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Very High Resolution & New Space: ATM-MPC Copernicus Contributing Missions & VH RODA experiences

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ESA/ESRIN

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KNMI

3rd June 2026 – ACVC#22, Leiden



What is what?



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ATM-MPC – Mission Performance Cluster:

ESA Frame contract, responsible for Sentinel-5Precursor – product algorithms/quality/validation....

Additional WP: tasked to support CCM Cat1 and perform QC/validation on sample data sets

CCM – Copernicus Contributing Missions:

In addition to data provided from Copernicus Sentinel satellites, delivering complementary data;

Contributing missions from ESA, their Member States, Eumetsat and other European and international third party mission operators

VH-RODA – Very High-resolution Radar and Optical Data Assessment:

There is a growing number of public and commercial providers of high-resolution space-borne Earth Observation data. VH-RODA → to evaluate and compare the quality and reliability coming from SAR, Optical and Atmospheric commercial or Third Party Missions

ESA's Dynamic Purchasing System for CCM



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- Through the Dynamic Purchasing System (DPS), ESA tries to support the evolving needs of Copernicus Services and the wider Copernicus scientific community.
- This DPS includes opportunities for three groups of data providers:

→ CCM Category 1

European Earth Observation Emerging Data Suppliers:

Mini-competitions awarding anchor customer contracts (max. duration of 5 years) for data purchase & data quality validation activities; addressed at European companies, which are registered in an EU Member State or Copernicus Participating Country for less than 15 years

Now 15 active contracts

a new competition under discussion

→ CCM Category 2

European Earth Observation Established Data Suppliers:

Mini-competitions awarding commercial contracts for systematic or on-demand data purchase; addressed at European companies, which are registered in an EU Member State or Copernicus Participating Country. Objective is to buy increasingly more European data in line with the EU Space regulation on Strategic Autonomy.

**6 new CAT-02
contracts signed**

**+ NeoCap 2026 contract
+ VHR27 ongoing**

→ CCM Category 3

Earth Observation Data Suppliers for miscellaneous data needs:

Mini-competitions awarding commercial contracts to companies which either act as owner or as a broker of non-European satellite data

**4 CAT-03 contracts
signed;
one additional contract
under evaluation**

Copernicus Contributing Missions domains as of May 2026



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 ESA InCubed
Participation
(upcoming, current or past)

Multispectral - $\leq 1\text{m}$

Multispectral - $\leq 4\text{m}$

SAR

Atmospheric
Composition

Thermal IR

Hyperspectral

Radio Frequency

Emerging providers

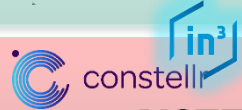
Category-1 (EU)



aerospacelab



SATLANTIS



AISTECH
access to intelligent space technologies

SatVu

KUVA SPACE



Established providers

Category-2 (EU)



AIRBUS



AIRBUS



ICEYE

AIRBUS

e-geos
AN ASI / TELESPAZIO COMPANY

Category-3 (non-EU)



+1 soon



DEMONSTRATING THEIR
CAPABILITIES TO SERVE
COPERNICUS NEEDS



ESA InCubed
Participation
(upcoming, current or past)

Emerging providers

Category-1 (EU)



Established providers

Category-2 (EU)



+1 soon



OPERATIONALLY SERVING
COPERNICUS NEEDS

Multispectral - $\leq 1m$

Multispectral - $\leq 4m$

SAR

Atmospheric
Composition

Thermal IR

Hyperspectral

Radio Frequency

CAT-01 activities - Overview



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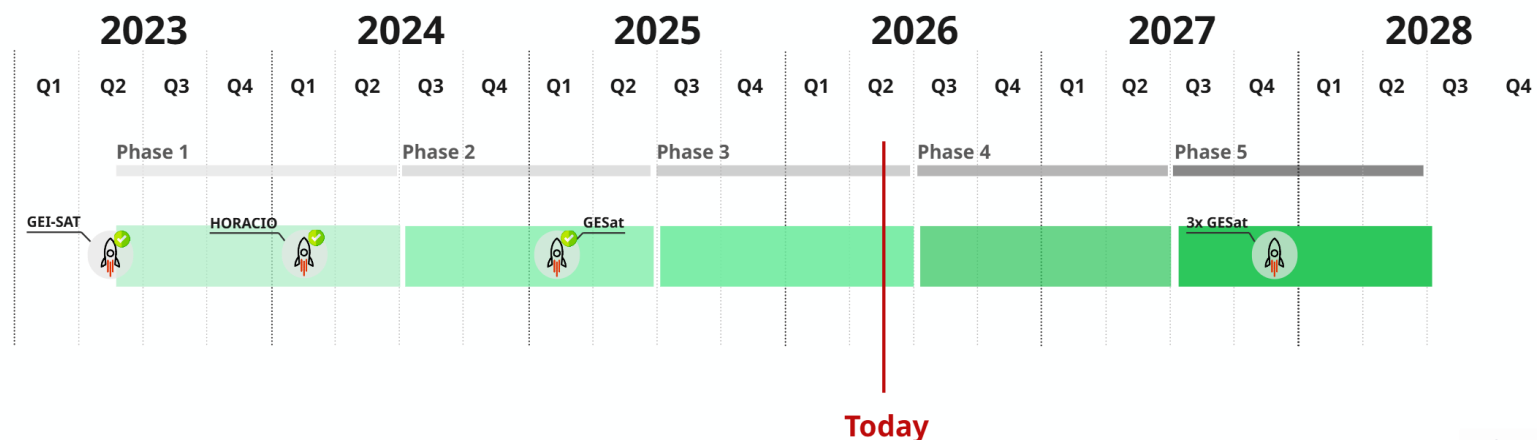


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Latest Review:

Phase 3 MTR:



Current Capacity:

Absolut Sensing:
a. GESat

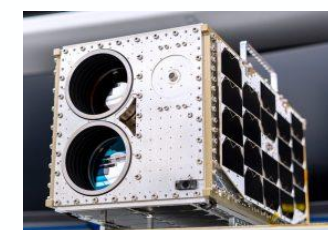


Launched:
14 Jan 2025

Satlantis:
b. GEI-SATP
c. HORACIO



Launched:
12 Jun 2023



Launched:
04 Mar 2024

Data:

a. MPC:

Data delivery to MPC continues, with latest packages delivered on 22/05/2026.

b. Pilots:

Both CCMs are continuously collecting data worldwide to support a total of 9 pilot activities. The results and lesson learned from this phase are expected to be shared during the annual review in mid-July.

c. Dissemination

Both companies now have an initial version of the data delivery platform in place, where data is being uploaded.

- Absolut Sensing: [Plum UI](#)
- Satlantis: [DataHub - Satlantis](#)

By the end of the year, the pilot activities will also be available through the [Copernicus Data Space Ecosystem](#)

CAT-01 CCMs – Brief Update



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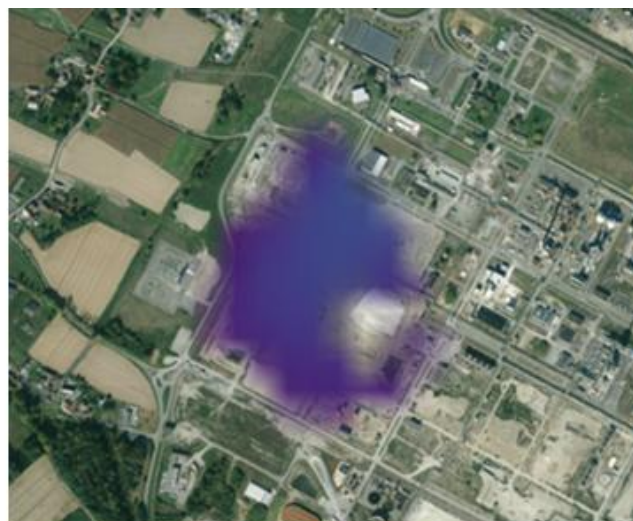


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Major events since MTR

- TADI blind test successful :
GES.REP.00400.AS_0101 - CalVal Phase 3
- DPC and quality assessment updated
with payload configuration :
GES.TNO.TEC.00454.AS
- Publication : manuscript was accepted
for preprint posting and interactive
public peer review
- CDSE Integration Kick-Off
- Phase 3 Pilot Progress : 74%
- Final Phase 3 delivery (in July TBD)
- Plum digital platform major release to
come in June
- New commercial name :
Sensing Atmospheric Intelligence



Request product

Configure the product request for the selected AOI.

ORGANIZATION: test-org2
AOI: pakistan

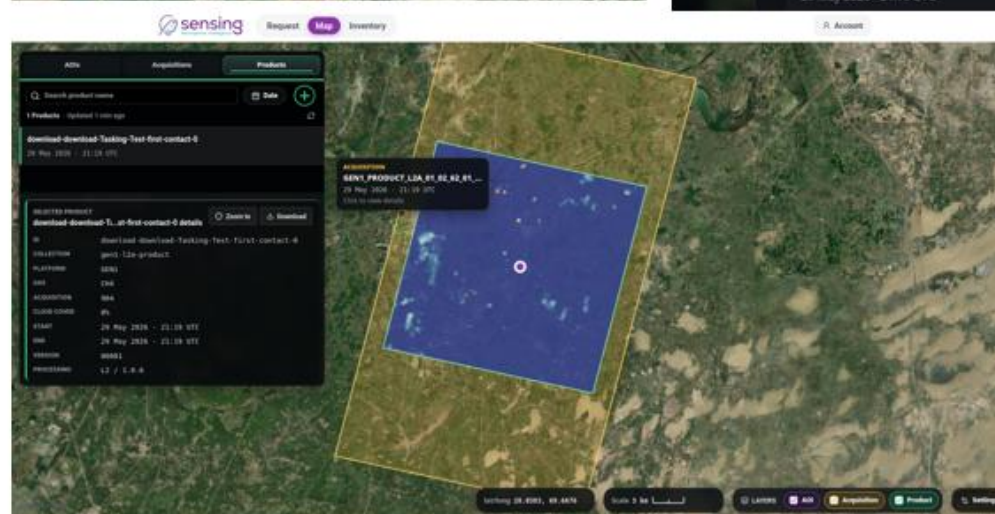
REQUEST NAME
Product-pakistan

SOURCE
SOURCE ACQUISITION
Search acquisition

GEN1_PRODUCT_L2A_01_02_62_01_000001_XXX #904
29 May 2026 - 21:19 UTC

Tasking

Back Validate



CAT-01 CCMs – Brief Update



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- A **new version of the processing pipeline will be released this week**, that will improve alignment between VNIR and SWIR products. In the new version the interpretation capacity will improve, but also users capacity to use the data since SATLANTIS is offering VNIR data along with methane enhancement.
- The **tipping and cueing pilot** case data are under processing and interpreting windows. The interpretation phase is still quite manual. A total of **42 GEISATP windows and 34 HORACIO windows** among which 12 and 8 potential methane plumes have been interpreted, respectively. **All detections were related to IMEP super emitter's locations.**
- **Controlled releases pilot activity in Haro is starting.** The methane blocks and the instrumentation is expected to be all settled up this week and the controlled releases are scheduled for June. The experiments will start from last year activity, so the first releases will be used to confirm our past detections of 400 kg/h.
- netCDF file structure was consolidated thanks to the feedback coming from ATM-MPC.
- The Copernicus Data Space Ecosystem (CDSE) onboarding activity kicked-off in the past week and will help Satlantis in developing a solution to display the CH₄ products and netCDF.

Current status of Atmos CCMs



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- **Absolut Sensing and Satlantis** are Category-1 (CAT-01) data providers (European Emerging CCMs) that have now both reached Phase 3. At this stage, both CCMs are capable of providing data, programming acquisitions, and have implemented data distribution platforms. Currently, the ATM MPC is working with their data to support the issuing of the readiness of the data products with respect to data quality – initial user CAMS.
- The current contracts are in place until Q1 2028; once their capability is confirmed, they can participate in the operational data procurement in CCM Category-2 (CAT-02).
- **GHGSat** is a Category-3 (CAT-03) data provider fully operational since 2025.
- ESA provides access to different GHGSat data:
 - Archive: previously acquired data, including full-scene coverage and derived products.
 - Simple source new tasking: new acquisition over single emission point with limited, localized area of interest.
 - Complex source new tasking: new acquisition over multiple emission sources or plumes within a broader scene.

Context: Atmospheric MPC - CCM



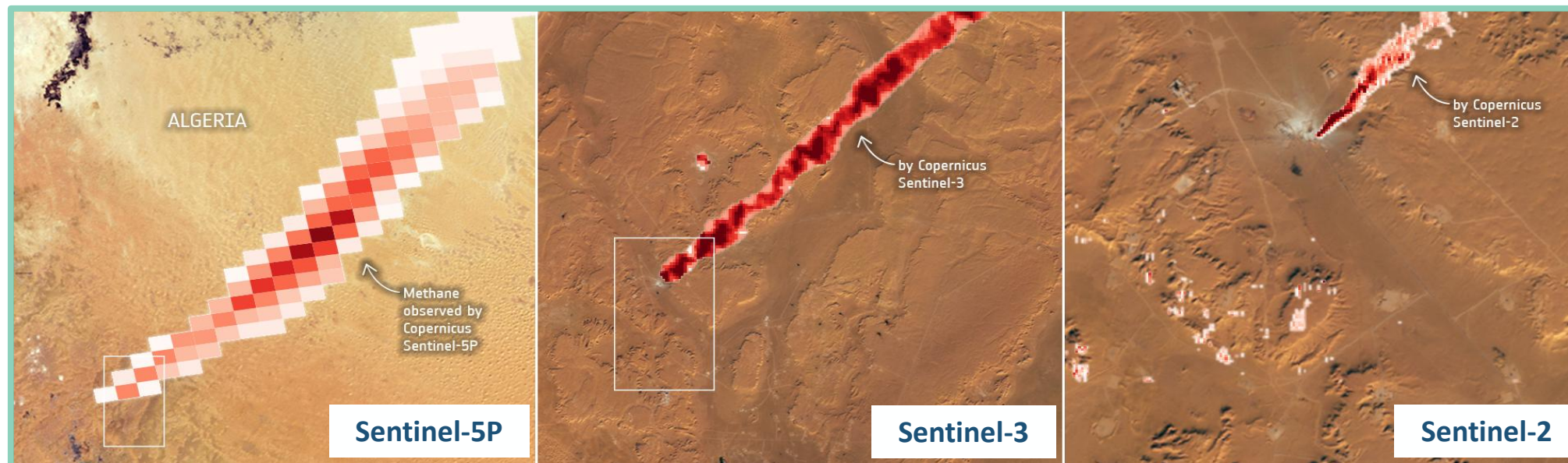
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Courtesy: D. Stein-Zweers, KNMI



Methane super-emitter detected near Hassi Messaoud, Algeria on 4 Jan 2020

Higher Spectral Resolution

Higher Spatial Resolution

- Comparison via tipping and cueing and observations of known emitters are essential for CCMs to compare and build statistics
- S5P CH4 is now available **NRTI since late-Nov 2025**, within 3 hours of sensing (> 97%);
- Sentinel 5 can provide comparable morning observation once operational and well calibrated;
- S5P bridges well to CO2-M high-quality NO2, at higher resolution as well as CH4

Using the EDAP+ Framework Systematic Evaluation Approach:

- Support ESA review cycle and connect CCMs to Community practices for:
 - FRM, methods, cal/val, error budgets
- Provide guidance for data chain **L1**, **L2/3/4**
 - Formatting and variable definitions, **netCDF**
- First systematic assessments completed: EDAP-evaluation of CCM documentation
 - Systematic Data Analysis IN PROGRESS for SATLANTIS, A.Sensing to follow**
- Agreed set of key observation sites to different purposes (geolocation, FRM, ...) different types of emitters (waste, O&G ...)


QA4ECV Product Documentation Guidance: Algorithm Theoretical Basis Document


PURPOSE

Aim: Clearly and concisely describe the parameter(s) provided by the product including a full
 

Audience: Users req product derivation (e.g
 


QA4ECV Documentation Guidance: Product User Manual

PURPOSE

Aim: Clearly and concisely describe the product including information on how it might be utilised.
 

Audience: Users requiring general information on the data product, including its structure, strengths and weaknesses.

For more details, see the PUM template.

Data Provider Documentation Review			Validation Summary	Key
Product Information	Metrology	Product Generation		
Product Details	Sensor Calibration & Characterisation	Calibration Algorithm	Measurement Validation Method	Not Assessed
Availability & Accessibility	Geometric Calibration & Characterisation	Geometric Processing	Measurement Validation Results Compliance	Not Assessable
Product Format, Flags & Metadata	Metrological Traceability Documentation	Retrieval Algorithm	Geometric Validation Method	Basic
User Documentation	Uncertainty Characterisation	Mission-Specific Processing	Geometric Validation Results Compliance	Good
	Ancillary Data			Excellent
				Ideal
				Not Public

EDAP Maturity Matrix
Issued by ATM-MPC
Quarterly Basis

ATM MPC – CCM analysis, example



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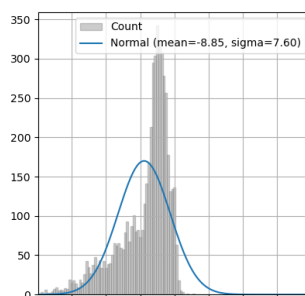
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L1, Geolocation Analysis: plots, G. L

Geometric Error distribution

Monitored : 4847_swir_resampled10m.tif
Reference : S2band08Clipped.tif

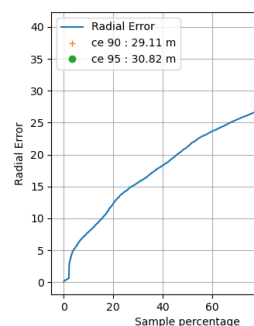


Total Number of Key Point : 5175
Confidence value : 0.40
Percentage of Confident Pixels : 0.17%
Pixel size : 10.0 m EPSG: 32736

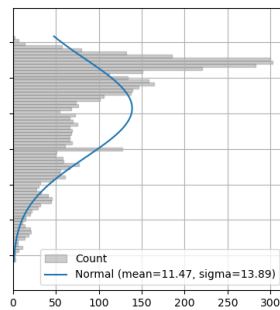
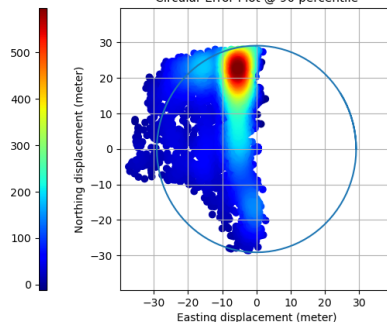
Easting displacement (meter):
Min : -39.77 m
Max : 5.51 m
Mean : -8.85 m
Sigma : 7.60 m
RMSE : 11.67 m

Northing displacement (meter):
Min : -31.75 m
Max : 31.24 m
Mean : 11.47 m
Sigma : 13.89 m
RMSE : 18.01 m

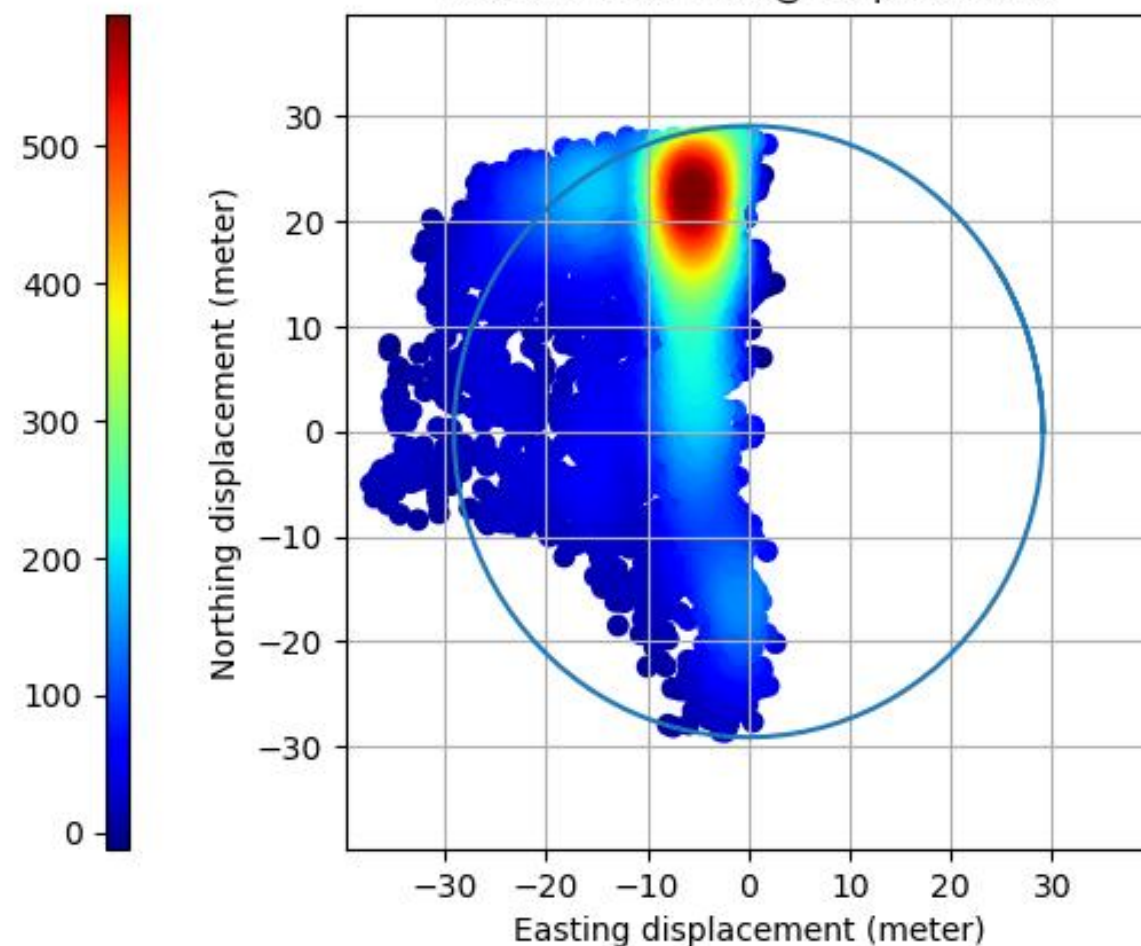
Global RMSE : 21.46 m
CE @90 the percentile : 29.11 m
CE @95 the percentile : 30.82 m



Circular Error Plot @ 90 percentile



Circular Error Plot @ 90 percentile



Results of Review activities with CCM Cat1:

- improved documentation, better traceability of methods to data chain mapping,
- have now provided additional metrics (ex. SNR and SNR over time),
- better structured data files in NetCDF,
- data volume of test products for the ATM-MPC to produce systematic quality checks available since mid May 2026

Outlook

- Q2-26, Performing deeper analysis of large dataset to summarize in EDAP in Q3-2026
→leading to further refinements to improve CCM traceability and quality
- Analysis of near-future larger datasets from A.Sensing/Atmos.Intelligence (CAT-I)
- GHGSat data (CAT-III) investigate the potential of aircraft data particularly for controlled release data

The ATM-MPC aims to provide a high-level data quality statement to CAMS with advice regarding data analysis in Q3-2026.

Objectives of the workshop

6th Very-High resolution Radar and Optical Data Assessment workshop – VH RODA 2025 (17th – 21st November 2025)

- *Allow dialogue across commercial and public entities on data quality and Cal/Val topics. Identify synergies and gaps across complementary roles*
- *Facilitate interoperability*
- *Identify critical topics that will require more attention from either a research perspective or in pre-/operational service environment*
- **Coordination with JACIE (Joint Agency Commercial Imagery Evaluation) – U.S. counterpart to VH-RODA**
- *International context: CEOS WGCV / GSICS / IVOS activities.*

365 Registered attendees
256 in-person participants
109 Online participants

VH-RODA
2025
Group Picture!

Institutional Presentations (ESA, DLR, CNES, NPL, MPCs, NASA, GA, CEOS
USGS, ECMWF, EEA/CLMS, CMEMS, EC-JRC, KARI)

- 1) **Cal/Val for the Atmospheric Domain**
- 2) **Cal/Val for the OPT and TIR Domains**
- 3) **Reference Cal/Val Sites and FRMs**
- 4) **Quality Control, Product Validation and Best Practices**
- 5) **Cal/Val for the SAR Domain**
- 6) **Processing and Algorithms including AI**
- 7) **Digital Elevation Models (DEMs) and GCPs**
- 8) **Reference Networks, Campaigns and GCPs**
- 9) **Analysis Ready Data (ARD) and Interoperability**
- 10) **Maturity, Intercomparison, towards Certification**

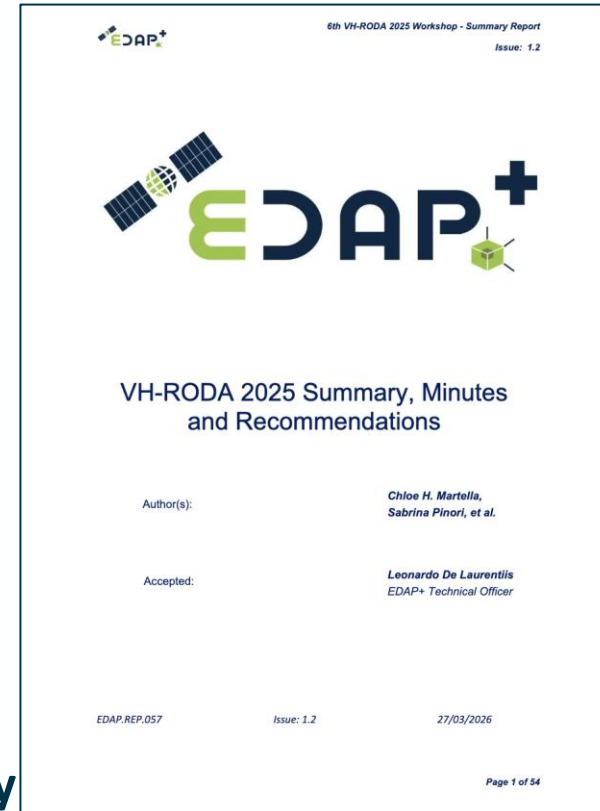
- **Institutional Missions** as a reference are extremely relevant to NewSpace
- **Commercial Companies** are becoming more and more **Key Players**
- **Public Institutions support to NewSpace** is crucial (ESA: TPMs, CCMs, InCubed. NASA: CSDA; USGS: JACIE)
- International effort to build and operate **Cal/Val sites and networks** is of paramount importance (SAR-/Rad- CalNet, HYPERNETS, TIRCalNet under development, **Cal/Val Park**)
- **Data Interoperability is a major challenge!**
- **Maturity Matrix** and **Custom Guidelines** (SAR, OPT, ATM, DEM) are necessary → **ESA-NASA-USGS Guidelines**
- **AI** and **ML** methodologies and tools are now **essential** components of **data processing chains** and **widely adopted**
AI Trustability and **Uncertainty** are **KEY**

VH RODA 2025 recommendations (focus Atmos)

VH RODA summary is online available:

<https://earth.esa.int/eogateway/documents/d/earth-online/vh-roda-2025-summary-minutes-and-recommendations>

- **Open-source!** (implement **more tools** for Cal/Val and quality assessment to commercial companies)
 - **IQ Toolbox**
 - **CEOS PVP** - Product Validation Platform
 - **KARIOS** (Geolocation Accuracy)
 - **GenCP** – Generative (Ground) Control Points
 - **GCP Viewer (CEOS GCPIX)**
- **ATM Composition Cal/Val support**
 - **More instruments, e.g., portable/cheap FTIR**
 - **Open DATASET** from **controlled releases** and/or **known emitters/industry**
 - **CH4 – CO2 Intercomparison Exercises**



VH-RODA Actions Updates – Open Tools

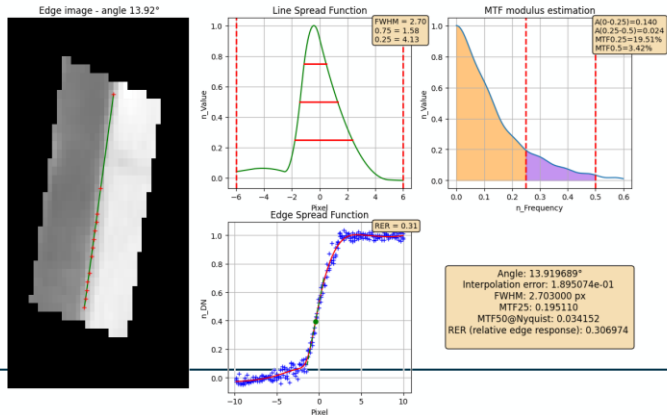


CEOS PVP – Product Validation Platform
Online – Under Development

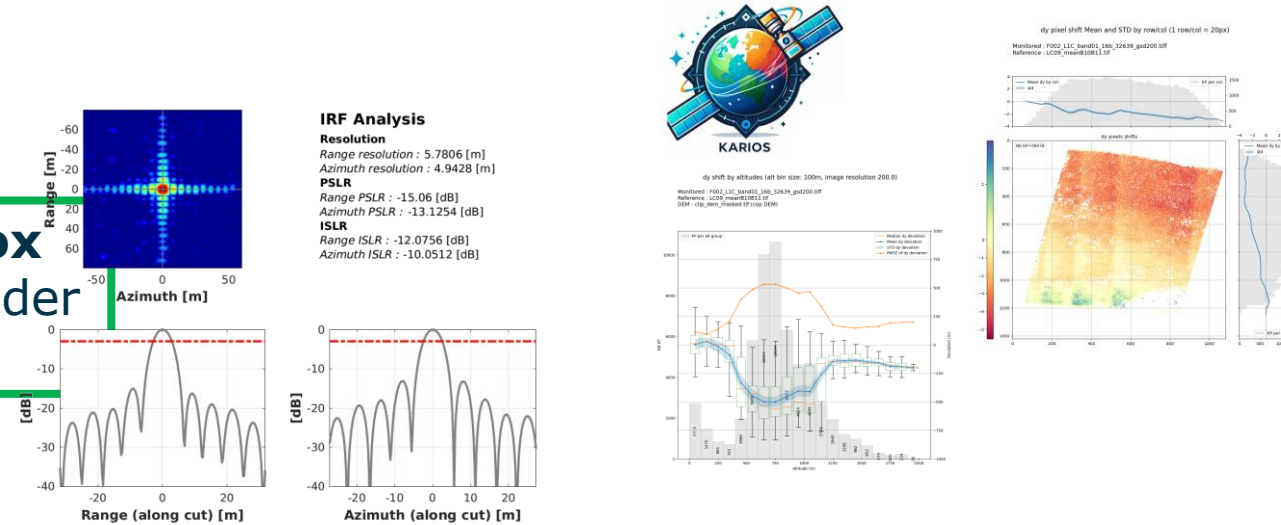
RadVAL
Radiometric Validation
AnaLytics Tool

SCT – SAR Calibration Toolbox
Open and Free – New features under development

Image Quality Toolbox – MTF & SNR
Under Development



KARIOS – Geolocation accuracy Toolkit
V2 recently released



VICALOPS
Released

CoMeT Toolkit
Released



7th edition: Open forum (new space, commercial and institutional) on status and developments related to the **calibration and validation** of space borne **very high-resolution SAR, OPT and ATM sensors** and data products, focusing the attention on the commercial entities in Cal/Val activities, synergies between optical and SAR communities, presentation of standards and best practices for data quality.

No registration fee!



EUROPEAN SPACE AGENCY

VH-RODA

Workshop 2026

CONFIRMED DATES

16–20 November 2026

ESA–ESRIN | Frascati (Rome), Italy

Workshop topics (for VHR data):

- *Calibration Techniques*
- *Processing and Algorithms (incl. AI for Cal/Val)*
- *Calibration Sites & Fiducial Reference Measurements*
- *Quality Control, Best Practices, Product Validation and Certification Approaches*
- *Cal/Val and Data quality for Constellations and Big Data*
- *Analysis Ready Data, Digital Elevation Models and Ground Control Points*
- *Calibration of Future Missions*