Joint CEOS-CGMS WGClimate Report - CEOS Plenary 2026

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The Joint CEOS-CGMS Working Group on Climate (WGClimate) provides the strategic continuity required to sustain long-term satellite climate observations across agency leadership cycles. Beyond the cumulative contributions of individual space agencies, WGClimate provides a durable framework that aligns agency priorities, maintains continuous observation architectures, and delivers unified data and technical expertise to global climate mechanisms such as GCOS, UNFCCC, and the Global Stocktake.

The below report highlights WGClimate's strategic added value for CEOS-CGMS Agencies internally, for external stakeholders, and for the global observing system for climate.

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WGClimate Overview

WGClimate has the following key objectives:

1. **Support for GCOS Implementation Plan**: Actively contribute to the Global Climate Observing System Status Report and Implementation Plan by aligning space agency efforts with GCOS priorities, particularly regarding Essential Climate Variables (ECVs). This includes responding to GCOS requirements and addressing actions related to space observations.
2. **Coordination of Climate Data Records (CDRs)**: Provide a comprehensive and accessible overview of existing CDRs generated by CEOS and CGMS member agencies. Facilitate the generation of new CDRs, including multi-mission datasets, by identifying and addressing gaps in cross-calibration and reprocessing activities.
3. **Optimized Planning of Satellite Missions**: Advise CEOS and CGMS on the optimization of future satellite missions and constellations to expand the coverage and record length of existing and planned CDRs, and address potential gaps relative to GCOS requirements.
4. **Support for Climate Agreements**: Ensure that space-based observations are fully utilized in climate monitoring and reporting, including contributions to international agreements.
5. **Advocacy and Outreach**: Promote the use of space-based data for climate monitoring through key platforms such as the UN Framework Convention on Climate Change (UNFCCC), Earth Information Day, and other relevant fora.
6. **Collaboration with Key Stakeholders**: Maintain strong partnerships with GCOS, the World Meteorological Organization (WMO), the World Climate Research Programme (WCRP), Group on Earth Observations (GEO) and other relevant organizations to advance the use of satellite observations in climate science and policy.

Greenhouse Gas Task Team (GHG-TT)

The GHG-TT, led by Yasjka Meijer (ESA), brings together experts from across CEOS and CGMS, including from WGClimate, Atmospheric Composition Virtual Constellation (AC-VC), and the Working Group on Calibration and Validation (WGCV) to help in implementing the GHG Roadmap. In particular, Annex C outlines a number of specific actions across several thematic areas, which is the Task Team's primary focus for implementation. Annex C is regularly reviewed and updated to ensure the actions remain relevant.

Strategic Added Value Internally: Supporting Agency Implementation & Common Objectives

CDR & F(C)DR Inventories

The CDR Inventory (formerly, ECV Inventory) is a service provided by EUMETSAT for the CEOS and CGMS communities since 2017. Its database contains information on hundreds of satellite-derived Climate Data Records (CDRs) either directly produced, funded or planned by space agencies, and covers 40 of the 42 GCOS ECVs (13 Atmosphere, 18 Land, and 11 Ocean considered to be observable from space. Expansion to include CDRs addressing selected non-GCOS variables that are relevant for climate applications is in planning.

The Inventory directly supports the WGClimate objective on CDR planning by providing a comprehensive overview of existing and planned CDRs. An interlinked F(C)DR Inventory is in development *[CMRS-26-07]* and will link these thematic (T)CDRs to the respective underlying fundamental (level 1) FCDRs. Gap-analysis of the CDR Inventory and, in future, the FCDR Inventory facilitates identifying the needs and prospects for new CDRs and multi-mission datasets, cross-calibration and reprocessing activities.

The database contents continue to be reviewed, and the priority has been the closing of false gaps at the level of ECV: CDRs addressing Plankton, Evaporation from Land, Terrestrial Water Storage, and River Discharge were added. Missing contributions for Marine Habitat Properties are being investigated. Anthropogenic Water Use will likely remain a gap. Contributions from C3S and ESA-CCI Projects are currently being updated; next step will be updating the contributions from EUMETSAT and its SAF network, followed by other agencies.

Together with the effort to complete the contents of the database to reflect the current and planned scenarios for the production of CDRs and their connection to the space segment, its structure and organisation have been also evolved to foster faster and more complex analyses. WGClimate and individual space agencies will be supported by a growing set of built-in tools in the identification of gaps in the production of CDRs, and future risks at the level of the space segment.

GHG Best Practices

Following the endorsement of the *Common Practices for Quantifying Methane Emissions from Plumes Detected by Remote Sensing* in 2025, the team worked with CarbonMapper and GHGSat to assess their products against these specifications. The lessons learned from this activity will inform the second version, which is aiming for 'good' practices. A workshop is planned in January 2027 to further the development.

Future work includes developing similar specifications for methane area flux estimates *[CARB-26-14]*, as well as expanding to (initially) facility scale carbon dioxide flux estimates *[CARB-26-24]*.

GHG Calibration and Validation

The annual vicarious calibration campaign was conducted in June 2026 at Railroad Valley, and included participation of OCO-2, OCO-3, GOSAT, GOSAT-2, GOSAT-GW, TROPOMI (Sentinel-5P), TEMPO and MicroCarb. The data and results are available on the vicarious calibration portal *[CARB-26-09]*.

An intercomparison project is underway, focused on global-regional flux inversions of CO_2 with realistic simulation of aerosols, surface, and clouds. This activity aims to reduce the uncertainty in GHG retrievals caused by aerosols.

Requirements for ground-based networks to support the operational validation of space-based sensors have been defined by the Copernicus Anthropogenic Carbon Dioxide Monitoring constellation (CO2M) team. These requirements will be generalised for all sensors.

GHG Sensor Development and Constellation Architectures

The GHG Portal (ceos.org/ghg) continues to evolve and be updated. Several new instruments were launched in 2025, including Sentinel-5A, GOSAT-GW and MicroCarb, and all are in their commissioning phase.

GHG-TT, through AC-VC, has contributed to the 2026 CEOS State of the Virtual Constellations report, with a dedicated section for both facility scale and area mapper GHG instruments.

Climate Data Records Definition *[CMRS-24-04]*

The activity to define the term 'climate data record' has progressed. Using the guidelines set out in the Vocabulary chapter of the Interoperability Handbook, a definition as follows was proposed:

A collection of related factual information (such as measurements or statistics) about Climate System elements and their variations, organised and treated as a single unit over a long period of time, (to represent the long-term conditions at a particular location).

A scientific paper is in preparation to detail this definition, and a draft will be submitted before the end of 2026. It will likely be published in 2027 in either the *Journal of the European Meteorological Society* (JEMS) or *Frontiers of Remote Sensing*.

This task serves as a demonstrator of the Vocabulary factor of the Interoperability Handbook.

WGClimate Website Update *[CMRS-24-01]*

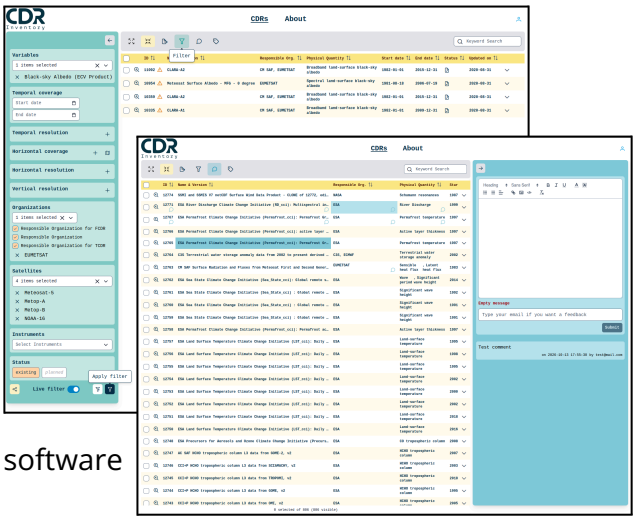


The CEOS WGClimate webpage was updated in June 2026 to better highlight the outputs and activities of the Working Group. The team is also considering retiring the climatemonitoring.info website, such that all WGClimate content is hosted on the CEOS WGClimate page (ceos.org/wgclimate).

Strategic Added Value Externally: Delivery of Discoverable & Application-Ready Products

Climate Data Record Inventory

Apart from its CEOS and CGMS internal purpose, the CDR Inventory is a public resource made available to any users wishing to explore this global database of satellite-derived CDRs and encourage more widespread usage of the data. A user-friendly and visually appealing interface presents the database alongside a set of tools to assist users in discovering datasets relevant to their needs. Moderated mechanisms for commenting on the entries enable any user to provide feedback, suggest edits, improvements or report issues. The built-in analysis tools under development to assist the WGClimate in gap analysis exercises are also made publicly available; external analysis is facilitated by straightforward export to spreadsheet formats, for ease of use by office-type software and via a REST API.



Two key developments will further enhance the accessibility of the Inventory. First, an experimental integration will enable AI applications/agents to directly consume the Inventory data – as AI is increasingly used for search and analysis, making the content and functionality more naturally available ensures continued relevance, boosts accessibility and accelerates usage of the information. Second, an application-based typology at the level of ECV will directly identify application-relevant CDRs, simplifying their discovery for selected areas of science, services, and policy support. *[CMRS-25-01]*

UNFCCC Engagement *[CMRS-26-02]*

A decision was taken at WGClimate-24 in February 2026 to incorporate the activities of the UNFCCC Tiger Team into the regular activities of WGClimate. This includes:

- Maintaining dedicated primary Points of Contact between WGClimate and UNFCCC Secretariat for overall coordination purpose. The current contacts are Heather Maseko and Vincent-Henri Peuch.
- Working with the UNFCCC Secretariat and the thematic workstream leads to ensure appropriate support from the satellite EO community across all aspects of UNFCCC work.
- Contributing to Earth Information Day and side events at COP and SB to showcase the use of space-based data, working with WMO, GEO, other organisations and relevant programmes.
- Coordinating the presence of CEOS/CGMS Agencies at UNFCCC COP and other relevant events.

WGClimate continues to work closely with the UNFCCC Secretariat, with a detailed session hosted at WGClimate-24 in February 2026 to discuss EO support for the various UNFCCC Workstreams. The Adaptation and Climate Finance workstreams were identified as the highest priority, and WGClimate will continue discussing with UNFCCC about joint actions to advance EO support for these areas.

IMEO Engagement

GHG-TT has regular engagement with UNEP's International Methane Emissions Observatory (IMEO), in particular to ensure data supply to support the Methane Alert and Response System (MARS) *[CARB-26-12]*. A white paper is under development to describe the usefulness of multispectral missions for methane detection, to support mission funding decisions. Work to develop use cases for IMEO is also progressing *[CARB-26-11]*. GHG-TT are also collaborating with IMEO to consider exploring GEO satellites and more particularly the MTG-FCI satellite instrument (and potentially Himawari) for detecting methane plumes.

To support IMEO, CEOS developed the Database of Controlled Release Experiments in 2025. In 2026, this database was expanded, with 797 individual past releases cataloged for search and discovery *[CARB-26-08]*. The intent is to allow for upcoming releases to be announced, such that satellites can be tasks accordingly. The team continues to work to understand the needs of the user community, such that the resource can be used to coordinate validation activities.

G3W Engagement

The GHG-TT has closely collaborated with WMO's Global Greenhouse Gas Watch (G3W) and has jointly developed requirements for space-based data in support of G3W *[CARB-26-15]*, which will be used to inform the development of G3W's monthly top-down net fluxes *[CARB-26-17]*.

GHG Inventory Compiler Engagement

In 2024, GHG-TT and WGClimate conducted a National Greenhouse Gas Inventory Compiler regional workshop in Europe. GHG-TT is now considering options to add a satellite component to the Workshop on GHG Inventories in Asia (WGIA), with the objective to host a similar regional event in Asia with Asian inventory compilers *[CARB-26-16]*.

System Development

A tip-and-cue system for methane observations has been proposed, and GHG-TT is working to understand existing tip-and-cue systems, as well as what may be needed to have improved coordination to better exploit global mappers to identify methane anomalies, which can be followed up by point source mappers *[CARB-26-20]*. The GHG-TT is considering a workshop, which will allow commercial entities to better target their satellites and exchange on lessons learnt regarding mission planning tools for facility-scale mappers.

Capacity Building

Existing capacity building materials and training activities related to the monitoring of GHGs from space have been compiled in a spreadsheet. This spreadsheet will continue to be updated, and the contents will be made available in some way in the future.

GHG-TT is engaging with the organisers of the Workshop on GHG Inventories in Asia (WGIA) to plan a space-based component for the 2027 edition of the workshop.

Strategic Added Value Globally: Supporting Stakeholders and Global Governance

UNFCCC COP-31

WGClimate has drafted the CEOS-CGMS Statement to SBSTA-65, to be delivered orally at the SBSTA opening session by the national delegation of the CEOS Chair Agency (Norway). The statement highlights recent progress in space-based Earth observations and the knowledge gained from sustained observations across four key thematic areas: adaptation and resilience, greenhouse gas observations, economic impact and aquatic observations. Input was also provided to the themes and structure of the 2026 Earth Information Day, and WGClimate is supporting the delivery of the CEOS-CGMS presentation to Earth Information Day, coordinated with GEO.

Adaptation and Resilience *[CMRS-26-03], [CMRS-26-04]*

In June 2026, ESA and EC-JRC hosted a joint workshop titled *Earth observation and the Global Goal on Adaptation*. The workshop identified and prioritised EO data research needs, products, and services that can be used to track Global Goal on Adaptation (GGA) indicators. It has been identified that EO can strongly support 18 of the 59 indicators, while EO-based climate observations can provide important context for many others. A shortlist of 5 indicators (water, food and agriculture, health, ecosystem, and infrastructure) has been identified where immediate progress can be made to test the implementation of these indicators.

GCOS Support *[CMRS-26-01], [CMRS-25-03]*

In February 2026, WGClimate met jointly with GCOS to discuss the next GCOS Status Report and Implementation Plan. To support these discussions, WGClimate prepared an update of the Space Agency Response to the 2022 GCOS Implementation Plan *[CMRS-26-01]*, highlighting updates to mission status and planned missions.

The CDR Inventory is supporting the preparation of the next GCOS Status Report, through the identification of gaps for space-observable ECVs. There is an ongoing cooperation with WMO OSCAR/Space for crossing information between the two databases, linking satellites and instruments to the de facto observation of GCOS ECVs.

GCOS has also conducted a rationalisation process for the Essential Climate Variables (ECVs), to which WGClimate has provided feedback and support. There is a proposed change from 'Products' to 'Quantities', which may change where the requirements are placed on the value chain, and could change how we respond and act. WGClimate will continue reviewing and supporting this process, including by reviewing the draft ECV requirements protocol document.

Global Stocktake Actions

The GHG-TT have taken on a number of actions identified by the Global Stocktake study team, however many require additional resources to make significant progress. The actions include:

- GST2 prototype products and guidance *[CARB-26-06]*
- Evaluation and validation strategies for GHG concentrations *[CARB-26-18]*
- Evaluation and validation strategies for GHG fluxes *[CARB-26-19]*
- Identify candidate approaches for higher-resolution inversions *[CARB-26-22]*
- Develop multi-scale integration methods that leverage both plume and area-mapper data. *[CARB-26-23]*

Future Work

At the 2026 CEOS Plenary, the WGClimate Chair transitions from Wenying Su (NASA) to Vincent-Henri Peuch (ECMWF). Susanne Mecklenburg (ESA) will join the leadership team as Vice-Chair.



Wenying Su, NASA

Vice Chair: 2023-2024
Chair: 2025-2026



Vincent-Henri Peuch, ECMWF

Vice Chair: 2025-2026
Chair: 2027-2028



Susanne Mecklenburg, ESA

Vice Chair: 2027-2028
Chair: 2029-2030

WGClimate and the GHG Task Team plan to meet in person in February 2027, in Bonn, Germany. As the UNFCCC Secretariat is also located in Bonn, WGClimate plans to capitalise on this co-location to advance discussions between the two organisations.

Other activities for 2027 include:

- Continue the work to map GGA indicators to EO products and services
- Publish the *Definition of Climate Data Records* paper
- Support the development of the GCOS Status Report and Implementation Plan
- Workshop on mission planning of targeted missions and a coordinated tip-and-cue system for methane observations
- Beta release of the F(C)DR Inventory
- Deliver a satellite component for the Workshop on Greenhouse Gas Inventories in Asia