Towards Operational Greenhouse Gas Monitoring

Outcomes and recommendations of the operationalisation of GHG observations in the framework of CGMS meeting of 2 June

Presented to CGMS-53 Plenary Meeting, Agenda item 4

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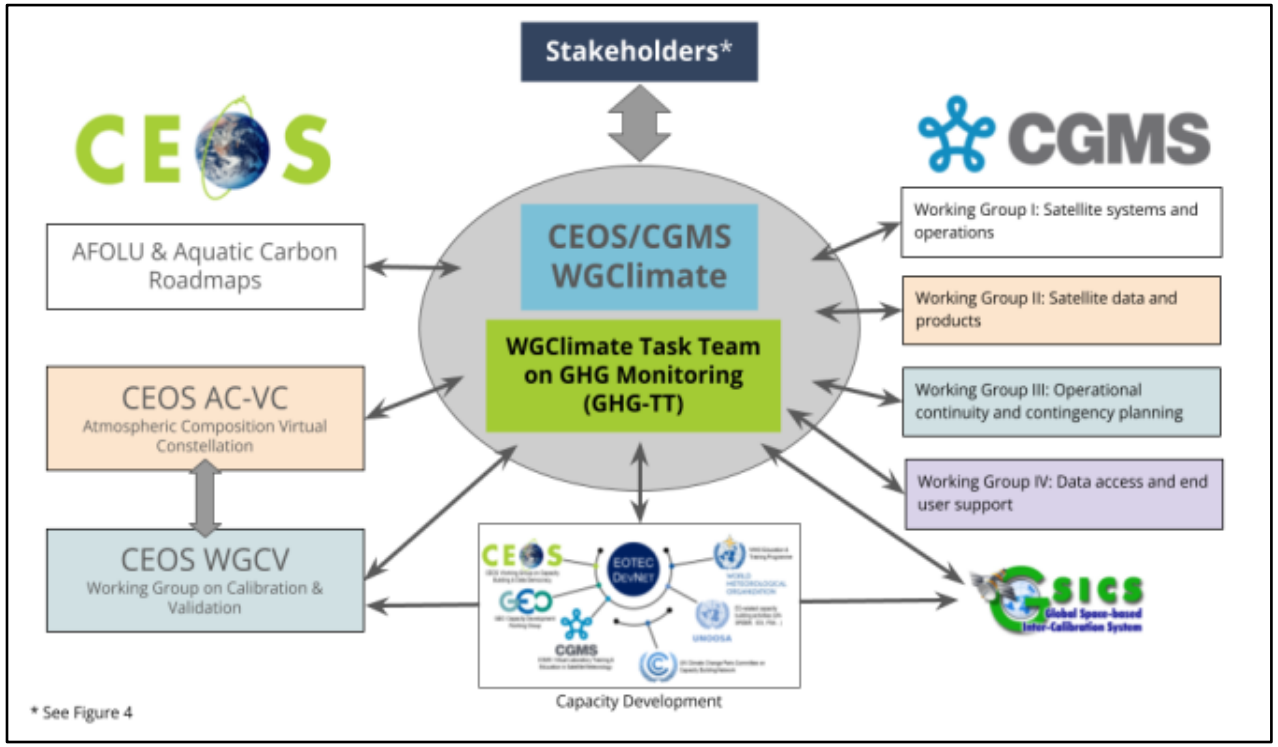
GHG Task Team & Roadmap - Recall

- ❖ Greenhouse Gas Task Team (GHG TT) is part of joint CEOS-CGMS WGClimate
- ❖ Responsible for maintaining and implementation of the GHG Roadmap

- GHG **Roadmap issue** 1 is from Mar. 2020 followed from recommendations in GHG White Paper
- Decided to update the GHG Roadmap



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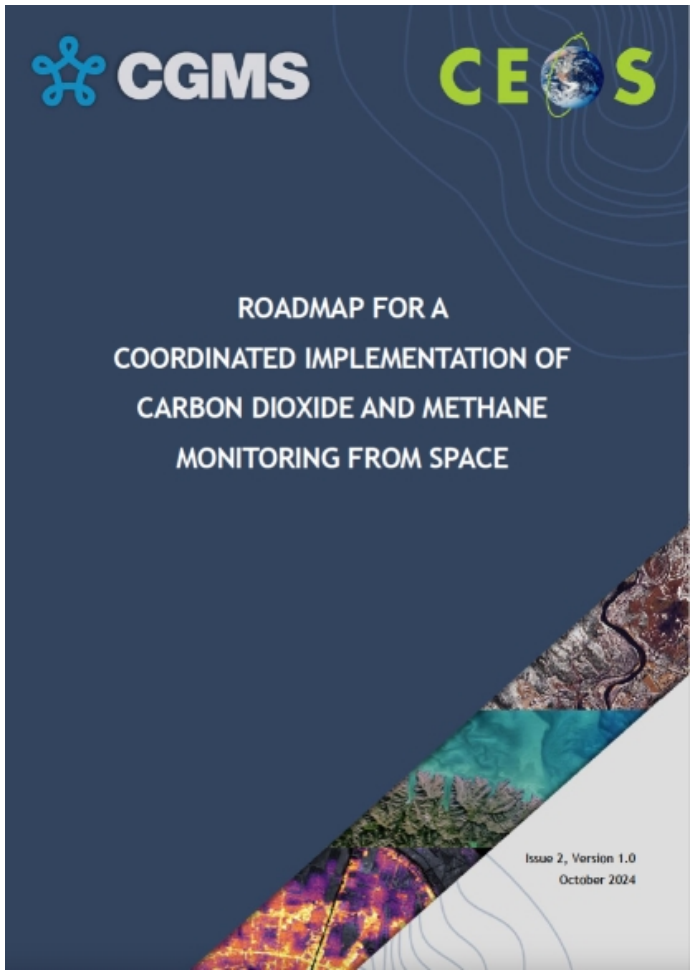
GHG Roadmap – Issue 2 - final



- Issue 2 has been established in close coordination with CGMS, G3W and IMEO
- Endorsement received at CEOS Plenary
- Endorsement received by **CGMS** in parallel
- Issued in October 2024, available here

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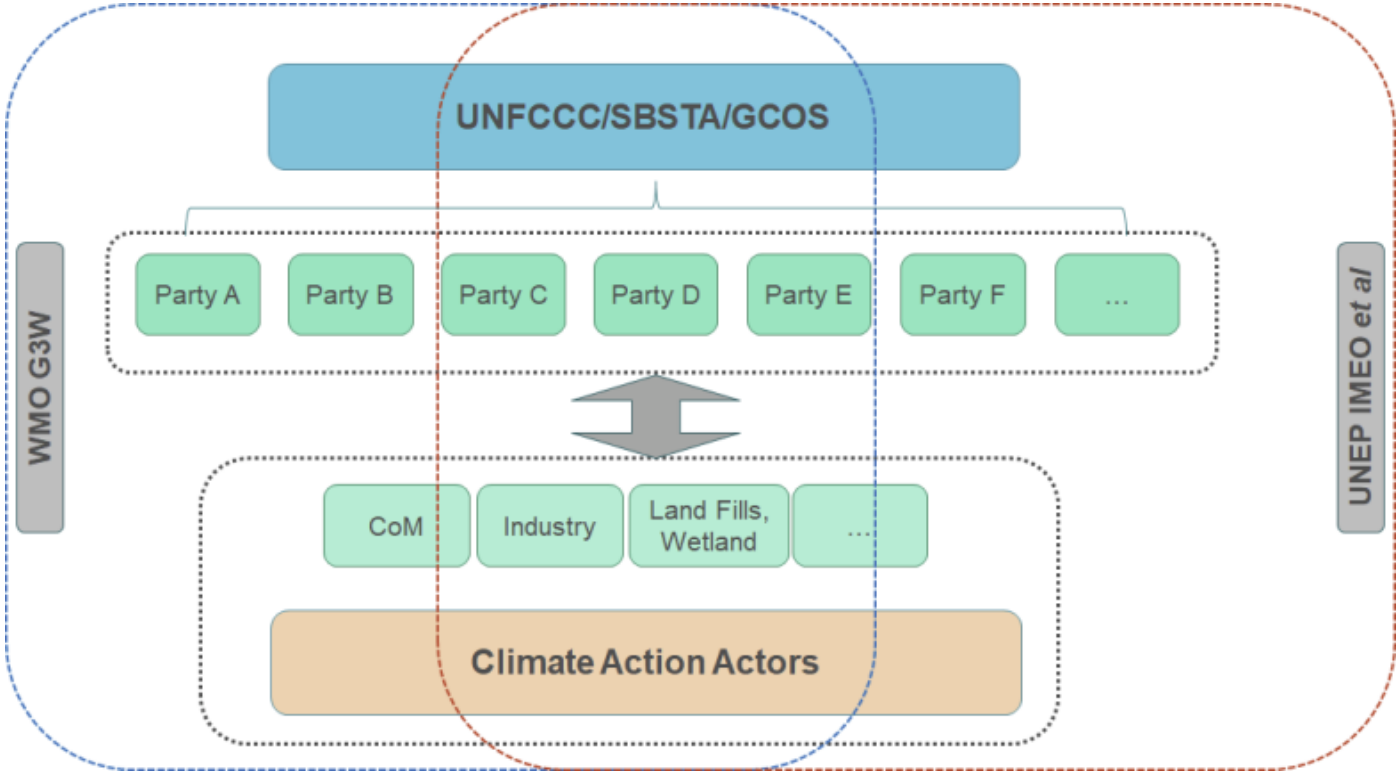
GHG Roadmap – Stakeholder

- Issue 2 has specific focus on co-developing with stakeholders fit-for-purpose products
- Section 3 covers "**Stakeholders and their Requirements**", which explicitly includes WMO **G3W** and UNEP's **IMEO**
- Section 5a describes the thematic activity for "**Fostering Stakeholder Engagement**"



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GHG Task Team – Next Steps

- **Thematic activities** (long-term goals) described in **section 5** with **leads** (plus deputies):
    a. Fostering Stakeholder Engagement - **Mark Dowell (John Worden, Wenying Su)**
    b. Sensor Development and Constellation Architectures – **John Worden (AC-VC) (Yasjka)**
    c. Calibration and Level 1 Products – **Hiroshi Suto (Akihiko Kuze)**
    d. Level 2 Products and Validation **– Ruediger Lang & Dave Crisp**
    e. Flux Inversion Modelling and Validation – **Kevin Bowman (Frederic Chevallier)**
    f. Best Practices – **John Worden (Paul Green)**
    g. System Development – **Richard Engelen (John Worden, Kevin Bowman)**
    h. Capacity Building – **TT and EO TecNet**

- Implementation will focus on short-term actions as (to be) described in GHG Roadmap Annex C
- CGMS role is specifically to support the transition to operational GHG Monitoring

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Progress on activities

Started and on-going:

- Methane common practices estimating emissions → **next presentation**
- Collaboration with UNEP's IMEO has been reestablished → **specific GEO sat. request**
- Continued strong involvement with WMO's G3W → **need for CGMS expertise**
- Engagement with UNFCCC and planning for GST-2
- National stakeholder engagement established in Harwell

Potential CGMS involvement:

- Capacity building, especially for rolling out experience to developing world (**CGMS ?**)
- Validation infrastructure and access to **GHG validation, e.g. EM-27, CMA via CGMS ?**
- Engage with **CGMS for operational experience**, e.g. G3W data access
- Engage with **CGMS for exploiting methane capabilities** of GEO satellites

Purpose of meetings on the operationalisation of GHG observations

- CGMS-52, first meeting to enhance collaboration
  - Better coordinate activities across WGs of CEOS-CGMS and WMO G3W
  - Co-develop the GHG Roadmap fostering a path to an operational system for GHG monitoring
- CGMS-53, further enhance collaboration
  - Identify operational needs (e.g., timeliness) for a baseline for concrete operational GHG service (e.g., MVS and G3W),
  - Discussion on update of GST Strategy and possible CGMS contribution

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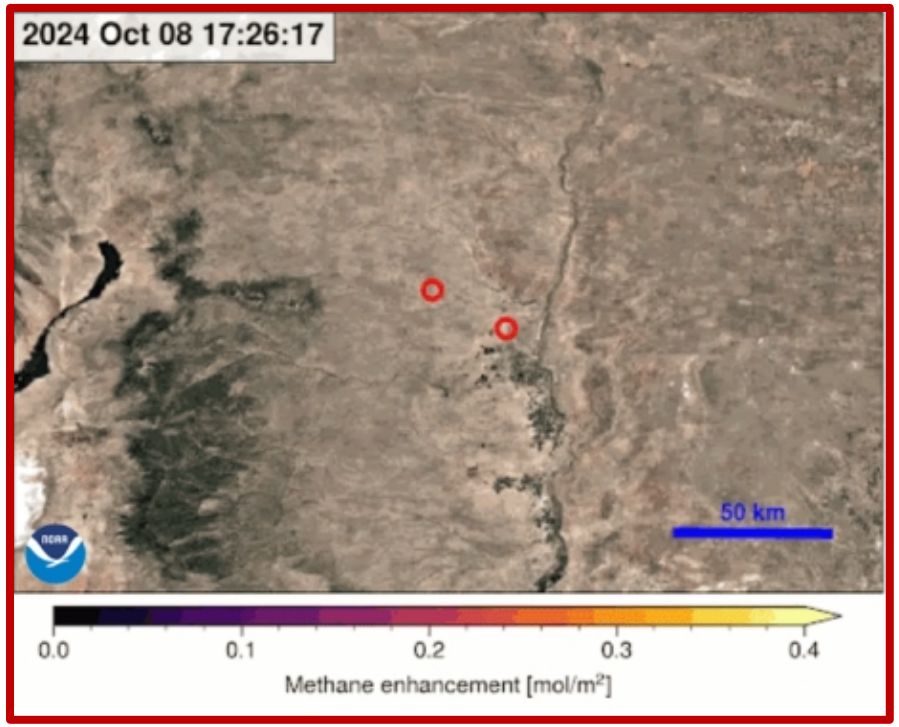
Major outcomes and recommendations from 2 June 2025 - I

- Discussing the potential contribution of geostationary observations to the detection of very large methane emission sources **it is recommended that WMO and the GHG Task Team to capture the requirements of IMEO and other interested applications**
- The GHG Task Team presented a set of initial requirements for operational GHG monitoring. While scientific performance requirements are known from earlier CEOS-CGMS GHG monitoring white paper and implementation plan the focus for an operational system is on revisiting time (mapping capabilities), product timeliness, and product availability



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Major outcomes and recommendations from 2 June 2025 - II

- **It is recommended to CGMS-53 Plenary that WMO and GHG Task Team work on a baseline for operational GHG monitoring that ensures a common understanding of the requirements and can function as a guideline for the utilisation of current and the establishment of future missions including from the commercial sector (Action would be due by CGMS-54 Plenary in 2026)**
- With respect to a sustained validation of GHG estimates from space it is important to work towards a validation infrastructure for operational GHG satellite missions that could fit into a GBON like tiered network structure as envisioned by G3W. **It is recommended that a first step is an assessment of the current capabilities based on known objectives and resource perspective. This could be performed by the WG Climate GHG Task Team**

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Major outcomes and recommendations from 2 June 2025 - III

- Based on the lesson learnt exercise on the delivery of data/information to the first UNFCCC Global Stocktake (GST) performed by the joint CEOS-CGMS WGClimate, CEOS has started an update of the *Strategy for Global Stocktakes* that is currently a CEOS only strategy. The updated strategy shall improve the delivery of information to the second GST planned for 2028 and subsequently better remote sensing products in the areas of mitigation, adaptation and maybe other areas relevant to the UNFCCC
- It is planned to provide a solid draft to the CEOS Technical Workshop (9-11 September 2025 at EUMETSAT) and endorse it at CEOS Plenary (4-6 November 2025 in Bath, UK)
- The meeting participants identified benefits if the GST strategy would become a joint CEOS-CGMS strategy:
  - pathways for operational systems providing sustained support for mitigation and adaptation activities, such as demonstrated for the GHG monitoring supporting monitoring of carbon and methane emissions and potentially extended to other areas, e.g., land and ocean monitoring of carbon related quantities

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Major outcomes and recommendations from 2 June 2025 - IV

  - in the context of adaptation, provide a better connection of the GST strategy with the WMO EW4ALL initiative, as CGMS agencies support both warning on extreme events and long-term adaptation by learning from the climatology of extremes
  - ensuring the utilisation of past and future observations from operational satellites in geostationary and polar orbits in this context

- We will provide the outline of the strategy document until end of June and CGMS members are asked to provide feedback to the CGMS – Secretariat until end of September 2025 if they see it useful if CGMS joins the strategy formally by endorsing it at Plenary level after thorough review

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Time for questions

and discussion

THANKS!

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