

Minutes of the 24th Meeting of the Joint CEOS-CGMS Working Group on Climate (WGClimate-24) and the 7th Meeting of the Greenhouse Gas Task Team (GHG-TT-7)

9 - 12 February, 2026

ESA ECSAT, Harwell, UK

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Day 1: Monday 9th February, 2026

Session 1: Opening Session

1.1 - Welcome & Review of Agenda

Wenying Su (NASA, WGClimate Chair) reported:

- Opened the WGClimate-24 Meeting and led a tour de table. The full list of participants can be found in Appendix A.
- Mark Dowell (EC) suggested adding to the agenda a discussion on the impact of the ECV rationalisation effort on WGClimate activities.

1.2 - WGClimate Work Plan

Wenying Su (NASA, WGClimate Chair) reported: [[slides](#)]

- In 2025, WGClimate delivered four activities, including restructuring the ECV Inventory, Space Agency response to the GCOS IP, GST1 Lessons Learned, and the Coordinated Action Plan.
- Ongoing deliverables include expanding the utility of the CDR Inventory, updating the WGClimate web presence, supporting GCOS in the ECV rationalisation process, gap analysis for above-ground biomass, soil moisture, and sea level records, and the CDR definition activity.
- New deliverables include an updated GCOS IP response (due Q2 2026), regional satellite experts for national inventory compilers (due Q4 2026), mapping EO products to adaptation indicators (due Q4 2026), and guidance for EO data for resilience and adaptation efforts (due Q4 2027).
- Recurrent WGClimate tasks include the maintenance and population of the CDR Inventory, coordination of the annual CEOS-CGMS Statement to UNFCCC SBSTA, and coordination of themes and inputs for UNFCCC Earth Information Day.
- Libby Rose (WGClimate Secretariat) shared the status of WGClimate's webpages (CEOS website WGClimate page, CGMS website WGClimate page, and climatemonitoring.info).
- The proposed update for the CEOS WGClimate focuses on bringing to the front links to WGClimate's main output activities. Detailed background information will be moved to a subpage. Updates to climatemonitoring.info may also be needed.

Discussion

- Jörg Schulz (EUMETSAT) noted climatemonitoring.info was established to house WGClimate activities, due to the joint nature of the working group, and to avoid a one-sided representation. Jörg suggested continuing to build out the content on climatemonitoring.info.
- Mark Dowell (EC-JRC) recognised that some previous sensitivities around the webpages and hosting of WGClimate information no longer exist, and hence suggested focusing the information on the CEOS and CGMS webpages. Should also have clear links to the GST and GHG Portals.
- Vincent-Henri Peuch (ECMWF, WGClimate Vice-Chair) suggested including a list of agencies involved in WGClimate, to help others to get involved and broaden the participation of the working group.

WGClimate-24-01	EUMETSAT to review where the CDR Inventory is hosted, to increase visibility of the Inventory on CGMS and CEOS websites.	Due: Q2 2026
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- Susanne Mecklenberg (ESA) noted ESA will contribute to the deliverable on adaptation indicators.

1.3 - GHG Roadmap and Activities

Yasjka Meijer (ESA, GHG-TT Lead) reported: [\[slides\]](#)

- Receiving a major update in 2024, the GHG Roadmap informs the activities of the WGClimate GHG Task Team (GHG-TT). Long-term prospects and objectives are described within the roadmap and short term activities are defined in an online annex. The goal is to implement sustained monitoring from space of CO₂ and CH₄.
- The CEOS GHG Portal was updated for 2026 to provide information on public and non-public missions, and includes tools to build GHG constellations, view detailed mission information and case studies, and timelines of mission availability.
- The GHG-TT has focus areas for sensor development and constellation architecture, calibration and level 1 products, level 2 products and validation, flux inversion modelling and validation, system development, methane common practices, and fostering stakeholder engagement.
- In 2025, GHG-TT joined CEOS SIT, AC-VC, SIT-TW, and Plenary meetings, as well as CGMS WG-II and CGMS-53 Plenary. Thanked the 2024-2025 JAXA SIT Chair Team for their support to GHG observation efforts over their SIT Chair term.

- Welcomed nominations to join the sensor development and constellation architecture area as co-lead.

GHG-07-01	GHG-TT members are invited to nominate leads for the sensor development and constellation architecture area.	Due: Q2 2026
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Discussion

- Simon Elliot (EUMETSAT, CGMS) noted that the CGMS Plenary will take place in June 2026 in Korea, and the CGMS Working Group meetings will take place in April in Darmstadt, overlapping with SIT-41.
- Wenying Su (NASA, WGClimate Chair) recalled that the SIT Chair team has asked WGClimate to nominate topics for SIT-41, to be brought to Principal attention.
- Vincent-Henri Peuch (ECMWF, WGClimate Vice-Chair) added that the week also clashes with the Global Atmospheric Watch Symposium in Geneva.

WGClimate-24-02	WGClimate members to let Wenying know if they plan to travel to SIT-41, in Irvine, California, USA, 14-16 April 2026, as well as any topics which should be brought to SIT-41.	Due: Q1 2026
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1.4 - CEOS Executive Officer Report

Lefteris Mamais (Exec Officer) reported: [\[slides\]](#)

- Lefteris has taken on the role of CEOS Executive Officer from 1 January 2025, and will be supported over the coming two years by Julia Caufape, Phil Harwood and Branimir Radun.
- The CEOS Executive Officer Team coordinates the CEOS Work Plan, liaises with the CEOS Working Groups, Virtual Constellations, and other groups, represents CEOS externally, maintains CEOS governance documents, and responds to ad hoc CEOS requests.
- Currently working on developing the 2026-2028 CEOS Work Plan, with almost all contributions received from the CEOS groups. A first complete draft of the work plan will be shared by the end of February.
- A combined chapter on “Observations for Climate Research” has been proposed, combining the previous sections 3.1-3.3 to avoid repetition and harmonise inputs.
- Propose to keep the carbon deliverables (previously section 3.2) with the ‘CARB’ prefix as the identifier.

- Actions from the 2025 CEOS GST Strategy will be included in the CEOS Work Plan, following the mapping done by the SIT Chair Team.

1.5 - WGClimate & GHG-TT Action Review

Libby Rose (WGClimate Secretariat) reported: [[slides](#)]

- Of the 29 actions from WGClimate-22, 23 have been completed.
- A final reminder on three additional actions was provided, and then agreed to close.
- WGClimate-22-03: *ECV/CDR Inventory team to review the information available on the CEOS MIM Database, and consider establishing linkage with the CDR Inventory.*
 - This action can also be closed, as the MIM database is now used for a couple of missions/instruments which were missing from WMO OSCAR. A broader discussion about the prime source of information for mission/instruments in the Inventory is still needed, and will be addressed in item 3.2.
- Regarding, WGClimate-22-20 & 21, which resulted from the session with the national inventory compilers, agreed that these actions can be closed, with perhaps new ones opened later this week.
- All but one action is closed from GHG-TT-05, and half the actions from GHG-TT-06 have been closed.

Discussion

- Yasjka Meijer (ESA, GHG-TT Lead) had discussions alongside the meeting with a South African GCOS colleague, who noted they might be able to support hosting EM-27 sensors on South African Antarctic vessels to address GHG validation gaps over the ocean.
- Patrick Gibson (UKSA) noted UKSA's quota with GHGSat has now been met by IMEO, and will run out at the end of March.
- Richard Engelen (ECMWF) added that ECMWF has just started acquiring GHGSat data, mostly from the archive.
- Regarding GHG-06-08, Abhishek Chatterjee (Schmidt Sciences) noted that he, with Laura Lorenzoni and Dave Crisp, are discussing how to elevate the ocean observation gap into the Aquatic Carbon Roadmap.
- OCR-VC plans to bring the Aquatic Carbon Roadmap to SIT-41 for endorsement, and the SIT Chair Team has encouraged them to share the draft by end of February to allow for feedback from the community.

GHG-07-02	Yasjka Meijer to coordinate the potential placement of EM-27 sensors on South African shipping vessels (PoC T. Morris, SAEON), for coverage in the Southern Ocean and research station on Marion Island.	Due: Q2 2026
GHG-07-03	Yasjka Meijer to arrange a meeting between GHG-TT and OCR-VC to discuss the ship validation opportunities for ocean GHG fluxes.	Due: Q2 2026

ECV Rationalisation Discussion

- WGClimate provided feedback to GCOS on the ECV rationalisation process.
- Mark Dowell (EC-JRC) raised concerns about the change from ECV 'Products' to 'Quantities'. This changes where the requirements are placed on the value chain, and could change how we respond and act. Does WGClimate need to prepare in any way for this change?
- Richard Engelen (ECMWF) likes the distinction between products and quantities, with quantities more closely related to the observable. What's less clear is how to find the overarching ECV.
- Validating products with respect to requirements is different to validation of a quantity.
- Rüdiger Lang (EUMETSAT) understood GCOS is relying on a user-focused naming convention, but products need to be individually validated and aggregated at a higher level. There is a process to clarify how the concept would work in practice.
- Jörg Schulz (EUMETSAT) noted there will need to be requirements for each of the 174 quantities. There are also now quantities which merge 3 or 4 tracers into one, which could raise problems with the CDR Inventory if someone provides e.g. only 2 of the 4 tracers.
- Vincent-Henri Peuch (ECMWF, WGClimate Vice-Chair) recognised that the goal of GCOS to be agnostic to technological capabilities is somewhat flawed - requirements are only useful when there is a balance between user needs and current capabilities. If requirements may never be achieved, what is the point in listing them?
- Richard noted 'quantity' is directly related to what a new mission can provide, but how it relates to each 'product' is less clear.
- Gareth Thomas (UKSA) acknowledged that the ECV Products sometimes covered multiple variables, so the change to 'Quantity' helps simplify the relationship to requirements for an observing system.

- Rüdiger Lang (EUMETSAT) understands that under each ECV name, there is the number of quantities which contribute to that. Each quantity has requirements, which is then somehow traced back to the ECV.
- Jörg suggested GCOS review the process for defining requirements for the next edition of the GCOS Status Report.
- Mark suggested that this year, GCOS should propose a protocol for the requirement-setting process, which WGClimate should be involved in. The requirements cannot be completely agnostic of data provision.
- Wenying Su (NASA, WGClimate Chair) noted that GCOS has asked for a WGClimate representative to join the GCOS Status Report writing team. GCOS plans to issue the Status Report and Implementation Plan together in 2027, with requirements for the new ECVs released in 2028.
- WGClimate should engage with the requirement writing process, to ensure the requirements they defined are useful to justify agency programmes.

WGClimate-24-04	WGClimate members to nominate to join the GCOS Status Report writing team.	Due: 20 March 2026
WGClimate-24-05	Mark Dowell to request the GCOS ECV Task Team share a draft of the requirements protocol document with WGClimate.	Due: Q1 2026

Day 2: Tuesday 10th February, 2026

1.6 - ERA6: ECMWF Reanalysis Project

Hans Hersbach (ECMWF) reported: [\[slides\]](#)

- Hans leads the reanalysis team at ECMWF.
- ERA5 provided 31km spatial resolution, while ERA6 aims to provide 14km. ERA5 provides hourly data from 1940 to five days behind time, operationally. Over 200,000 users have accessed petabytes of data to support accurate and timely climate monitoring.
- ERA6 will benefit from an additional eight years of research and development, as well as improved compute capacity, facilitating higher horizontal resolution, better uncertainty estimation, a fully coupled ocean model, and the resolution of several known ERA5 issues.

- Products will include 3D and 2D ocean parameters, height levels for the lowest part of the atmosphere, hourly parameters with new parameters e.g. clear-air turbulence, daily statistics, and the GRIB2 format. ERA6 introduces ocean and ice as an integral part of the data assimilation.
- A number of historical datasets have been recovered, and will be included in ERA6, extending the data record back to around 1970.
- ERA6 incorporates more and better use of satellite and in-situ observations, and is assessed against ERA5 around the world in a 'scorecard pilot,' demonstrating particular improvements in pressure and wind extremes.
- ERA6 production is about to start, having completed the spin-up years. Data from 2007 onwards is expected to be released publicly by mid 2027.

Discussion

- The possibility of an ERA6 Land product was discussed, and Hans noted that ERA5 Land will be continued, as well as capabilities of the Horizons Europe CERES (Climate change and European Aquatic REsources) project.
- The €1B of economic value resulting from the ERA5 data ([study](#)) includes the uptake of ERA5 in training AI/ML models.
- Mark Dowell (EC-JRC) noted community efforts to produce derived indicators using ERA5, and asked if the use of downstream indicators are tracked. Hans noted that the team is actively looking into developing a user database.
- Vincent-Henri Peuch (ECMWF, WGClimate Vice Chair) added that the economic study found that the benefit of ERA5 to the wind sector alone pays for C3S.
- ECMWF is working to assimilate the Sea Surface Temperature (SST) products, rather than relying on individual products. Not yet using the satellite data directly.

Session 2: Agency Reports

2.1 - EC

Hugo Zunker reported: [\[slides\]](#)

- Copernicus represents the EO component of the EU Space Programme, managed by EC for data acquisition, information services, data access and distribution, and user uptake. Developed in partnership with Member States, ESA, EUM, ECMWF, and others.
- Copernicus data and infrastructure is guaranteed beyond 2030.

- The Copernicus Space Segment includes the Sentinel missions, the Copernicus Expansion missions, and the Next-Generation Sentinel missions.



- Last year, Copernicus launched the Sentinel-4A, -5A, -1D, and -6B missions. In 2026, Sentinel-3C is expected to be launched, followed by CO2M-A, the first of the expansion missions, in 2027.
- The amount of data generated by the Copernicus missions is growing exponentially, with the volume during 2028-2034 expected to reach 600 PB, as the spatial resolution, number spectral channels and number of missions increases.
- The Copernicus Services contribute to key policies and aim to scale up ‘policy-ready’ products, better integrate digital capacities such as artificial intelligence for image acquisition, processing and interpretation, as well as support key government needs and applications.
- The three pillars of Copernicus user uptake are EC’s Knowledge Centre for Earth Observation (KCEO), national collaboration programmes (NCPs), and the EUSPA user consultation platform.

Discussion

- Yajska Meijer (ESA, GHG-TT Lead) asked if materials are available on how the three pillars drive user uptake, as it is of interest for the GHG-TT to understand feedback and lessons learned.
- Mark Dowell (EC-JRC) noted better interfaces between the three pillars may be needed. He suggested that KCEO could test extracting everything related to GHGs addressed by

KCEO, NCPs and EUSPA, and share with WGClimate as a pilot. This could be extended to other thematic areas if useful.

WGClimate-24-06	EC to share lessons learned in connecting with users, through a small pilot of all GHG aspects addressed by KCEO, NCPs and EUSPA. Report outcomes of pilot study to WGClimate-25.	Due: WGClimate-25
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2.2 - ECMWF

Vincent-Henri Peuch reported: [\[slides\]](#)

- ECMWF produces medium range weather forecasts, ranging from three days to approximately two weeks, as well as sub-seasonal and seasonal forecasts up to a year ahead of time. Not a space agency, but one of the biggest users of satellite observations.
- ECMWF has 23 Member States, 12 Cooperating States, and ~600 staff. The agency hosts the largest weather and climate data archive in the world, with 1.4 exabytes of data. Contributions beyond weather include Destination Earth, and the Copernicus services for Climate Change (C3S), Atmospheric Monitoring (CAMS), and Emergency Management (Copernicus EMS).
- AI-based systems are now operational at ECMWF, with the Artificial Intelligence/Integrated Forecasting System (AIFS) implemented in 2025.
- Emphasis on developing graphics which are meaningful and easy to understand for the mass media.
- EAC5 (atmospheric composition reanalysis) will start shortly. Methane emissions data from satellites has increased the alignment of CAMS EvOLution (CAMEO) with the Global Carbon Project estimates.
- ECMWF has developed interactive Copernicus apps for climate monitoring and atmospheric composition, including the Global Methane Explorer.
- Destination Earth is developed together with ESA and EUMETSAT, and is moving into Phase III in 2026, with discussions progressing with EC to bring mature elements closer to Copernicus.

Discussion

- Mark Dowell (EC-JRC) noted that Copernicus is exploring the integration of public Sentinel data with data from the commercial sector. In the core Copernicus services and

in independent applications, commercial sector data is incorporated where applicable. The data is available via the Copernicus Contributing Missions (CCM) programme.

2.3 - EUMETSAT

Jörg Schulz reported: [\[slides\]](#)

- Meteosat-9 has now completed 20 years on orbit, having overtaken Meteosat-7's record as EUMETSAT's longest operating satellite.
- MTG-I1 and -S1 were launched in 2022 and 2025, respectively, with MTG-I2 planned to launch in 2026. MTG's imager platform provides imagery, fire detection, and lightning mapping, with 16-channel spectral imagery every 2.5 minutes over Europe. MTG-S1, carrying sounding instruments, is still in the commissioning phase.
- MetOp-SG A1 launched in August 2025, and will be joined by MetOp-SG B1 in 2026. METimage replaces the AVHRR sensor carried on the MetOp series.
- In October 2025, EUMETSAT hosted a Climate Symposium, targeted at the national climate services/offices of the EUMETSAT member states. A number of recommendations regarding the assessment of satellite data needs and product planning were developed. Key user needs for future EUMETSAT climate data and products were also discussed.
- EUMETSAT has provided rescued and recalibrated historical data for assimilation into ERA6.
- Producing an irradiance dataset for the whole Geostationary satellite archive, providing a seamless dataset for the whole globe. Working with the Indian government to fill gaps over the Indian Ocean prior to 1997. Test dataset covering 2019-2024 is now ready to use, with a feedback workshop being held by EUMETSAT in June 2026. The full record starting in the 1970s will be available in 2027.
- The concept of direct observation prediction using AI has demonstrated some success using GEO observations. Data prepared for reanalyses can also be used to improve machine learning forecasts.

Discussion

- Gareth Thomas (UKSA) added that work is also ongoing to fill in polar gaps in the GEO Ring dataset using LEO instruments, for use within CCI.
- Jörg noted that EUMETSAT is committed to understand how to complement the GEO Ring dataset with polar data, to establish a global field of radiances by 2030.

2.4 - JAXA

Misako Kachi reported: [\[slides\]](#)

- The JAXA Earth Observation Research Center (EROC) was established 30 years ago.
- JAXA's missions provide observations to support water cycle variation, disaster response/land, climate change, precipitation, and greenhouse gases. 17 years of GHG observations from space are provided by GOSAT, GOSAT-2 and GOSAT-GW. The TANSO instruments housed onboard aim to provide long term monitoring of GHGs, verify anthropogenic national GHG emissions, and detect large-scale emission sources. TANSO-3 acquired its first spectral images in 2025, and its initial cal/val phase will be completed in April 2026.
- The AMSR series has provided observations of water-related parameters since 2002, operating on Aqua (AMSR-E), GCOM-W (AMSR-2) and GOSAT-GW (AMSR-3). AMSR-3 is currently in cal/val phase, with public data to be released in July 2026. Intercalibration with AMSR-2 and GMI (onboard GPM) is ongoing.
- Once AMSR-3 calibration and validation is complete, JAXA plans to reprocess AMSR-2 and AMSR-E data to make a continuous dataset.
- ALOS-4 was launched in 2024, with an extended lifespan of seven years. The L-band PALSAR-3 instrument provides synergised observations with ALOS-2 in multiple polarisations.
- The ESA-JAXA EarthCARE mission addresses clouds and aerosols, which represent the largest uncertainty in climate projections. An EarthCARE-GPM coincidence dataset is now publicly available, making use of orbit crossing cases between the missions.
- The JFY 2025-2032 strategic programme identifies four priority themes: understanding and creating natural capital, water hazard and resource management, marine domain awareness, and infrastructure and disaster reduction. Candidate priority themes are climate resilience and GHG, as well as the smart and sustainable food systems.
- JAXA collaborates with domestic climate modelling communities to improve accuracy of global warming predictions, corresponding to extreme weather events, and resolve societal issues caused by climate change.

Session 3: Climate Data Records

3.1 - CEOS-ARD Stability Requirements for CDRs

Mark Dowell (EC-JRC) reported: [\[slides\]](#)

- The CEOS-ARD Oversight Group is considering including stability requirements in the Product Family Specifications (PFSs) following feedback from WGClimate. This is detailed in the [Future of CEOS-ARD Consultation Paper](#) delivered to 2025 CEOS Plenary.
- The CEOS-ARD Initiative was established in 2016, aiming to ease the use of satellite EO data to reach new, non-expert users. CEOS-ARD are satellite data processed to a minimum set of requirements and organised in a form that allows immediate analysis with a minimum of user effort. A key aspect of the framework is to ensure robust metadata and documentation through a suite of product family specifications (PFS).
- Chris Merchant and Emma Wooliams have drafted a paper in which they define terminology for stability, including ‘observational stability’, ‘stability error’, ‘stability uncertainty’ and ‘stability standard uncertainty’.
- A goal-level requirement is proposed as follows:

Provide indicative metrics on stability, via stability uncertainty expressed as a stability standard uncertainty (with a 66% confidence level) or stability expanded uncertainty (with a 95% confidence level). Include considerations of:

 - (a) temporal drift of individual sensors*
 - (b) inter-sensor biases as instruments are replaced*
 - (c) changes in the spatial and/or temporal sampling regime and impacts on aliasing with, e.g., diurnal and seasonal cycles and spatial patterns.*
- Once the draft requirement is agreed, 2-3 test CDRs will be assessed for their compliance, presented to the CEOS-ARD Oversight Group to be included in all PFS, and all CDR producers will be encouraged to include this metric in their products in the CDR Inventory.

WGClimate-24-06	WGClimate members to propose CDRs which could be used to test the proposed CEOS-ARD stability requirement.	Due: Q2 2026
WGClimate-24-07	WGClimate Secretariat to share the draft CEOS-ARD stability requirement for feedback from WGClimate and CEOS-ARD Oversight Group members.	Due: Q1 2026

Discussion

- Matt Steventon (CEOS-ARD Oversight Group Secretariat) noted a Goal level requirement would ensure the requirement is optional. The requirement should also be generic enough such that it can be rolled out consistently across all of the existing PFSs.

- Jörg Schulz (EUMETSAT) suggested a minor modification - that 'seasonal cycles' should also be included as considered in the temporal drift element. He also noted that drift and inter-sensor bias are addressed at level 1, so would expect that to be provided by an FCDR.
- The requirement is only a text requirement, and not a full uncertainty quantification. Hence, it wouldn't be overstretching what is possible, and should be a minimum best practice for constructing a CDR would be to include this.
- Matt noted that the CEOS-ARD Oversight Group is considering moving away from the Threshold and Goal level of requirements, and towards a 'fitness for purpose' approach. CDRs could land somewhere on that 'fitness for purpose' spectrum. Goal is the closest to optional which is available in the current framework.
- John Remedios (UK NCEO) recognised that some datasets will have no means of determining stability.
- Mark added that feeding into this discussion was Chris and Emma's work on the stability definitions, which will also be presented to the GCOS Steering Committee to establish consistency within GCOS as well on what 'stability' means.

3.2 - CDR Inventory Update

Jörg Schulz (EUMETSAT) reported: [[slides](#)]

- The ECV Inventory v6.0 was published in mid-November as a downloadable excel file only, and the new CDR Inventory database and webpage was made public in mid-November.
- Over the next year, the CDR Inventory tools and user experience will continue to be refined, and the inputs from the typology mapping exercise will be included. The Inventory will also be expanded to allow for non-GCOS ECVs widely used for climate applications (e.g. NDVI).
- Working to create an F(C)DR inventory, to provide input data and guidance for global reanalyses. Prototype will be completed by mid-May 2026, with beta release planned by the end of 2026.
- Other additions for the Inventory include database (WMO OSCAR / CEOS MIM) synergy, and connections to CEOS WGISS and CEOS-ARD.
- The CDR Inventory already provides a documented API info retrieval, useful for human search but in need of better AI discoverability. A model context protocol server is being explored to enable AI access and retrieval.

- Witnessed disruptive changes in mission planning faster than the GCOS Implementation Plan cycles, which are not fully contained in the Actions. WGClimate and GCOS should consider joint analysis to develop a way forward to be used in future mission planning, including using the new EUMETSAT foresight mechanism.

WGClimate-24-08	Jörg Schulz to confirm with GCOS the plans for the gap analyses for Sea Level and Earth Radiation Budget.	Due: Q1 2026
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- Encouraged anyone using the Inventory to share their experiences to ensure continued funding for the resource.

Discussion

- Misako Kachi (JAXA) noted JAXA previously had an account to update the old ECV Inventory system. Will accounts be provided to agencies for the new system?
- Jörg clarified that the process has now changed, as the team will source inputs on the latest CDR products from agencies via the internet, and share with the Agency points of contact for verification.
- Wenying Su (NASA, WGClimate Chair) recalled discussions around the number of CDRs in the inventory, some of which are the same dataset but with different coverage, resolution etc.
- Jörg noted the team has agreed to collapse these datasets into one, taking the dataset with highest space-time resolution and adding a note that coarser datasets with smaller volumes are available. However, it will be important to clarify why the total number of CDRs has reduced.
- CDRs produced by academics or other non-space agencies are not included in the Inventory, so there could be a number of missing products. Should encourage these teams to share information about their products as well.

3.5 - Interoperability Demonstrator

Nitant Dube (ISRO, WGISS Chair) reported: [\[slides\]](#)

- The CEOS Interoperability Handbook V2.0 provides guidance to organisations to develop interoperable data and services and to help measure their maturity level. The handbook provides recommendations for factors for vocabulary, interface, architecture, quality, and policy.

- WGISS is now developing Interoperability Demonstrators, with the aim to evidence the impact of the handbook's recommendations, refine and add to the recommendations, and provide interoperable reference software for implementation.
- Types of deliverables can include Jupyter Notebooks, software, best practices, and documents/vocabulary, all made available in GitHub.
- A discussion was initiated with WGClimate in January 2026 to consider a WGClimate Interoperability Demonstrator. Proposed demonstrators include:
 - Develop the CDR Inventory and submit it to the CEOS EO Glossary
 - Increase discoverability of CDRs by attaching collection-level metadata tags
 - Use Jupyter Notebooks to provide consolidated access to datasets from different agencies
 - Assess the compliance of CDR inventory datasets with the handbook's recommendations.
- WGISS has started exploring connections between the CDR Inventory and the WGISS Connected Data Assets, to improve discoverability of CDRs.

Discussion

- Jörg Schulz (EUMETSAT) suggested that a Jupyter Notebook which maps datasets against strengths and weaknesses for specific applications could be useful.
- A hackathon could be held to develop and test results, however a significant amount of resources would be required. The event could be held with WCRP to support assessment of CDRs.
- The CDR Definition work is already ongoing, and the team have leant on the Vocabulary recommendations from the handbook to guide the development.

DECISION	WGClimate will contribute the CDR Definition as a vocabulary interoperability demonstrator.	
WGClimate-24-09	WGClimate to explore organising an event/hackathon with WCRP for testing interoperability of CDRs - supporting the Architecture recommendations of the CEOS Interoperability Handbook.	Due: WGClimate-25

3.4 - Defining 'Climate Data Record'

Jörg Schulz (EUMETSAT) reported: [[slides](#)]

- A CDR definition is essential because the term sits at the junction of science, operations, policy, and standards. It aims to ensure common understanding, distinguish 'climate-quality' records from other products, support integrity in the climate system, enable quality assurance, align with policy needs, and support interoperability/standardisation.
- A definition of the term CDR shall be based on existing referenceable definitions of its parts, i.e., climate, data, and record. It should be general, but is not a complete description of the characteristics of a CDR. It may be supplemented by practises to enable needed characteristics
- The definition should remain valid for a long time, while the characteristics of a CDR may change (improve) over time.
- Using sources such as Merriam Webster, the CEOS EO Glossary, the Encyclopaedia Britannica, and the WGISS Collection Management Principles, hierarchical definitions can be established as follows:
 - Data: Factual information (such as measurements or statistics) used as a basis for reasoning, discussion, or calculation.
 - Record: A collection of related items of information on past events treated as a unit, typically within a database.
 - Data Record: A collection of related factual information (such as measurements or statistics) on past events organised and treated as a single unit.
 - Climate Data Record: 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).
- Next steps include consulting more widely and converting the agreed definition into peer reviewed publication, as well as publishing it in the CEOS EO Glossary. It will be important to have GCOS adopt the definition as well.
- Currently missing are definitions for satellite data specifics, such as FCDR and ICDR, which could be developed with a reference to the general definition. Best practices could be developed on creating CDRs from both satellite and in-situ data.

Discussion

- The in-situ community should also be included, however it may delay the process. It was suggested to consult with the GCOS community for the in-situ aspects, making it a

joint initiative. Vincent-Henri Peuch (ECMWF, WGClimate Vice-Chair) suggested connecting with José Miguel Rubio Iglesias (European Environment Agency).

WGClimate-24-10	Jörg Schulz to check the proposed CDR definition with Peter Strobl (EC-JRC, LSI-VC) and GCOS colleagues (Peter Thorne), including whether GCOS would like to contribute on the in situ aspect.	Due: Q1 2026
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1.7 - EarthCARE: New Products & Synergies with WIVERN

Alessandro Battaglia (Politecnico di Torino) reported:

- WIVERN was selected by ESA as Earth Explorer 11 in 2025.
- The ESA/JAXA EarthCARE mission was launched in May 2024, and all instruments are performing as expected. The mission is now expected to last until 2034.
- EarthCARE aims to understand how aerosols and clouds heat and cool Earth by providing vertical profiles co-located with measurements of solar and emitted thermal radiation. The mission carries a cloud profiling radar (CPR) - the first spaceborne radar with doppler capabilities, an atmospheric lidar (ATLID), a multispectral imager (MSI), and a broadband radiometer (BBR).
- EarthCARE follows ESA's free and open data policy, providing Level-1b single-instrument to Level-2b multi-sensor synergy products. Radar products from CPR include corrected doppler velocity, which involves a technique using ocean surface doppler as a zero reference, reducing bias errors. From doppler velocity, the first ever global climatology of sedimentation velocity can be derived.
- EarthCARE allows for the analysis of vertical motion of clouds inside storms, as demonstrated in September 2025 for Hurricane Humberto in Florida, USA. Limitations include that EarthCARE only measures 2D profiles, and it doesn't measure horizontal winds.
- No current or planned observing systems provide global profiles of in-cloud winds. WIVERN will fill this gap by measuring 3D winds within clouds at a global scale.
- The mission will carry a W-Band instrument conically scanning over a 800 km swath, capable of measuring Doppler winds up to 40 m/s, and mapping the complete 3D structure of hurricanes in less than two minutes.
- The Level-1B products will include brightness temperature, reflectivity, and line of sight Doppler velocity. Level-2B products will include cloud and precipitation, wind, and other secondary products.

- Sampling errors dominate uncertainties when producing cloud and precipitation climatology from nadir looking spaceborne radars. WIVERN presents 70 times the sampling compared to a nadir-looking sensor. The mission will be a ‘gauge in space’ to monitor changes in snowfall precipitation at regional and seasonal scales in polar regions.
- WIVERN plans to launch from 2034 and operate into the mid 2040s.

Discussion

- Wenying Su (NASA, WGClimate Chair) noted the possibility of generating a long-term W-band based CDR with CloudSat, EarthCARE and WIVERN data, however there are some temporal gaps between the missions. Furthermore, CALIPSO and ATLID use different wavelengths. How will these issues be addressed?
- Alessandro noted simulators will be used to integrate the datasets. For EarthCARE, the Level 2 products are still being adjusted, once complete, will look at assimilating with CloudSat data to develop a CDR. It will be more complex with WIVERN due to the conical scanning strategy.

3.3 - Expanding the utility of the CDR Inventory

Mark Dowell (EC-JRC) reported: [[slides](#)]

- A draft mapping of ECVs to application areas has been developed:
 Mapping GCOS Essential Climate Variables to Application Areas
- The activity began after WGClimate-22, aiming to improve the discoverability and usability of CDRs through a typology supporting research and applications which would serve as an interface to the CDR inventory, constraining options for users.
- The proposed typology defines categories aligned with science, services, and policy support.
- The goal is to have the typology verified by the end of March 2026, and then share it broadly with CEOS in April 2026. The typology would be delivered to the CDR Inventory team in June 2026, to be implemented in the Inventory.
- The typology is organised into categories, sub-categories, and ECVs.

WGClimate-24-11	WGClimate members to contribute to the CDR Typology , assigning names to respective areas.	Due: 31 March 2026
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Session 4: GHG Task Team

4.1 - Review of GHG Constellation

Yasjka Meijer (ESA, GHG-TT Lead) reported: [\[slides\]](#)

- This thematic area was previously led by John Worden, then Abhishek Chatterjee, who have both now left NASA.
- A number of Global GHG Mappers continue to operate, including GOSAT, OCO, and Sentinel-5 Precursor, as well as more planned to launch in the coming years.
- The [CEOS GHG Portal](#) is regularly updated, and includes information on current and future GHG missions.
- GOSAT-GW, MicroCarb, and Sentinel-5 launched in 2025. All missions are currently performing well.
- The public release for Level 2 MicroCarb data is expected by the end 2026. Calibration of the instrument is expected by the end of March/April, then Level 2 validation will commence.
- For OCO-2 and -3, NASA is exploring commercial partnerships to continue the missions, with final decisions expected around April 2026.
- GOSAT has recovered from an anomaly and resumed its long-term record of XCO₂ observations.
- ISRO's G20 satellite aims to carry an environmental sensor for atmospheric composition (EnSAC) for CO₂, CH₄, and N₂O. Yasjka is looking for an ISRO representative for the GHG-TT to represent this mission.
- Copernicus CO₂M will consist of three satellites, each with a 270 km swath providing high resolution measurements of CO₂, CH₄, and NO₂. The first satellite's acceptance review is scheduled for August 2027.
- CEOS AC-VC Meeting is scheduled for 1-5 June 2026 in Leiden, Netherlands, and IWGGMS from 29 June - 2 July in Bonn, Germany.

Discussion

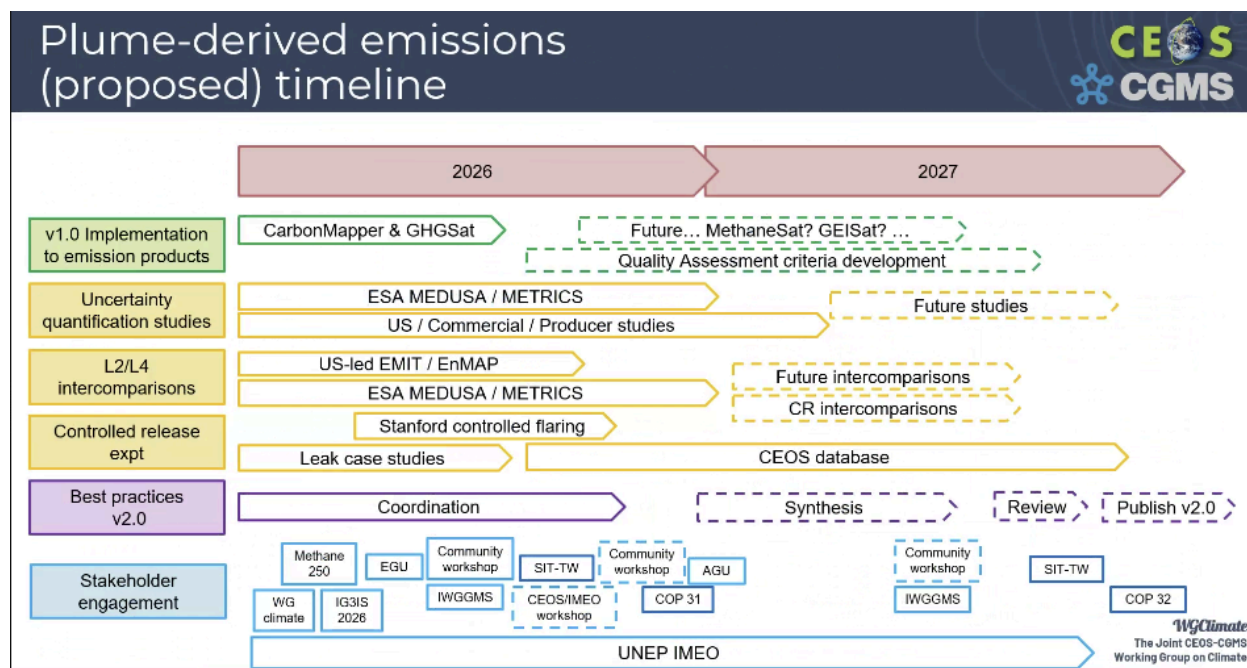
- Giorgio Licciardi (ASI) added that, together with ESA, ASI is developing the IRIDE Constellation, which include five missions carrying hyperspectral sensors. The sensors build on the lessons learned from PRISMA, and are planned to launch by the end of 2027.

GHG-07-03	Paul Green to share with Yasjka Meijer the name of the ISRO contact for the G20 EnSAC mission.	Due: ASAP
GHG-07-04	Libby Rose to add IRIDE HSI mission to GHG Portal, and confirm parameters with Giorgio Licciardi.	Due: Q2 2026

4.2 - Best Practices

Paul Green (NPL) reported: [[slides](#)]

- Common Practices for facility scale methane measurements were developed in 2025 to help data producers understand community expectations and data users understand how it should be generated and used. The overall structure includes remit, common practice for L0-L4 data development, current validation practices, and a quality assessment framework.
- Controlled release experiments have developed further in the past few years, with much more community organisation enabling multiple satellites to utilise controlled releases simultaneously.
- The quality assessment framework is aligned with that developed by ESA/EDAP.
- [Version 1.0](#) of the document was endorsed by CEOS-CGMS in 2025, and has since been highlighted in the UK Methane Action Plan, as well as numerous references at COP30 and other fora.
- There is a lot of community appetite to continue this effort. The team is engaged with GHGSat and CarbonMapper as first adopters for the practices. Will continue engaging at various community events throughout the year as well.



- The team is considering developing a second version of the document as a ‘best practices’ within the next couple of years.
- The development of Area Flux common practices for methane may be considered next, but need individuals to step up to support this effort.

GHG-07-05	GHG-TT members willing to get involved in the development of Methane Area Flux Common Practices and/or the Methane Plume Best Practices should reach out to Paul Green.	Due: Q2 2026
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Discussion

- Richard Engelen (ECMWF) recognised the linkage with IG3IS is good, as they are also planning to develop documentation on facility-scale observations. Paul will present to IG3IS in April.
- Yasjka Meijer (ESA, GHG-TT Lead) noted the number of controlled release experiments is dropping, and encouraged all to promote and use the database of controlled release experiments (ceos.org/ghg/experiments) on the GHG Portal.

4.3 - GHG L2 Validation: Provision of ground-based reference data

Rüdiger Lang (EUMETSAT) reported: [\[slides\]](#)

- CO2M’s product cal/val service began in 2025, with the aim to prepare for the mission’s commissioning. The service will develop a framework to receive ground-based

reference data, interact with TCCON and COCCON PIs, and hold a dedicated call for ground-based network data provision.

- Need a more resilient service of available validation data, routinely monitoring to assure data quality. Don't want to follow ad-hoc approaches, but a global service approach for CO2M. CEOS/CGMS could play a critical role in developing and coordinating truly operational interoperable products.
- The ground-based reference product data will be funded by Copernicus. Exploring the calculation of priors, will support the capability of networks to produce 'gold-standard' reference products through the provision of additional processing and quality control.
- This service will be the first step towards improvement of latency, availability and sustainability of GHG products from ground-based remote sensing networks. However, more investment will be needed, in particular to support the actual measurements.

Discussion

- Vincent-Henri Peuch (ECMWF, WGClimate Vice-Chair) recognised the importance of data providers retaining ownership of their data, and the space agencies will need to accept the data in the quality that it comes.
- A data availability pipeline for the validation pipeline still needs to be established within Copernicus.
- CO2M will participate in campaigns as opportunities arise, however the focus is on continuous sustained data flow.
- Rüdiger noted that the CO2M project team is producing a large database of station data, alongside overpass statistics for CO2M, enabling station operators to consider creating a new station to further contribute to the mission.

GHG-07-07	Rüdiger Lang to share the online browser of validation sites compiled for CO2M by BIRA.	Due: March 2026
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4.4 - Algorithms for Intercomparison: Aerosol scattering

Dave Crisp (Crisp Spectra) reported: [\[slides\]](#)

- Aerosols are typically the largest uncertainty source in current GHG retrievals, and the leading source of bias and random error. When trying to retrieve CO2 or CH4, a mission observes dramatic changes in XCO2. Seen in missions such as OCO-2 and TROPOMI.
- Several different groups have defined approaches for retrieving CO2 and CH4 in the presence of aerosols, although the community hasn't been able to determine which

works best. An aerosol-focused full-physics intercomparison project is proposed to address these issues.

- One alternative to accommodate aerosol impacts is to fly dedicated instruments like done by CO2M, providing a significant reduction in uncertainties.
- Chris O'Dell is developing the intercomparison project, focused on global-regional flux inversions of CO2 with realistic simulation of aerosols, surface, and clouds.
- Progress has been delayed since mid-2025, however a renewed effort is anticipated through the spring and summer of 2026.

GHG-07-08	Chris O'Dell to inform the GHG-TT about the status and renewed timeline of the algorithm intercomparison exercise.	Due: March 2026
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Day 3: Wednesday 11th February, 2026

Session 5: UNFCCC Engagement

5.1 - UNFCCC Tiger Team Update

Vincent-Henri Peuch (ECMWF, WGClimate Vice-Chair) reported: [\[slides\]](#)

- The UNFCCC Tiger Team was set up at WGClimate-22 to reinforce collaboration with UNFCCC, ensure consistent preparation for Earth Information Day (EID), contribute to the CEOS Global Stocktake Strategy, coordinate CEOS and CGMS objectives for COP, and survey agency participation at COP.
- A number of teleconferences have been held to organise workshops with UNFCCC and prepare for SBSTA and EID at COP30.
- A workshop was held with UNFCCC on 29 April 2025, to discuss links between CEOS and the seven streams of UNFCCC engagement.
- The EID COP30 agenda was coordinated with GEO and the WMO Systematic Observations Financing Facility (SOFF), with a focus on closing data gaps.

5.2 - ESA's Activities in Brazil

Clement Albergel (ESA) reported: [\[slides\]](#)

- ESA has worked with UNFCCC since 2001, as an intergovernmental observer organisation and has been present at UNFCCC COPs since 2002. The role of EO in support of UNFCCC is to assess the state of the climate, validate climate models, and provide transparent information to track global progress.
- At COP30, ESA provided contributions on forest monitoring, GHG inventories, and adaptation goals. The opening session at COP stressed the importance of EO systems, which were formally recognised in the conclusions of the scientific and technical advisory arm of UNFCCC.
- COP30 had a large focus on the state and conservation of tropical rainforests. The Mutirão decision included:
 - Paris Agreement goal to limit global warming to 1.5°C
 - Transition from fossil fuels: no commitments included, but a parallel roadmap submitted

- Deforestation: No commitment included, but the Tropical Forest Forever Facility was announced, a voluntary finance fund via states and companies to encourage tropical countries to reduce deforestation
- Adaptation: 59 indicators agreed; decision adopted to pursue efforts to triple adaptation finance by 2035, within the already agreed envelopes, to support countries most vulnerable to the effects of climate change
- Twelve countries signed a declaration on the integrity of climate change information to ensure reliable and transparent climate information

Discussion

- Mark Dowell (EC-JRC) reviewed the notes from the 2025 UNFCCC workshop, and noted that one thing missing are activities around ‘slow onset’ events.
- Clement noted difficulties to make visible individual agency contributions. Often, individual contributions are set up in the month before COP.
- Vincent-Henri Peuch (ECMWF, WGClimate Vice-Chair) supported the notion of covering slow, unspectacular events that aren’t at the forefront of EO. In 2025, we tried to prepare early for COP30. For COP31, we should articulate the side events closer to the time, working with country pavilions.
- Clement noted limited success coordinating with national / IPCC pavilions in the past. ESA recently hosted the Turkish Space Agency in the UK and discussed preparations for IAC and COP31, both hosted in Antalya in 2026.
- John Remedios (NCEO) reported that the UK government was closely consulted for COP30, which provided useful insights into COP negotiations. It was useful to have these discussions especially at an early stage.
- Susanne Mecklenburg (ESA) noted that the call for side events at SBSTA-64 (8-16 June 2026; Bonn, Germany) has been released. We should coordinate how we would like to contribute to the session.

5.3 - Look back at COP30, outlook to upcoming SBSTA and COP31, working together

Heather Maseko (UNFCCC) reported: [\[slides\]](#)

- Research and Systematic Observations (RSO) in UNFCCC aims to inform work under the substantive UNFCCC workstreams including adaptation, loss and damage, mitigation, means of implementation, transparency, and cooperation.

- RSO provides ‘best available science’ outcomes to inform the Paris Agreement, providing a platform for expert dialogue, to fill gaps and strengthen knowledge, and support observations of ECVs and early warning systems.
- EID provides an opportunity to have more detailed consultations with parties, ahead of the SBSTA and main COP events.
- Thematic areas at EID in 2025 included the state of the global climate observing system, observations supporting climate action, and enhancing EO data sharing and access.
- SBSTA discussions highlighted the importance of and value of EO and status of the global climate system, observational gaps and financial support to developing countries, and cross-cutting areas such as open science, geographical representation, and the Mutirão decision. The full list of SBSTA conclusions are available [here](#).
- Discussion by Parties also included how to best represent climate extremes and inter-annual variability, noting that 2024 was the warmest year on record globally.
- Submissions are open now for the 2026 EID themes, with a deadline of August 2026. This year, UNFCCC invites a wider geographic balance, systematic engagement with the UNFCCC workstreams, and collaboration on messaging for SBSTA with COP delegations.

Discussion

- Mark Dowell (EC-JRC) recognised the limitations of the half-day EID event as conducted at COP30 to showcase a broad range of EO activities. Will the format continue moving forward?
- Heather noted that it’s very unlikely that we will get more time than half a day. There are now 16 mandated events for every COP – finding time and space for each is hard. If there is strong pushback from countries, it might be extended.
- The possibility of organising a virtual poster session for future events, outside the nominal four hour slot, was discussed.
- Heather confirmed the possibility, which was considered for COP30 but not proceeded with due to technical challenges. Should COP31 be able to provide this, UNFCCC would be open to organising this.
- Vincent-Henri Peuch (ECMWF, WGClimate Vice-Chair) noted that the majority of heavy lifting will be done by the COP host. We could collectively invest in building virtual poster infrastructure and link it to the host nation. This needs a long-term vision.
- Clement Albergel (ESA) supported the idea of a virtual poster session, but would also like a physical poster session that is viewable for the entire week.

WGClimate-24-12	Vincent-Henri Peuch to consider developing a virtual poster session platform for Earth Information Day at COP-31. Connect with COP-31 host organisation and SBSTA Chair to ensure the technical capability to support this.	Due: Q2 2026
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- Yasjka Meijer (ESA, GHG-TT Lead) noted his impression as a COP outsider that it's difficult to reach the right people at these events. Should we focus on establishing contact with the right people in the lead up to COP?
- Vincent-Henri recognised that this is the intent of the ongoing country engagement effort - ensuring our national representatives are informed ahead of time.
- Jörg Schulz (EUMETSAT) suggested that we also provide a shorter fact sheet summary prior to the COP, which addresses the main questions delegations may have regarding space-based data for climate.
- Beth Greenaway (UKSA) noted that piling delegations with scientific information is not helpful nor should they be expected to read posters. Emphasis should be to support and align negotiators well ahead of time.
- Mark Dowell (EC-JRC) recalled a previous proposal to produce a common policy brief mid-year to distribute to CEOS Principals and national party negotiating teams.
- Heather shared that different geographic representations can get divided in terms of scientific fact, and organisations like CEOS are needed to bring them together with common messaging. Parties value the impact of having a common voice, so aligning messaging between delegations is critical.

WGClimate-24-13	Vincent-Henri Peuch to create a policy brief and/or fact sheet, to be shared via CEOS/CGMS Agencies with the national UNFCCC negotiators ahead of UNFCCC COP31.	Due: August 2026
WGClimate-24-14	WGClimate members to share highlights demonstrating the use of EO for different aspects of the climate system, to be included in the annual statement to SBSTA.	Due: May 2026

Session 6: Adaptation

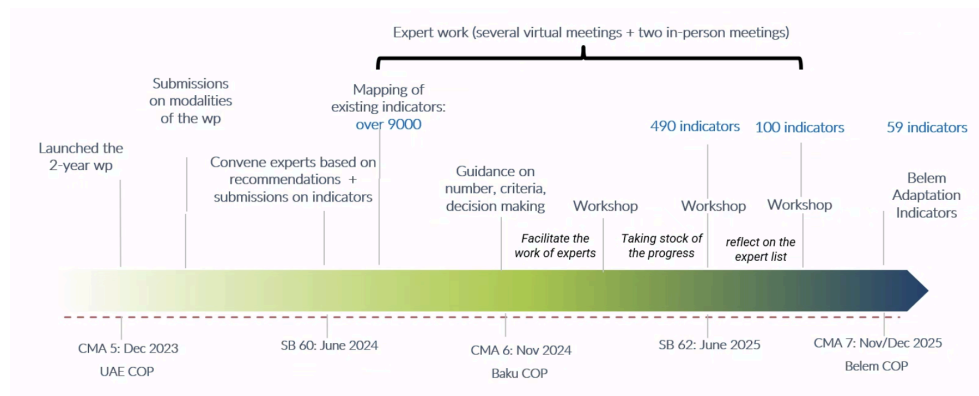
6.1 - Global Goal on Adaptation (GGA)

Maryam Navi (UNFCCC) reported: [\[slides\]](#)

- The PA established GGA under article 7 with the goal of *'Enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change, with a view to*

contributing to sustainable development and ensuring an adequate adaptation response in the context of the temperature goal referred to in Article 2.'

- The GGA framework was adopted in Dubai in 2023, alongside the launch of a programme on indicators. Belém adaptation indicators were adopted at COP30, guided by the following process:



- Disclaimers were added that the Belém Adaptation Indicators are voluntary and non-prescriptive, and won't add additional reporting or financial burdens.
- Indicators can be disaggregated into social categories, climate-related hazards, geographical characteristics, ecosystems, administrative and settlement levels, and thematic sectors.
- The Belém-Addis vision on adaptation established a two-year forward looking process to align policy processes and call upon international organisations and agencies to support work on improving metadata and methodologies. The 2026-2028 Baku Adaptation Roadmap sets modalities for implementation-focused work on the GGA, including activities shaped by party submissions to be adopted at CMA 5.
- Invited technical feedback on example GGA indicators, including those focused on impact, vulnerability and risk assessment.
- Questions for discussion:
 - Is there a global assessment of observational data coverage gaps that could be overlaid with the GGA indicators?
 - Which GGA indicators are most strongly dependent on ECVs, and how feasible is a mapping between existing ECVs and the Belém Adaptation Indicators?
 - To what extent can existing earth observational products (e.g. ESA's biomass mission) provide proxies for ecosystem resilience and adaptation outcomes indicators?

- What lessons from supporting mitigation could be translated to adaptation assessment (if any), and where does adaptation clearly require a different approach?
- If we fast-forward to the second Global Stocktake, what would success look like from the perspective of the earth observation community in supporting credible global adaptation assessment?

Discussion

- Clement Albergel (ESA) recognised the importance for CEOS Agencies in understanding how indicators will be reported against. Who will compile the reports, and how can we engage with them?
- Maryam noted that reporting is voluntary, and who will be doing it will differ country to country. Often it will be a country's climate change unit or ministry (if they have one), but it will need to be assessed case by case. Experts from the indicator selection process may also support the reporting of Parties against the indicators.
- Carlos Ruiz (UNFCCC) shared that the [Adaptation Committee's State of Adaptation country portals](#) may be a useful resource.

6.2 - CEOS Chair Activity

Alex Held (CSIRO, CEOS Chair) reported: [\[slides\]](#)

- The 2026 CEOS Chair, Team Australia, is led by CSIRO with Geoscience Australia and the Bureau of Meteorology, with the headline theme '*Positioning CEOS for success in a rapidly changing context*'.
- The team plans to prepare information products that support Principals at the 2026 CEOS Plenary to strategically consider the role of CEOS in societal adaptation and resilience in the face of environmental change.
- Case studies will be showcased in the ESA-led 2026 edition of the CEOS Earth Observation Handbook, which is planned to be finalised for the end of 2026.
- Invited CEOS and CGMS community to suggest EO examples.

6.3 - GGA Indicators measurable via space-based observations

Mark Dowell (EC-JRC) reported: [\[slides\]](#)

- The first CEOS Global Stocktake Strategy didn't address adaptation, while the second proposed specific recommendations that have now been adopted into the 2026 CEOS

Work Plan. Aims to address community needs, scaling activities, and follow-up on requirements.

- The GST2 strategy recommends that CEOS should showcase adaptation use cases that employ EO data, enhance discoverability of adaptation-relevant CDRs, and map ECVs and other amenable EO products to GGA indicators.
- Often, ECVs needed in an adaptation context do not have the same requirements as those established by GCOS.
- Will look at tracing back the indicators from the list of 59 to the original reduction to 490, to understand where consolidation and grouping may have occurred. This will provide a better understanding of the data needs and goals of each indicator.
- The next steps include a first level analysis of opportunities for EO data across 59 indicators, and understanding the workflow traceability for indicator production. Dependency on non-EO data (e.g. socioeconomic) in indicator production also needs to be considered.
- Will share the initial analysis with indicator reporters for feedback, and then produce test datasets for a few 'champion' indicators.
- The end goal is to establish sustained/operational production of datasets to report against the indicators.
- In parallel, the narrative also needs to be built, to indicate the feasibility of indicator production, support transparency, global products and support to LDCs, alleviate reporting burden, catering to both EO and socio-economic data.

WGClimate-24-15	Mark Dowell to work with UNFCCC to develop a short document to explain the importance of reporting against the Adaptation indicators, and the benefits of EO data.	Due: Q2 2026
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Discussion

- Sonam Lhaden Khandu (UNFCCC) shared that while indicators for measuring adaptation are important work, the Parties noted a focus of adaptation actions on the ground. LDCs expressed the need for support for vulnerability assessments via exposure mapping.
- EO could also help countries define their National Adaptation Plans (NAPs) based on scientific evidence, rather than experience as some countries have done previously.
- UNFCCC also welcomes ideas of how EO can play a role in how to help prioritise investment (identification of hotspots etc.).

- Noted the NAP Expo in May, where the EO community could participate and share information and experiences.

WGClimate-24-16	WGClimate to consider supporting the National Adaptation Plan (NAP) Expo in May 2026.	Due: April 2026
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6.4 - 2026 EO Handbook: Adaptation and Resilience

Stephen Ward (EO Handbook Team) reported: [[slides](#)]

- The Earth Observation Handbook (EO Handbook), provided by ESA for CEOS, was first developed in 1992 for the Rio Conference, and promotes the role and importance of satellite EO for thematic areas, to policy makers, politicians and key users. 12 editions have been published to date, with various UN foci including SDGs, disasters, and the GST.
- The 2026 edition will focus on Adaptation and Resilience, supporting the 2026 CEOS Chair theme.
- Part 1 of the 2026 edition will explain the value of EO for adaptation and resilience, and Part 2 will be in the form of a global case study atlas.
- Looking for stories about programmes and projects demonstrating real benefits and solved real problems for identifiable user communities, at all scales, which clearly highlight the role of satellite EO data.
- Example case studies are available on the EO Handbook website, including 'In Season Yield Forecasting for Decision Making in Malawi' and 'Combat Against Climate Change on Cotton Communities (C5)'. The Handbook would be printed and online ahead of the 2026 CEOS Plenary.
- Case studies can be submitted here: eohandbook.com/2026casestudies

Discussion

- Mark Dowell (EC-JRC) recalled Maryam Navi's presentation and UNFCCC interventions, and noted the Handbook should include use cases where EO is supporting parties in reporting into the NAP processes.

WGClimate-24-17	Mark and EO Handbook Team to ensure success stories about reporting to National Adaptation Plans (NAPs) are included in the 2026 EO Handbook.	Due: Q2 2026
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Session 5: UNFCCC Engagement (cont.)

5.4 - Discussion: working together on Mitigation

Yasjka Meijer (ESA, GHG-TT Lead) reported: [\[slides\]](#)

- The session aims to discuss useful items to progress in view of the second UNFCCC Engagement Workshop in April 2026.
- Shared background on the CEOS GHG Roadmap Issue 2.
- EO data provides increasingly precise, accurate, and transparent data on the principal drivers of climate change. The key to discuss is how to reach stakeholders to enable mitigation efforts.

Stelios Pesmajoglou (UNFCCC) reported:

- From a mitigation perspective, if you cannot measure it, you cannot control it. We need robust data to inform policymakers and involve the whole ecosystem which supports mitigation. The work space agencies are doing in providing data is extremely important.
- Large demand for information still persists, yet access to data remains restricted. We need to go beyond capacity building to develop a system through where data can flow to people who need it on the ground. There are a host of experts underneath governments that need access to information. Do we need to make accessible proprietary and confidential data?
- How do we go beyond what we are doing right now, to address the comments from parties regarding access to data?

Discussion

- Yasjka noted the need to reach out to UNFCCC contacts / experts on a proper platform. UNFCCC could contribute to efforts similar to CEOS-CGMS collaboration with G3W.
- Sofia Vargas Lozada (UNFCCC) noted that regarding the usability of data, it would be useful to identify which datasets could be useful from a mitigation perspective. Regarding NDCs and implementation, how do you link data being produced and implementation of NDCs?
- Vincent-Henri Peuch (ECMWF, WGClimate Vice-Chair) recognised the importance of realising that the quality of information we can provide changes rapidly. Some products are readily available and can address some questions today. We shouldn't wait until products can answer all questions. Certain products today will not answer all questions, but it's important now to establish a dialogue and processing pipeline.

- Yasjka recalled that the CEOS Greenhouse Gas Roadmap describes fit-for-purpose data and understanding requirements to optimise products.
- Mark Dowell (EC-JRC) added that CEOS has also developed roadmaps for AFOLU and Aquatic Carbon. With these three, we should be covering all areas of mitigation. We've tried various approaches to engage stakeholders in bilateral agency discussions within CEOS and CGMS, including the workshop held with European inventory compilers in 2025. There is now interest to replicate this in other regions.

WGClimate-24-18	Yasjka Meijer to share the GHG and AFOLU Roadmaps with UNFCCC mitigation colleagues (Stelios, Sofia & Nicolas), as well as the Aquatic Carbon Roadmap (when finalised).	Due: March 2026
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- Is there a forum where we can periodically go and present and update on the state of products which can be provided from space?
- Stelios noted that it depends on the audience. From a UNFCCC perspective, both party and non-party stakeholders attend events. Stelios' subdivision will conduct peer-to-peer exchanges with regional entities to identify implementation gaps for NDCs, present data access issues, and identify where EO can support.
- There may be opportunities to bring the EO community into the peer-to-peer exchanges and conduct assessments to understand their requirements.
- Heather suggested a compilation on the observations side to report statuses. UNFCCC wants to know what is currently out there, and what can be used to foster further engagement and support.
- Emerging data gaps and issues with data accessibility were discussed, following concerns over agency disengagement.
- Yasjka noted that NASA, NOAA and other American colleagues have been providing a lot of data and support. The CEOS GHG Portal provides timelines and information on all GHG missions from both public and private missions. OCO-2 and -3 provide the main source for US GHG observations and are currently subject to funding uncertainty, but there will be an increased prospect for observations with the upcoming launch of CO2M.
- There was a discussion on the immediate use of data and connections to user communities. The first step to establish this is to understand the user needs, which we tried to understand from inventory compilers at WGClimate-22. They have bigger needs on the LULUCF sectors and less on emissions. We need to provide data with the right latency and in a format to serve their needs.

- Mark noted that we should be able to provide feedback on the utility of existing products and feedback on the fitness for purpose of future products.
- Richard Engelen (ECMWF) noted that national inventory agencies interact with data providers across the Copernicus services. Engagement is mostly in the EU, but also through WMO internationally to develop products and tools.
- Yasjka noted that working with ‘champions’ can be very helpful, and suggested a small workshop with inventory champions.
- Vincent-Henri echoed the need to find the right tools and communication platforms. This year, [IWGGMS-22](#) will take place in Bonn after SBSTA in June. He invited UNFCCC to discuss and make progress.

5.5 - Discussion: working together on Capacity Building

Albrecht von Barga (DLR) reported:

- CEOS and CGMS have a number of avenues to provide capacity building, including EOTEC DevNet and the CEOS EO Handbook.
- Need to identify UNFCCC’s needs in the field of capacity building.

Alejandro Kilpatrick (UNFCCC) reported:

- Every year, a synthesis report is prepared from UNFCCC Parties on capacity building, referencing the capacity building framework for developing countries. It remains a challenge to extract information, as countries typically under-report. This year’s report is being prepared for release by April, ahead of the SBSTA session in June.
- Noted the importance of strengthening institutional and individual capacities. Peer-to-peer learning is very important.
- From certain policy perspectives, most countries have institutes for training public officials. We need to recognise the overlap between national capacity building efforts and exchange knowledge.
- The Capacity Building Hub is organised for COP, with a series of events over six days presenting an opportunity to exchange information and experiences in a structured manner.
- The [Capacity Building Portal](#) is managed by the UNFCCC Secretariat and aims to make accessible all available capacity building resources for parties and stakeholders.

Discussion

- Christoph Aubrecht (ESA, WGCapD Vice-Chair) noted that WGCapD is happy to contribute to this conversation. It resonates with WGCapD's approach to activities that go beyond individual capacity development to the institutional level. Going a step beyond capacity building (training to use EO-based tools/services) is skills transfer, enabling local stakeholders to develop and maintain tools/service (and create commercial opportunities). This allows for sustainable adoption in the long-term and leads to spill-over effects on the growth of local digital economies.
- An action item from CEOS Plenary is to strengthen the connection between WGClimate and WGCapD on this item – potentially by exploring dedicated streams in WGCapD or developing Task Teams. UNFCCC would be a great stakeholder to engage in these conversations.

WGClimate-24-19	Albrecht von Bargen and Christoph Aubrecht to connect with Aljeandro Kilpatrick to continue the discussions around Capacity Development.	Due: Q2 2026
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5.8 - Discussion: working together on Technology

John Remedios (NCEO/UKSA) reported: [[slides](#)]

- The Technology Mechanism was established at COP in 2010 to facilitate enhanced action on climate technology development. It is split into the Technology Executive Committee (TEC) and Climate Technology Centre and Network (CTCN).
- Recently, there has been development on EW4All technology co-sponsored by GEO. Other technologies featured in the TEC annual reports include AI for climate and climate technologies for agrifood systems transformation.
- CTCN provides technical assistance in response to specific climate action requests from developing countries.
- Points for discussion:
 - What further information and links would be helpful?
 - Which agencies have an interest in aspects of the Technology work?
 - Do we have contacts in the working members of the TEC and CTCN (or National Designated Entities, NDEs)?

Maia Tskhvaradze (UNFCCC) shared:

- TEC is supported by the UNFCCC Secretariat to provide policy analyses and recommendations for party and non-party stakeholders. CTCN is more on the

implementation side, supporting countries. TEC has their own work plan, with a guiding principle to be informed by science, and to be transformative. The 2023-2027 Work Plan took important information from IPCC guidance. It has four workstreams, together with RDND, National Systems of Innovations, and Digital Technologies (AI).

- For AI, TEC is the leading body under UNFCCC. They will be working over the next two years on this topic, including identifying challenges, risks and opportunities.
- The TEC Work Plan will be updated through to 2032, presenting an opportunity to engage better with the EO community. UNFCCC has engaged with EC-JRC's research angle for policy briefs with the aim to cooperate in common activities.
- Points for discussion:
 - What further information and links would be helpful?
 - Which agencies have an interest in the aspects of the Technology work?
 - Do we have contacts in the working members of the TEC and CTCN (or National Designated Entities, NDEs)?

Discussion

- Vincent-Henri supported the idea of a dedicated call to discuss this further, focused on how we streamline engagement in common topics as a community. Mapping of who is engaged in these rapidly changing landscapes is important.

WGClimate-24-20	John Remedios to organise a meeting with Maia Tskhvaradze (UNFCCC) and colleagues from TEC and CTCN to understand where space-based data can support the UNFCCC Technology workstream.	Due: March 2026
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5.7 - Future workshop with Asian Inventory compliers

Hiroshi Tanimoto (NIES) reported: [\[slides\]](#)

- NIES was established in 1974, with an earth system division with a large focus on climate modelling and analysis. It is currently preparing Japan's GHG Center and hosts the Global Carbon Project's international office. The division receives contributions from ground, ship, satellite, and airborne observations.
- The Workshop on GHG inventories in Asia (WGIA) has been hosted annually since 2003 by the GHG inventory office of Japan.

- WGIA is hosted by NIES and MOEF to assist Asian countries improve the quality of their GHG inventories, build capacity for inventory preparation, and enhance collaboration with other climate change related projects.
- Outcomes include an established network platform for information exchange, identification of common issues, and improvements to inventories.
- Workshops also include hands-on training using IPCC inventory software.
- The 2025 workshop had 144 participants from 15 countries, including representatives from IPCC TFI, UNFCCC Secretariat and FAO Secretariat.
- Plans for the 2026 workshop will be confirmed in April.

Discussion

- Yasjka Meijer (ESA, GHG-TT Lead) asked whether the use of satellite data had been discussed at previous workshops. Hiroshi noted the Ministry is aware of the importance of space-based data, and is pushing the use of GOSAT data in inventories.

GHG-07-09	Hiroshi Tanimoto to explore how to integrate a discussion around the use of space-based data into the Workshop on GHG Inventories in Asia, potentially as an additional day. Hold a call in February 2026 with GHG-TT to understand the format and content which should be proposed to NIES and MOEJ.	Due: March 2026
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5.6 - Discussion: working together on Transparency and GHG Inventories

Susanne Mecklenburg (ESA) reported: [\[slides\]](#)

- WGClimate-22 held a workshop with national entities responsible for reporting against the Paris Agreement targets. The types and expertise of the national entities varies greatly.
- There is no systematic assessment for use of EO in the Global Stocktake. We are considering producing an annual event to continue systematic national agency engagement.
- ESA's RECCAP project is working with a subset of European countries and Brazil to explore top-down and bottom-up approaches, and is considering systematic approaches for the uptake of EO.
- New observations of GHGs are available from GOSAT-GW, MicroCarb, and others. How can we measure increased uptake from their data for Paris Agreement reporting? Do

we need to tailor EO data products for reporting purposes? Is LULUCF more useful than GHG?

- The Directorate-General for Climate Action (DG CLIMA) aims to demonstrate uptake of EO data on a land use / vegetated forest level, citing the paper [“Satellite-based global maps are rarely used in forest reference levels submitted to the UNFCCC”](#) published in 2023.

Discussion

- Clement Albergel (ESA) shared the [LUCUCF Data Hub](#) publication. On the UNFCCC website, national inventory reports can be accessed by country and satellite observation. It’s tedious to open each, but it can be done.

WGClimate-24-21	EC-JRC to assess the feasibility of extracting information on the use of satellite data in the National Inventory Reports published by UNFCCC Parties.	Due: WGClimate-25
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- Vitor Gois (UNFCCC) noted that 129 parties are now submitting national inventory reports. Information is subject to review for around one year per report. Synthesis reports on BTRs are submitted for information, though they don’t include the methodologies used, particularly for the LULUCF sector. Information is compiled in another synthesis report that feeds the GST process. The transparency division is preparing to make data available on the website, no longer requiring the documents to be scoured.
- The satellite observations aspect is emerging, with more enquiries coming through. Emissions observations are provided through WMO IG3IS. Some parties are using top-down data in their inventories, mostly for verification. IPCC guidelines suggest using the data for verification, but are ambiguous when it comes to whether the data should be used in the inventory.
- The main difficulties are strict rules for UNFCCC, e.g. allocating emissions and removals per source, discretised for LULUCF; inventory teams may not be well connected to the scientific community; and different institutional arrangements. When using LULUCF activity data, emissions and removals come from global CO₂ fluxes. Most countries’ national inventories for forest data are not based on satellite data.
- Richard Engelen (ECMWF) noted that LULUCF does not only use atmospheric concentrations to support top down estimates. ESA’s Biomass mission has potential to support LULUCF as well.
- Vitor added that New Zealand uses airborne lidar data to measure above-ground biomass for their inventory, which is supported as long as they use it in alignment with

IPCC guidelines. Clement added that integrated biomass maps from NASA, JAXA, and ESA are collected in the ESA CCI. There is no impediment to using data to improve biomass, it's a matter of parties being aware of methodologies.

- Yasjka Meijer (ESA, GHG-TT Lead) recognised that providing DOI for data would be an appreciated practice to suggest that reviewers provide. It could be framed as both a gap filling and verification supporting exercise.
- Vitor noted that the reporting guidelines will be revised by 2028. Important is that countries and parties communicate what needs to be considered. This is relevant for both UNFCCC and IPCC. WMO's guidelines for using emissions data are mostly for ground based data.
- Mark Dowell (EC-JRC) recalled that the RED+ community produced a technical guidance supplement on EO for LULUCF and AFOLU, and wondered if there is any merit to produce a supplement for atmospheric GHG emissions as well. IPCC has plans through to 2028, with one report on CO2 removals and another on short-lived carbon forcers. Currently unsure if they'd have the capacity to produce another supplement.
- Richard Engelen (ECMWF) noted that in the [IPCC Work Programme](#) there is mention of a revision of the 1994 IPCC Technical Guidelines on impacts and adaptation as well as adaptation indicators, metrics and guidelines, which will be developed in conjunction with the Working Group II report and published as a separate product.

5.9 - Discussion: working together on Loss and Damage

Mark Dowell (EC-JRC) reported:

- The UNFCCC-WGClimate 2025 Workshop introduced the technical working groups under the Warsaw International mechanism for loss and damage and recognised stakeholder capacity through technical guidelines. It also identified engagement areas on guidelines for glacial retreat and knowledge of cultural heritage.
- One recommendation in the CEOS GST2 Strategy is for: *“CEOS to work with WMO, CGMS, and other partners to refine space-based observations, derived products and delivery systems to reduce vulnerability to emerging threats. Increased support for UN initiatives, such as the UN's Early Warning for All (EW4All), should be explored.”*
- There are missed opportunities in CEOS to address slow-onset events through European programmes that aren't branded appropriately. What is the cumulative contribution CEOS can make to slow-onset events?

Discussion

- Jörg Schulz (EUMETSAT) noted that for slow-onset events, agencies look carefully for data to end up in IPCC report WG1, covering predictions of sea level. C3S is striving for an event-attribution system; identifying extreme events and opening the door for adaptation. It's an area where space agencies can make huge contributions.
- Heather noted the [Expert Working Group on Slow Onset Events](#) being established. Attribution is falling under different departments within the UNFCCC Secretariat, but there is growing interest in this topic.
- Mark noted that for slow-onset events, a mapping of how our different agency programmes have data products and services that address them would be useful, and could be put together quite quickly.
- Heather Maseko (UNFCCC) shared the Expert Working Group's current [work plan](#).

5.10 - Pathways to incorporate the temporary activities of UNFCCC Tiger Team into routine WGClimate activities

Vincent-Henri Peuch (ECMWF, WGClimate Vice-Chair) proposed moving the activities of the UNFCCC Tiger Team into routine activities of WGClimate.

Discussion

- Yasjka supported the approach, but suggested keeping a dedicated interface and lead for UNFCCC engagement and related activities. For next two years when Vincent-Henri steps up to chair WGClimate, this will be a priority area.
- Jörg Schulz (EUMETSAT) supported the transition to WGClimate, noting the informative interactions with the UNFCCC Secretariat over the last year.
- Mark agreed, though noted a few items that can be continued in the tiger team format, including the production of briefings for COP.

DECISION

UNFCCC Tiger Team activities will be incorporated into the regular activities of WGClimate. This includes:

- Maintaining dedicated primary Points of Contact between WGClimate and UNFCCC 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.
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5.11 - Session Wrap-up

Reviewed the actions recorded during the session. The next step will be to set a date in April for the workshop between UNFCCC and WGClimate.

WGClimate-24-22	Vincent-Henri Peuch to fix a date for the workshop with the UNFCCC Secretariat in April/May 2026. Discussion topics for the workshop should include: - Developing a mechanism for parties to request space-based data products to support mitigation. Including: - Utilising peer-to-peer exchanges. - Identifying champion inventory compilers interested in space-based data to hold a small workshop with. - Discussing at IWGGMS-22 in June/July 2026. - Contribution of resources to the UNFCCC Capacity Building Portal regarding use of space-based data - Review of the National Inventory Reports published on the UNFCCC website, to understand the use of space-based data. - How WGClimate can engage in the revision of the reporting guidelines in 2028 - WGClimate engagement in the Slow Onset Event Working Group - Review of space agency programmes which support slow onset	Due: March 2026
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Session 7: Stakeholder Engagement

7.1 - Earth System Modelling & Observations (ESMO) Working Group for Observations for Researching Climate (WGORC)

Claire Macintosh (ESA) reported: [\[slides\]](#)

- WGORC is the newest working group in ESMO, aiming to identify and address research gaps in climate observation data and act as a facilitator for collaboration across diverse research and industry sectors.

- WGORC will act as a focal point for the data provider community in ESMO, with a clear remit to work across earth system modelling scales. Held first in person meeting in 2025, and have developed a draft work plan.
- The first activity is supporting uncertainty metadata conventions led by NPL, hosted by the University of Reading. Several groups are working on the same problem simultaneously.
- An alpha testing phase has been conducted since August 2025, with an expression of interest for the beta testing community phase released.
- Data providers have access to an uncertainty checklist, mandating the provision of clear uncertainty metadata. Currently undergoing an information gathering phase to review the checklist before generating test cases of 'uncertainty-aware' model evaluation.
- CMIP's focus will shift towards evolution, addressing the needs of annually extended datasets, sustainable underlying coordination, development and research, and a widened applicability to other climate and modelling activities.
- Uncertainty metadata meeting produced an uncertainty report, along with recommendations for broader requirements at the observations-model interface.
- The workshop recommendations included the following for CEOS / CGMS / WGClimate:
 - For WCRP and CEOS to increase the strategies, forums and resources for collaboration between the observation and modelling communities.
 - For WGORC to set up a joint task with WGClimate, so respective communities can work together specifically to create demonstrations of value from uncertainty information, new forms of uncertainty information and the early entry points.
 - For CEOS, WMO and Observational Programmes to promote consistency of the naming and meaning of uncertainty information in observational datasets for ease of usage.
 - For WGCapD and WGClimate to scope routes for development of uncertainty insight tools for interface points between the observations-modelling workflows to propagate uncertainty information to many end users at the point of shared standard resources being created.

Discussion

- Jörg Schulz (EUMETSAT) recognised the ambition and enthusiasm of WGORC, and encouraged sustained coordination with CEOS, CEOS-ARD, and ongoing metadata discussions.

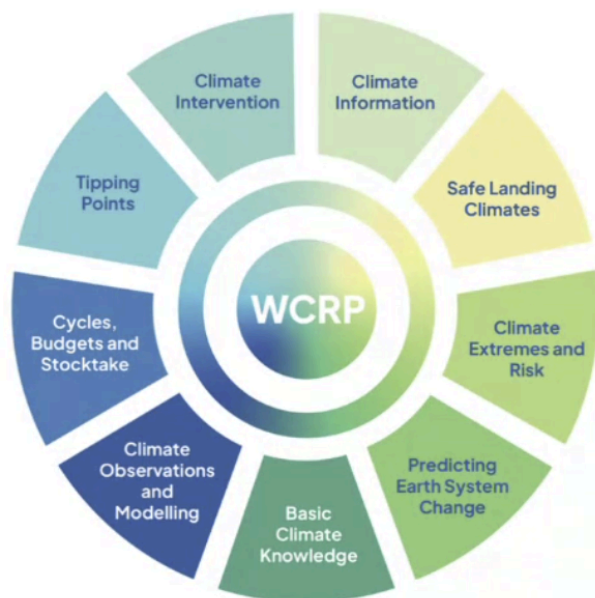
- Mark Dowell (EC-JRC) recognised the uncertainty checklist and the metadata formats, could be useful for the CDR Inventory. In an ideal world, all datasets in CDR Inventory would be compatible with the checklist, however uncertainty estimates are complicated.
- Simon Elliot (EUMETSAT, CGMS) recognised that CGMS also has a task group looking at standardisation of metadata, and would welcome coordination with CMIP.

WGClimate-24-23	Simon Elliott to connect the CGMS WGIV Task Group on Metadata to Claire Macintosh and CMIP, for coordination of the uncertainty standardisation activity.	Due: April 2026
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7.2 - World Climate Research Programme (WCRP)

Michael Sparrow (WCRP Secretariat) reported: [\[slides\]](#)

- Approached WCRP groups to hear key interactions with the satellite community, revealing multiple areas of interactions.
- Working on the current strategic plan for 2028. WCRP coordinates the scientific community for priority topics over different realms, with a large science focus on climate information at the regional scale.



- The six core projects of WCRP cover atmospheric processes, climate and cryosphere, climate and ocean variability, earth system modelling, global energy and water (GEWEX), and regional information for society.

- ‘Lighthouse activities’ are limited (8-10 years) projects geared to answer key questions, including Digital Earths, explaining and predicting Earth system change, global precipitation (GPEX), climate risk, climate intervention, and safe landing climates.
- GPEX relies on satellite precipitation products to study variability, extremes, and key drivers across regions and timescales. Aim to integrate with in-situ data for uncertainty characterisation, improve precipitation predictability.
- WCRP has flagship teams, the coordinated regional climate downscaling experiment (CORDEX), the coupled model intercomparison project (CMIP), and the WCRP academy.
- Recent highlights include the WCRP Status Brief, high level assessments, global south inclusion task team, and a series of papers, hackathons, and webinars.
- WCRP has lost approximately 60% of its funding from the US and co-sponsors, and is working to refocus activities. Major focus on fundraising with the private finance sector.

Day 4: Thursday 12th February, 2026

Session 2: Agency Reports (Cont.)

2.5 - ESA

Susanne Mecklenburg reported: [\[slides\]](#)

- ESA’s Council of Ministers (CM) takes place every three years, and the latest was held in November 2025. The main topics for CM25 were FutureEO, Copernicus, Digital Twin Earth, and InCubed.
- FutureEO includes EO foundations, Earth action, and EO missions and data.
- Earth action aims to attract users for the exploitation of space-based data.
- A record 22.3 B EUR was received for ESA at CM25, with 15% for the Earth Observation Programme, where the largest portion of that was dedicated to FutureEO. The ERS-EO programme was successfully introduced.
- The final suite of data products for EarthCARE are now released. The end of commissioning for Biomass was announced in mid-January.
- The launches of MTG-I2, Sentinel-3C, MetOp-SG B1, and FLEX are planned for 2026.
- The Copernicus Expansion Missions will support adaptation, with increased temporal and spatial resolution.

- ESA's Climate Office hosts the Climate Change Initiative (CCI) and represents the focal point for ESA climate activities, part of the international climate network, an observer at IPCC and UNFCCC, and secondment to Future Earth. Hosts the WCRP CMIP and CORDEX project offices.
- ESA CCI has expanded over recent years to support global climate policies and decision makers with cross-ECV activities, tipping point research, and a number of adaptation activities.
- MEDUSA, Ocean Carbon 4 Climate and RECCAP-2 are ESA-supported activities in support of the UNFCCC Paris Agreement's mitigation and adaptation goals. MEDUSA explores missions and datasets supporting global methane observations.
- The ESA-INPE CarbonARA campaign was developed following the first CEOS GST Strategy recommendation to conduct large-scale field experiments to improve understanding of natural source emissions and dynamics in the Amazon.
- Supporting a number of areas of research for Tipping Points, including via a workshop hosted later this year.
- Cross-ECV activities support carbon, water, and energy cycles in the contexts of IPCC and GCOS. Have supported the IPCC special report on cities and urban areas.

2.6 - DLR

Albrecht von Barga reported: [\[slides\]](#)

- DLR currently operates TanDEM, TerraSAR-X and EnMAP.
- The GRACE programme is jointly run by DLR and NASA, with GRACE-C (Continuity) expected to launch in 2028. GRACE monitors ice sheets in Antarctica and Greenland, with the programme's long time series expected to continue with GRACE-C.
- MERLIN will be launched in 2029, a bi-national mission developed with CNES to monitor methane with a lidar instrument.
- METImage is the new imager onboard the MetOp-SG satellites, developed by DLR.
- EnMAP has been operating routinely for three years, and continues to operate well. The mission will be extended beyond the original design life of three years. Acts as a pathfinder for the Copernicus CHIME missions.
- DLR is providing EnMAP data for IMEO, via an interface for automatic Level-1B product access. The mission has provided data on the status of emissions in more than 20

mitigation cases for IMEO MARS. Exploring hyperspectral applications including phytoplankton in lakes and non-photosynthetic vegetation.

- The TerraSAR Follow-On X-Band Mission (TerraSAR-FOX) is under development and is planned to consist of three small/medium-sized multistatic satellites.
- A call for missions was released in 2024 for small and medium/large missions. DLR has selected six mission studies which will explore vegetational carbon cycle, hyperspectral imaging, gravitational variables, AtOx in the thermo/mesosphere, and two multispectral/TIR sensors.
- German commercial startups supported by DLR through data purchase contracts and free data provision for science in Germany with the EO-Lab platform include Constellr, Ororatech and Marble Imaging.
- The national platforms CODE-DE and EOlab provide full availability for all Sentinel data and improved federation with other areas of the European cloud ecosystem
- Capacity building and education initiatives at DLR is supported by EO-College MOOCs with partnerships with CEOS WGCapD and EOTEC DevNet.

Discussion

- The CO2Image mission was selected for implementation following a competition of a number of small satellites. However, the development now faces budget cuts, and the programme is being reviewed. DLR is considering a shared mission, and is in discussion with other countries regarding a suitable platform. The instrument remains in development.
- Yasjka Meijer (ESA, GHG-TT Lead) recognised CO2Image would fill a gap for CO2 observations, complementing TANGO and CO2M.

Session 8: GHG Task Team

8.1 - Calibration Campaigns Update

Hiroshi Suto (JAXA) reported: [[slides](#)]

- Two campaigns were performed in 2025 at Railroad Valley, with the summer campaign including 6 instruments (GOSAT, OCO-2, OCO-3, TROPOMI, GOSAT-2, TEMPO), and the newly launched GOSAT-GW and MicroCARB also joining in the fall.
- Surface reflectance was observed as higher in the summer than in the fall, and confirmed via RadCalNet.

- The GOSAT-2 oxygen band showed a large difference between the observed and forward calibration for GOSAT-2 band1 radiance. All other observations were within 10%.
- Common processing conditions applied to multiple datasets provided over the site presented accurate and precise spectral radiance characteristics.
- For the 2026 campaign, the team are considering three different time windows within June-July. The preferred window is 17-22 June, as this is closest to the summer solstice.

Discussion

- Yasjka Meijer (ESA, GHG-TT Lead) recalled concerns around mining activity in the Railroad Valley area which could disrupt the use of the site for calibration. Hiroshi noted this activity looks to be stopped for now.
- Albrecht von Barga (DLR) noted the large range in the results from TEMPO. Hiroshi recognised that TEMPO's imaging method is different from the other sensors, so the team are looking at several correction methods to improve the results.

8.2 - GCP & RECCAP Engagement

Clement Albergel (ESA) reported: [\[slides\]](#)

- GCP includes annual carbon cycle budgets of CO₂, CH₄, N₂O, H₂, black carbon, and CO. Tendency to move away from complete carbon models to estimate emissions, but using satellites to create estimates.
- Carbon budget refers to all emissions and removals of CO₂ resulting from anthropogenic activities. Largest emission from gas, oil, and coal, with the rest from land use change.
- CO₂ removed from vegetation uptake, and the ocean. Our understanding of the origin and contribution of each flux remains uncertain. Global balance of CO₂ budget remains largely uncertain, as CO₂ fluxes from land use and change have high uncertainty. Satellite observations can help reduce the uncertainties.
- RECAP-2 used satellite data for terrestrial regional GHG budgets over two decades.
- The project combines satellite data with ground observations to map global land carbon stock.
- RECAP-3 is planned to be launched in 2026, with a conference by the end of 2026 / early 2027. The goal will be to refine the data to provide precise information about the

location, size, and contributors to carbon sinks. RECCAP-3 will also move towards national rather than regional budgets.

Discussion

- Stephan Bojinski (EUMETSAT) noted sensitivity to peatlands and marshlands should be considered.
- Yasjka Meijer (ESA, GHG-TT Lead) recognised the Carbon from Space Workshop planned for October at ESA ESRIN.

GHG-07-10	Clement Albergel to share information about the Carbon from Space workshop when available, planned by ESA in October 2026.	Due: Q2 2026
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- Some regional assessments use satellite data on an ad hoc basis, such as MODIS and VIIRS for active fire data. However, it is difficult to assess how much space-based data is used.
- Richard Engelen (ECMWF) noted CAMS data is used in the inversions, which is mostly based on OCO-2 for CO₂, and GOSAT and TROPOMI for CH₄.

8.3 - IMEO Engagement

Itziar Irakulis Loitxate (UNEP IMEO) reported: [\[slides\]](#)

- Over 21,000 plumes have been detected by MARS since 2023, from over 3000 point sources. An increasing number of detections have been observed in the coal and waste sectors. 70% of emissions currently detected come from the oil & gas sector.
- The number of plumes detected is increasing due to a growing volume of data ingested from satellite observations, including from PRISMA. In 2025, space-based data helped detect 10,000 plumes, up from just over 6,700 in 2024.
- Over 30 sources have been effectively mitigated in more than 10 countries. Can be difficult to track the mitigation efforts and the sustainability of any fixes applied to prevent re-emission in the future.
- Reported strong response from countries, several with a 100% response rate, and 26 countries with nominated MARS focal points and 156 OGMP companies engaged.
- To be able to notify organisations regarding observed plumes, the plumes must be no older than 15 days, and must be attributable to a specific point source. Only plumes from the oil and gas sector can be notified for now.

- MARS uses data from EnMAP, PRISMA, EMIT, Sentinel-2, Landsat, Sentinel-3, VIIRS, Sentinel-5 Precursor, and MethaneAIR. Able to provide high frequency observations including over complex areas. Increasing access to data from EnMAP and PRISMA.
- New mission data planned to be added to MARS include the MethaneSAT and MethaneAIR archives, Carbon Mapper's Tanager-1, the Chinese GaoFen-5, ZY-1, and MUSICO missions, GOSAT-GW, Sentinel-5, and GEO satellites (including GOES and Himawari series).
- MUSICO is planned to be installed to the Chinese Space Station in May 2026 to detect CO₂ and CH₄ at comparable resolution to OCO-2 and GHGSat-D, with a swath width of 50 km.
- AI-driven models are being developed to identify potential plumes from high resolution missions.
- Aim to make data more actionable and useful for policymakers, through the addition of probability of detection estimation, emission persistence metrics, emission status, and a list of top emitters.
- The Eye on Methane data platform will be updated this year with additional features, and welcomes feedback for future updates.

Discussion

- Stephan Bojinski (EUMETSAT) noted the infrared sounder hosted on MTG-S has methane sensitivity, and EUMETSAT is planning to develop methane products. It will be at a coarser resolution, but with a 30 min repeat cycle over Europe, so could be used in conjunction with higher resolution data.
- Yasjka noted John Worden's retirement, who was the former GHG-TT contact to IMEO. Giorgio Licciardi (ASI) will be the new contact to IMEO for GHG-TT.
- Giorgio noted the upcoming IRIDE hyperspectral constellation of 5 satellites which will be launched over the next 18 months. The instruments are built on the heritage of PRISMA, and will have the same spectral resolution as PRISMA, but at a spatial resolution of 20m rather than 30m, with the same swath width. With 5 satellites in orbit, the data will have high temporal resolution. The missions will work in tasking not global coverage.
- Mark Dowell (EC-JRC) recalled a prior suggestion for a note from IMEO on the importance of multispectral data such as that provided by Sentinel-2 for IMEO work - noting the mission was not developed with these applications in mind. This can then be included in mission requirements for future missions.

DECISION	Giorgio Licciardi will be the new Point of Contact for IMEO.	
GHG-07-11	Giorgio Licciardi to work with Ferran Gascon and IMEO to develop a short report on the usefulness of using multispectral missions such as Sentinel-2 for the detection of methane. Additionally, note any impact of having the third Sentinel-2 mission on the number of detections.	Due: GHG-TT-08

8.4 - System Development: Inventory of use cases

Richard Engelen (ECMWF) reported: [\[slides\]](#)

- The original goal for the activity was to facilitate a fitness for purpose operational system that integrates space-based GHG estimates with in-situ observations to address stakeholder needs. With the rapidly evolving number of initiatives, there is an increasing need to coordinate international efforts including all aspects among virtual satellite constellations, efficient data exchange, and consistent coordination of expertise.
- Most of the System Development topic is now covered elsewhere, such as G3W and IMEO. Is there still a need for use cases?

Discussion

- Yasjka Meijer (ESA, GHG-TT Lead) recognised the goal was always that this would be taken up by G3W. This area might be more in a dormant state at the moment, as G3W finds its feet, and can understand what it needs from GHG-TT.
- For the global scale, the interactions between agencies are happening in the G3W framework. On a local scale, it is more diffuse, with IG3IS and IMEO supporting.
- Agreed to pause these activities, however retain the capability to reinstate it if other activities fall through.
- Richard suggested continuing reports of G3W discussions to maintain awareness and understand any requirements for satellite data.

GHG-07-12	Richard Engelen to modify the System Development actions in Annex C to refocus on reporting of progress made by G3W in system development.	Due: March 2026
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Session 7: Stakeholder Engagement (Cont.)

7.3 - Group on Earth Observations

Rui Kotani (GEO Secretariat) reported: [\[slides\]](#)

- Thanked WGClimate for the close coordination for EID 2025. The GEO update was delivered by Florence Rabier (ECMWF) on behalf of CEOS & CGMS, highlighting GEO's efforts in driving climate action.
- RSO conclusion at UNFCCC COP-30 acknowledged the goal of technical innovation. For GEO, it was proof that GEO's work is increasingly important.
- Outside RSO negotiation and EID, GEO initiatives launched supplements to NAP technical guidelines on coastal and ocean adaptation, and another on LDN.
- GEO is supporting the collection of case studies for the 2026 CEOS EO Handbook, and has launched a joint call for an expression of interest for use cases. Received a lot of interest from the broad GEO community, and are drafting a sample use case with GEOGLAM.
- GEO's Symposium and 21st Plenary will be held from 26-28 May 2026, with submissions for posters, community events and showcases open until 28 February 2026.
- GEO has launched a series of Open House Webinars, highlighting GEO work programme activities. One on 24 March, 1:30 CET, will focus on disaster risk reduction, climate, and biodiversity, and will highlight a number of activities participated by CEOS.

Discussion

- Mark Dowell (EC-JRC) shared that ESA and EC are planning a workshop on adaptation indicators from 22-25 June 2026, and will contact GEO community members to participate and share perspectives on NAP indicators.

Session 8: GHG Task Team (Cont.)

8.7 - Capacity Development Materials

Libby Rose (GHG-TT Secretariat) reported: [\[slides\]](#)

- Action from meeting in September recognising agencies providing workshops and materials in support of space-based GHG. Conducted research to compile existing resources.

- A wide range of resources were identified, with a variety of target audiences and content types.
- Welcomed inputs on other relevant resources, and also how best to share and promote.

Discussion

- ECMWF developed training workshops for DG-CLIMA, but they may now be outdated.
- Mark Dowell (EC-JRC) In the next two months, a new report will be released from KCEO using EO to support compliance with respect to legislation. A number of use cases related to GHG in EU strategies.
- The UN Office of Sustainable Development (OSD) could be an entry point to link with inventory compilers. Can engage with UNFCCC colleagues.
- Oksana Tarasova (WMO) suggested incorporating sections on the use of satellite data for national inventories in the good practices, and to conduct joint WMO/IG3IS-CEOS/CGMS training. Engagement is currently in the early stages, including discussions with the Task Force on Inventories (TFI) to promote observation-based techniques.
- Martyna Stelmaszczuk-Górska (EOTEC DevNet) noted EOTEC DevNet makes existing materials available through a web-based tracker, including the [Flood Tools Tracker](#).

GHG-07-13	Yasjka Meijer to follow up with UNFCCC Transparency and GHG Inventories / Mitigation colleagues regarding integration of space-based data topics in the the UN Office of Sustainable Development (UN OSD) Greenhouse Gas Inventory System Training Workshops.	Due: Q2 2026
GHG-07-14	Libby Rose to continue building out the list of GHG/Climate Capacity Building materials, developing a spreadsheet database, with labels and categorisation. Materials to follow up with include: • ECMWF slides used in the DG-Clima training workshops regarding space-based GHG data • KCEO report on the use of EO to support legislation compliance	Due: GHG-TT-08

8.5 - IG3IS

Oksana Tarasova (WMO) reported: [\[slides\]](#)

- IG3IS is a common framework to provide systematic services to the user community supporting their GHG emission reduction ambitions. It aims to support the use of atmospheric data to improve emission/removal estimates, achieve consensus on good practices, and provide quality control exercises.
- In 2025, IG3IS revised the [good practice for urban scale applications](#), which includes 31 techniques to enhance quantification of gaseous emission estimates by integrating atmospheric observations with activity data. The techniques are connected to diverse users requirements.
- [Good practices for national scale applications](#) were developed in 2025, presenting eight national cases to reduce reporting uncertainty. The good practices were discussed at the dedicated workshop with the representatives of IPCC TFI and UNFCCC Transparency Division. The first edition focuses on well-established techniques. Satellite data was presented as an opportunity to improve reporting, however it currently lacks the maturity for this edition.
- For the next edition, IG3IS plans to collaborate with several EU projects and to include a more diverse set of techniques.
- For 2026, IG3IS will continue developing good practices for facility scale CH₄ and landscape-scale CO₂ emissions and removals with the focus on forestry, alongside continuous webinars.
- The [IG3IS Stakeholder Consultations and Use Summit 2026](#) will be held from 20-22 April in Geneva, Switzerland.
- Request that WGClimate participate in the IG3IS stakeholder consultations and contribute to the good practices.

Discussion

- Paul Green (UK NPL) noted that GHG-TT is working on facility-scale common practices, which they are aiming to evolve to best practices. Paul will attend the IG3IS stakeholder workshop, and plans to discuss the plans for the IG3IS good practices with the lead.
- It will be critical to ensure the CEOS-CGMS and IG3IS recommendations are aligned, in particular for similar techniques. Need to avoid confusion over conflicting standards.

GHG-07-15	Paul Green to review the IG3IS good practices and engage in the development process, to ensure alignment with the CEOS/CGMS efforts.	Due: Q2 2026
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8.6 - G3W Engagement

Oksana Tarasova (WMO) reported: [\[slides\]](#)

- G3W aims to explore global scale net fluxes with 1 degree resolution at monthly resolution. G3W provides boundary conditions for national, urban, and facility-scale applications developed by IG3IS.
- It has been challenging to move forward with the G3W Implementation Plan given the current political landscape and limited resources available to the Secretariat. The work is very slow on cataloguing data products and user needs. Little progress has been made to develop strategies and requirements for R&D, user engagement, and user uptake.
- G3W's pre-operational phase has officially started and the Advisory Group and Task Teams (G3W Modelling, G3W Networks and G3W Data) have been formed.
- The extraordinary congress of WMO decided to: "advance the goals of G3W by integrating key components into existing programmes, including the expanded World Weather Watch and Global Atmosphere Watch Programmes, as appropriate, without adversely affecting the workplans of those programmes."
- Several approaches to network design were presented at the recent network design workshop, with the goal to gain global total flux uncertainty reduction within ~50 optimally located in-situ sites.
- By November 2026, WMO will present the results of an initial network design, inventory existing GHG observations, and map data streams to the WMO Technical Commission on Infrastructure. In 2027, G3W aims to develop demonstrators for network implementation, develop a network sustainability strategy, advance data architecture and establish operational model comparison protocols and data workflows.

Discussion

- As part of the Copernicus CO2 Task Force, EC-JRC released [a policy document detailing the definition of 'priors'](#).
- Oksana noted that the designated operational centers would provide access to the priors used, but G3W won't provide any recommendations as to which priors should be used.
- Vincent-Henri (ECMWF) noted that while limited resources are available at the Secretariat level, the task groups are quite active - highlighting the coordination power of G3W.

- Limited funding is available for experts and capacity development, meaning the engagement needed to scale networks to developing countries is missing.
- Yasjka Meijer (ESA, GHG-TT Lead) recognised CEOS can support the data needs of G3W, and help WMO meet latency requirements.
- Rüdiger Lang (EUMETSAT) recalled a workshop held in Geneva, in which requirements were drafted for data availability and latency. It is extremely useful to have inputs from the modelling community regarding why they would benefit from better availability and shorter latency. The workshop advanced some discussion, but no conclusions were made, or decided under which umbrella requirements should be finalised.

GHG-07-16

Rüdiger Lang to connect with G3W regarding data latency and availability requirements.

**Due:
Q1 2026**

Session 7: Stakeholder Engagement (Cont.)

7.4 - CEOS Working Group on Capacity Development and Data Democracy (WGCapD)

Christoph Aubrecht (ESA, WGCapD Vice Chair) and Martyna Stelmaszczuk-Górska (EOTEC DevNet) reported: [[slides](#)]

- WGCapD aims to provide sustained long-term collaboration on EO training, capacity building of underrepresented communities, and cross-cutting deliverables between CEOS groups. Further priorities include the capacity development of decision and policy makers, the incorporation of new AI tools and best practices, and engagement with more CEOS Members.
- The group is currently working to execute 29 deliverables, leveraging activities beyond the scope of CEOS (e.g. through EOTEC DevNet) and starting a consolidated effort to structure Working Group activities within a classification framework.
- The Earth Observation Training, Education, and Capacity Development Network (EOTEC DevNet) began in 2021 from WGCapD to expand the reach of EO capacity building globally. Since the end of last year, more than 2000 individuals have engaged with the activities, including vibrant and thematic communities of practice, over 130 spotlight sessions, and five webinars.
- EOTEC DevNet is structured as an information hub to facilitate exchange between experts.
- Recognise gaps in uptake despite the increasing availability of data and tools. The primary challenge is not the availability of training content, but their discoverability

- EOTEC DevNet can foster access to tools and data, facilitate community contributions and feedback, and channel information to a diverse community (~400 members).
- A recommendation from the 2025 CEOS GST Strategy asked WGCapD to connect with WGClimate, GHG-TT, and AFOLU experts to discuss potential linkages and identify priority use cases. WGCapD will also develop and deliver EO training and capacity development for adaptation and resilience through continued liaising with EOTEC DevNet and additional CEOS Members.
- Propose to develop a joint WGClimate-WGCapD coordination team to address capacity building in the climate domain. Would leverage EOTEC DevNet community insights.
- Continue the effort to collect existing capacity building materials, to provide a status overview and identify any gaps in materials.
- WGCapD member agencies will be encouraged to submit deliverables in the climate domain.

Discussion

- Chris recommended a staged process to review currently available materials, and structure it in a meaningful way. Then, can consider making the resources available online - perhaps through EOTEC DevNet's structure, or ESA's new global knowledge hub on Earth action. Can also then look at whether there are any gaps, and if so, how we can fill them.
- Yajka Meijer (ESA, GHG-TT Lead) recognised the need to be as specific as possible in defining the target audiences.
- When collecting materials, we can be as broad as possible, but when structuring and presenting the materials, we need to be targeted towards a specific audience.
- Chris noted that WGCapD is working on a conceptual analysis of what capacity building is beyond trainings, webinars, etc. ESA does a lot of work on skills transfer to foster sustainable uptake - not just training to use tools someone else develops, but ability to maintain and develop themselves. Another opportunity is to influence curricula in universities as well.
- Martyna recognised that capacity building strengthens the ability of individuals, groups and institutions to use or access data.
- Wenying Su (NASA, WGClimate Chair) welcomed closer collaboration between WGClimate and WGCapD.

- Albrecht von Barga (DLR) recognised communications to UNFCCC should be very specific, and targeted towards increasing the awareness of Parties about the use of space-based data. Need to bring the value proposition demonstrating impacts in a transparent manner.

Session 8: GHG Task Team (Cont.)

8.8 - Flux Inversion Modelling and Validation

Kevin Bowman (NASA/JPL) reported: [\[slides\]](#)

- The goal of this activity is to try to understand the relationship between data and the fluxes we want to understand, subject to prior understanding of how the world works. The return on investment is contingent on chosen approximations made for each component of inverse modelling.
- The spatial-temporal sampling and coverage varies by orders of magnitude. The CEOS carbon observatory is incomplete without a concomitant independent validation network.
- The 2019 IPCC mandate states “An ideal condition for verification is the use of fully independent data as a basis for comparison. Measurements of atmospheric concentrations provide such datasets, and recent scientific advances allow using such data as a basis for emission modeling.”
- OCO-2, GOSAT, and TROPOMI have been the pathfinders to quantify global GHG fluxes in support of assessment of national and subnational commitments.
- When looking at the total number of countries reporting, non-Annex I countries haven't reported or don't have the capacity to report their emissions of CO₂ and CH₄. Independent estimates will be necessary.
- The paper from [James East et al., 2025](#), estimates global methane emissions for 2023 using TROPOMI data. Large differences between top-down and bottom-up estimates. Provides a starting point for improving our understanding of our emission estimates.
- The [NOAA Model Intercomparison Project \(MIP\) tool](#) provides systematic evaluation of OCO-2 posterior concentration outputs against independent data, including other satellites.
- The relationship between differences in concentrations from a model relative to independent data and underlying fluxes that led to the differences is an ongoing research topic. Inverse model fluxes are not directly observed.

- Resolution is an important component to distinguish signals. At the 3km scale, can resolve urban scale attributors to flux estimates.
- Do high resolution models produce more accurate RT estimates? A new European effort, the Carbon Atmospheric Tracer Research to Improve Numerics and Evaluation (CATRINE), aims to quantify the transport uncertainty using both CO₂ and SF₆.
- The ability to estimate fluxes at high spatial resolution does not mean that the resolution of the inversion is higher.
- The Mid-Atlantic Gas Emissions Quantification (MAGEQ) campaign held in 2025 coordinated aircraft to quantify anthropogenic and natural emissions needed by public, commercial and philanthropic stakeholders. Overlaying the data with TROPOMI emissions provides a prior insight into spatial gradients, allowing better quantification of point sources in a regional emissions context.
- CEOS observations offer new opportunities to improve understanding of the distribution and magnitude of emissions. The advances in inverse modelling over the past 15 decades should inform resource allocation of other CEOS assets including MicroCarb, GOSAT-GW, and CO₂M.

Discussion

- Shobha Kondragunta (NOAA) asked whether there is any relationship between uncertainty and the source types.
- Kevin noted high latitude source uncertainties will be higher in non-summer months due to cloud cover and snow. Biomass burning, important channels for ecosystem resiliency, can be seen in CO₂ and CO data. NO₂, CO trace gases are important to trace emissions to different sectors.
- Higher spatial resolution inversions do not necessarily result in better observations. The important part is to quantify the accuracy.

Session 9: Closing Session

9.1 - Action Review

Libby Rose (WGClimate Secretariat) reported:

- The draft WGClimate and GHG-TT actions and decisions were presented for review. The full list of actions for WGClimate-24 can be found in Appendix B, and the actions for GHG-TT-07 can be found in Appendix C.

- Jörg Schulz (EUMETSAT) has discussed the CDR definition with GCOS colleagues throughout the week and has found large agreement. May publish for wide acceptance, pending approval from Peter Thorne (GCOS) and Peter Strobl (LSI-VC, EC-JRC).
- Wenying shared the proposed actions derived from the CEOS Global Stocktake Strategy recommendations. The strategy sets 16 recommendations for CEOS to address the goals of the second GST, which have been mapped as deliverables for various CEOS groups to address. Invited GHG-TT members to identify responsible agencies to lead relevant recommendations.

WGClimate-24-24	WGClimate & GHG-TT Members to review the CEOS Work Plan recommendations mapping of the Global Stocktake Strategy Issue 2 (GHG-TT items , WGClimate items).	Due: 20 February 2026
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9.2 - Closing remarks

Wenying Su (NASA, WGClimate Chair) reported:

- Thanked all for attending the meeting, and ESA for hosting.
- Wenying's term as WGClimate Chair comes to an end at the 2026 CEOS Plenary. Nominations for WGClimate Vice-Chair for 2027-2028 and subsequent Chair from 2029-2030 are welcomed from all members. As the nominal leadership rotation alternates between meteorological and non-meteorological agencies, nominations from non-meteorological agencies will be prioritised. The nomination will be endorsed at CGMS Plenary in June and CEOS Plenary in November.

WGClimate-24-25	WGClimate members to nominate for WGClimate Vice-Chair for 2027-2028, and Chair for 2029-2030, who should be from a non-meteorological agency.	Due: April 2026
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- WGClimate thanked Jörg Schulz (EUMETSAT) for his contribution to WGClimate over the last 15 years.

Appendix A: List of Participants

In-person participants

Affiliation	Name
ASI	Giorgio Licciardi
CEOS Exec Officer	Lefteris Mamais
DLR	Albrecht von Bargaen
ECMWF	Richard Engelen
ECMWF	Vincent-Henri Peuch
ECMWF	Hans Hersbach
ESA	Angelika Dehn
ESA	Simon Pinnock
ESA	Yasjka Meijer
ESA	Clement Albergel
ESA	Susanne Mecklenburg
ESA	Claire Macintosh
EUMETSAT	Frank Kaspar
EUMETSAT	Ruediger Lang
EUMETSAT	Simon Elliott
EUMETSAT	Jörg Schulz
EUMETSAT	Stephan Bojinski
European Commission	Hugo Zunker
European Commission	Mark Dowell
JAXA	Hiroshi Suto
JAXA	Misako Kachi
NASA	Wenying Su
NCEO / University Of Leicester	John Remedios
NCEO / University Of Leicester	Darren Ghent
UK NPL	Paul Green
UKSA	Gareth Thomas
UKSA	Patrick Gibson
UKSA	Beth Greenaway
UNFCCC	Maryam Navi
WCRP CMIP	Briony Turner
WGClimate Secretariat	Harvey Jones
WGClimate Secretariat	Libby Rose

Virtual Participants

Affiliation	Name
Data Foundation	Annmarie Eldering
CMA	Lu Zhang
CNES	Deniel Carole
Crisp Spectra Llc	David Crisp
EOTEC DevNet	Martyna
EOTEC DevNet	Stelmaszczuk-Górska
ESA	Erin Martin
ESA	Damiano Guerrucci
ESA	Chris Aubrecht
ESA/Solenix	Filippo Marchesi
EUMETSAT	Robert Husband
GEO Secretariat	Rui Kotani
GEO Secretariat	Martin Clark
ISRO	Nitant Dube
LSI-VC Secretariat	Matt Steventon
NASA / EOTECDevNet	Yasha Moz
NASA JPL	Kevin Bowman
NIES	Hiroshi Tanimoto
NOAA	Adria Schwarber
NOAA	Shobha Kondragunta
NOAA	Jeff Privette
Politecnico di Torino	Alesandro Battaglia
Schmidt Sciences	Abhishek Chatterjee
UNFCCC	Heather Maseko-Mysale
UNFCCC	Carlos Ruiz-Garvia
UNFCCC	Motsomi Maletjane
UNFCCC	Sonam Lhaden Khandu
UNFCCC	Sofia Vargas Lozada
UNFCCC	Stelios Pasmajoglou
UNFCCC	Alejandro Kilpatrick
UNFCCC	Nicolas Henriksson
UNFCCC	Paola De Salvo
UNFCCC	Maia Tskhvaradze
UNFCCC	Vitor Gois
UNFCCC	Tomo Aizawa
University Of Edinburgh	Paul Palmer
WCRP	Mike Sparrow

Appendix B: WGClimate-24 Actions & Decisions

ACTION ID	DESCRIPTION	DUE
WGClimate-24-01	EUMETSAT to review where the CDR Inventory is hosted, to increase visibility of the Inventory on CGMS and CEOS websites.	Due: Q2 2026
WGClimate-24-02	WGClimate members to let Wenying know if they plan to travel to SIT-41, in Irvine, California, USA, 14-16 April 2026, as well as any topics which should be brought to SIT-41.	Due: Q1 2026
WGClimate-24-03	WGClimate members to nominate to join the GCOS Status Report writing team.	Due: 20 March 2026
WGClimate-24-04	Mark Dowell to request the GCOS ECV Task Team share a draft of the requirements protocol document with WGClimate.	Due: Q1 2026
WGClimate-24-05	EC to share lessons learned in connecting with users, through a small pilot of all GHG aspects addressed by KCEO, NCPs and EUSPA. Report outcomes of pilot study to WGClimate-25.	Due: WGClimate-25
WGClimate-24-06	WGClimate members to propose CDRs which could be used to test the proposed CEOS-ARD stability requirement.	Due: Q2 2026
WGClimate-24-07	WGClimate Secretariat to share the draft CEOS-ARD stability requirement for feedback from WGClimate and CEOS-ARD Oversight Group members.	Due: Q1 2026
WGClimate-24-08	Jörg Schulz to confirm with GCOS the plans for the gap analyses for Sea Level and Earth Radiation Budget.	Due: Q1 2026
DECISION	WGClimate will contribute the CDR Definition as a vocabulary interoperability demonstrator.	
WGClimate-24-09	WGClimate to explore organising an event/hackathon with WCRP for testing interoperability of CDRs - supporting the Architecture recommendations of the CEOS Interoperability Handbook.	Due: WGClimate-25

WGClimate-24-10	Jörg Schulz to check the proposed CDR definition with Peter Strobl (EC-JRC, LSI-VC) and GCOS colleagues (Peter Thorne), including whether GCOS would like to contribute on the in situ aspect.	Due: Q1 2026
WGClimate-24-11	WGClimate members to contribute to the CDR Typology , assigning names to respective areas.	Due: 31 March 2026
WGClimate-24-12	Vincent-Henri Peuch to consider developing a virtual poster session platform for Earth Information Day at COP-31. Connect with COP-31 host organisation and SBSTA Chair to ensure the technical capability to support this.	Due: Q2 2026
WGClimate-24-13	Vincent-Henri Peuch to create a policy brief and/or fact sheet, to be shared via CEOS/CGMS Agencies with the national UNFCCC negotiators ahead of UNFCCC COP31.	Due: August 2026
WGClimate-24-14	WGClimate members to share highlights demonstrating the use of EO for different aspects of the climate system, to be included in the annual statement to SBSTA.	Due: May 2026
WGClimate-24-15	Mark to work with UNFCCC to develop a short document to explain the importance of reporting against the Adaptation indicators, and the benefits of EO data.	Due: Q2 2026
WGClimate-24-16	WGClimate to consider supporting the National Adaptation Plan (NAP) Expo in May 2026.	Due: April 2026
WGClimate-24-17	Mark and EO Handbook Team to ensure success stories about reporting to National Adaptation Plans (NAPs) are included in the 2026 EO Handbook.	Due: Q2 2026
WGClimate-24-18	Yasjka Meijer to share the GHG and AFOLU Roadmaps with UNFCCC mitigation colleagues (Stelios, Sofia & Nicolas), as well as the Aquatic Carbon Roadmap (when finalised).	Due: March 2026
WGClimate-24-19	Albrecht von Bargaen to connect with Aljeandro Kilpatrick in Bonn to continue the discussions around Capacity developments.	Due: Q2 2026
WGClimate-24-20	John Remedios to organise a meeting with Maia Tskhvaradze (UNFCCC) and colleagues from TEC and CTCN to understand where space-based data can support the UNFCCC Technology workstream.	Due: March 2026

WGClimate-24-21	EC-JRC to assess the feasibility of extracting information on the use of satellite data in the National Inventory Reports published by UNFCCC Parties.	Due: WGClimate-25
DECISION	UNFCCC Tiger Team activities will be incorporated into the regular activities of WGClimate. This includes: • Maintaining dedicated primary Points of Contact between WGClimate and UNFCCC 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-24-22	Vincent-Henri Peuch to fix a date for the workshop with the UNFCCC Secretariat in April/May 2026. Discussion topics for the workshop should include: • Developing a mechanism for parties to request space-based data products to support mitigation. Including: ◦ Utilising peer-to-peer exchanges. ◦ Identifying champion inventory compilers interested in space-based data to hold a small workshop with. ◦ Discussing at IWGGMS-22 in June/July 2026. • Contribution of resources to the UNFCCC Capacity Building Portal regarding use of space-based data • Review of the National Inventory Reports published on the UNFCCC website, to understand the use of space-based data. • How WGClimate can engage in the revision of the reporting guidelines in 2028 • WGClimate engagement in the Slow Onset Event Working Group • Review of space agency programmes which support slow onset	Due: March 2026
WGClimate-24-23	Simon Elliott to connect the CGMS WGIV Task Group on	Due:

	Metadata to Claire Macintosh and CMIP, for coordination of the uncertainty standardisation activity.	April 2026
WGClimate-24-24	WGClimate & GHG-TT Members to review the CEOS Work Plan recommendations mapping of the Global Stocktake Strategy Issue 2 (GHG-TT items , WGClimate items).	Due: 20 February 2026
WGClimate-24-25	WGClimate members to nominate for WGClimate Vice-Chair for 2027-2028, and Chair for 2029-2030, who should be from a non-meteorological agency.	Due: April 2026

Appendix C: GHG-TT-07 Actions & Decisions

ACTION ID	DESCRIPTION	DUE DATE
GHG-07-01	GHG-TT members are invited to nominate leads for the sensor development and constellation architecture area.	Due: Q2 2026
GHG-07-02	Yasjka Meijer to coordinate the potential placement of EM-27 sensors on South African shipping vessels (PoC T. Morris, SAEON), for coverage in the Southern Ocean and research station on Marion Island.	Due: Q2 2026
GHG-07-03	Yasjka Meijer to arrange a meeting between GHG-TT and OCR-VC to discuss the ship validation opportunities for ocean GHG fluxes.	Due: Q2 2026
GHG-07-04	Paul Green to share with Yasjka Meijer the name of the ISRO contact for the G20 EnSAC mission.	Due: ASAP
GHG-07-05	Libby Rose to add IRIDE HSI mission to GHG Portal, and confirm parameters with Giorgio Licciardi.	Due: Q2 2026
GHG-07-06	GHG-TT members willing to get involved in the development of Methane Area Flux Common Practices and/or the Methane Plume Best Practices should reach out to Paul Green.	Due: Q2 2026
GHG-07-07	Rüdiger Lang to share the online browser of validation sites compiled for CO2M by BIRA.	Due: March 2026
GHG-07-08	Chris O'Dell to inform the GHG-TT about the status and renewed timeline of the algorithm intercomparison exercise.	Due: March 2026
GHG-07-09	Hiroshi Tanimoto to explore how to integrate a discussion around the use of space-based data into the Workshop on GHG Inventories in Asia, potentially as an additional day. Hold a call in February 2026 with GHG-TT to understand the format and content which should be proposed to NIES and MOEJ.	Due: March 2026
GHG-07-10	Clement Albergel to share information about the Carbon from Space workshop when available, planned by ESA in October 2026.	Due: Q2 2026

DECISION	Giorgio Licciardi will be the new Point of Contact for IMEO.	
GHG-07-11	Giorgio Licciardi to work with Ferran Gascon and IMEO to develop a short report on the usefulness of using multispectral missions such as Sentinel-2 for the detection of methane. Additionally, note any impact of having the third Sentinel-2 mission on the number of detections.	Due: GHG-TT-08
GHG-07-12	Richard Engelen to modify the System Development actions in Annex C to refocus on reporting of progress made by G3W in system development.	Due: March 2026
GHG-07-13	Yasjka Meijer to follow up with UNFCCC Transparency and GHG Inventories / Mitigation colleagues regarding integration of space-based data topics in the the UN Office of Sustainable Development (UN OSD) Greenhouse Gas Inventory System Training Workshops.	Due: Q2 2026
GHG-07-14	Libby Rose to continue building out the list of GHG/Climate Capacity Building materials, developing a spreadsheet database, with labels and categorisation. Materials to follow up with include: - ECMWF slides used in the DG-Clima training workshops regarding space-based GHG data - KCEO report on the use of EO to support legislation compliance	Due: GHG-TT-08
GHG-07-15	Paul Green to review the IG3IS good practices and engage in the development process, to ensure alignment with the CEOS/CGMS efforts.	Due: Q2 2026
GHG-07-16	Rüdiger Lang to connect with G3W regarding data latency and availability requirements.	Due: Q1 2026