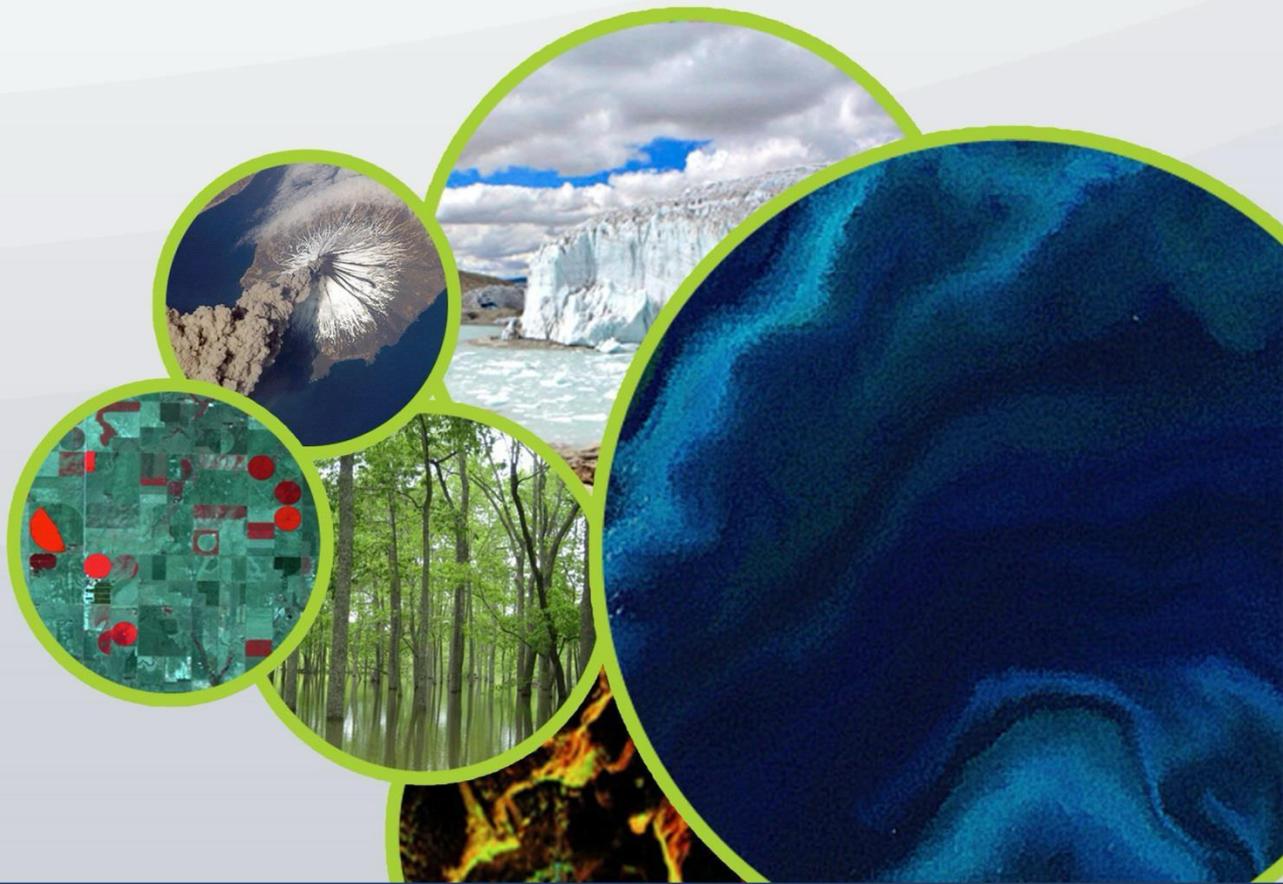




Committee on Earth Observation Satellites



# 2025-2027 Work Plan

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## i. Acronyms

AC-VC	CEOS Atmospheric Composition Virtual Constellation
BST	CEOS Biodiversity Study Team
CEO	CEOS Executive Officer
CEOS	Committee on Earth Observation Satellites
CEOS-ARD OG	CEOS Analysis Ready Data Oversight Group
CGMS	Coordination Group for Meteorological Satellites
COAST-VC	CEOS Coastal Observations Applications Services and Tools Virtual Constellation
EETT	CEOS Ecosystem Extent Task Team
GEO	Group on Earth Observations
LSI-VC	CEOS Land Surface Imaging Virtual Constellation
NSTT	CEOS New Space Task Team
OCR-VC	CEOS Ocean Colour Radiometry Virtual Constellation
OST-VC	CEOS Ocean Surface Topography Virtual Constellation
OSVW-VC	CEOS Ocean Surface Vector Winds Virtual Constellation
P-VC	CEOS Precipitation Virtual Constellation
SDG CG	CEOS Sustainable Development Goals Coordination Group
SEC	CEOS Secretariat
SEO	CEOS Systems Engineering Office
SIT	CEOS Strategic Implementation Team
SST-VC	CEOS Sea Surface Temperature Virtual Constellation
UN	United Nations
VC	CEOS Virtual Constellation
WG	CEOS Working Group
WGCapD	CEOS Working Group on Capacity Building and Data Democracy
WGClimate	Joint CEOS – CGMS Working Group on Climate
WGCV	CEOS Working Group on Calibration and Validation
WGDisasters	CEOS Working Group on Disasters
WGISS	CEOS Working Group on Information Systems and Services

## ii. Introduction and Overview

The CEOS 2025-2027 Work Plan was developed by the CEOS Executive Officer (CEO) under the direction of the United Kingdom Space Agency (UKSA) as the CEOS Chair for 2025, in consultation with the Japanese Aerospace and Exploration Agency (JAXA) as the CEOS Strategic Implementation Team (SIT) Chair, the CEOS Secretariat (SEC), CEOS Working Groups (WGs), CEOS Virtual Constellations (VCs), CEOS Ad Hoc Teams, the CEOS Systems Engineering Office (SEO), CEOS Agencies at large, and external stakeholders.

This document outlines the near-term objectives and deliverables identified by CEOS to support the mission and goals defined in the CEOS Strategic Guidance document. It includes a description of activities scheduled for 2025 and provides a forward-looking summary of anticipated endeavors for 2026 and 2027, some of which are multi-year efforts. Additional resources, including previous Work Plans and thematic observation strategies adopted by CEOS, can be accessed via the CEOS website (<https://ceos.org/>). The CEOS Work Plan undergoes an annual review that includes updates to reflect progress, integrate new initiatives, and adapt to evolving global priorities.

Two characteristics of CEOS particularly influence the Work Plan cycle: first, the very nature of CEOS as a “best-efforts” collaborative organisation; and second, the leadership rotations (yearly for the CEOS Chair and every two years for the CEOS SIT Chair). The best-efforts context calls upon the organisation to periodically re-examine its activities for their continued relevance and that it be mindful of the demand on its collective and individual resources. The leadership rotations bring Chair and SIT Chair priorities every year and every two years, respectively, while ensuring continuity and monitoring of activities identified in the previous Work Plan. Although the Work Plan is officially updated and approved on an annual basis, CEOS agencies, Working Groups, Virtual Constellations, and ad hoc Teams are expected to communicate progress on activities and changes throughout the year. New tasks can therefore be acknowledged and incorporated into the next edition of the Work Plan in an efficient way.

### CEOS Mission Statement

**CEOS ensures international coordination of civil space-based Earth observation programs and promotes exchange of data to optimize societal benefit and inform decision making for securing a prosperous and sustainable future for humankind.**

The primary objectives of CEOS are:

- To optimise the benefits of space-based Earth observation through the cooperation of CEOS Agencies in mission planning and the development of compatible data products,

formats, services, applications, and policies.

- To aid both CEOS Agencies and the international user community by, among other things, serving as the focal point for international coordination of space-based Earth observation activities, including the Group on Earth Observations (GEO) and entities related to global activities that have an environmental or socioeconomic impact.
- To exchange policy and technical information to encourage complementarity and compatibility among space-based Earth observation systems currently in service or development, and the data received from them, as well as address issues of common interest across the spectrum of Earth observation satellite missions.

Achievement of these three objectives requires significant internal and interagency coordination, and external consultation and coordination of outputs to respond to the needs of key stakeholders.

### iii. CEOS Recent Developments

As 2024 CEOS Chair, the Canadian Space Agency (CSA) hosted the 38<sup>th</sup> CEOS Plenary at its headquarters in Montreal, Canada on 22-24 October 2024. As CEOS Strategic Implementation Team Chair (SIT Chair) for 2024 and 2025, the Japan Aerospace Exploration agency (JAXA) chaired the SIT-39 meeting in Tokyo, Japan on 9-11 April 2024, and the CEOS Technical Workshop in Sydney, Australia on 17-19 September 2024. Together, CSA and JAXA garnered support for CEOS to undertake priority activities between November 2023 and November 2024. The CEOS collective produced outputs that were endorsed at principal-level meetings in 2024. As examples, CEOS endorsed the establishment of a new COAST Virtual Constellation; it endorsed an update to the [CEOS Strategic Guidance document](#); it endorsed Issue 2 of the CEOS-CGMS Greenhouse Gas Roadmap; it endorsed the 2024 CEOS Analysis Ready Data (ARD) Strategy; it endorsed an update to the Terms of Reference of the CEOS Working Group on Information Systems and Services (WGISS).

The 38th CEOS Plenary marked the 40<sup>th</sup> anniversary year of CEOS, which since its establishment in 1984, has greatly advanced international coordination on satellite Earth observation and now comprises 34 Members and 30 Associate Members. CEOS today is recognised as the authoritative source for satellite EO matters, thereby supporting and further informing policy and decision makers worldwide.

Throughout 2024, CSA sought to ensure the continued focus of the CEOS community on the agreed priorities, as listed above, but with a further specific focus on biodiversity to:

- 1) Explore a post-2024 Strategy for CEOS and Biodiversity and
- 2) Enhance Support for and Linkages to the global Biodiversity Community.

An *ad hoc* Ecosystem Extent Task Team (EETT) was formed at the 2022 CEOS Plenary. The EETT was given a two-year mandate to explore how Earth observation could and should be supporting the definition and monitoring of ecosystem extent. The EETT produced a white paper in 2023, and in 2024 the team worked on a set of demonstrators to prove concept. The EETT successfully completed their mandate at the 2024 CEOS plenary and a new activity to expand the thinking beyond ecosystem extent to biodiversity more broadly was established for one year as a follow-on activity. In 2025, the Biodiversity Study Team (BST) has been tasked to explore if and how CEOS should/could support biodiversity in a more sustainable and coordinated manner. They will report on their findings at the 2025 CEOS plenary.

Key decisions from the 2024 Plenary included:

- Formal endorsement of the CEOS Strategic Guidance document update.
- Establishment of the CEOS Biodiversity Study Team to assess long-term engagement in biodiversity-related activities.
- Endorsement of issue 2 of the Greenhouse Gas (GHG) Roadmap aiming for a coordinated implementation of carbon dioxide and methane monitoring from space.
- Endorsement of the GHG Best Practices framework, aiming to standardize facility-scale space-based methane measurements.
- Approval of the CEOS Analysis Ready Data Strategy 2024 to enhance EO data accessibility.
- Confirmation of the CEOS commitment to the UNFCCC Global Stocktake, ensuring EO data supports climate policy decisions.
- Endorsement of the CEOS Montréal Statement, emphasizing CEOS role in global EO coordination.

The 2024 CEOS Plenary welcomed the United Kingdom Space Agency (UKSA) as the 2025 CEOS Chair, with a central theme for 2025 is of "Unlocking Earth Observation for Society." UKSA's leadership year will focus on bridging the gap between EO data and its real-world applications, particularly in public services, climate policy, and global sustainability efforts. Key initiatives under this theme will be the "CEOS In Schools" programme, designed to engage youth in EO applications, and support for the development and uptake of methane best practices, co-developed by the UK's National Physical Laboratory and the NASA/Jet Propulsion Laboratory.

Through its strategic focus and initiatives, CEOS reaffirms its role as a global leader in Earth observation, fostering international collaboration, data accessibility, and innovative applications for the benefit of society.

This three-year Work Plan, covering the years 2025-2027, provides a high-level summary of planned CEOS activities by the relevant entities, as well as crosscutting efforts that are part of the unique value CEOS international coordination delivers to the remote sensing community, stakeholders, and data users. It is an integral part of the transparency and accountability of CEOS to itself, partner organisations, and stakeholders. More detailed implementation plans are developed and tracked at the technical level in the CEOS Working Groups, Virtual Constellations, and Ad Hoc Teams.

#### iv. Projected Outcomes in 2025-2027

The projected outcomes in the 2025-2027 time frame reflect the ongoing and emerging focus areas of CEOS, in consideration of CEOS internal decision making, resources, and existing stakeholder commitments. They emphasize improved Earth observation systems coordination and enhanced data access for key global programmes and initiatives involving the following thematic areas:

- 3.1. Climate Monitoring, Research, and Services
- 3.2. Carbon Observations in Support of Climate Science and Policy
- 3.3. Observations in Support of the Global Stocktake of the UNFCCC
- 3.4. Observations for Agriculture
- 3.5. Observations for Disasters
- 3.6. Observations for Water
- 3.7. Data Quality
- 3.8. Capacity Building and Data Democracy
- 3.9. Data Discovery, Access, Preservation, Usability and Exploitation: approaches, systems, tools and technologies
- 3.10. Advancement of the CEOS Virtual Constellations
- 3.11. Observations in support of the United Nations Sustainable Development Goals
- 3.12. Support to Other Key Stakeholder Initiatives
- 3.13. CEOS Services

The projected outcomes for each thematic area are summarised in short introductory paragraphs that list the objectives / deliverables to be pursued in the three-year period of the Work Plan. A table indicating Objective / Deliverable Number, Title, Projected Completion Date (indicated by quarter of the calendar year) and Responsible CEOS Entities concludes each section.

This Work Plan is a companion document to the CEOS Deliverables Online Tracking Tool, which captures the most current information available for each Objective / Deliverable, including

detailed descriptions of the Objective / Deliverable, background information, status, projected outcomes, connections to other CEOS external partners and entities, and other important information.

CEOS operates on a best-efforts basis. The assigned/responsible CEOS entities are expected to accomplish the Objectives / Deliverables identified in this document and the Online Tracking Tool to the best of their abilities. The CEOS Deliverables Online Tracking Tool (accessible via <https://ceos.org/tracking/>), captures significantly more information than presented in this Work Plan.

### 3.1 Climate Monitoring, Research, and Services

CEOS and the Coordination Group for Meteorological Satellites (CGMS) collaborate through the Joint CEOS/CGMS Working Group on Climate (WGClimate) to facilitate climate measurements, science, and monitoring from space through the coordinated planning, tracking, production, improvement, sustainment and availability of space-based climate data records. These activities are focused on implementation of the *Strategy Towards an Architecture for Climate Monitoring from Space* (hereafter referred to as the *Architecture*) developed and endorsed by CEOS, CGMS, and the World Meteorological Organization (WMO). Further, in 2018 WGClimate chartered a Greenhouse Gas (GHG) Task Team focused on supporting the Global Stocktakes. The following sections summarise activity from the perspective of CEOS contributions to the joint effort, as well as CEOS-specific activities in the climate domain.

As part of its sustained annual activities, WGClimate will:

- Deliver the annual Space Agency Statement to the UNFCCC Subsidiary Body of Scientific and Technological Advice (UNFCCC/SBSTA). The Statement is provided to the CEOS Chair Team for submission to the SBSTA meeting at the COP. WGClimate will also provide a summary version for oral presentation to SBSTA.
- Leverage its comprehensive Essential Climate Variable (ECV) Inventory of Climate Data Records (CDRs) and implement coordinated actions arising from ECV Inventory gap analyses. The gap analyses identify opportunities for improvement of data records and their usage along the climate information value chain outlined by the *Architecture*.
- Examine the ECV Inventory to identify issues in the future availability of measurements for the Global Climate Observing System (GCOS) ECVs as described in GCOS Implementation Plans. As issues are identified, WGClimate will initiate mitigation actions by improving coordination on long-term mission planning. Additionally, WGClimate will leverage the ECV Inventory to communicate progress of the satellite coordination

community within the United Nations System, and more broadly.

- Coordinate CEOS and CGMS activities towards the definition and implementation of an integrated operational global carbon observing system, including a system for monitoring the column concentrations of CO<sub>2</sub>, CH<sub>4</sub>, use and other greenhouse gases from space. In 2024, CEOS and CGMS endorsed the issue 2 of the Greenhouse Gas Roadmap. Together with the GHG Task Team, WGClimate will coordinate progress on and provide updates to tasks stated in its Annex. This involves collaborative work with the UNFCCC Subsidiary Body of Scientific and Technological Advice (SBSTA) and GCOS in support of the Paris Agreement.
- Continue to publish online use cases for climate data records to encourage wider utilisation of satellite Earth observations. This activity effectively validates the *Architecture* and fosters the use of satellite derived CDRs.
- Provide oversight of the continuing implementation of GHG monitoring activities.

During **2025**, WGClimate will also:

- **Finalise the Space Agency Response** to the 2022 GCOS Implementation Plan. The Response has been provided to the GCOS Panels for review and comment, and will be presented for CEOS endorsement after the CEOS SIT-40 meeting. WGClimate will present it for CGMS endorsement thereafter. In addition, WGClimate intends to meet jointly with GCOS in early 2026 to discuss next steps.
- **Deliver “Lessons Learned and Recommendations from Space Agencies’ Support for the First Global Stocktake”** to support the CEOS SIT Chair’s priority and to provide inputs to updating the CEOS strategy for supporting the Global Stocktake.
- **Implement the new CDR Inventory framework**, including a rolling update process. The CDR Inventory is the evolved version of the previous ECV Inventory.
- Discuss **expanding the CDR Inventory** to meet emerging needs.
- Conduct a one-year consultation with the community to determine if it is possible to converge on the **definition of *Climate Data Record*** (CDR), including the characteristics of the variants, such as Fundamental Climate Data Records (FCDRs) and Interim Climate Data Records (ICDRs). The study is expected to also assess the use of metadata standards and develop a roadmap for integrating all CDR types into the CDR Inventory. This absorbs actions #2018-01 and #2018-05 from the Coordinated Action Plan.
- Coordinate space agencies engagement at key UNFCCC events. This includes developing a comprehensive multi-year engagement strategy aligned with the phases of the global stocktake process and defining key objectives for each Conference of the Parties (COP)

and Earth Information Day (EID) to ensure CEOS and CGMS efforts are strategic and aligned with broader climate goals.

- Build on the success of the national emission community engagement session at the the WGClimate #22 meeting, more sessions similar to this would be encouraged. WGClimate will work with the CEOS and CGMS, and WMO to facilitate more engagement sessions.

For **2026-2027**, significant outputs beyond the annual activities listed above will include:

- Work with GCOS to make the **GCOS ECV rationalisation process** useful for satellite data records and ensure compatibility with the CDR Inventory. WGClimate will organise a joint meeting with GCOS Panels in Q1 2026, to prepare the GCOS status report and next GCOS implementation plan inclusive of promoting new ways of deriving application related needs/requirements. This absorbs actions #2018-07, #2024-01, #2024-02, and #2024-04 from the 2024 Coordinated Action Plan.
- Together with WGCV ACSG and AC-VC, GHG Task Team will discuss the concept of **Cal/Val Supersites for Greenhouse measurements**, alongside understanding gaps in the existing networks. This will be done to support WMO’s Global Greenhouse Gas Watch (G3W) and the UNEP International Methane Emissions Observatory (IMEO).
- In collaboration with UNFCCC and IPCC TFI, explore the possibilities to establish regional satellite data experts to advise national inventory compliers on the utilities of satellite data.
- Following actions #2018-26, #2024-03, #2024-05, and #2024-06 outlined in the 2024 Coordination Action Plan, conduct a **gap analysis** in 2027 to understand:
  - if more operational production of globally consistent AGB data records appear in agency or climate service planning;
  - if the availability of soil moisture data records is improving based on additional FCDRs; and
  - if transitions to more operational production of sea-level data records appear in agency or climate service planning.

Number	Objective/Deliverable Title	Projected Completion	Responsible CEOS Entity(ies)
CMRS-23-04	Provide Agency Response to GCOP IP	2025 Q2	WGClimate
CMRS-24-01	Update and align WGClimate website instances (CEOS, CGMS, climatemonitoring.info)	2025 Q4	WGClimate

CMRS-24-03	Restructure CDR Inventory architecture and processes for population, review, gap analysis	2025 Q3	WGClimate
CMRS-24-04	Conduct consultation to converge on definition for Climate Data Records (CDRs) and its variants	2025 Q4	WGClimate
CMRS-24-07	Lead “Lessons learned and recommendations from space agencies’ support for GST1” to support SIT Chair update of the CEOS GST Strategy	2025 Q2	WGClimate
CMRS-25-01	Expanding the utility of the CDR Inventory	2026 Q2	WGClimate
CMRS-25-02	GHG Cal/Val Supersites	2026 Q4	GHG TT, AC-VC, WGCV ACSG
CMRS-25-03	Support for GCOS ECV rationalisation process	2026 Q2	WGClimate
CMRS-25-04	Gap Analysis for ABG, Soil Moisture and Sea Level data records	2027 Q4	WGClimate

## 3.2. Carbon Observations in support of Climate Science and Decision Making

- I. **Coordinate space-based observations to support the effective monitoring and management of the world’s forested regions in support of international climate agreements and the Data Component of the GEO Global Forest Observations Initiative (GFOI).**

Through the LSI-VC Forests and Biomass (LSI F&B) Team, CEOS is coordinating the implementation of the CEOS Strategy for Space Data for GFOI (endorsed by the 2011 CEOS Plenary) for the provision of satellite observations in support of the development of national forest monitoring and measurement, reporting and verification (MRV) systems. This strategy will evolve to reflect changes in relevant CEOS Agency mission plans and to include coordination of the missions contributing to estimations of above-ground biomass (AGB). This new generation of missions, amounting to an investment of more than \$US4 billion by CEOS Agencies, is of significant interest to countries and institutions seeking to estimate avoided carbon emissions through incentive schemes such as REDD+. The LSI F&B Team proposes to support the accelerated policy relevance of the data from these missions by facilitating interaction between the GFOI community and technical CEOS communities, such as those pioneering the CEOS Biomass Protocol in the Working Group on Calibration and Validation (WGCV) Land Product Validation (LPV) subgroup, as well as the outreach and engagement defined and implemented through the CEOS AFOLU Roadmap.

## **2024-2025:**

The LSI-VC Forest and Biomass subgroup will develop an action plan under the CEOS AFOLU Roadmap (endorsed at the 2023 CEOS Plenary in Chiang Rai, Thailand) to support the second UNFCCC Global Stocktake process (GST2 in 2028). The team will also ensure that CEOS products support the AFOLU sector in a harmonized way through four thematic product teams, including Above Ground Biomass (AGB), Land Cover, Wetlands and Mangroves. It will continue to steward the updated GFOI Data Strategy and to advance the priority initiatives identified concerning the policy relevance of AGB estimation missions.

The LSI-VC Forest and Biomass subgroup will seek to ensure that the work of CEOS in support of GFOI is consistent with and supportive of the broader CEOS Carbon Strategy activities, including the CEOS Strategy to support UNFCCC Global Stocktakes.

## **II. Implementation progress of the CEOS Strategy for Carbon Observations from Space**

In 2014, CEOS endorsed the *CEOS Strategy for Carbon Observations from Space* in response to the *GEO Carbon Strategy* (CARB). The CEOS strategy addresses three domains-- atmospheric, oceanic, terrestrial--and their interfaces, and identifies a number of recommended actions to be completed by CEOS Agencies.

At the 2016 CEOS Plenary in Brisbane, Australia, CEOS determined specific targeted initiatives to advance the implementation of the CEOS Strategy for Carbon Observations from Space. These initiatives are crosscutting in nature and address numerous actions in the strategy. The initiatives cover a broad range of CEOS WGs and VCs and are addressed by the CARB objectives/deliverables. Past deliverables include:

- A Constellation Architecture for Monitoring Carbon Dioxide and Methane from Space (also known as the [GHG White Paper endorsed by CEOS in 2018](#))
- [GHG Roadmap Issue 1 \(endorsed by the 2020 CEOS Plenary\)](#)
- [AFOLU Roadmap \(endorsed by 2023 CEOS Plenary\)](#)
- [GHG Roadmap Issue 2 \(endorsed by the 2024 CEOS Plenary\)](#)
- [GHG Satellite Missions Portal](#)
- [GST Data Portal](#)

**2025-2026:** The CEOS-CGMS GHG and CEOS AFOLU Roadmaps foresee a long-term commitment to the further refinement of CEOS Agency data products in support of the GST process. Both roadmaps are accompanied by Actions tables, which are routinely reviewed. Further implementation actions are anticipated, including efforts to promote, educate and build capacity

as we learn from the first GST (GST1 in 2023) and move toward supporting the second GST (GST2 in 2028). While the GHG Roadmap Issue 1 focused on supporting the first Global Stocktake, the updated GHG Roadmap Issue 2 includes support for new stakeholders to better understand their needs and support them with the relevant GHG data. Concretely, for an understanding of CO<sub>2</sub> to reach policymakers at smaller spatial and temporal scales (covenant of mayors, finance sectors), and for CH<sub>4</sub> activities to also reach policymakers, and stakeholders of non-oil and gas related emissions, e.g., landfills, wetlands. Two important stakeholders are WMO's Global Greenhouse Gas Watch (G3W) and UNEP's International Methane Emission Observatory (IMEO).

The GHG Task Team will collaborate with CEOS and CGMS Agencies, and private partners on GHG product continuity from current and future satellite missions. A set of common practices for uncertainty reporting of flux estimation will also be developed to facilitate future product intercomparison. In 2025, the focus is on releasing the common practices on facility-scale methane emissions. Calibrated and validated harmonised products from multiple sensors and multiple agencies can provide seamless long-term, frequent and intense global data for GHG monitoring. WGCV seeks to work in the coming years with the GHG community to perform intercomparison of both radiance and retrieved GHG density levels, undertake calibration and validation (cal/val) campaigns, and provide common standard calibration and validation datasets. The GHG Task Team, together with WGCV, will continue to secure and support sustainability, quality of, and timely access to GHG ground networks in support of GHG Monitoring and Verification Support (MVS), such as Total Carbon Column Observing Network (TCCON), Collaborative Carbon Column Observing Network (COCCON), and Integrated Carbon Observation System (ICOS).

The third carbon roadmap, focusing on Aquatic Carbon, is in development, with an anticipated publication date of Q1 2026. The SIT Chair Team is coordinating regular meetings between all three roadmap teams to ensure the coordination of activities which cross the boundaries between domains, such as inverse modelling.

### **III. Pursue an integrated carbon cycle interface between CEOS and the UNFCCC**

CEOS made significant efforts to inform and support the UNFCCC Global Stocktake (GST) process; to demonstrate the policy relevance of EO satellite data; to plan for dataset inputs for the first and second UNFCCC Global Stocktakes (GST1 in 2023 and GST2 in 2028); and to inform the policy process. Informed by the outcomes of GST1, CEOS will focus on the GST2 process, engaging the appropriate climate stakeholders. To this end, the JAXA SIT Chair team set two priorities for 2024-2025:

1. Climate Policy Impact – Addressing obstacles and opportunities for CEOS Agency data, particularly AFOLU/Biomass map datasets, to have maximum impact in the key climate policy processes, notably, the successive UNFCCC Global Stocktakes that will occur every five years.

2. Greenhouse Gas Observations from Space – Coordination to address data continuity challenges ahead in support of evolving global and societal needs.

**2025:** WGClimate, supported by the SIT Chair Team, will publish a series of Lessons Learned from GST1, and thereafter, the SIT Chair Team will lead the development of a new CEOS GST Strategy. Section 3.3 contains additional information on GST related activities.

Number	Objective/Deliverable Title	Projected Completion	Responsible CEOS Entity(ies)
CARB-20-02	Integrated Carbon Cycle interface between CEOS and the UNFCCC	2025 Q4	WGClimate WGClimate GHG Task Team SIT Chair CEOS GFOI Lead LSI-VC GEOGLAM Team
CARB-20-05	Support and encourage space data uptake in GFOI countries	2025 Q2	LSI-VC F&B Team
CARB-22-01	Production of harmonised biomass products from CEOS Agency missions	2025 Q4	WGCV LPV
CARB-23-05	New Space and GHG product development and standards setting	2025 Q4	WGClimate GHG Task Team
CARB-25-01	GHG Roadmap Activities on Fostering Stakeholder Engagement	2027 Q4	WGClimate GHG Task Team
CARB-25-02	GHG Roadmap Activities on Sensor Development and Constellation Architectures	2027 Q4	WGClimate GHG Task Team
CARB-25-03	GHG Roadmap Activities on Calibration and Level 1 Products	2027 Q4	WGClimate GHG Task Team
CARB-25-04	GHG Roadmap Activities on Level 2 Products and Validation	2027 Q4	WGClimate GHG Task Team
CARB-25-05	GHG Roadmap Activities on Flux Inversion Modelling and Validation	2027 Q4	WGClimate GHG Task Team
CARB-25-06	GHG Roadmap Activities on Best Practices	2027 Q4	WGClimate GHG Task Team
CARB-25-07	GHG Roadmap Activities on System Development	2027 Q4	WGClimate GHG Task Team
CARB-25-08	GHG Roadmap Activities on Capacity Building	2027 Q4	WGClimate GHG Task Team

### 3.3 Observations in support of the Global Stocktake process of the UNFCCC

Article 14 of the 2015 Paris Agreement among the Parties to the UNFCCC stipulates the concept of successive Global Stocktakes (GSTs) to evaluate global progress towards the goals of the Agreement. The outcome of the GST will inform the preparation of subsequent Nationally Determined Contributions (NDCs) to allow for increased ambition and climate action to achieve the purpose of the Paris Agreement and its long-term goals. CEOS Agencies coordinated in support of the first GST (GST1 in 2023) and CEOS will consider the outcomes of the first GST to inform its planning, decisions, and activities in support of subsequent GSTs (due every five years thereafter).

The substantive elements of the GST of particular interest to CEOS are:

- Mitigation, i.e., reporting, measurement, and tracking the progressive decrease in national GHG emissions,
- Adaptation to ongoing climate change and its consequences and impacts,
- Finance of mechanisms to support the Paris Agreement, and
- Equity among Parties for implementation (this last being implicit in the process)
- Theme of loss & damage and needed observations/services.

The GST strategy paper sets out a series of recommendations for action, taking into account CEOS capabilities and interests, and building on existing efforts where appropriate. The recommendations are as follows:

1. It is recommended that the WGClimate and WGClimate GHG Task Team consult with the relevant elements of CEOS, including Associates such as International Science Council (ISC), World Climate Research Programme (WCRP) and the Global Climate Observing System (GCOS), together with modelers, to check the GHG Roadmap implementation on completeness concerning requirements for terrestrial observation (Solar-Induced Fluorescence SIF, Net Primary Productivity NPP, land cover, biomass, etc.) for supporting mitigation actions through the development of Monitoring and Verification System (MVS). The actions in Annex C of the Greenhouse Gas Roadmap shall be complemented as needed.
2. It is recommended that the need for parallel inputs to ocean models, deemed necessary for the support of MVS and for a wider validation of carbon flux estimates globally, be considered and appropriately combined into the actions in Annex C of the GHG Roadmap.
3. The results of the actions from the above recommendations should inform (a) the report of CEOS to UNFCCC (e.g., SBSTA/RSO (Research and Systematic Observation) discussion

on observation to support the implementation of the Paris Agreement) and should proactively flow (b) into the consultation process of the *ad hoc* group for the Synthesis Report on Observations for the GST.

4. It is recommended that CEOS consider, in conjunction with modelers, setting up one or more focused observational campaigns in the areas suggested above, or others, as a major contribution to the understanding of the trends of GHG emissions from natural sources in key areas.
5. It is recommended that the AFOLU roadmap team continue the work it has started for CEOS, reflecting the decisions taken at 2020 CEOS Plenary. The AFOLU Roadmap team and WGClimate GHG task team should work together to ensure consistency between data for emissions reported via AFOLU and for prior biogenic terrestrial emissions, and those due to changing land use, in implementing monitoring and verification systems. These need to be consistent on both temporal and spatial scales. The WGClimate GHG Task Team should ensure that their Roadmap is consistent with the outcomes of this discussion.
6. It is recommended that, to help in ensuring the take-up of satellite-based methods for AFOLU (and indeed in the context of MVS), CEOS should work with a few selected demonstrator countries to assist them in their national reporting under AFOLU (the model of GFOI can be compared). USGS through its SilvaCarbon programme would be well placed to lead this.
7. It is recommended that CEOS work with the various partners set out above to identify data requirements and actions for CEOS in relation to adaptation, including participation of relevant CEOS groups such as WGClimate and WGDisasters. Case studies might be of value to demonstrate competence and relevance. Partnership with specific countries in implementing their National Adaptation Plans (NAPs) could be of value, as in the case of AFOLU above, both to demonstrate worked examples and to strengthen support for this approach at UNFCCC, including at COPs.
8. It is recommended that CEOS maintain a watch over the implementation of projects funded through climate fund mechanisms to ensure that all appropriate assistance is given by agencies in their implementation and governance.
9. It is recommended that CEOS continue all efforts to provide the necessary climate data records that support the assessment of the actual status of the climate and the prediction and projection of future climate change, its response to changing GHG emissions and other drivers, and the impacts of climate change.

Implementation of the CEOS GST Strategy is guided by the SIT Chair in consultation with the WGClimate and other CEOS entities, since the activities can involve actions and actionees across the CEOS structure, including multiple Working Groups and Virtual Constellations. During 2025, the SIT Chair proposes to oversee an update of the GST Strategy.

Number	Objective/Deliverable Title	Projected Completion	Responsible CEOS Entity(ies)
GST-22-02	Ensure that the products from terrestrial observations needed to derive biogenic emissions as priors for Monitoring and Verification System (MVS) such as CO2MVS are considered in the GHG TT Roadmap Annex C.	2025 Q4	WGClimate GHG Task Team LSI-VC
GST-22-03	Ensure that the products from oceanic observations needed to derive biogenic emissions as priors for Monitoring and Verification System (MVS) such as CoMVS are considered in the GHG TT Roadmap Annex C.	2025 Q4	COAST AHT OCR-VC SST-VC WGClimate
GST-22-04	Deliver results of GST Strategy actions to key meetings in the UNFCCC Calendar, including SBSTA and COP, and meetings of the GST Ad hoc group for the Synthesis Report on Observations for the GST.	2025 Q4	WGClimate WGClimate GHG Task Team
GST-22-07	Establish National Inventory Test User Group and channels for country feedback on CEOS products and their application.	2025 Q4	LSI-VC F&B Team

### 3.4 Observations for Agriculture

The GEO Global Agricultural Monitoring initiative (GEOGLAM) is an open international community of practice aiming to enhance agricultural production estimates using Earth observations to address concerns raised by the G20 Agricultural Ministers about market volatility for the world’s major crops, as well as to provide early warnings of crop shortages and failures in countries most at risk of food insecurity. The activities described in the following paragraphs will be carried out in 2025.

**I. Respond to the Group on Earth Observations Global Agricultural Monitoring (GEOGLAM) community’s articulation of Essential Agricultural Variable (EAV) requirements for monitoring agriculture.**

In 2018-2019, GEOGLAM completed its Requirements Refresh, which provided a more holistic view of needs beyond acquisition and into accessibility and utilisation. An important component of this is GEOGLAM’s Essential Agricultural Variables (EAVs), which are articulations of user-oriented key agricultural products for assessing state and change in agricultural land use and

productivity; CEOS deliverable AGRI-19-04 reflects this. From this EAV definition, several public-facing GEOGLAM documents will be updated to reflect these needs, including:

- **GEOGLAM Community Research and Operationalization Agenda.** First published in 2018, this agenda sets out key priorities for GEOGLAM with respect to its operational R&D activity – JECAM – and it identifies barriers in implementing EO in operational systems. Part of the EAV articulation is a gap analysis, i.e., a data-to-information lifecycle analysis, which seeks to identify the drivers of gaps in operationalisation utilising EO (e.g., EO data coverage, EO access, EO utilisation, training data and validation, computing infrastructure and training).
- **GEOGLAM Earth Observation Data Requirements.** Very minor adjustments are expected to the GEOGLAM EO Data Requirements to ensure harmonisation between the EAVs and the EO data. Most changes will be in “Target Product” names, with some small adjustments in target resolutions anticipated. A new CEOS Response to GEOGLAM Requirements should then be completed (AGRI-22-02).

From the GEOGLAM Requirements Refresh, additional opportunities were identified for GEOGLAM and CEOS to collaboration increasing utilisation of EO data. While these prospects have not yet been approved by CEOS, the recommended approach is for CEOS to consider them as items of value to the agricultural community. These include:

- **A white paper produced by the CEOS LSI-VC GEOGLAM Subgroup on data quality control and assessment.** In light of the recent proliferation of data streams and associated products from CEOS Agency missions, many users expressed uncertainty about which products were appropriate for their applications, as well as how to gain access to them. Interoperability between sensors was consistently referenced as having utmost importance. A white paper explaining which data sources and space agency funded products are suitable for which applications would be valuable.
- **CEOS Analysis Ready Data (CEOS-ARD) for higher level products (including EAVs).** Expanding the framework of CEOS-ARD to accommodate higher level products that directly address EAVs and other thematic needs (e.g., EBVs, SDGs) will be explored. It is recommended that the CEOS-ARD Oversight Group maintain open lines of communication with the GEOGLAM community.

Recognizing the importance of a structured approach to advancing EAVs, the Committee on Earth Observation Satellites (CEOS) will establish a dedicated **EAV** team within the CEOS Land Surface Imaging Virtual Constellation (LSI-VC) GEOGLAM. This group will facilitate

collaboration between CEOS agencies and GEOGLAM to ensure that satellite data acquisition and analysis align with agricultural monitoring needs.

## **Objectives of the LSI-GEOGLAM EAV Working Group for CEOS**

### **1. Formalizing the CEOS-GEOGLAM Collaboration**

- Develop Terms of Reference (ToR) to define roles, responsibilities, and collaboration mechanisms between CEOS and GEOGLAM.
- Consider presenting the Terms of Reference for approval by a CEOS Plenary and GEOGLAM Executive Committee. CEOS will consider the development of this “Roadmap”.

### **2. Advancing the EAV Gap Analysis and Implementation Plan**

- Identify priority areas where EO data can enhance agricultural monitoring.
- Consider developing action plan for addressing key gaps, including recommendations for new data collection, processing pipelines, and validation frameworks.

### **3. CEOS-GEOGLAM EAV Stocktake Workshop (May 2025)**

The CEOS EAV Working Group will play a central role in the upcoming GEOGLAM EAV Stocktake Workshop, scheduled for May 13-15, 2025, at the Joint Research Centre (JRC) in Ispra, Italy. This workshop will bring together international space agencies, GEOGLAM stewards, and agricultural monitoring experts to:

- Update and refine the EAV framework.
- Begin developing a collaborative CEOS-GEOGLAM action plan for consideration by the CEOS community.
- Define a strategy for integrating agency contributions into GEOGLAM’s operational monitoring workflows.

### **Next Steps**

- **Q2 2025:** Obtain LSI-VC approval to create an LSI-VC/GEOGLAM Subgroup/Essential Agricultural Variable (EAV) team and organize the GEOGLAM EAV Stocktake Workshop to finalize strategic priorities.
- **Q3-Q4 2025:** Execution of priority tasks, including gap analysis and implementation planning.

By establishing a GEOGLAM Subgroup EAV team, we aim to ensure that EO data continues to support global food security monitoring and agricultural policy decisions in a structured and sustainable manner.

## II. Soil Organic Carbon Stock and Flux Estimates for Agricultural Land Uses: Input to GST AFOLU, Nationally Determined Contributions, and National Adaptation Planning

Estimates of Soil Organic Carbon (SOC) stocks and fluxes are an important yet poorly constrained component of the global climate system. Accurate quantification and error budgeting of SOC stocks and fluxes is needed to study and understand the effects of human activities on the carbon-climate system. These measurements help policymakers assess progress in meeting high-level policy goals, such as Nationally Determined Contributions (NDCs), as well as providing important input to the Global Stocktake of carbon emissions and sequestration in Agriculture, Forestry and Other Land Uses (AFOLU) as linked to the Paris Agreement and Glasgow Agreement. Further, this information is critical in the development of realistic and scientifically guided national adaptation plans. CEOS LSI-VC has adopted a Global Stocktake of Emissions from AFOLU, and has developed an impressive protocol for utilising EO to quantify forest biomass, but has not yet developed a system for emissions and sequestration accounting in agriculture.

To better inform stakeholders and priority applications, the CEOS SEO is supporting a project in the context of GEOGLAM to utilise EO data, best-in-class machine learning approaches, and existing soil samples to create a global digital SOC stock and flux data product that will provide gridded data at 0.25-degree resolution on SOC stocks, pH, Cation Exchange Capacity (CEC) and fluxes in the form of soil heterotrophic respiration. Soil pH and CEC are key indicators of soil fertility and its ability to sequester soil carbon, an important part of utilising agriculture to mitigate climate change. SOC stocks and fluxes are needed to compute carbon budgets over agricultural lands. These products will be representative of soil properties over the last 5 years and, most importantly, the project is developing a free, open, and accessible workflow/pipeline that can be replicated at multiple scales using new soil samples and EO data by stakeholders around the world.

Number	Objective/Deliverable Title	Projected Completion	Responsible CEOS Entity(ies)
AGRI-19-04	Iteratively respond to GEOGLAM EO Data Coordination team’s definitions of “Applications Ready Data” (ARD+) and “Essential Agricultural Variables for GEOGLAM”	2025 Q4	LSI-VC GEOGLAM Subgroup
AGRI-22-02	CEOS Response to GEOGLAM Requirements	2025 Q4	LSI-VC GEOGLAM Subgroup
AGRI-25-01	EAV Gap Analysis and Implementation Plan	2025 Q2	LSI-VC GEOGLAM Subgroup

AGRI-25-02	CEOS-GEOGLAM EAV Stocktake Workshop	2025 Q2	LSI-VC GEOGLAM Subgroup
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### 3.5 Observations for Disasters

The CEOS Working Group on Disasters (WGDisasters) ensures the sustained coordination of disaster-related activities undertaken by CEOS Agencies and acts as an interface between CEOS and the community of stakeholders and data users involved in risk management and disaster risk reduction.

Increased impacts of global climate change bring more frequent and extreme hydro-meteorological events, often leading to consequences such as landslides, flooding, drought, wildfires, or rising sea levels. These hazards and other traditional non-climate hazards such as volcanoes present enhanced opportunities for the EO community to demonstrate the unique scope and reach of satellites in support of the full cycle of risk management.

The primary objectives of the WGDisasters are:

- To promote new scientific advancements in disaster and risk sciences
- To support the efforts of Disaster Risk Management authorities in protecting lives and safeguarding property through satellite-based EO and science-based analyses
- To foster increased use of EO in support of disaster risk management (DRM)
- To support the implementation of the *United Nations Sendai Framework for Disaster Risk Reduction 2015-2030* (focusing on its Priority 1 “Understanding Risk”)
- To raise the awareness of politicians, decision makers, and major stakeholders (e.g., GEO, UN Agencies, donor institutions like the Asian Development Bank, World Bank/Global Fund for Disaster Risk Reduction, scientific communities, national resource management agencies, civil protection agencies, local decision makers, and others) of the benefits of using satellite EO in all phases of Disaster Risk Management.

In 2025, the WGDisasters will support the ongoing work of international initiatives, including GEO, to strive to increase the awareness of decision makers of the critical role of satellite EO, and reinforce the need for enhanced satellite EO programmes to better address Disaster Risk Management (DRM) needs. The WGDisasters has highlighted the importance of moving from technical demonstrations to sustained application of EO for improved risk management. This is demonstrated by the approval by the 2023 CEOS Plenary of two activities born of CEOS WGDisasters demonstrators: G-VEWERS (Global Volcano Early Warning and Eruption Response from Space) and the pre-operational CEOS Recovery Observatory. The move toward a more

permanent effort with regard to volcano monitoring and value-added information provision for disaster recovery is a significant step forward.

- Recovery Observatory - Beginning with a transition from a CEOS-led RO to a DRM stakeholder-led RO in 2024, the RO aims to establish 2-4 Recovery Observatories (ROs) globally each year. The Recovery Observatory was recently recognised by the UN General Assembly in the framework of the Space 2030 Agenda as “a means to increase the contribution of satellite data to recovery from natural disasters” and to contribute to Sendai Framework priority 4: Build Back Better. The WGDisasters intends to build on this recognition by engaging new partners to support this critical phase of risk management.
- G-VEWERS - An incremental approach for global monitoring with scalable options for implementation will be presented. As a result, monitoring for volcanoes globally could accelerate, ensuring risk reduction and improved volcano response.

In 2025, final reports are expected from the Wildfire Pilot, the Flood Pilot and the Landslide Demonstrator. In addition, the WGDisasters has kicked off a preparedness pilot in Tonga.

Another new initiative concerning Seismic Risk, including Hazard and Exposure mapping and the generation of products for immediate use by decision makers, will be started in 2025. Sustainable application of EO is achievable with increased visibility within donor communities and a strong appeal for support from committed end users.

The WGDisasters will continue to support the GEO Geohazard Supersites and Natural Laboratories initiative (GSNL) with data. The GSNL aims to improve the monitoring and management of seismic and volcanic hazards, providing access to new EO data and capacities, especially in developing countries, e.g., Africa and the Latin America and Caribbean (LAC) region. Periodic reports will be submitted by the Supersites for evaluation and verification of progress.

Other GEO activity is described in the Earth Observations for Disaster Risk Management (EO4DRM) initiative. The demonstrators previously mentioned fall under this scope. EO4DRM has several key thematic demonstrators reaching maturity; each demonstrator presents specific sustainability challenges and requires a dedicated approach.

- Operational Landslide Monitoring and Next-generation Landslide Science. Targeted local applications at commercial maturity with private partners but that have a global approach requires renewed science commitment.
- The GEO/LEO/SAR Flood Pilot will report on effective best practices and value of data and methodologies shared by pilot team members to CEOS Agencies. It will also explore how to effectively improve flood risk management with the use of Earth observation from satellites.
- The Wildfire Pilot will complete its study of user needs and the definition of the final pilot

deliverables geared towards integrating satellite-based EO observations in support of global fire monitoring. All demonstrator activities will produce reports in accordance with specified WGDIs Deliverables.

Number	Objective/Deliverable Title	Projected Completion	Responsible CEOS Entity(ies)
DIS-20-04	Landslide demonstrator showing value of combining optical and radar data for multi and cascading hazard disaster risk prediction and assessment products (maps and models in areas of high known risk due to activity, exposure and vulnerability), with report on effective practices, key data and practices.	2025 Q4	WGDisasters
DIS-22-04	Wildfire Pilot Final Report	2025 Q4	WGDisasters
DIS-24-01	G-VEWERS – Global Volcano Early Warning and Eruption Response System	2030 Q4	WGDisasters
DIS-24-02	Pre-operational RO	2026 Q4	WGDisasters
DIS-24-03	Tonga Preparedness Pilot	2025 Q4	WGDisasters
DIS-24-04	Data provision to the GEO GSNL initiative	2030 Q4	WGDisasters
DIS-24-05	GEO-GSNL contribution to the WGDisasters	2030 Q4	WGDisasters

### 3.6 Data Quality

The CEOS Working Group on Calibration and Validation (WGCV) continues to evaluate and recommend best practices for the characterisation/calibration of satellite-based sensors, and the validation of satellite-based EO data products. The results of this work are the calibration and validation building blocks for data and tools that underpin the work of the Virtual Constellations and other Working Groups. For these underpinning activities, different tasks are focused within subgroups focused on specific areas of interest.

The WGCV supports six Subgroups that operate as individual entities and focus on specific technical areas related to calibration and validation as follows:

- [Atmospheric Composition \(ACSG\)](#)
- [Infrared Visible Optical Sensors \(IVOS\)](#)
- [Land Product Validation \(LPV\)](#)

- [Microwave Sensors \(MSSG\)](#)
- [Synthetic Aperture Radar \(SAR\)](#)
- [Terrain Mapping \(TMSG\)](#)

**I. Coordinate and contribute to the development of suitable methodologies for the on-ground characterisation of satellite-based EO sensors, the on-orbit calibration of EO missions, and the validation of satellite-based Level 1 and Level 2 products.**

2024-2026: The calibration of missions in the thermal infrared domain is becoming increasingly important, with several CEOS Agencies working on future missions in this area. This includes SBG (Surface Biology and Geology) (NASA), Copernicus LSTM (Land Surface Temperature Monitoring) (ESA/COM) and Trishna (CNES/ISRO). A team of experts from the IVOS and LPV subgroups is conducting a study to determine the necessary characteristics of sites and their instrumentation to produce a derived brightness temperature signal at top of atmosphere with the highest possible accuracy while minimising any associated uncertainties. The team has also identified an inventory of potential sites that fulfil or could fulfil these criteria and provide a roadmap toward the establishment of what is being called TIRCalNet, following the past example of RadCalNet. The first progress meeting was held in January 2024 with CNES and JPL, the partnering agencies. They have committed to providing input data to the study from La Crau and Lake Tahoe sites respectively. There will be several deliverables during the study that will take approximately 18 to 24 months depending on progress and data availability. The most relevant deliverable would be the final report, constituting the roadmap towards an operational TIRCalNet, expected in 2026.

In the context of Synthetic Aperture Radar (SAR), the SARCalNet initiative aims to promote standardised SAR calibration and facilitate the harmonised implementation of cal/val tasks by a broad SAR community. It is crucial to have a network of curated calibration sites for SAR and well-established cal/val procedures. A team representing many SAR mission agencies has been working on documents to establish the requirements for SARCalNet. These documents include guidelines for artificial and natural targets; recommended minimum analysis of the imagery; as well as a handbook describing SARCalNet submission protocols and procedures. A subcommittee of users will actively curate the reference target submissions and produce an annual summary report. The WGCV SAR subgroup have completed the establishment and initialisation of the SARCalNet site, where registered users can access information on user-submitted artificial and

natural SAR calibration targets. WGCV will continue to support the development of SARCalNet through regularly reviewing submissions and ensuring the document library is kept up to date.

There is a growing number of public and commercial providers offering high-resolution space-borne Earth observation data. To effectively utilise this data, it is important to understand its characteristics, calibration methods, and quality and technical capabilities. Interoperability between satellites and products will expand opportunities for global applications including agriculture, assessment of the water cycle, forest and vegetation monitoring, pollution monitoring, and climate. Data can be used together only if it is sufficiently characterised, therefore, harmonisation of calibration and validation approaches is fundamental. The WGCV will continue supporting New Space through its active participation in VH-RODA and JACIE workshops, as well as direct involvement through its various subgroup initiatives.

In 2025, WGCV will continue conducting pilot assessments for assessing cal/val measurements as Fiducial Reference Measurements (FRMs) based on the FRM assessment framework that has been developed and is made available on the [CEOS Cal/Val Portal](#). FRM measurements should ideally have documented SI traceability (e.g., via round-robin characterisation and regular pre- and post-deployment calibration of instruments) using metrology standards or community recognised best practices. The uncertainty budget for all FRM instruments, and derived measurements, must be available and maintained. FRM measurement protocols, procedures and community-wide management practices like measurement, processing, archive, documents, etc. are defined, published and adhered to by FRM instrument deployments. The results of the pilot assessment will be discussed at the 2024 WGCV Plenary and will be published on the [CEOS Cal/Val Portal](#). A second FRM Assessment Framework exercise will be conducted in 2025, with plans to update the Maturity Matrices from PGN, Fiducial Reference Measurements for Ground-Based DOAS Air-Quality Observations (FRM4DOAS), and Radiometric Calibration Network (RadCalNet) in particular.

The WGCV will continue to provide a framework for performing intercomparison exercises. The intercomparison frameworks have demonstrated to be successful and useful. ACIX – intercomparison of atmospheric correction scheme – is evolving towards hyperspectral using PRISMA and EnMap data. CMIX - Cloud Masking scheme intercomparison – is progressing with improvement in the validation approach using the SkyCam – ground-based sky camera network for validation on satellite-derived cloud masks. DEMIX - DEM intercomparison and impact on orthorectification process - has produced four peer-reviewed publications, a new ‘DEMIX tiling’ system, and a processing platform. A comprehensive final report is expected in early 2025. SRIX4VEG - Intercomparison of Surface reflectance for vegetation – following the completion of

the SRIX4VEG II campaign held in Australia in March 2024, the FRM4Veg team created a community-agreed best practice protocol for UAV-based surface reflectance, endorsed by WGCV in January 2025. Supported by the ACTRIS-CREGARS Research Infrastructure and under the auspices of the Network for the Detection of Atmospheric Composition Change (NDACC) the Third Cabauw Intercomparison of DOAS-like Instruments (Differential Optical Absorption Spectroscopy) with external referee (CINDI-3) took place in the Netherlands from May-June 2024 with community-wide field intercomparison and certification of MAX-DOAS instruments. Finally, a match-up database for radiometric quality assessment is being developed that will support the quality assessment from New Space.

**II. Continue cooperation with GEO, Global Space-based Inter-calibration System (GSICS), WMO, and ground-based networks in the provision of high-quality EO data products.**

A joint task team between WGCV and GSICS has been established to coordinate and ensure interoperability of the forthcoming SI-Traceable Satellites (SITSats). SITSats are envisioned to be the foundation for a future ‘international climate and calibration observatory’ and this new generation of explicitly designed satellites will help enable a new epoch in climate quality observations of the Earth. The joint task team will build on the workshop “SI-Traceable Space-based Climate Observing System: a CEOS and GSICS Workshop” held in London in September 2019, which assessed the benefits and requirements of a space-based climate observing system, summarising current measurement capabilities, climate-based needs, and future implementation plans.

The WGCV will continue working with the GEO Secretariat, including work to support relevant GEO activities, mainly by encouraging the widespread adoption of quality assurance principles. The development of calibration and validation infrastructure and comparison campaigns within the frame of the WGCV will be used to promote these principles and best practices. The WGCV will continue to foster cooperation with WMO, ground-based networks, and CEOS WGs and VCs through dedicated presence during WGCV meetings and by reaching out to science users and data product providers in the atmosphere, terrestrial, and ocean communities.

Number	Objective/Deliverable Title	Projected Completion	Responsible CEOS Entity(ies)
CV-17-01	L1 top-of-atmosphere interoperability	2025 Q4	WGCV
CV-20-03	DEMIX	2025 Q2	EC ESA
CV-23-03	TIRCALNET: Establishment of initial TIRCalNet processes	2026 Q4	WGCV IVOS

	and network initiation		Subgroup WGCV LPV Subgroup
CV-23-04	Launch of a GCP Intercomparison Exercise	2025 Q2	WGCV TMSG
CV-23-05	Retrieval and validation of high winds with combined active-passive microwave measurements	2025 Q2	WGCV MSSG
CV-23-06	Retrieval and validation of sea surface atmospheric pressure with microwave remote sensing	2025 Q2	WGCV MSSG
CV-24-01	Third Cabauw Intercomparison of DOAS-like Instruments (CINDI-3)	2025 Q1	WGCV ACSG
CV-24-02	Good Practices Protocol on Land Cover	2025 Q2	WGCV LPV
CV-24-03	Good Practices Protocol on Vegetation Indices	2025 Q2	WGCV LPV
CV-25-01	Conduct a second FRM Assessment Framework exercise	2025 Q4	WGCV
CV-25-02	Develop a white paper for the Quality and consistency of land surface reflectance in the solar reflective region	2025 Q4	WGCV
CV-25-03	Development of a radiometric match-up database	2026 Q4	WGCV
CV-25-04	With the Working Group on Information Systems and Services (WGISS), develop/compile a base CEOS glossary of common Earth Observation terms.	2025 Q4	WGCV, WGISS

### 3.7 Capacity Building and Data Democracy

The CEOS Working Group for Capacity Building and Data Democracy (WGCapD) focuses and unifies CEOS efforts towards providing intensive Earth observation awareness raising, capacity building, education and training in multiple formats; promoting wider and easier access to EO data; increasing the sharing of software tools such as the use of open source software and open systems interface; and increasing data dissemination capabilities, aiming at transferring relevant technologies to end users. In 2025 the WGCapD will continue to increase its efforts in support of GEO and the global disaster, environmental and sustainability agendas.

2025-2027: WGCapD will continue to address a global need for the identification and coordination of the world’s diverse and often disparate capacity building and training resources related to satellite Earth observations.

WGCapD divides its work into support for global, regional, national and infrastructure activities:

- v. For **global work**:
  - Focus on online learning through e-learning, Massive Open Online Courses (MOOCs), webinars, challenges and blended learning approaches.
  - Development of a curriculum using WGCapD-produced resources.

vi. For **regional work**:

- Focus on support to regional GEOs: AfriGEO and AmeriGEO.
- Support trainings in conjunction with regional societies and other meetings.
- Leverage single-agency regional activities as possible.

vii. For **national work**:

- Support national training where fitting.
- Strengthen our understanding of national needs in other thematic areas.
- Strengthening inclusiveness and support to underrepresented communities.

viii. For **infrastructure**:

- Enablers, with a focus on sharing of best practices and resources, convening key stakeholders, and addressing user needs.
- Joint work with WGISS.

Number	Objective/Deliverable Title	Projected Completion	Responsible CEOS Entity(ies)
<b>Global Deliverables</b>			
GEO to strengthen AmeriGEO and AfriGEO through training contributions at their respective meetings/workshops.			
CB-22-07	Open Source Science Outreach Plan and Training	2025 Q4	WGCapD
CB-23-03	Guidance Document for Conducting Needs Assessments for Capacity-Building	2025 Q3	WGCapD
CB-23-04	Open-Source Science Outreach Plan and Training in support of NASA's Transform to Open Science (TOPS) Initiative	2025 Q2	WGCapD
CB-23-06	Recovery observatory for decision makers	2025 Q4	WGCapD a self-sustaining phase.
CB-24-01	ESA/NASA Trans-Atlantic Training 11	2025 Q2	WGCapD
CB-25-01	Earth Science challenge at the Science Hub Feb 2024	2026 Q2	WGCapD
CB-25-02	Earth Science challenge at the Science Hub May 2024	2025 Q2	WGCapD
CB-25-03	Online PolInSAR Webinar	2025 Q3	WGCapD
CB-25-04	11 <sup>th</sup> Trans-Atlantic Training (TAT)	2025 Q3	WGCapD
CB-25-05	EU Polar Science week school Lab	2026 Q3	WGCapD
CB-25-06	Arctic Methane and Permafrost Challenge (AMPAC)	2026 Q4	WGCapD

CB-25-07	Advanced Land Training Course 2024	2026 Q3	WGCapD
CB-25-08	PUMAS	2026 Q4	WGCapD
CB-25-09	SELPER	2026 Q3	WGCapD
CB-25-10	ESA Training on EO for Forestry	2026 Q4	WGCapD
CB-25-11	Hyperspectral Remote Sensing	2026 Q4	WGCapD
CB-25-12	COBRA- Polarimetry	2026 Q4	WGCapD
CB-25-13	Earth Science Challenge at the Science Hub 2025	2026 Q4	WGCapD
CB-25-14	Advanced Training Course on Ocean Synergy Remote Sensing 2025	2026 Q3	WGCapD
CB-25-15	Living Planet Symposium School Lab	2026 Q2	WGCapD
CB-25-16	Advanced Land Training Course 2025	2026 Q3	WGCapD
CB-25-17	PECS-BiDS Training Course	2026 Q3	WGCapD
CB-25-18	12 <sup>th</sup> Trans-Atlantic Training (TAT-12)	2026 Q3	WGCapD
CB-25-19	COBRA-InSAR	2026 Q3	WGCapD
<b>Regional Deliverables</b>			
CB-20-21	Copernicus User Uptake in Africa	2025 Q4	WGCapD
CB-22-08	Copernicus training of trainers in Africa	2025 Q4	WGCapD
CB-24-03	Engage & empower South African youth to use EO for Economic Empowerment	2025 Q1	WGCapD

Number	Objective/Deliverable Title	Projected Completion	Responsible CEOS Entity(ies)
<b>National Deliverable</b>			
<b>Infrastructure Deliverables</b>			
CB-20-07	Best Practice Guide to E-Learning	2025 Q3	WGCapD
CB-22-10	Sentinel Selected Applications: practical training with Jupyter Notebooks on the ESA EO Platform	2025 Q4	WGCapD
CB-22-12	EOTEC DevNet Multi-Stakeholder Network Analysis	2025 Q4	WGCapD
CB-22-15	Third Vietnam School of Earth Observation (VSoEO 3)	2025 Q4	WGCapD

### 3.8 Data Discovery, Access, Preservation, Usability and Exploitation: Approaches, Systems, Tools, and Technologies

Through the CEOS Working Group on Information Systems and Services (WGISS), CEOS Agencies will continue to evolve Earth Observation data discovery and access capabilities as well as foster ongoing data stewardship efforts. These activities enable enhanced interoperability and exploitation of EO data for CEOS entities as well as external entities such as GEO, UN, WMO, and others.

The WGISS Data Discovery and Access Interest Group will support the adoption of supported WGISS standards e.g., Open Geospatial Consortium (OGC), Catalogue Service for the Web and CEOS OpenSearch Best Practices, and definition of new ones, with the aim of connecting as many

CEOS Agencies as possible into a federated system. The Interest Group is concerned with ensuring data users have easy and efficient ways of discovering and accessing data and associated services through the exploitation of standard protocols and the harmonizing of search and data retrieval processes.

The interest group has recently defined a best practice at CEOS level for the collection and granule discovery based on the Spatio Temporal Asset Catalog (STAC). In addition, WGISS will continue exchanging on STAC matters, either with other CEOS groups (e.g., LSI-VC and ARD-OG), or participating to forum with external groups, including OGC. The increased requests for a federated collaborative environment to access data and services, has led the Interest Group to explore scenarios for a federated authentication and authorization mechanism and by this implement a white paper on the subject.

Earth observation data represent a unique, valuable, independent, and strategic resource that needs to be preserved, managed and curated throughout its lifecycle to make sure it continues to provide essential information on our planet and the changes which are affecting it. The WGISS Data Preservation and Stewardship Interest Group continues to lead data preservation and curation efforts for EO data and associated information archiving, preservation, consolidation, and valorisation aspects, including efforts to recover heritage data currently not accessible or at preservation risk.

The Interest Group has recently finalised a white paper on EO data collections management and governance that addresses topics including management of data collections in the cloud, preservation of collections, reproducibility of previous collections versions (algorithm availability), cross-collection validation, and general interoperability and governance approaches. The Interest Group is also developing a white paper to address and recommend techniques to ensure preservation and reusability of software tools related to EO missions.

The WGISS Technology Exploration Interest Group continues to survey cutting-edge technologies for Earth observation data access, storage, discovery, and analysis. The findings are provided to the CEOS community as guidelines and best practices. In 2024, the “Jupyter Notebook Best Practice” was issued in collaboration with WGCapD, UN, GEO, and other related groups. Additionally, a live document white paper was released in the same year, summarising the use cases of Artificial Intelligence/Machine Learning (AI/ML) in EO research and applications. This document, starting with version 1, will be continuously updated along with the rapidly evolving AI/ML landscape. Looking ahead, the group will explore data compression including new AI-driven approaches designed for both cloud-based and on-board operations. Furthermore, the integration of Earth observation data and analytical methods into digital twin technologies will be examined, assessing both current and future applications.

With the exponential increase in the number, type and suppliers of EO data, and the importance of EO data in a wide range of applications, including agriculture, climate change monitoring, disaster management, and urban planning, the interoperability of data and associated services has become an essential requirement. The WGISS Data Interoperability and Use Interest group has developed a framework to promote the interoperability of data and services among the CEOS agencies and to promote the cooperation of public and commercial space actors. This framework is used to develop CEOS Interoperability Handbook 2.0, which will be available by Q4 2025. The Interest group will develop an Interoperability Maturity Matrix by Q4 2026, which will help EO data suppliers, including new space start-ups and commercial data providers evaluate their maturity levels of interoperability of data and services.

Number	Objective/Deliverable Title	Projected Completion	Responsible CEOS Entity(ies)
DATA-24-01	White Paper on EO Data collections management and governance	2025 Q1	WGISS
DATA-24-02	White paper on Software preservation	2025 Q3	WGISS
DATA-24-03	CEOS Interoperability Handbook 2.0	2025 Q4	WGISS
DATA-25-01	White paper on federated access	2026 Q3	WGISS
DATA-25-02	CEOS Interoperability Maturity Matrix	2026 Q4	WGISS
DATA-25-03	White Paper on EO for Digital Twins	2026 Q2	WGISS
DATA-25-04	EO Data Citation Guidelines	2026 Q4	WGISS

### 3.9 Advancement of the CEOS Virtual Constellations

CEOS seeks to characterise the Virtual Constellations in the context of both the development of the space segment for GEOSS and of the multitude of outcomes and deliverables that CEOS seeks to provide for GEO and other users and frameworks.

**2025-2027:** Ensure that the Virtual Constellations (VCs) — Atmospheric Composition (ACVC), Coastal Observations, Applications, Services, and Tools (COAST-VC), Land Surface Imaging (LSI-VC), Ocean Colour Radiometry (OCR-VC), Ocean Surface Topography (OST-VC), Ocean Surface Vector Wind (OSVW-VC), Precipitation (P-VC), Sea Surface Temperature (SST-VC) — are accomplishing the outcomes and deliverables associated with the activities documented in the CEOS Virtual Constellations Process Paper and their respective terms of reference and implementation plans.

## I. AC-VC

The CEOS Atmospheric Composition Virtual Constellation (AC-VC) exists to sustain a systematic capability to provide essential observations of atmospheric composition from space. Key objectives include coordination of the collection and delivery of data to improve predictive capabilities for changes in ozone layer, monitor air quality, and monitor climate forcing associated with changes in atmospheric composition.

AC-VC is supporting the WGClimate and GHG Task Team in the implementation of the updated GHG Roadmap issue 2.0, endorsed at the CEOS Plenary 2024. AC-VC keeps tracking the status and stimulating progress related to satellite sensors, atmospheric products, surface flux estimation capabilities, and validation infrastructure. 2025 activities include Level-2 intercomparisons, the preparation of the validation for upcoming wide-field missions (e.g., CO2M, GOSAT-GW, Sentinel-5), and the elaboration of Best Practices for generating, reporting, validating, and assessing the quality of facility-scale emissions.

The harmonization of tropospheric ozone datasets is progressing well. The achievements of the ongoing community effort Tropospheric Ozone Assessment Report, Phase II (TOAR-II, 2020-2024) have been published in the TOAR-II Community Special Issue (ACP/AMT/BG/GMD inter-journal). The action VC-20-01 (Tropospheric ozone dataset validation and harmonization) is now closed with the publication by Keppens et al. on 'Harmonisation of sixteen tropospheric ozone satellite data records' (AMT 2025, <https://doi.org/10.5194/egusphere-2024-3746>).

AC-VC pursues the coordination of calibration and validation of missions with air quality observation capabilities, following related whitepapers. The validation and harmonization of products from the air quality missions in orbit in particular TEMPO, GEMS and S5P/TROPOMI is progressing well. The ESA/DLR PEGASOS project is evaluating the GEMS L2 operational products. A joint ESA-EUMETSAT Announcement of Opportunity led to a variety of proposals supporting the Cal/Val of products from Sentinel-4 and Sentinel-5 expected to be launched in summer 2025.

A roadmap pursuing the recommendations from the PM2.5 whitepaper and a presentation of use cases is in the making. A review article on vertical distribution info from satellite is in progress.

Ideas for pursuing the coverage of the Middle East and Africa with hourly satellite air quality observations were brought forward; the writing of a whitepaper has been initiated.

## II. LSI-VC

The CEOS Land Surface Imaging Virtual Constellation (LSI-VC) is guided by a vision of sensor-agnostic land surface data from all missions, achieving observations that enable users to characterise change on the Earth's surface through time.

LSI-VC championed the concept of CEOS Analysis Ready Data (CEOS-ARD) and continues to develop specifications for land surface products. In 2025, LSI-VC will work with the CEOS-ARD Oversight Group and other CEOS VCs and entities to implement the CEOS-ARD Strategy 2024.

LSI-VC continues to engage with the commercial sector on CEOS-ARD and other land surface imaging topics, and continues its work on land surface imaging gap and requirement analyses, with a focus on agriculture and forests (noted below, led by the LSI-VC subgroups).

Following the endorsement of the CEOS AFOLU Roadmap in 2023, the LSI-VC Forests and Biomass Subgroup now turns its attention to defining specific actions to implement the Roadmap and achieve the 2035 observing system required to address the AFOLU information needs of society.

The LSI-VC GEOGLAM (agriculture) Subgroup will serve as the forum for a CEOS response to the updated GEOGLAM observation requirements that are driven by the Essential Agricultural Variables (EAVs). The subgroup will seek to explore how the operational products required to achieve the agricultural monitoring ambitions of GEOGLAM might be met with the support of CEOS Agencies.

### **III. P-VC**

The CEOS Precipitation Virtual Constellation (P-VC) exists to sustain and enhance a systematic capability to observe, measure and validate global precipitation. These observations are essential to understand the distribution and characteristics of precipitation, its role in the hydrological/water cycle, and its impact on the climate system. Importantly, accurate and timely knowledge of global precipitation is needed to improve the prediction of high-impact weather events such as hurricanes, floods, droughts and landslides, as well as the management of freshwater resources and the interconnectivity with the Earth System (for example, crop yields and fire susceptibility). The spatial and temporal variability of precipitation necessitates the utilisation of data from multiple sensors on multiple satellites to ensure sufficient observations are available to provide representative sampling across the range of scales (spatially and temporally) as required by the research, operational and application-driven user communities.

The P-VC has the following strategic objectives to address this aim:

1. Provide a coordination mechanism to harmonise precipitation-capable satellite systems, data collection, processing and delivery, retrieval algorithms, and calibration/validation infrastructures,
2. Serve as a programmatic point of contact for precipitation measurements, addressing issues which go beyond the individual mission programmes,
3. Coordinate activities to develop and improve the knowledge and understanding of precipitation (rainfall and snowfall) processes, the distribution of precipitation and the changes in precipitation over time on a global basis, and
4. Support and engage the scientific and operational user communities.

#### IV. SST-VC

The CEOS Sea Surface Temperature Virtual Constellation (SST-VC) provides a forum for collaboration on the production and coordination of sea surface temperature products across the international spectrum of remote sensing instruments, including infrared and microwave sensors on polar orbiting and geostationary platforms working closely with science team members from the Group for High Resolution Sea Surface Temperature (GHRSSST).

The SST-VC will continue to participate in and support the CEOS ARD Oversight Group and its related activities, including the emerging Open Geospatial Consortium (OGC) ARD Standards Working Group, and CEOS Interoperability initiatives. This will include working with the SIT chair and other CEOS-ARD interests to continue to evolve and improve the CEOS ARD Framework and Product Family Specification. The SST-VC will also continue participation in the Ocean Coordination group to bring expertise from the GHRSSST project in data formats and metadata for marine products, remote sensing requirements in high latitude regions and other related activities. The SST-VC will look for areas to collaborate with the newly proposed COAST-VC, ensuring no overlap in work, with the SST-VC focusing on user needs and mission requirements of very and ultra-high resolution SST in coastal and high-latitude regions. The SST-VC will intend to expand participation to the team from the CEOS members by seeking additional engagements.

#### V. OST-VC

The goal of the CEOS Ocean Surface Topography Virtual Constellation (OST-VC) is to implement a sustained, systematic capability to observe the surface topography of global oceans. OST-VC links CEOS Agencies, the Ocean Surface Topography Science Team (OSTST) and the altimetry user community. It is suited to discuss constellation-wide programmatic issues and high-level constellation user requirements.

In **2025**, the OST-VC will continue to strengthen multi-mission collaboration. One important objective for this year will be the publication of the OST-VC white paper 'A Coordinated International Satellite Altimetry Virtual Constellation: Toward 2050'. A key event will be the launch of Sentinel-6B in November, which will ensure the continuity of the reference altimetry mission.

**2026 and 2027** activities will be dedicated to commissioning of Sentinel-6B then preparation, launch and commissioning of Sentinel-3C.

## **VI. OCR-VC**

The focus of the CEOS Ocean Colour Radiometry Virtual Constellation (OCR-VC) is the monitoring and forecasting of Earth's living aquatic environments. OCR provides information in three major application areas: climate, carbon, and water quality.

OCR-VC activities for 2024 will focus on continuing the development of the Aquatic Carbon roadmap. Carbon-related activities include the Blue Carbon Workshop taking place early in 2025, whose outputs will feed into the roadmap. The OCR-VC will continue to contribute to the Aquatic Reflectance Product Family Specification for CEOS-ARD to extend it to all water types including seas and open oceans. Finally, in 2024, capacity building will continue to provide new resources and training to users.

OCR-VC activities for 2025-2026 will include the continuation of developing a coordinated multi-mission basis for OCR cal/val, including System Vicarious Calibration (SVC) infrastructures and protocols for bio-optical in situ measurements, as well as collect and synthesize feedback from users through the International Ocean Colour Symposium (IOCS) being held in 2025.

All OCR-VC activities and deliverables support the implementation of the International Network for Sensor InTercomparison and Uncertainty Assessment for Ocean Colour Radiometry (INSITU-OCR).

## **VII. COAST-VC**

This new virtual constellation with a coastal focus will help bridge land and aquatic observations within CEOS, and given its cross-cutting nature, it will continue to integrate across multiple CEOS entities and domains, both thematic and technical. COAST will leverage the CEOS Analysis Ready Data (CEOS-ARD) framework; best practices arising from WGCapD and others on stakeholder engagement and co-design; and to the extent feasible, utilize the CEOS Systems Engineering Office Analytics Lab for product development. COAST leadership will collaboratively identify and acquire the necessary resources (human, Internet Technology capacity, et al.) from CEOS members to successfully execute product development and provide open user access.

In the 2025-26 time period, COAST VC has opportunities to collaborate with other CEOS entities to advance mutual projects within the coastal realm. At the same time, COAST will be working to introduce the newly developed coastal products and the Application Knowledge Hub to a wider international user audience through tutorials and scientific meetings and developing novel coastal products to satisfy user demand and international priorities (e.g. biogeochemical products within 1km of the land-sea interface). COAST will leverage emerging new technologies to prioritise data delivery in the coastal region for major international partners and in support of the UN Ocean Decade objectives (i.e. SAR data product development, HiRes SST from new missions, ocean color based phytoplankton functional types from existing and future missions,

Specifically in 2025-26, COAST will deliver or improve satellite-derived coastal Blue Carbon products, and biogeochemical products (e.g. primary productivity, phytoplankton size class) within 1km of the land-sea interface, in one, or more, COAST-VC pilot region(s). COAST-VC will also reconvene the satellite-derived bathymetry focus team within COAST-VC for renewed cross-agency collaboration.

Number	Objective/Deliverable Title	Projected Completion	Responsible CEOS Entity(ies)
VC-14-09	Implementation of the International Network for Sensor Intercomparison and Uncertainty Assessment for Ocean Colour Radiometry (INSITU-OCR)	2026 Q4	OCR-VC
VC-19-06	Update of CEOS OST-VC User Requirements Document	2025 Q4	OST-VC
VC-20-26	System Vicarious Calibration (SVC) infrastructures in support of Climate-quality OCR data records	2026 Q4	OCR-VC
VC-20-27	Development of protocols for bio-optical in situ measurements	2026 Q4	OCR-VC
VC-22-04	Mission continuity timelines for land domain CEOS-ARD PFS	2026 Q4	LSI-VC
VC-23-01	Aquatic Carbon Roadmap	2026 Q1	OCR-VC
VC-23-05	CEOS-ARD Impact Case Studies	2025 Q4	CEOS-ARD OG LSI-VC
VC-23-06	CEOS-ARD in the Cloud	2025 Q4	CEOS-ARD OG LSI-VC WGISS
VC-23-09	CEOS-ARD Community Building	2027 Q4	CEOS-ARD OG LSI-VC
VC-23-10	Expansion of the Aquatic Reflectance CEOS-ARD PFS to Cover Oceans	2025 Q2	CEOS-ARD OG OCR-VC LSI-VC
VC-23-11	LSI-VC Response to the Observation Requirements of the CEOS AFOLU Roadmap	2025 Q4	LSI-VC LSI-VC GEOGLAM Team LSI-VC F&B Team
VC-23-12	CEOS-ARD Product Family Specifications (PFS)	2027 Q4	CEOS-ARD OG All VCs
VC-23-13	CEOS-ARD Product Assessments	2027 Q4	CEOS-ARD OG WGCV All VCs
VC-24-01	CEOS-ARD Strategy 2024 Implementation	2026 Q4	CEOS-ARD OG LSI-VC
VC-24-03	CEOS-ARD STAC Extension (Optical)	2025 Q4	CEOS-ARD OG LSI-VC
VC-24-06	List of POLINSAR Reference Sites	2025 Q1	LSI-VC

VC-24-08	Coordination with Agency PoCs, incl. tasking of new polarimetric observations and requests for archived data	2025 Q1	LSI-VC
VC-25-01	Modularisation of the CEOS-ARD PFS Requirements	2026 Q4	CEOS-ARD Oversight Group, LSI-VC
VC-25-02	Metadata specifications for optical CEOS-ARD products	2025 Q4	CEOS-ARD Oversight Group, LSI-VC
VC-25-03	Greenhouse Gas Flux CEOS-ARD Product Family Specification	2027 Q4	GHG TT, CEOS-ARD Oversight Group
VC-25-04	CEOS Response to GEOGLAM EAVs	2026 Q4	LSI-VC
VC-25-05	PM2.5 Roadmap	2025 Q4	AC-VC
VC-25-06	Expanding the Geostationary Atmospheric Composition Constellation: Toward Global Coverage	2025 Q4	AC-VC
VC-25-07	Deliver or improve OceanSat 3/1-derived coastal Blue Carbon products in at least 3 COAST-VC pilot regions (e.g. Bay of Bengal, W African Coast and Chesapeake Bay)	2026 Q4	COAST-VC
VC-25-08	Deliver or improve satellite derived biogeochemical products (e.g. primary productivity, phytoplankton size class) within 1km of the land-sea interface (GCOS 2022 Implementation Plan) in one, or more, COAST-VC pilot region(s)	2026 Q2	COAST-VC
VC-25-09	Reconvene the satellite-derived bathymetry focus team within COAST-VC for renewed cross-agency collaboration	2025 Q2	COAST-VC
VC-25-10	Update of GOES Enterprise Rain Rate with METEOSAT-12	2025 Q3	Precipitation-VC
VC-25-11	CMORPH2 reprocessing	2025 Q4	Precipitation-VC
VC-25-12	GOSAT-GW AMSR3 Snowfall Rate	2026 Q4	Precipitation-VC
VC-25-13	GPCP v3.3 release	2025 Q1	Precipitation-VC
VC-25-14	GPCP v4.0 release	2026 Q3	Precipitation-VC
VC-25-15	NASA Precipitation Processing System (PPS) V08 product release (L1 and L2)	2026 Q1	Precipitation-VC
VC-25-16	NASA Precipitation Processing System (PPS) V08 product release (L3 - IMERG)	2026 Q3	Precipitation-VC
VC-25-17	Analysis Ready Data for Precipitation: product family specifications	2026 Q2	Precipitation-VC
VC-25-18	Release of EarthCARE L2 precipitation product	2025 Q1	Precipitation-VC
VC-25-19	Release of EarthCARE L2 precipitation product	2025 Q4	Precipitation-VC
VC-25-20	Launch of GOSAT-GW with AMSR3	2025 Q3	Precipitation-VC
VC-25-21	Release of AMSR3 data	2026 Q3	Precipitation-VC
VC-25-22	GPM Dual frequency Precipitation Data reprocessing	2026 Q1	Precipitation-VC

VC-25-23	Release of new version of GSMaP precipitation products	2026 Q2	Precipitation-VC
VC-25-24	Blended MTG FCI IR / LEO MW precipitation	2025 Q3	Precipitation-VC
VC-25-25	Accumulated blended MTG FCI IR / LEO MW precipitation	2025 Q3	Precipitation-VC
VC-25-26	Gauge adjusted accumulated blended MTG FCI IR / LEO MW precipitation	2025 Q3	Precipitation-VC
VC-25-27	CEOS-ARD Framework update for EAVs and other higher-level products	2026 Q4	CEOS-ARD OG, LSI-VC

### 3.10 Observations in Support of United Nations Sustainable Development Goals

The CEOS Sustainable Development Goals Coordination Group (SDG CG), a permanent and coordinated home for the management of all CEOS activities related to the U.N. Sustainable Development Goals (SDGs) set up in 2021, includes representatives from the CEOS Strategic Implementation Team (SIT) Chair, the CEOS Executive Officer (CEO), and other key members (e.g. CSIRO) from the former SDG *ad hoc* Team (2016-21). The CEOS SIT Chair provides strategic oversight to the Coordination Group. The Coordination Group coordinates SDG deliverables and Work plan activities by liaising with all lead experts responsible for each SDG Deliverable, discussed and approved each year. The Deliverable leads organize their technical capacity and support using a pool of experts (CEOS internal and/or external) connected to each SDG topic (e.g., former SDG indicator ‘sub team’ members), CEOS experts (WG, VC, AHT), and SDG-related GEO Work Programme activities.

The SDG Coordination Group continues to focus its activities on four SDG indicators: 6.6.1 on water extent, 11.3.1 on urbanization, 14.1.1 on coastal eutrophication/marine pollution, and 15.3.1 on land degradation, and explores ways of supporting other Indicators related to current CEOS Priorities (e.g. Climate, Greenhouse Gas).

In doing so, the SDG CG provides support to United Nations Custodian agencies and other strategic SDG stakeholders, by analyzing satellite data requirements and availability for key indicators upon request, and liaising with other CEOS groups (Working Group Capacity Development, CEOS-ARD OG, Interoperability Handbook, etc.) to harness CEOS collective expertise and maximize usefulness of CEOS Agency data and benefits for the SDG stakeholder community.

Throughout monthly meetings and two face-to-face meetings (SIT and SIT TW) in 2024, the SDG CG discussed their progress and plans, confirming the critical role for a coordinating body to ensure CEOS provides satellite data expertise to stakeholders including UN Custodian Agencies

(e.g. UNEP on water extent, UNCCD on land degradation, etc.), and in particular the Group on Earth Observation (GEO) which is now transitioning to implementation of the GEO Post-2025 Strategy.

Considering feedback from CEOS Members, the SDG Coordination Group has further engaged across CEOS (WGCapD, Ecosystem Extent, WGClimate) to ensure relevant SDG-relevant efforts are promoted, leveraging expertise across the organization. The SDG CG agreed to maintain some activities for end-users (EO support sheets to be renewed as required), while exploring other activities aligning with CEOS strategic priorities and responding to external requests.

At the CEOS 38th Plenary in Montreal, Canada, the SDG Coordination Group reported on the status of 2024 deliverables and informed CEOS Principals about planned activities in 2025.

## **2025:**

In 2025, the CEOS SDG intends to ensure continuity with:

EO Support Sheets Review. These CEOS technical resources have been extremely useful for many SDG stakeholders, with the latest versions being published on the SDG website and featured in various forums to include UNCCD COP 16 and the UN Statistical Commission 56th Session. In 2024, the review process started with a full update of the template to ensure more consistency across the four documents, as well as providing new information such as flagging potential new missions, tools and resources relevant to SDGs. Three Support Sheets were updated 2024, while the one on 6.6.1 (water, ecosystems extent) will be delayed for a few months, to include changes and updates being currently discussed at the UN Custodian agency level. In 2025, the SDG CG will request another review from CEOS experts to ensure the documents remain accurate and useful. Further, the SDG CG will partner with WGClimate to explore ways of empowering countries with satellite datasets, tools and services to help them report on SDG 13.2.2 (*“Total greenhouse gas emissions per year”*).

Broad contributions to SDG Communications. The SDG webpage and CEOS social media will be updated and rearranged to reflect the current activities undertaken by the group. The Group will continue its effort to call for inputs to other CEOS bodies and partner with the CEOS Communications Team to promote CEOS work on SDG in CEOS communications.

Improve coordination and outreach within CEOS:

As determined following the 38th CEOS Plenary, the Chair requested all CEOS groups to report on their SDG related activities monthly in their written reports, to help the SDG CG identify CEOS work relevant to SDGs, and promote it to maximize our impact.

WGCapD. The Group engaged with new leadership and facilitated external connections (UNESCAP) to increase SDG capacity building support - however no new activities at this stage.

Biodiversity Study Team. Since this team comprises key individuals already engaged with the SDG CG (ESA, CSIRO) and will have a broader scope, there is an opportunity for SDG CG to address synergies between SDG and Biodiversity Indicators/Targets. A new feature has been implemented on the online tracking system so that each CEOS entity entering a new deliverable can indicate whether it supports SDGs. This gives us an opportunity to derive the level of efforts at the SDG indicator-level for each CEOS work activity.

Improve CEOS external engagement and impact:

United Nations Global Geospatial Information Management (UN-GGIM) ‘Rescuing the SDGs’ Paper. The SDG CG has contributed to a UN-GGIM-led paper to highlight the value of using EO data and help accelerate the UN SDG delivery process. In doing so and being actively involved in UN-GGIM IAEG (Inter-Agency Expert Group)-SDG discussions, CEOS will have the opportunity to contribute and influence any potential SDG indicator reporting framework updates that will ease use of Earth observation data used in national reporting through 2030.

UNCCD and GEO-LDN: The GEO Land Degradation Neutrality Flagship works closely with UNCCD (UN Convention to Combat Desertification), and requested CEOS help to address specific needs with regards to satellite data and decision tree documentation (see the Good Practice Guidance). The SDG CG will complete and provide feedback to the SIT Chair led effort to respond to this external request.

**2026-2027:**

Additional ideas and activities are being discussed, but will require further strategic and resources refinement. If CEOS aims to support and improve the use of EO satellite data in the SDG Framework, and continue to offer its expertise to UN Agencies, CEOS Principals need to allocate appropriate resources.

Future work associated with other SDG indicators will be considered through normal CEOS governance processes: *CEOS External Requests Process Paper* and *CEOS New Initiatives Process Paper*.

This includes exploring ways to support and deliver a Wetland inventory (the new Ecosystem Task Team will prepare a “white paper” on ecosystem extent, which will likely include a Wetland inventories); the creation of an SDG Dashboard (a visualization tool, similar to the NASA-ESA-JAXA EO dashboard, to help show how CEOS datasets can be used in the SDG context); and opportunities to collaborate with the commercial sector (potential future demonstration project targeted on SDGs (links to specific data for end-users requiring CEOS and/or GEO’s help to get access to data that only industry would provide, e.g. high resolution data for islands, or Radar data in other regions, etc.).

The SDG CG continue engagement with the Small Island Developing States (SIDS) including PICTS throughout its contribution to the Digital Earth Pacific program led by SPC (Pacific Community)

as a Member of its Steering Committee, as well as other regional initiatives where CEOS agencies and individuals are also involved such as GEO LDN Global Dialogue events.

Finally, the CEOS SDG Coordination Group will maintain awareness of evolving United Nations activities to develop a follow-on global policy framework that will address global sustainable development post-2030. It is critical that the value and impact of Earth observations be integrated early in this process as foundational information, rather than the ‘non-traditional data’ status it holds currently in the existing county-owned, country-led SDG reporting process.

Number	Objective/Deliverable Title	Projected Completion	Responsible CEOS Entity(ies)
SDG-24-01	EO Support Sheet for SDG Indicator 6.6.1 (Water) Annual Update	2025 Q3	SDG CG
SDG-25-01	EO Support Sheet for SDG Indicator 11.3.1 (Urbanization) Annual Update	2025 Q4	SDG CG, GEO Secretariat
SDG-25-02	EO Support Sheet for SDG Indicator 14.1.1 (Marine Pollution) Annual Update	2025 Q4	SDG CG
SDG-25-03	EO Support Sheet for SDG Indicator 15.3.1 (Land Degradation) Annual Update	2025 Q4	SDG CG
SDG-25-04	UNSC IAEG-SDGs / UN-GGIM WGGI Engagement	2025 Q3	SDG CG

### 3.11 Support to Other Key Stakeholder Initiatives

#### I. Continue CEOS contributions to UN Ocean Decade and maintain leadership role in the GEO Blue Planet Initiative.

**2025-2026:** CEOS Agencies will continue to develop and distribute experimental and operational data, products and services, undertaken within the CEOS COAST Virtual Constellation, including contribution to the UN Ocean Decade (IOC). Both activities include linkages with GEO Blue Planet, and likewise continue operational satellite oceanography activities (EUMETSAT, NOAA) to facilitate distributed access to collocated, synergistic datasets with fit-for-purpose latency, quality, coverage and content for applied, commercial and research use.

## II. CEOS Engagement in Biodiversity.

**2025-2027:** As a forum for national and international organisations focused on space-based EO, CEOS is uniquely positioned to explore how data products from EO missions can support the needs of the biodiversity community. CEOS encourages and coordinates member and associate member activities in support of biodiversity such as activities that serve to enhance and advance the measurement, monitoring, and understanding of biodiversity from space.

In December 2022, the Parties to the Convention on Biological Diversity (CBD) agreed to the Kunming-Montreal Global Biodiversity Framework (KMGBF), which identifies the CBD's Goals and Targets for the next decade and beyond. A key component of the KMGBF is its Monitoring Framework that includes specific indicators, many of which are directly or indirectly dependent on space-based EO data products. Some of these indicators include but are not limited to ecosystem extent, ecosystem condition, invasive species, and ecosystem services. During the negotiations of the resumed COP16 in Rome, Parties reached an agreement on how the indicators would be measured and utilized. This will enable all Parties to track progress in a manner that is meaningful to national policymakers while also generating data that can be aggregated at the global level, offering a comprehensive view of KMGBF implementation. While the KMGBF does not identify all of the information needed to assess and protect biodiversity, it does provide a policy context that CEOS can use as it evaluates approaches for a sustained and enduring CEOS contribution to biodiversity; this was a priority of the Canadian Space Agency as 2024 CEOS Chair, and led to the recommendation to form the Biodiversity Study Team. Another key input to CEOS in this regard is the System of Environmental Economic Accounting (UNSEEA), which has identified Ecosystem Extent, Ecosystem Condition, and Ecosystem Services as three of its ecosystem accounts.

### **CEOS Biodiversity Study Team**

With the above as context, at the 2024 CEOS Plenary, the Biodiversity Study Team (BST) was formed for a one-year duration to assess the options for sustainable support for biodiversity in CEOS. This was the recommendation from the CEOS Chair after numerous consultations with the Convention on Biological Diversity and other key biodiversity organizations. Steps leading to evaluating the options include a stakeholder needs assessment, consultation across CEOS entities and agencies, and collaboration with the CEOS Executive Officer and others to develop the supporting documentation for the recommended option. That option will be presented at the 2025 Plenary.

The BST's Stakeholder Assessment utilizes a standardized table to capture the user needs of the biodiversity community. Each of the key biodiversity user organizations has an assigned BST member to interact with the organization to collect top-level user needs for which EO can play a significant role. These needs will be consolidated into a single, high-level list of needs suitable for discussion with CEOS entities to identify the areas for which CEOS is most able to contribute.

These areas will be summarized in a short document and used as the basis for discussion and assessment of the options that would be most appropriate for CEOS as an enduring entity for engagement with biodiversity. The result of that discussion will be a recommendation to CEOS at its 2025 Plenary. If endorsed, CEOS could then take the steps to create and implement that entity.

### **Biodiversity Demonstrators**

One of the deliverables of the CEOS [Ecosystem Extent Task Team](#) was a demonstrator to show the value of EO for ecosystem extent mapping and monitoring. The EETT was fortunate to have three demonstrators, each supported by a different CEOS organization: Work on each of these activities will continue over the next year as described below.

<b>Title</b>	<b>Sponsor</b>
Hudson Bay Lowlands	ECCC (Canada)
Costa Rica Forests	CNES (France)
Great Western Woodlands	CSIRO (Australia)

Hudson Bay Lowlands: Refinement of ecosystem mapping in the Hudson’s Bay Lowlands is continuing at the ecozone level with a focus on using satellite platforms that cover the entire ecozone. Ecosystem mapping in Canada will expand to the arctic and sub-arctic areas, as well as the Canadian prairies, learning from the case study completed in the HBL. In addition to AI and ML method development for ecosystem mapping, we will continue to explore additional EO datasets for various regional applications.

Costa Rica Forests: For the Costa Rica Forests demonstrator, as the work moves forward it aims to continue improvement of forest ecosystem maps using remote sensing data and providing indicators of ecosystem condition. At the same time, it will assess the ecological integrity of secondary forests in human-modified tropical landscapes to support biodiversity conservation. Methodologically, data from a variety of complementary sensors (radar, lidar, optical, hyperspectral) will be included in a Data Cube and then used to integrate classical ecology with remote sensing techniques to examine structure, composition, and function. Additionally, the project seeks to make the EO data as well as the resulting indicators available to ecologists, forestry professionals, and managers. The approach for assessing the conservation potential of forest ecosystems—based on mapping  $\alpha$  and  $\beta$  diversity at the national level in Costa Rica and

predicted both directly and indirectly from spectral information—was successfully tested in Peru. The deployment of the method will continue in Guyane Française, Réunion and Mayotte.

Great Western Woodlands: Research is ongoing for the Great Western Woodlands demonstrator and efforts are underway to increase the area of analysis to the full extent of the woodlands with CSIRO's EASI data cube platform. Additional L-band data SAR data that has been provided by JAXA is currently being processed, and the preliminary analyses are being expanded to incorporate Deep Learning approaches. UAV-LiDAR data and additional information on species composition will be acquired in an upcoming fieldtrip in July 2025.

### **III. CEOS and the Commercial Earth Observation Sector:**

The evolution of the global commercial Earth observation (EO) sector and the value of commercial and institutional data integration is a strategic topic for CEOS. The European Space Agency (ESA), as the 2022-2023 CEOS SIT Chair, established the New Space Task Team (NSTT) in December 2022 with the intent to submit recommendations regarding the potential role of CEOS in supporting and collaborating with the commercial EO sector. A White Paper and summary memo were produced and endorsed at the 2023 CEOS Plenary, and the work of the NSTT concluded. The Geo-Informatics and Space Technology Development Agency (GISTDA), as the 2023 CEOS Chair, moved CEOS forward through a Chair theme for 2023: "Supporting Exploration of New Geometries for Space Agencies and CEOS with New Space". The Canadian Space Agency (CSA), as the 2024 CEOS Chair, encouraged the reporting of commercial engagement across CEOS priorities at leadership meetings, and the development of further guidance documents.

The CEOS community has benefited from sharing experiences and exchanging information about initiatives across EO since its inception in 1984. This collaborative attitude creates an environment where CEOS Agencies can discuss new trends and it is necessary given recent trends that "New Space", more accurately described now as the "commercial EO sector", remains a subject of discussion across the CEOS community.

In January 2025, a new page was created on the public CEOS website to clarify opportunities for commercial sector engagement across CEOS:

*Increasingly, CEOS Members, Associates, and priority stakeholders are integrating both civil and commercial Earth observation (EO) data to optimize societal benefit and inform decision making. To this end, the strategic priorities of CEOS affirm that it must remain a forward-thinking and adaptive participant in the Earth observing community. As the world increasingly seeks to use and integrate high-quality civil and commercial space data at multiple spatial, spectral, and temporal scales, CEOS seeks commercial space sector engagement that is mutually beneficial and capable of expanding global impact.*

*CEOS welcomes collaboration with the commercial Earth observation sector through its thematically and technically oriented Working Groups (WG), Virtual Constellations (VC), and Task Teams.*

*Leadership meetings, including annual CEOS Plenaries and SIT meetings, are reserved for CEOS Members and Associates as defined in the CEOS Terms of Reference.*

Outreach and engagement requests from commercial sector actors can and should be evaluated by WG and VC leads on an individual basis. In some instances, WG and VC leadership may want to inquire how a commercial EO sector entity intends to contribute to the activities and deliverables of the relevant WG or VC. Requests to engage with CEOS entities should be based on activity- or project-driven cooperation and not individual marketing. CEOS entities are encouraged to highlight commercial engagement and/or new membership and contributions to group objectives during CEOS SIT, SIT Technical, and Plenary meetings as appropriate.

**2026-2027:**

It is anticipated that demand for solutions that seamlessly integrate civil and commercial data sources will increase in the coming years. Therefore, multiple groups across CEOS will continue to address this strategic topic, including the CEOS-ARD Oversight Group, LSI-VC, Systems Engineering Office, WGISS (including Interoperability Framework/Handbook activities), WGCV, and others.

Number	Objective/Deliverable Title	Projected Completion	Responsible CEOS Entity(ies)
OUT-24-02	Increase engagement with the commercial sector on CEOS-ARD	2026 Q4	CEOS-ARD OG
OUT-24-03	Unify CEOS engagement with the commercial sector at key meetings with respect to ARD and Cal/Val	2026 Q4	CEOS-ARD OG
OUT-25-01	LSI-VC & CEOS-ARD commercial engagement workshops and conferences	2026 Q4	LSI-VC, CEOS-ARD OG, SEO
OUT-25-02	Framework for commercial archive data catalogue and buyout opportunities for the public good.	2026 Q4	LSI-VC

### 3.12 CEOS Services

This section describes services provided by CEOS to the international Earth observation community. These are ongoing functions that serve space agency “core business” such as data discovery and calibration/validation, the CEOS Missions, Instruments and Measurements (MIM) database, the WGISS Connected Data Assets or Radiometric Calibration Network (RadCalNet). As ongoing functions, these services are presented in the Work Plan, but are not monitored in the same way as other Work Plan Deliverables.

### **I. Accessibility of CEOS Agency Datasets**

Full representation and accessibility of CEOS Agency datasets is provided by WGISS Standards and Connected Data Assets Infrastructure (i.e., International Directory Network [IDN], CEOS WGISS Integrated Catalogue [CWIC], Federated EO Gateway [FedEO]). As the Common Metadata Repository (CMR) contains OpenSearch endpoints for data access and is also the CEOS Data Collections access point for the GEOSS Platform (formerly GEOSS Common Infrastructure-GCI) and GEOSS Portal, it is essential that all CEOS Agencies keep information on their data collections, including Analysis Ready Data, up to date in the IDN according to its metadata model (DIF-10). This requires interaction with CEOS Agencies and data providers. The current status of Connected Data Assets and associated CEOS Agencies collections can be found at the following link on the [CEOS-WGISS website](#). CEOS Agencies are responsible for maintaining the accuracy of this information, in accordance with established guidelines, to ensure a consistent and up-to-date overview of the Connected Data Assets landscape.

**Responsible CEOS Entity:** WGISS, All CEOS Agencies and Entities

### **II. Radiometric Calibration Network (RadCalNet)**

The CEOS WGCV RadCalNet service provides all satellite operators (agencies and commercial) with access to ‘free and open’ SI-traceable Top-of-Atmosphere (TOA) spectrally-resolved reflectances to aid in the post-launch radiometric calibration and validation of optical imaging sensor data ([www.radcalnet.org](http://www.radcalnet.org)). This is an essential pre-requisite to achieving sensor-to-sensor harmonisation and subsequent data interoperability. RadCalNet provides the means to derive and correct for biases between sensors in a robust and consistent manner resulting in the information needed to assign the quality metrics increasingly required for many ARD products.

Following an initial developmental period with four sites, and an opening to the community in 2018, a fifth site was added (July 2020) following a peer review of the site against the membership criteria. Over the next few years, small evolutions are anticipated in documentation and procedures both at individual sites and at network level to account for improvements in technology, methodology and feedback from users. Whilst continuing to expand the range and number of users, membership of new sites are also anticipated and encouraged. Additional sites will increase the geographical and temporal availability of data while providing different spectral

radiometric properties. The continued improvements by WGCV's RadCalNet Working Group to RadCalNet processing and distribution, evaluation of test site protocols and hardware, and new test sites will facilitate the evaluation of a range of new sensor characteristics expected in the coming years.

**Responsible CEOS Entity:** WGCV

**I. Collection, Incorporation, and Quality Control of New and Updated Climate Information from Data Providers**

Update and verify the content of the ECV Inventory based on contributions by data providers and publish the annual version on [climatemonitoring.info](http://climatemonitoring.info).

Completion date is recurrent: Q4 every year from 2019 onward.

**Responsible CEOS Entity:** WGClimate

**II. Space Agency Statement to UNFCCC/SBSTA**

The WGClimate Chair drafts the annual "Space Agency Statement" to the autumn season SBSTA/COP and presents this for endorsement to CEOS and CGMS Plenaries (mostly done in virtual endorsement mode). The statement is presented at SBSTA by the country chairing CEOS. Completion date is recurrent in Q3/Q4 every year from 2019 onward.

**Responsible CEOS Entity:** WGClimate

**III. Maintain the Missions, Instruments and Measurements (MIM) database as a key tool to enhance understanding of Earth observations from space missions and data.**

The CEOS Missions, Instruments, Measurements Database, also known as the CEOS MIM Database, is the only official consolidated statement of CEOS Agency EO satellite-based programmes and plans. The Database represents the cornerstone of CEOS capabilities to undertake informed coordination decisions. Each year, the Database is updated based on survey inputs provided by all CEOS Agencies to reflect the current status and plans for CEOS Agency missions and instruments. In addition, CEOS issues quarterly updates on changes in mission status (e.g., launches, end of life). These quarterly updates inform community reporting between the annual comprehensive MIM Database updates.

The Database is an open resource serving CEOS, its Members and Associates, and the broader EO community. The European Space Agency (ESA) developed and maintains the MIM Database, and a website ([database.eohandbook.com](http://database.eohandbook.com)) which enables community access to the information. In addition, the CEOS SEO has developed analysis and visualisation tools (COVE, etc.) that use the MIM and support gap assessments. The information contained in the MIM Database is shared

openly with community members via the website, with exports in other formats available on request, and is part of the information backbone for several ongoing community resources.

CEOS will continue development of these resources each year, adding and updating functionality with a particular focus on engaging them for observational gap analyses, coordination of Earth observations, and the development of data products (e.g., CDRs, ARD, etc.). Where possible, links and mappings to other CEOS and community resources will be established and published, including COVE, FedEO, CWIC, the IDN, external information systems, such as WMO's Observing Systems Capability Analysis and Review Tool (OSCAR), the Global Change Information System (GCIS, <http://data.globalchange.gov/lexicon/ceos>), the EO Portal, JACIE, SATCAT/NORAD tracking information, and others. Over time, efforts will be made to increase the reach and utility of the information by making it available in machine readable formats (e.g., CSV, JSON, API, etc.).

The ESA CEOS MIM Database team will continue to lead the activity, and work on the development and promotion of new tools for, and in collaboration and coordination with, other CEOS Members and Associates, and the community. These efforts will seek to make maximum use of the information contained in the Database, in support of satellite derived EO data products and standards as defined by CEOS priorities and activities.

**Responsible CEOS Entity:** ESA

#### **IV. Publish the CEOS Newsletter**

CEOS, through contributions of JAXA, will continue the publication of this valuable, longstanding communications tool. CEOS Newsletter articles are posted once a month in a timely manner on its webpage and the annual newsletter is issued once a year.

**Responsible CEOS Entity:** JAXA

#### **V. Maintain the CEOS Website and Enhance Currency and Relevance of Content**

CEOS, with coordination through the SEO, will build on the "content management" approach underpinning the CEOS website to promote more up-to-date and relevant information for users. For example, the website will be proactively used to promote CEOS Agency launches.

**Responsible CEOS Entity:** SEO

#### **VI. Engage, attend, be strategically involved (where appropriate), report on CEOS achievements, and present at key meetings.**

On an ongoing basis, CEOS endeavors to maintain positive and productive connections with its Agencies and stakeholders during deliverable development. CEOS leadership and its representatives will seek to inform decision makers of CEOS Earth observation products and

coordination efforts and to enlist G20/G8 support, as practicable, for enhanced Earth observation coordination. CEOS will continue to highlight its contributions in global change monitoring and the significance of long-term satellite observation capabilities in statements at key high-level meetings.

**Responsible CEOS Entity:** CEOS Chair, SIT Chair, CEO, All CEOS Agencies and Entities

*This CEOS Work Plan will be updated annually by the CEOS Executive Officer (CEO) under the guidance of the CEOS Chair, and in consultation with the CEOS Strategic Implementation Team Chair, CEOS Secretariat, CEOS Working Groups, Virtual Constellations, Ad Hoc Teams, the CEOS membership at large, and external stakeholders. This document shall be consistent with and mutually supporting of other CEOS guiding documents.*