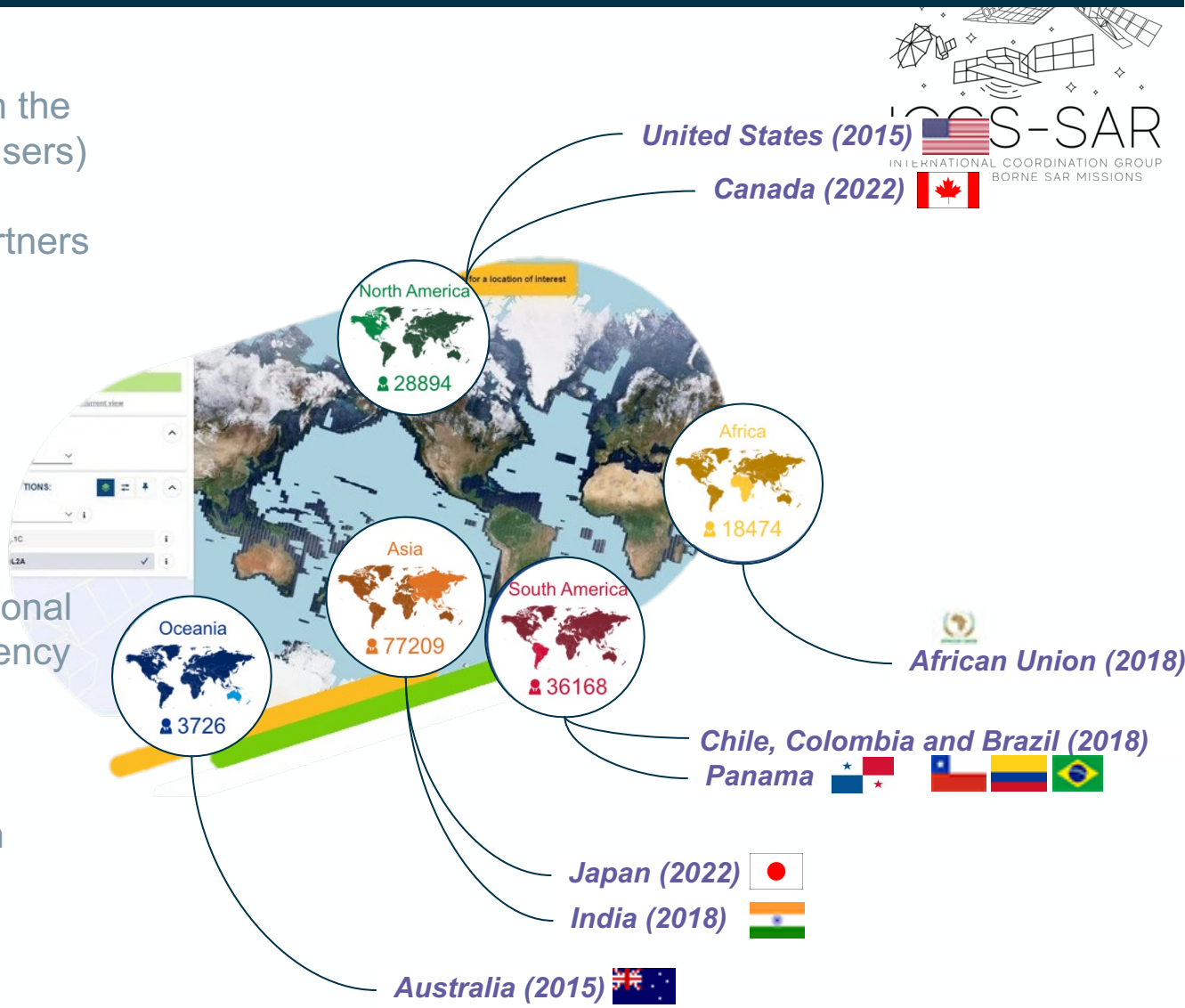
- Copernicus is serving a large user basis worldwide through the unique Copernicus Data Space Ecosystem portal (+100k users)

- Copernicus engaged international cooperation with key partners to enhance global Earth observation capabilities:
  - Exchange of data (free and open)
  - Data mirroring (NASA, CSA, GSA)
  - Contingency agreements (CSA)
  - Complementary tasking (CSA, ISRO)

- Cooperation improves data accessibility and allow international partners to better serve their users, contribute to the resiliency of the system and contribute to the worldwide success of Copernicus.

- NISAR and ALOS-4 will offer new possibility of cooperation

- Open Access Data is wildcard for effective cooperation



ESA / CSA Cooperation Arrangement: a success story

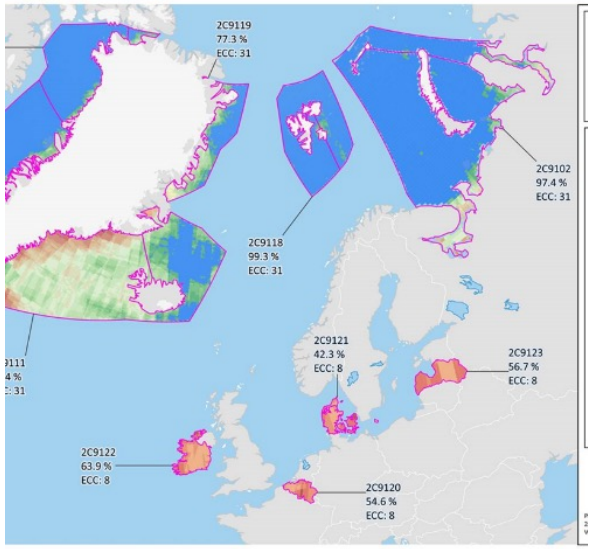
- In May 2022, EC signed the *" Copernicus Arrangement"* with the Canadian Space Agency with the aim to share each other's satellite Earth Observation data based on reciprocity and to formalise the principle of **"contingency plan for S-1 / RCM missions"**.

- Contingency measures have been successfully activated since the loss of Sentinel-1B to support:
  - Artic sea-ice monitoring
  - EC needs for agriculture

- ESA recently further asked the support of CSA to assess the RCM capacity to increase sensing over Europe in case of further Sentinel-1A degradation

- ESA/CSA collaborates actively in other domains like CAL/VAL
- Common will to reinforce cooperation for our future C-band programs



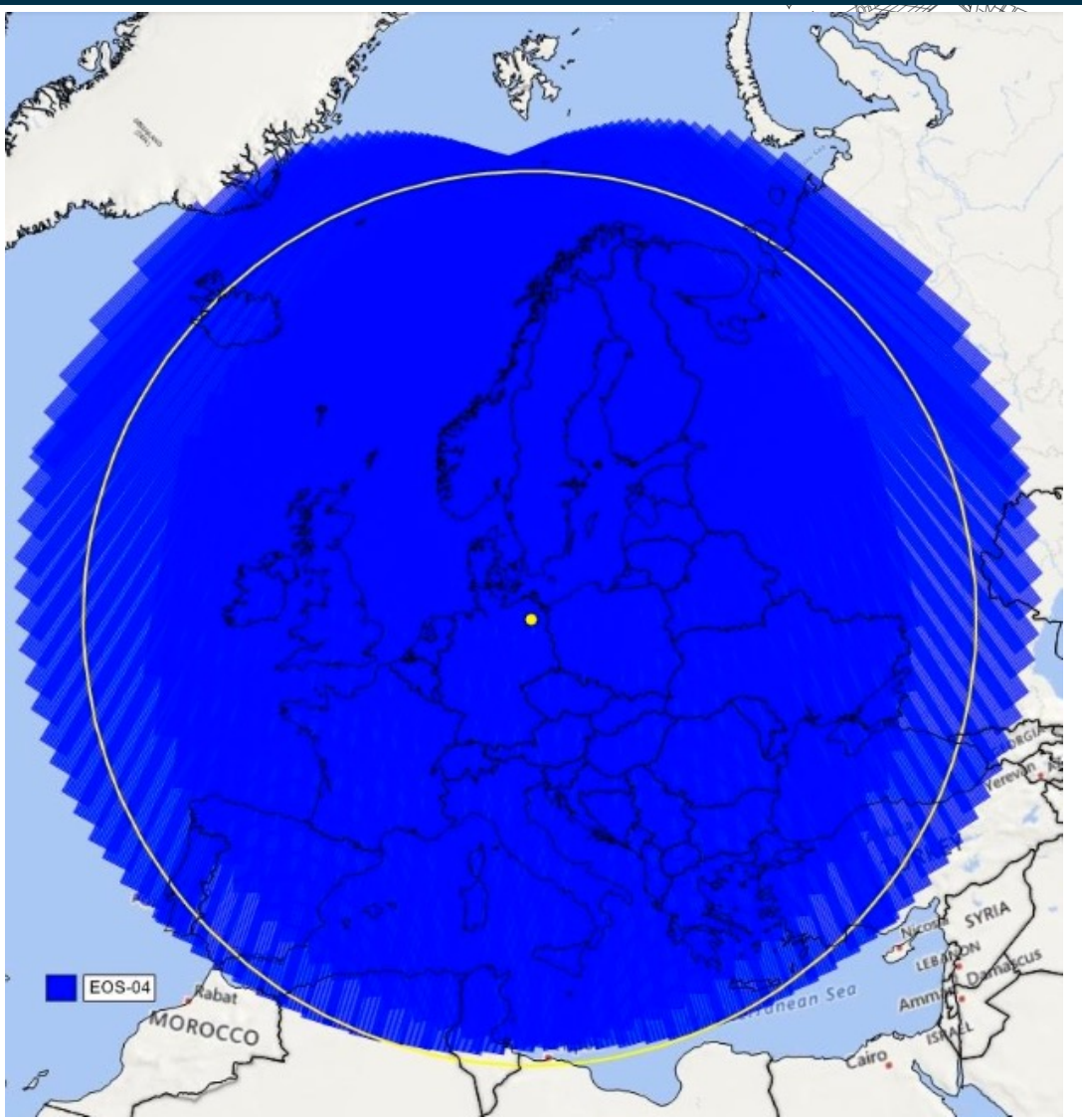


ESA / ISRO Cooperation at C-band

- ESA is further engaging with ISRO to support European needs with the EOS-4 (RISAT-1A) mission
    - Full European coverage in (at least) descending passess, 1 downlink station in Neusterlitz
- EOS-4 follows open data policy
- EOS-4 data quality assessment has been performed showing adequate level of performance

https://earth.esa.int/eogateway/documents/d/earth-online/technical-note-on-quality-assessment-for-eos-04

- Iterations are on-going with ISRO that already implemented processor fixes
- Data collections should start in end of 2024



Cloud oriented data access

COPERNICUS PROGRAMME ■ offers a long term perspective over the next two decades

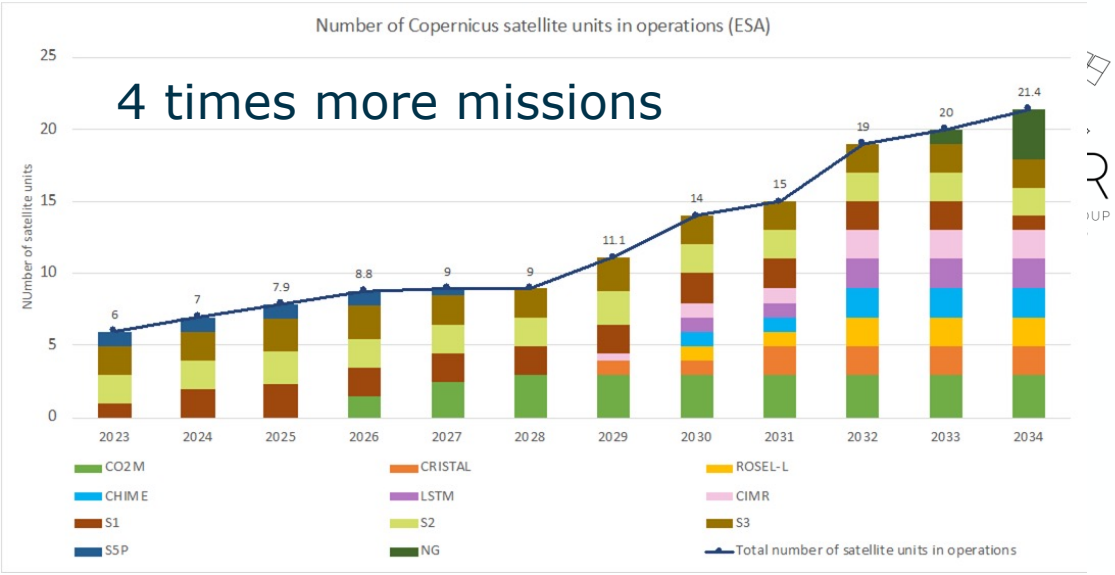
BY THE END OF 2034 ■ Copernicus will expanded significantly with respect to the present

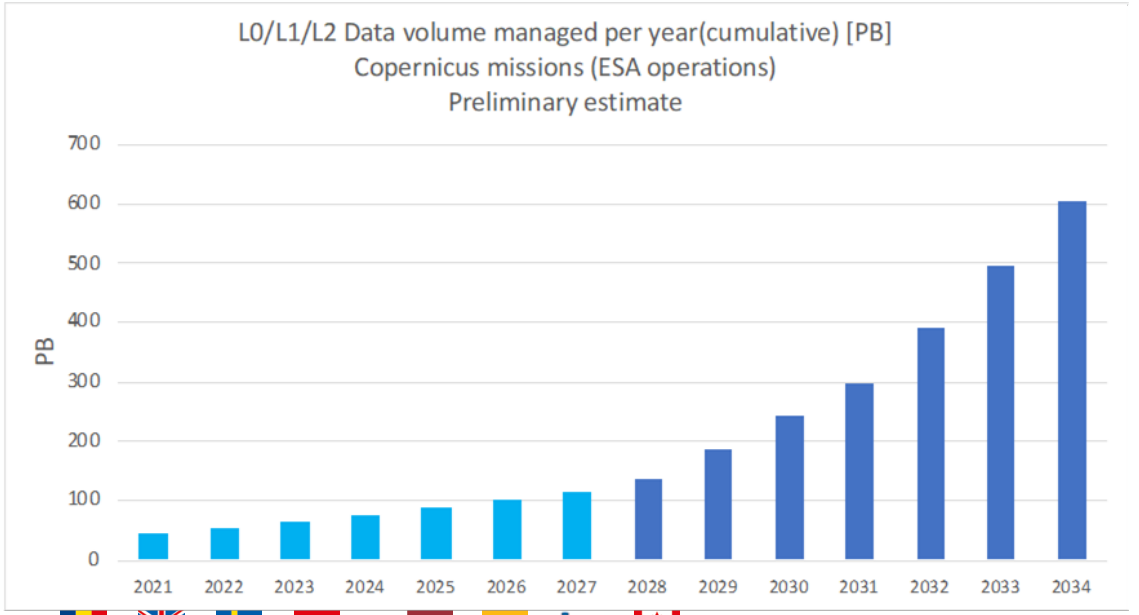
- More and more various missions (Sentinel expansion)
- Sentinel second generation will take over the first generation
- Copernicus will offer 20 years of open access data
- The data volume will increase by a factor of >4-6 (at least) facing a “data wall”

DATA WALL ■ requires to review the current data access paradigm. New data access will be based on the following principles:

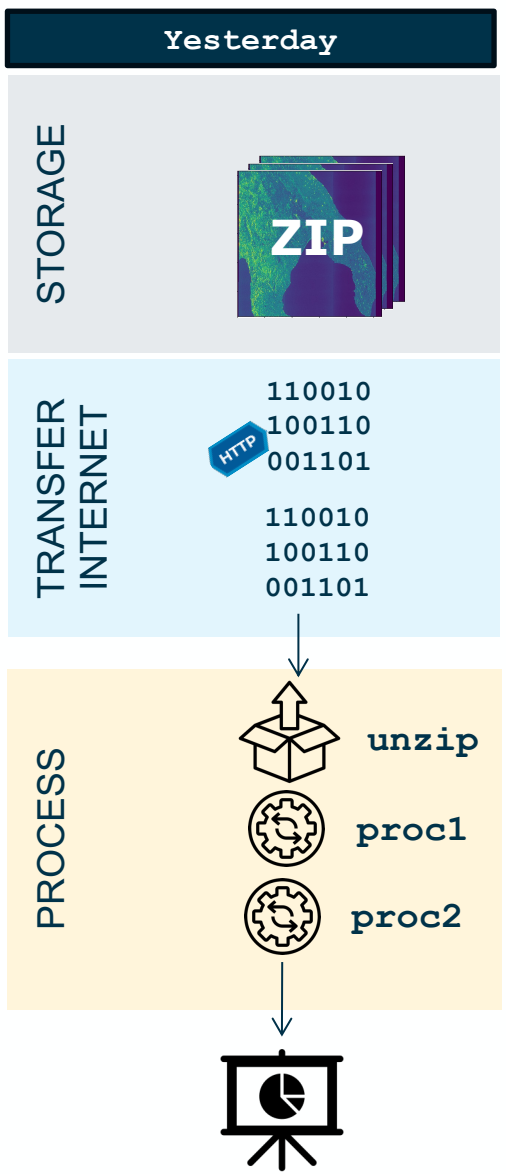
- **Standard** Cloud native data formats **ZARR** shared amongst the whole Copernicus family (as a target), not only for SAR centric
- **Native** cloud storage
- **Standard** OGC metadata for access catalogue (STAC, Odata, WMS, etc)
- **Standard** API for access

CLOUD TRANSITION ■ for data acces is an active on-going work



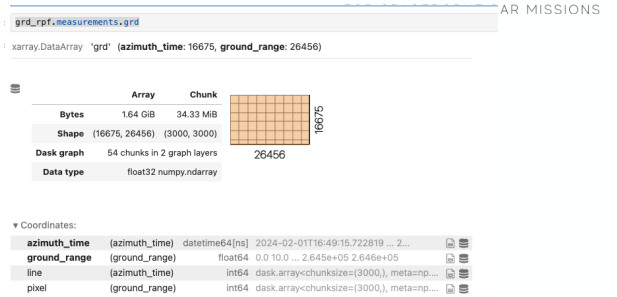


Data Access scenario transition

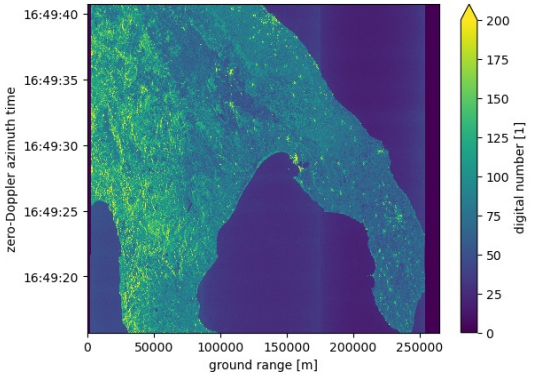



```
zfile = "https://eopf-public.s3.sbg.perf.cloud.ovh.net/eoproducts/S01SIWGRH_20240201T164915_0025_A146_S750E_VH.zarr.
store = fsspec.get_mapper(f"zip::{zfile}")
grd_rpf = datatree.open_datatree(store, engine='zarr', chunks={})
```

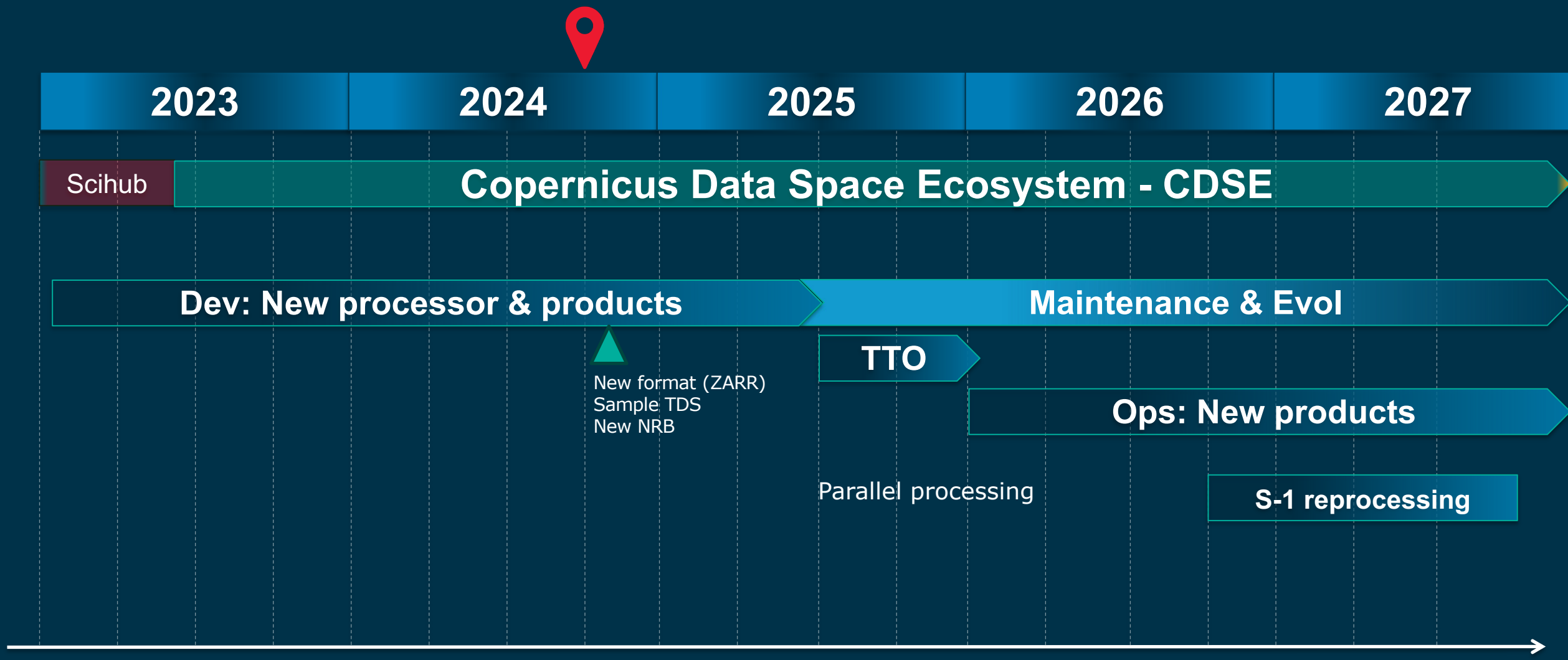
```
grd_rpf.measurements.grd
```




```
%%time
ml = grd_rpf.measurements.grd.coarsen(azimuth_time=10, ground_range=10, boundary='trim').mean()
ml.plot(vmax=200)
```

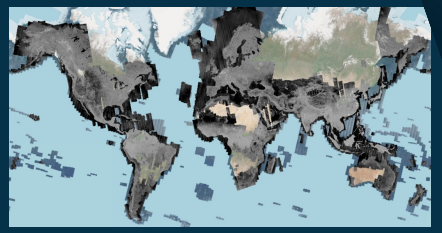


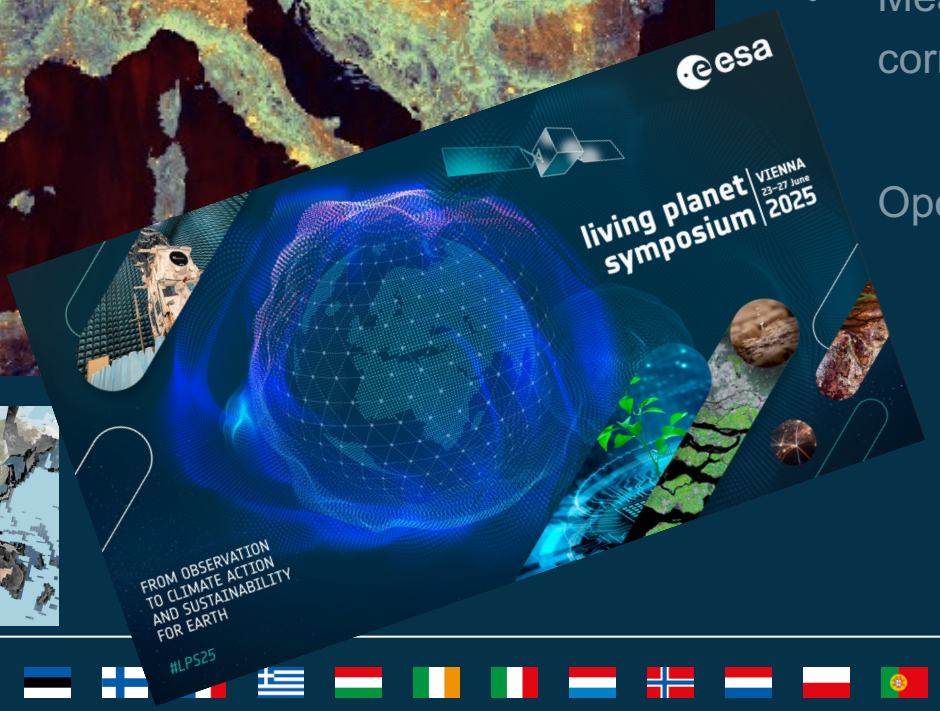
SENTINEL PROCESSOR & DATA CLOUD TRANSITION (indicative)



Normalised Radar Backscatter ”ARD”







- ESA has started the development of a native Sentinel-1 Normalised Radar Backscatter (NRB) based on the CEOS ARD initiative
- NRB development goes along the processor obsolescence management. GSLC is being developped but less mature
- Meanwhile NRB is available as monthly mosaic (gamma terrain corrected) in the CDSE portal

Operational scenario for NRB/GSLC products is no yet defined

THANK YOU



GO

SENTINEL-1C

03.12.2024

21:20 UTC

Rome is here