

CEOS-IMEO Engagement

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GHG TT (ESA)

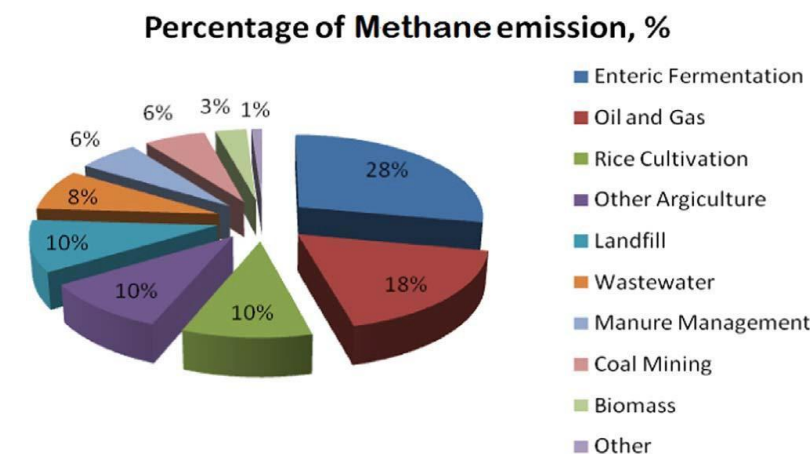
Agenda Item 6.19

- ❖ UNEP's IMEO exists to provide open, reliable and actionable information to individuals with the aim to reduce methane emissions
- ❖ CEOS started to engage with IMEO in 2021, via SIT Chair Team (AU)
- ❖ In June 2023, we organised a joint CEOS-IMEO Workshop in Harvard
“International Coordination Workshop on Detection of Anthropogenic Methane Emissions from High-resolution Satellites”
- ❖ Five IMEO working groups were formed at Harvard Workshop, but soon stalled
- ❖ IMEO is one of THE primary stakeholders targeted by the GHG Roadmap issue 2
- ❖ IMEO regularly attends our CEOS and GHG Task Team meetings in 2025–2026
- ❖ Aim to to jointly set priorities for implementation

- ❖ Heritage of Harvard Workshop in 2023
- ❖ In 2025, GHG TT initiative to reboot the dormant groups
- ❖ Use Case WG first, Roadmap WG to follow allowing to effectively set priorities
- ❖ **Output:** a detailed document showing various source sectors, stakeholder needs & satellite capabilities

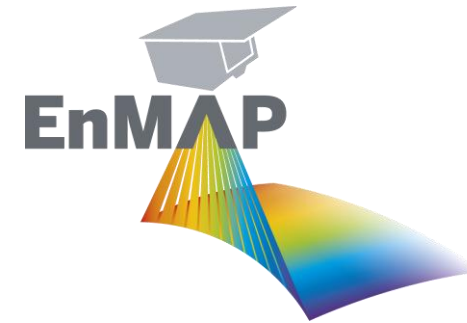
- ❖ **Objective:**

- Detail the main Use Cases using parameters relevant to IMEO and for space-based observations.
- Define each use case with attributes like source strength, observability, stakeholders, **mitigation potential**, etc.
- Allow setting priorities for implementation which shall be based on, e.g., potential mitigation impact and observability



Hyperspectral imagers

- ❖ Engagement with ASI and DLR to facilitate IMEO data access
- ❖ EnMAP was identified for provision of CH₄ source information
 - Requests included tasking
 - Semi-automated Level-1b data pick-up
 - All satisfactory tackled in 2025
- ❖ PRISMA was identified for provision of CH₄ source information
 - Requests were granted for upgrading user accounts to Level-1b
 - Requests were filed for systematic acquisitions over AOI of IMEO
 - explore local processing to reduce overhead
- ❖ Next discussion is on meteorological GEO satellite data access



- **Opportunity:** currently most controlled releases are only for individual satellites, or campaign style experiments being conducted that involve one (or two) satellite team(s)
- Community effort to design a system for documenting upcoming locations, schedule, and approximate magnitude of releases available to the whole community to take advantage of.
- **Relevant experiments** suitable for satellite detection and as such for the database:
 1. Academic controlled releases, e.g. work Adam Brandt's group
 2. Commercial controlled releases
 3. Campaign style experiments of a known emitter (for inter-comparison of satellites).
 4. Multi-scale campaigns involving satellite targeting (e.g. Madrid landfill campaign under MEDUSA).
 5. Scheduled industrial events of sufficient magnitude announced with sufficient notification (i.e. maintenance of compressor stations).

Online Table of Past & Planned Experiments

Controlled Release Experiments															Group	Filter 1	Sort 1	Q	...
Event Name	Status ↑	Organising Institution	Start Date & Time (UTC)	End Date & Time (UTC)	Latitude	Longitude	Site characteristics	Species	Average Release Rate (kg/h)	Release pattern/frequency	Cloud cover	Air Temperature (deg C)	Wind speed (km/h)	Wind direction (deg)	Notes				
August 2024 USA	Complete	Stanford University	2024-08-02 18:32 GMT	2024-08-02 18:43 GMT	41.2760750	-110.9306100	-	CH4	116.0	-	No cloud	28.6	77.1	3.03	https://our.stanford.edu/h001at3948...				
November 2024 USA	Complete	Copernicus Atmosp...	2024-11-08 20:50 GMT	2024-11-16 20:53 GMT	32.8218205	111.7857730	Arid, low-cloud climate, desert. Less complex ...	CH4	335.9	-	No cloud	-	7.2	18.00	https://amt.copernicus.org/articles/15/7155/2022/				
Landfill, November 2023, Canada	Complete	Environmental Rese...	2023-11-06 10:40 GMT	2023-11-06 10:40 GMT	42.8719440	-82.1205560	Landfill	CH4	12.2	-	Partial cloud	6.0	8.1	225.00	https://era4dn.org/product/a-controlled-release-...				

Form to submit new experiments

Anyone can submit, submissions will be reviewed and approved by database managers

New Controlled Release Experiments

Event Name*

Short name to describe the event, e.g. August 2023, Germany

Latitude*

Longitude*

Site characteristics

e.g. In a valley, far from gas pipes, forest

Start Date & Time (UTC)*

yyyy-mm-dd -- --

End Date & Time (UTC)

yyyy-mm-dd -- --

Species*

CH4

Average Release Rate (kg/h)

Organising Institution*

Release pattern/frequency

e.g. One off, 1 min each day at 10:00 for 5 days

Notes

Including any references or papers

Contact Name*

Contact Email*

I consent to the data collected being used by CEOS & WMO to gather details about upcoming controlled release events. My email and personal data will be stored securely and will not be shared.

Mailing list & automated notifications

- controlled-release-database@googlegroups.com (join [here](#))
- Once a new experiment is approved, an email is sent to the mailing list to notify satellite operators
- A notification is also sent 7 days prior to a planned event
- A notification is sent to the database managers 7 days after a planned event, to contact the organisers for updated information on the event

Controlled release & measurements database

- ❖ Hosted within the GHG Portal: ceos.org/ghg/experiments
- ❖ Have added 152 experiments from TADI series in 2024
- ❖ Working on refining structure and information presented
- ❖ Will look at also adding the full archive of Stanford experiments as well
- ❖ Feedback on the functionality welcome - contact libby@symbios.space

Database of Controlled Release Experiments

In collaboration with the UN Environment Programme International Methane Emissions Observatory (IMEO), CEOS has developed the database of controlled release experiments. This database aims to be a central point for information about planned and future controlled release experiments, to validate space-based and airborne instruments measuring greenhouse gases. By providing a central place for this information, the goal is to reduce the amount of greenhouse gases intentionally released for validation purposes. All GHG satellite operators are encouraged to sign up to the mailing list, to be notified of planned experiments such that satellites can be tasked appropriately. Organisations who are planning or previously conducted controlled release experiments are invited to fill out the below form with the details.

Email Address

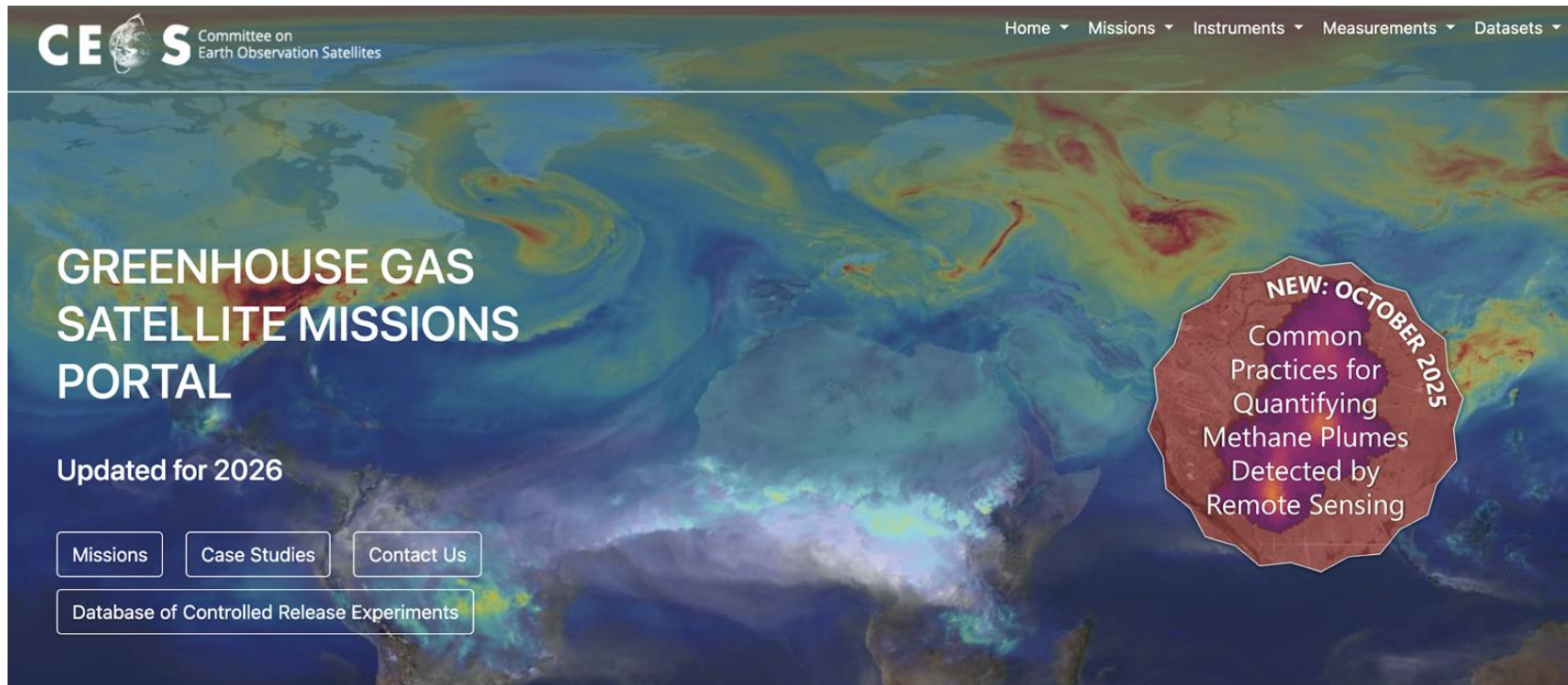
[Subscribe to receive notifications](#) [Submit a past or planned experiment to the database](#)

☐	ID	Event Name	Latitude	Longitude	Site characteristics	Start Date & Time (UTC)	End Date & Time (UTC)	Status
	1	5 August 2024 USA	41.2760750	-110.9306100		2024-08-02 18:32 GMT	2024-08-02 18:43 GMT	Contin
	2	6 November 2024 USA	32.8218205	111.7857730	Arid, low-cloud climate, desert. Less complex scene than many oil and ...	2024-11-08 20:50 GMT	2024-11-16 20:53 GMT	Comp
	3	7 Landfill, November 2023, Canada	42.8719440	-82.1205560	Landfill	2023-11-06 10:40 GMT	2023-11-06 10:40 GMT	Comp
	4	9 TADI 2024 #0	43.4127060	-0.6427270	Research facility	2024-06-17 11:07 GMT	2024-06-17 11:53 GMT	Comp
	5	10 TADI 2024 #1	43.4127060	-0.6427270	Research facility	2024-06-17 12:05 GMT	2024-06-17 12:51 GMT	Comp

Controlled release & measurements database

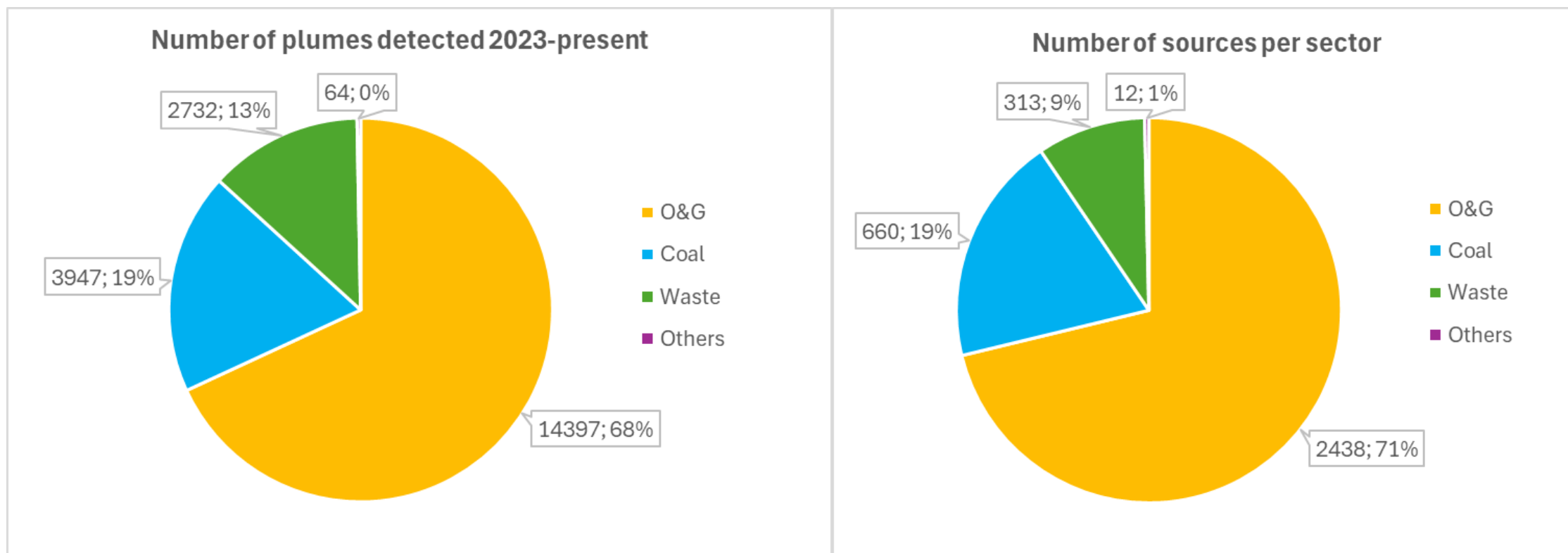
Benefits and functionalities:

1. widen the reach of each controlled release,
2. allow experiments to be announced,
3. enable alerting multiple satellite operators to join in,
4. central data repository.



IMEO MARS in numbers

Since 2023, MARS has detected **21,140 plumes**,
which are from **3,423 individual sources**



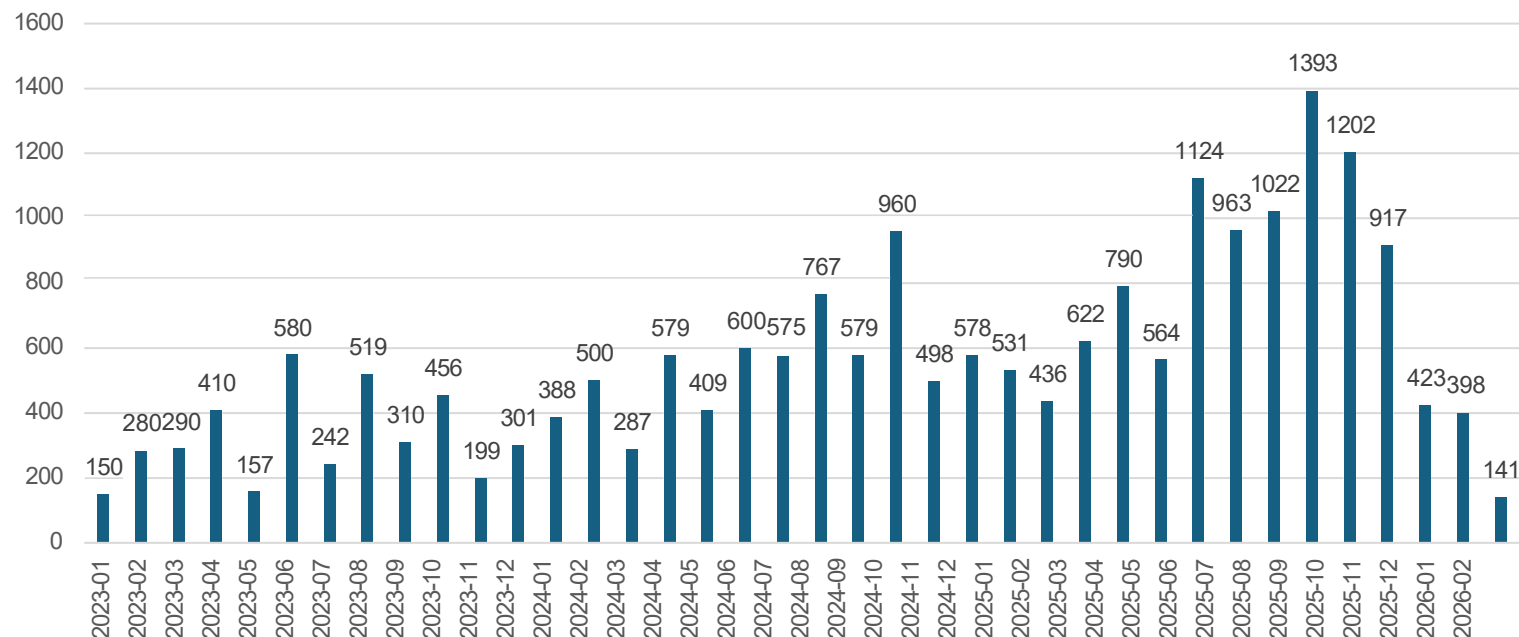
Credits: Itziar Irakulis Loitxate, IMEO

WGClimate

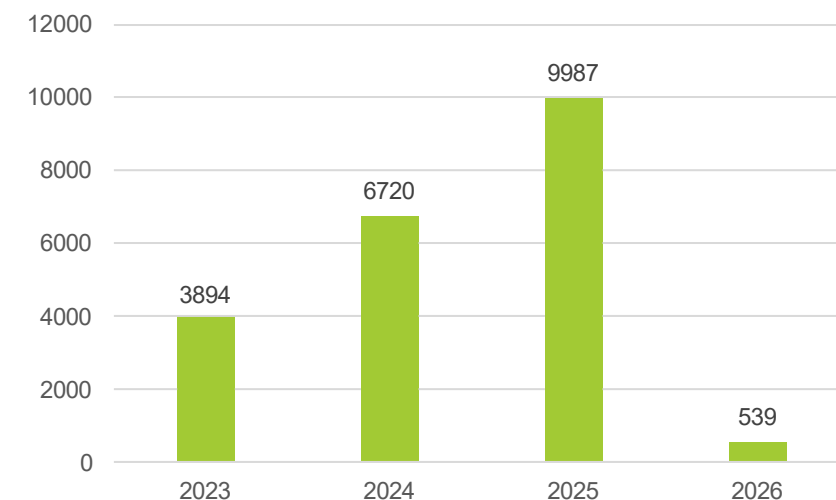
The Joint CEOS-CGMS
Working Group on Climate

IMEO MARS in numbers

Plumes detected per month



Detected plumes per year

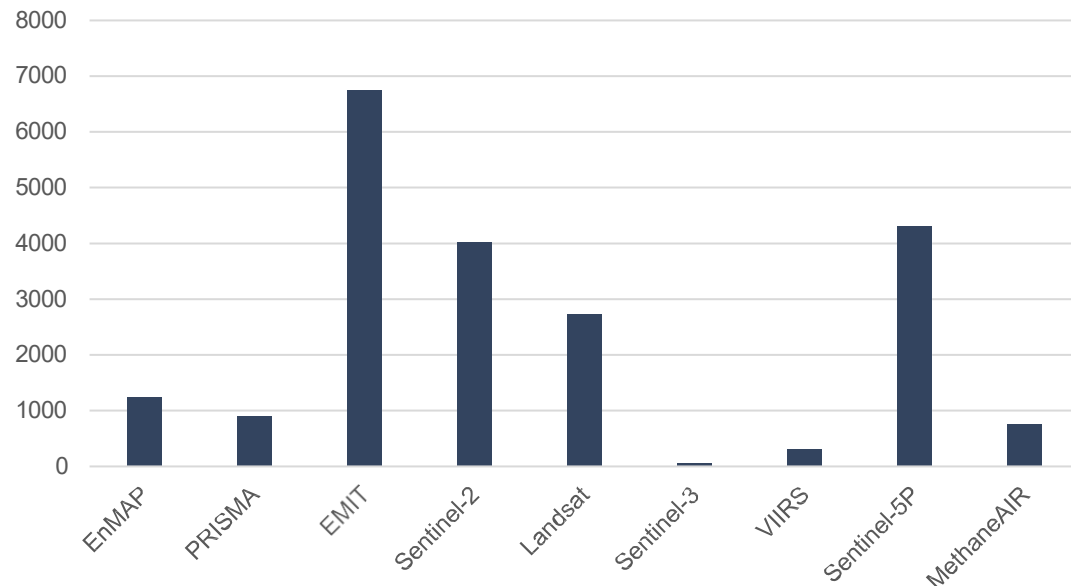


Credits: Itziar Irakulis Loitxate, IMEO

- ❖ 6164 plumes notified and >30 sources effectively mitigated in more than 10 countries
- ❖ Response rates are steadily increasing
- ❖ Some countries reach a 100% response rate (among others Argentina, Yemen, Mexico, Oman, or Brazil)
- ❖ 26 countries have a nominated MARS focal point and 156 OGMP companies engaged

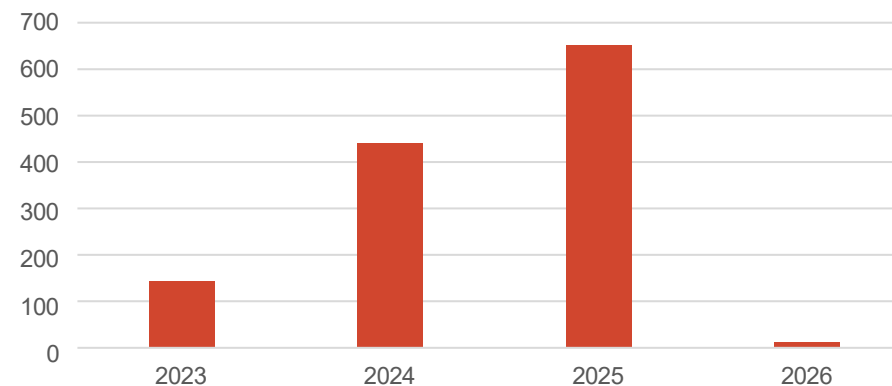
IMEO MARS in numbers

Plumes detected per satellite (2023-present)

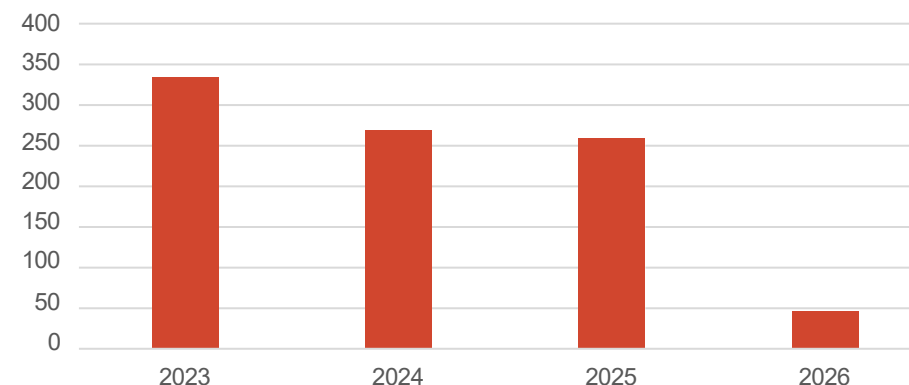


- ❖ EnMAP and PRISMA essential for complex areas, coal and waste sector, and emission cessation verification when we receive feedback
- ❖ GHGSat provided by UKSA key for mitigation verification

EnMAP plumes (emission date)



PRISMA plumes (emission date)



Credits: Itziar Irakulis Loitxate, IMEO

Next steps

- ❖ Proceeding with Use Case WG and initial use cases
 - Participation still welcome
- ❖ Continue working with to improve data access & support
- ❖ Evolve and stimulate exploitation of controlled release database
- ❖ Implement adoption of best practices by IMEO
- ❖ Jointly plan next CEOS-IMEO workshop

Time for questions,
discussion and mitigation

THANKS!