MINUTES OF CEOS SIT TECHNICAL WORKSHOP 2024 – 18-19 September 2024

Executive Summary

1. SIT Technical Workshop reviewed the work done by the CEOS Executive Officer Team to address action SIT-39-01. It was agreed that the impact of CEOS should be better understood, to understand the effectiveness of CEOS as an organisation.
2. The draft of Issue 2 of the GHG Roadmap was presented. The document is targeted for endorsement at CEOS Plenary 2024. The status of the GHG Best Practices was also presented, which is under review by the community and targeted for endorsement at CEOS Plenary 2025.
3. The Ecosystem Extent Task Team presented the status of their demonstrator work. The Canadian demonstrator will conclude at CEOS Plenary 2024, while the Australian and Costa Rican demonstrators will continue beyond Plenary.
4. The CEOS Chair presented draft recommendations for the way forward for CEOS on the topic of Biodiversity. The Chair recommends that a Biodiversity Study Team is formed with a term of one year to investigate in detail the role of CEOS in this space, and the future organisational home for the topic. A decision on this will be made at CEOS Plenary 2024.
5. CEOS support for the United Nations' Early Warnings for All (EW4All) Initiative was discussed, with the conclusion that more information is needed from the lead agencies (including WMO) to understand the specific request from CEOS.
6. WGISS is developing the CEOS Interoperability Handbook v2.0, and requested more engagement internally with CEOS, as well as externally. The topic is important to all aspects of Earth observation, so should be followed closely by all CEOS entities.
7. The CEOS-CGMS Statement to UNFCCC COP 29 SBSTA 61 has been drafted, and was reviewed during SIT Technical Workshop. UKSA will deliver this to SBSTA on behalf of CEOS & CGMS.
8. WGClimate is progressing the Space Agency response to GCOS, with 21 actions completed in 2023 and a similar number in 2024. The activity is on schedule for 2025 review and endorsement in line with the CEOS Work Plan.
9. The SIT Chair Team and WGClimate have developed a series of 16 recommendations on Lessons Learned from the First Global Stocktake. These will be discussed again at CEOS Plenary, with endorsement targeted for SIT-40. One key element is that products should be co-developed with users such that they are fit for purpose.
10. The Aquatic Carbon Roadmap is progressing in development, with outcomes from the Blue Carbon from Space Forum took in May 2024 to be included in the Roadmap.
11. The European Commission reported on the July 2024 IPCC Expert Meeting on Reconciling Land Use Emissions, which sowed important seeds of cooperation between the geospatial community and reporting community. A report from the meeting will be available in October.
12. GEO is starting the process to develop the Post-2025 Work Programme, with a call for proposals currently open. CEOS is invited to contribute to new and existing activities.
13. Progress on the actions supporting the AFOLU Roadmap continues. The biomass harmonisation effort aims to ensure consistency between products by enhanced coordination. SilvaCarbon, alongside CEOS and other partners, has delivered a number of workshops on biomass estimation and mangroves, with future work planned on forest fires.
14. P-VC reported that the International Precipitation Working Group (IPWG) recently produced a series of recommendations, including a top-level recommendation to maintain continuity of microwave imagers and promote future passive microwave sensors for precipitation.
15. COAST-VC noticed a lack of remote sensing technologies in communication materials for the UN Ocean Decade, and has hence developed a series of talking points to enable CEOS leadership to engage IOC, UN Ocean Decade and GOOS leadership in their countries where relevant.
16. SST-VC and COAST-VC presented a draft joint statement recommending masking requirements in coastal areas for upcoming SST missions. This will be presented to CEOS Plenary for endorsement.
17. The SEO has recognised a gap in the communication from CEOS around commercial participation in CEOS Activities at the working level, and would like to address this via an additional page on the CEOS website.

18. The SDG Coordination Group remains under-resourced. The SEO is working with UN-GGIM WGGI IAEG-SDGs on the 'Rescuing the SDGs' paper, and hopefully edit the metadata for a few select indicators to explicitly include geospatial data.
19. The SIT Chair is working through the External Requests Process Paper to respond to the letter from UNCCD.
20. The CEOS Missions, Instruments and Measurements (MIM) Database is currently undergoing the annual review cycle. The team is also working on implementing visual enhancements to improve the look, feel and performance of the website.
21. AquaWatch Australia is a new program being launched by CSIRO with a number of partners, and the objective to develop a new way to develop forecasts for water quality, merging in-situ, satellite data and modelling tools into a data analytics platform underpinned by Data Cube technology. The project leverages partnerships and relationships formed through CEOS, and the provision of space data from international partners demonstrates the power of cooperation.
22. The third UN Ocean Conference (UNOC) will be held in Nice, France in June 2025, as a part of the "UN Decade of Ocean Science for Sustainable Development 2021 -2030". CNES will seek endorsement at CEOS Plenary 2024 regarding CEOS representation in UNOC and the proposed Ocean Space Alliance.
23. OST-VC are updating the "Next 15 years of altimetry – OST Constellation User Requirement Document", last updated in 2009. This new document will be titled "A Coordinated International Satellite Altimetry Virtual Constellation: Toward 2050", and will provide an inventory of current and emerging user needs, as well as identifying gaps in the current international space constellation. OST-VC will target SIT-40 for CEOS endorsement of this document.
24. The 2025 CEOS Chair, UKSA, will focus on the headline theme of 'Unlocking Earth Observation for Society', and aims to bridge the gap between satellite EO and services. The activities include Unlocking EO for Public Service, Unlocking EO for the UNFCCC Global Stocktakes, Unlocking EO for the Global Methane Pledge and CEOS In Schools and Youth Summit.
25. The draft 2024 CEOS-ARD Strategy was presented, which aims to reaffirm the commitment of CEOS Agencies to supporting CEOS-ARD, reflecting on progress to date, take stock of future directions and needs, and confirm our strategy for the next few years. The document will be presented to CEOS Plenary for endorsement.

Session Index

Wednesday September 18th

Session 1: Welcome and Core Business

1.1: Welcome

Presenter: Hironori Maejima (JAXA, SIT Chair), Medhavy Thankappan (GA), Alex Held (CSIRO) *[presentation]*

Main points:

- Hironori Maejima (JAXA, SIT Chair) welcomed the participants to the 2024 SIT Technical Workshop.
- Alex Held (CSIRO) and Medhavy Thankappan (GA) welcomed participants to Sydney and acknowledged the traditional owners of the land, the Gadigal People of the Eora Nation. Alex thanked the SIT Chair for the opportunity to host the meeting.
- The SIT Technical Workshop is an opportunity to deepen discussions from the SIT-39 meeting in April, as well as prepare for the upcoming CEOS Plenary, in Montreal, Canada.
- Hironori reviewed the agenda for the coming two days.
- As a core activity of Climate Policy Impact, lessons learned from the first Global Stocktake (GST) are being compiled under the leadership of WGClimate Vice Chair, Wenying Su. During this session, the latest developments will be shared for input and feedback.
- For Greenhouse Gases Observation Coordination, the development of Issue 2 of the CEOS-CGMS GHG Roadmap is proceeding smoothly under the leadership of GHG Task Team lead, Yasjka Meijer. There will also be a progress report on the GHG Best Practices Document.
- Regarding the AFOLU Roadmap, the status of the actions will be reviewed, and efforts to ensure the Roadmap's smooth implementation will be discussed.
- The Ecosystem Extent Task Team (EETT) will report on their Demonstrator activities. The future plans for biodiversity-related activities in CEOS will be discussed, which will be presented for approval at CEOS plenary.
- Working Groups and Virtual Constellations have also been given an opportunity to present priority items for discussion. This includes the Interoperability Handbook, CEOS support for the UN Early Warning for All (EW4All) Initiative, and the draft CEOS-CGMS Statement for submission to SBSTA at UNFCCC COP-29.
- A number of other topics are also included in the agenda, including coordination with the GEO Post-2025 Work Programme, coordination with UNCCD, CEOS-ARD and SDGs.
- Participants were invited to introduce their delegations.

1.2: 2024 CEOS Plenary Objectives & Planning

Presenter: Eric Laliberté (CSA, CEOS Chair) *[presentation]*

Main points:

- The headline themes for the 2024 CEOS Plenary include: Sustained Biodiversity efforts, Climate Policy Impact, Greenhouse Gas Observations, and updates from the various CEOS Entities.
- The Plenary will also highlight the 40th Anniversary of CEOS, and a Montreal Plenary statement will be prepared in part to reflect on this milestone. The draft statement will be shared for Principal review by October 8, 2024.
- The meeting will be hosted at the CSA Headquarters, in Montreal, Canada from October 22-24, 2024.

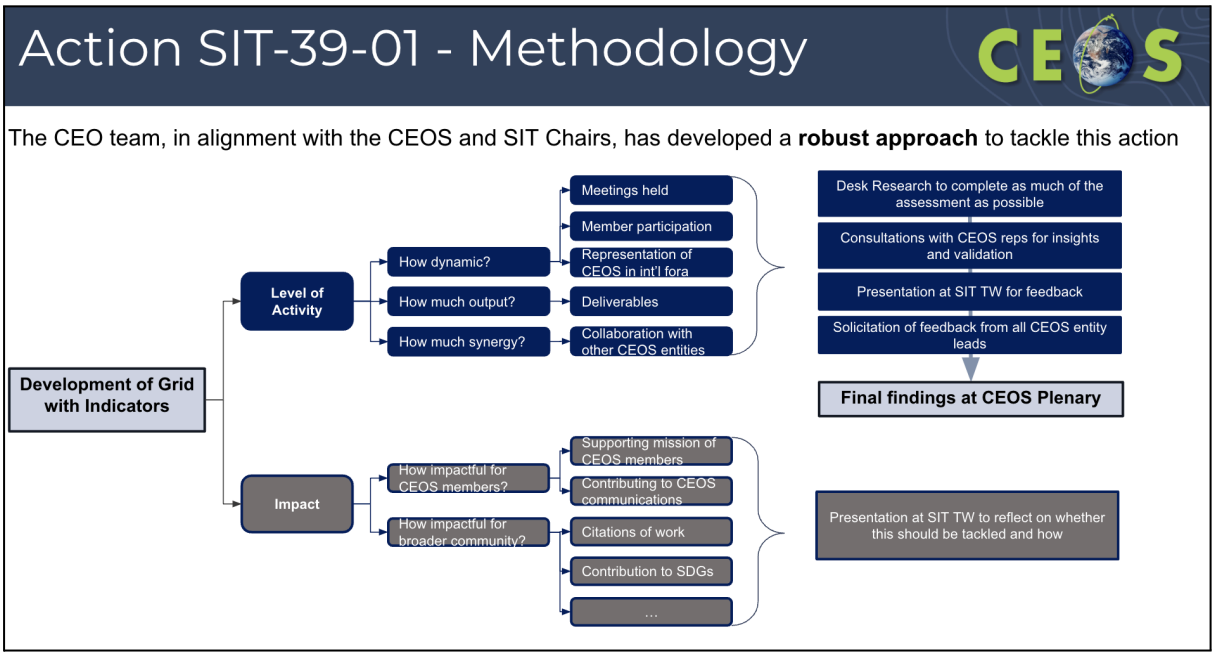
- Participants attending in person should send the requested passport details to the CSA team by 27 September to ensure access to the centre can be granted.
- The social programme includes an Indigenous campfire welcome and cocktail on the evening of Tuesday, 22 October, as well as the CEOS 40th celebration at Château Ramezay on Wednesday, 23 October.

1.3: 2024-2026 CEOS Work Plan and SIT-39-01

Presenter: Lefteris Mamais (CEOS Executive Officer Team) *[presentation]*

Main points:

- The CEOS Executive Officer Team was tasked with action SIT-39-01: *CEOS Executive Officer team to undertake an assessment of the level of activity of all CEOS constituent groups. Consideration should be given to their representation in the CEOS Work Plan and activity more generally, as well as their interactions with other CEOS entities. The CEO will report findings to the 2024 SIT Technical Workshop and facilitate a discussion.*
- The team has followed a systematic approach, and developed a grid of indicators.



- The analysis of deliverables revealed the following preliminary findings:
  - Activity of several working groups strongly reflected on the many active deliverables they have. From the Virtual Constellations, LSI-VC is the most active in terms of deliverables.
  - CEOS-ARD is very active amongst other activities.
  - Important nuances are not necessarily reflected in the number of deliverables, as often only the date changes, and several groups do not use the tracking tool consistently.
- A full mapping has been performed confirming significant synergies within CEOS (e.g. WGISS, ARD and LSI-VC) and outside (e.g. WMO, GEO).
- Regarding impact, the CEOS community is instrumental in providing input for future space missions, which directly benefits CEOS Agencies.
- Assessing the impact outside CEOS needs a more systematic approach. It would be good to be able to trace impact from CEOS work to the users, for example with GEOGLAM.
- This goal of the assessment is to understand if more resourcing is required for CEOS to achieve its goals.

- The CEOS Executive Officer Team consists of Steven Ramage, Lefteris Mamais and Irena Drakopoulou. Steven remains the primary support, with Lefteris and Irena supporting.

Main discussion points:

- Katy Matthews (NOAA) recognised that it is hard to look at the framework as presented and draw a conclusion, so Agencies will need to see the underlying data before a way forward can be decided. NOAA will look for any barriers present for Working Groups and Virtual Constellations, as well as if an improved direction can be provided to help those teams.
- Marie-Claire Greening (ESA) noted it is helpful to see where there might be gaps, and agreed that impact should be the focus, in particular with relation to the priorities of CEOS and how we are achieving those.
- The CEO team will share the underlying data so that additional questions and responses can be compiled, noting it reflects recent events only, based on the current CEOS Work Plan.
- Gary Geller (NASA, EETT Co-lead) welcomed the logical approach, but cautioned that the metrics themselves should not drive the activity of the groups, but rather impact should be the end goal. He asked about the weighting of approach and impact.
- Eric Laliberté (CSA, CEOS Chair) recognised that CEOS needs actionable information to help inform CEOS Principals and the Secretariat to better guide the organisation.
- Lefteris Mamais (CEO Team) agreed, recognising that the SIT-39 action is focused on representation and activity, but impact follows and should be considered if CEOS chose to expand the effort.
- Gary Geller (NASA, EETT Co-lead) via chat: *Eric made a good point, ie, if there is a lot of activity but not much impact, perhaps resources are not well-placed. So, the impact assessment would be useful for introspection and adaptively changing the activities according to results.*

Session 2: Greenhouse Gas Observation Coordination

2.1: Session Introduction

Presenter: Hiroshi Suto (JAXA) *[presentation]*

Main points:

- This session will cover the CEOS GHG Roadmap update, which is targeted for endorsement at CEOS Plenary; the ongoing work on GHG best practices; and the update of the CEOS GHG Portal being undertaken by the SIT Chair team.

2.2: Greenhouse Gas Roadmap

Presenter: Yasjka Meijer (ESA, GHG Task Team Lead) *[presentation]*

Main points:

- The GHG Task Team under WGClimate is responsible for the GHG Roadmap among other topics.
- CGMS has appointed Simon Elliot (EUMETSAT) as a Point of Contact to the Task Team, ensuring a smooth connection between CEOS & CGMS on this topic.
- The Roadmap has been restructured, with the underlying contents much the same but with specific updates and the addition of an Executive Summary. Draft issue 2 was circulated 9 September for feedback by 25 September, with the final version planned to be distributed to CEOS Principals by 8 October.
- Issue 2 will be presented for endorsement at Plenary by Wenying Su (NASA, WGClimate Vice-Chair).
- Longer-term actions have been moved from Annex C and instead detailed in chapter 5. This will hopefully improve the specificity and actionability of the actions in Annex C. Further refinement

of the actions will take place over the coming months, including during a side meeting at the upcoming WGClimate meeting in Harwell, UK in February 2025.

- Section 3 of the GHG Roadmap is now focused on stakeholder engagement, including UNEP IMEO and WMO G3W. Points of contact have been identified for IMEO (John Worden, NASA JPL) and G3W (Vincent-Henri Peuch, ECMWF). Section 5a, "Fostering stakeholder engagement", has also been added.
- The G3W Director, Gianpaulo Balsamo, has provided inputs to the Roadmap, and the collaboration remains strong.
- IMEO collaboration started strong last year, but has trailed off after the initial working group meetings. The aim is to reinvigorate, particularly regarding use cases. It could be valuable to have additional collaboration with IMEO, for example on aircraft activities and controlled release experiments. The GHG Task Team hopes to be able to open up hyperspectral data for IMEO activities and work towards a more automated tip-and-cue system for IMEO.

Main discussion points:

- Osamu Ochiai (JAXA) voiced JAXA's strong support for the GHG Roadmap, recognising the classification and refinement of short and long term goals will be a key improvement. This change should be made clear at CEOS Plenary. For the short term, CEOS should discuss what can be delivered at the product level, as well as the additional coordination needed to provide consistent inputs to policy frameworks.
- Yasjka Meijer (ESA, GHG Task Team Lead) noted that the Task Team plans to work towards more detailed actions, including prioritisation and time frame. This will be done in the review of Annex C early next year. On harmonised products, the hope is that this will also be reflected in the best practices document - which is cited in the Roadmap.
- Katy Matthews (NOAA) appreciated that the Roadmap is written in a manner that is digestible for non-experts. Regarding capacity/co-development side, effort needs to be put into this aspect to ensure similar discussions can be avoided when the next Global Stocktake comes around.
- Yasjka recognised CEOS shouldn't only look at the GST, but also a broader group of stakeholders, for example the Covenant of Mayors. He would like to see them using satellite data to deliver action on emission reduction.
- Katy noted that during the recent AmeriGEO Week, there was a training session on use of methane data, and there could be some lessons to draw from that.
- Eric Laliberté (CSA, CEOS Chair) noted that in Section 4c, non-governmental as well as private organisations doing GHG observations are addressed. There may be gaps in our communications to external and user communities, and it may be difficult to coordinate at an international level due to commercial interest.
- Yasjka recognised it is important to understand what observations are available, including from commercial sources. The best practices effort is a first step to standardise the data for the users which can also support non-CEOS Agency data providers.
- Peter Strobl (EC-JRC) via chat: *Many of the points mentioned in the GHG Roadmap we just discussed (automation, operationalisation, ease of access, fitness for purpose, standardisation) resonate with the concepts of CEOS-ARD. It would be great if we could see GHG proposals for 'product family specifications' (PFS) and further input to the CEOS-ARD and Interoperability efforts.*

2.3: Greenhouse Gas Best Practices

Presenter: John Worden (NASA/JPL) and Paul Green (UK NPL) *[presentation]*

Main points:

- The Best Practices focus on measurements that are of the facility scale, i.e. at the scale of tens of metres.
- The Global Methane Pledge (now signed by over 150 countries) seeks to reduce methane emissions by 30% from facilities between 2020 and 2030.
- There is a growing constellation of dedicated GHG satellites, and a need for guidelines for how these data should be developed and reported. Satellite data is increasingly being used for methane-related policy, regulation, and legal applications reflecting significant changes in laws and regulations around the world. As well as the oil and gas industry, there is a growing demand from climate risk reporting and insurance, etc., including voluntary schemes.
- UNFCCC COP-28 had events on monitoring methane from space, and NPL hosted a related workshop in February 2024.
- The best practices document is intended for use by both producers and users of the data. It covers common practices for L0-L4 data, validation, and a Quality Assurance (QA) framework.
- The system should guard against false positives. As a consequence, there tends to be a human in the middle of this process, which impacts what level of emissions is reported. The validation process takes a double blind approach.
- The QA framework is a joint effort between ESA-NASA-NPL, and others. The objective is to come up with a framework drawing on past knowledge from the NASA Commercial Smallsat Data Acquisition (CSDA) assessment.
- The timeline is driven heavily by existing commercial missions that are already being used, and will be revised towards the end of this year. 2024 has focused on developing the outline and going through peer review (including the GHG Task Team). 2025 will focus on developing more details, so that a working best practice will be ready towards the end of 2025.
- The team requested continued support of effort to define best practices for quantifying and reporting emissions. There is an identified need to extend a Best Practices to Area Flux Mappers to better support the Global Stocktake and Global Methane Pledge as well as diffuse point sources and other sectors.

Main discussion points:

- Jeff Privette (NOAA, WGClimate Chair) asked if any new space companies have been involved in the drafting or coordination, and Paul Green (UK NPL) confirmed they have been speaking with GHGSat, Carbon Mapper, MethaneSat, and others.
- Jeff asked about the QA framework, noting that it differs from previous work done by WGClimate with the CDR assessments. Who will perform the assessment?
- John Worden (NASA JPL) noted that GHGSat data was reviewed against the framework as part of NASA CSDA program. In future, the evaluation should be completed by an operational agency, but that remains to be determined.
- John Remedios (UKSA) recognised it is important that best practice is framed by those it is targeted at. How to have the guidance accepted, and how to promote uptake will need careful consideration.

2.4: CEOS Greenhouse Gas Satellite Missions Portal 2024 Update

Presenter: Libby Rose (SIT Chair Team) *[presentation]*

Main points:

- The CEOS GHG Satellite Missions Portal was created in 2023 as a collaboration between the SIT Chair Team and the CEOS MIM Database Team.
- The portal includes information on all current and planned greenhouse gas missions, including those from commercial and non-governmental organisations.

- To ensure the information is accurate and up to date, the team has contacted all commercial companies with missions listed on the portal. No dedicated point of contact has been identified for Orbital Sidekick and BrightSkies, and the team have been unable to get a response through their general contact channels. Any assistance in contacting these companies would be greatly appreciated.
- CEOS Agency updates are covered by the annual MIM Database survey, which is in the process of wrapping up now.
- To identify any new missions, the team conducted desktop research, as well as put a call out on the CEOS social media channels. One new mission was identified: UVSQ-Sat NG.
- Two new features will be added to the portal in 2024. The first is a case studies section, which consolidates existing web stories on the impact of space-based data.
- A 'constellation builder' spreadsheet has also been set up, which includes a number of filterable columns to allow a user to build a constellation of missions which meet certain requirements.
- The team have prepared a mock-up for a small postcard flyer to promote the GHG Portal. If agencies would like to bring this to COP-29, printing of these can be arranged to be distributed at CEOS Plenary.

Main discussion points:

- Yasjka Meijer (ESA, GHG Task Team Lead) thanked the SIT Chair Team for the GHG Portal, noting he has had many comments from the community about its utility. Jeff Privette (NOAA, WGClimate Chair) likewise supports the Portal.
- The CEOS GHG Portal uses information directly from MIM Database, and also includes representation from commercial data providers using the database backend.
- Alex Held (CSIRO) likes the constellation builder tool, and noted this approach is also being used for water quality and AquaWatch Australia.
- John Remedios (UKSA) commended the portal, and asked about the non-specialised SWIR and Sounder instruments that can also measure greenhouse gases.
- Libby Rose (SIT Chair Team) noted that the GHG portal makes mention of the many non-specialised instruments that have a theoretical capability to measure one or more greenhouse gases but that don't feature highly in the portal. The selection of missions is not automated based on MIM capability statements - it is the result of significant collaboration and discussion with the GHG Task Team with a focus on those missions with a purpose and substantial activity around GHG measurements specifically.

2.5: Other Greenhouse Gas Topics (For Discussion)

Moderator: Hiroshi Suto (JAXA) *[presentation]*

Main points:

- GST2 will be held in 2028, and will require preparation from CEOS Agencies to maximise impact.
- Satellite-based GHG measurements have great potential, but there are numerous stakeholders and avenues which require engagement. This engagement is a key focus for the JAXA SIT Chair Team.

Session 3: Biodiversity

3.1: Ecosystem Extent Task Team (EETT) Demonstrator Outcomes (For Information)

Presenter: Shaun Levick (CSIRO, EETT Co-lead) *[presentation]*

Main points:

- The task team was established to assess the utility for mapping Ecosystem Extent using current and new space-based observations that will become available in the next 10 years.
- The team has undertaken three demonstrators in 2024: Hudson Bay Lowlands (Canada, led by ECCC), Great Western Woodlands (GWW, Australia, led by CSIRO) and Tropical Forests (Costa Rica, led by CNES).
- Ecotype mapping using AI/ML in support of operational monitoring was the objective for Hudson Bay Lowlands demonstrator. Canada has a high level commitment to map all of Canada consistent with IUCN 2.0 Typology, Level 3 – Functional Groups by 2026.
- The GWW demonstrator is led by CSIRO with the goal of distinguishing vegetation assemblages and stand ages for land management and conservation. The demonstrator is using the CSIRO EASI platform, and has demonstrated the value of multi-sensor / multi-agency imagery, the importance of CEOS-ARD, the efficiency of EASI/ODC, and the need for large sample sizes of field data/labelling. Will move to using the full Landsat archive and GEDI in the next phase.
- The Costa Rican Tropical Forests demonstrator is led by CNES. The data cube architecture is operational, focusing on indices derived from Sentinel-2. On-ground validation work is ongoing, and further updates will be given at CEOS Plenary.
- EETT is nearing the end of its two-year timeline, with the white paper delivered in November 2023. Demonstrator work will continue beyond the close of the EETT initial mandate, which is expected to occur at Plenary.

Main discussion points:

- Ake Rosenqvist (JAXA) repeated his offer from the side meeting to provide additional time series of high resolution ALOS-2 scene data for the GWW demonstrator. He noted that the current GWW work is using the global ALOS mosaic products which don't offer as much value as the time series data.
- Julie Robinson (NASA) congratulated the team for the broad international scope and their work over the last two years, noting the lessons learned will help inform future work.
- Alex Held (CSIRO) asked if anyone from CEOS or the Canadian Government will be engaged in the upcoming UN CBD COP-16, noting that he will be attending as a part of the Australian delegation, and could represent CEOS. Eric confirmed the delegation from Canada will be led by Environment and Climate Change Canada and he will coordinate with ECCC on materials.
- Osamu Ochiai (JAXA, SIT Chair Team) asked if the results of the demonstrators will be published, for example in a paper or scientific journal. Shaun Levick (CSIRO, EETT Co-lead) confirmed they hope to summarise results across the three demonstrators, including around the utility of the various data types.
- Gary Geller (NASA, EETT Co-lead) noted that future work may include mapping UNIC GET typologies to different types of products and sensors. The ECCC team has begun this work, and hopefully will get some analysis by Plenary. This work is cutting edge, in particular around the application of multiple sensors to these mapping tasks.
- Eric Laliberté (CSA, CEOS Chair) agreed it is important not to keep the demonstrator findings internal, and that they should be communicated and summarised more broadly.

3.2: Proposed Inputs for CEOS Plenary Decision Regarding the Future of CEOS and Biodiversity (For Discussion)

Presenter: Eric Laliberté (CSA, CEOS Chair) *[presentation]*

Main points:

- The key takeaway from the joint Biodiversity Workshop hosted by UN CBD was that all organisations are looking to help countries (users) that will want and need to report on the progress against biodiversity loss.

- UN CBD is looking for support in the implementation of the Global Biodiversity Framework, and is looking to CEOS for guidelines on how to use satellite data for reporting against the goals.
- The 'Joint Communique' shared with the agenda is still an early draft, and is intended to communicate the intent to collaborate between CEOS, UN CBD, GEO BON and GEO Secretariat on the topic of Biodiversity. Feedback on the document is welcome.
- Proposal for a sustained presence of biodiversity in CEOS transition approach is to re-purpose the EETT into a "Biodiversity Study Team" with a view to establishing a new entity at CEOS Plenary 2025.
- The Study Team would have a 12-month mandate, with the following suggested tasks and deliverables:
    - Identify missions that can contribute to biodiversity;
    - Pull together guidance for countries looking to understand how to invest in their monitoring systems (e.g. decision tree);
    - Define structure that communicates potential contributions of missions to users;
    - Identify CEOS contributions to external existing projects;
    - Identify, in collaboration with WGCapD, examples of educational tools needed by national users;
    - Develop, in collaboration with CEO, the documentation in support of the creation of a WG Biodiversity; and,
    - Propose work plan activities and eventual WG Biodiversity tasks.
- The Chair suggested several actions around CEOS international collaboration on biodiversity, and it is proposed to have the CEOS Secretariat and CEOS Executive Officer (in collaboration with the proposed Biodiversity Study Team) maintain and strengthen the relationships with UNCBD, GEO Secretariat, and GEOBON.

Main discussion points:

- Tim Stryker (USGS) recommended that CEOS should be careful to not rush into deciding where Biodiversity fits in the organisational structure. An inclusive approach to engagement should be followed to ensure CEOS can productively engage with the global biodiversity community. CEOS needs to maintain its own identity in this space, and not be completely driven by external stakeholder requests.
- Eric Laliberté (CSA, CEOS Chair) confirmed that CSA does not have a presumed solution or outcome.
- Roger Sayre (USGS) supports the idea of an interim biodiversity study team, including the proposed tasks. The 'vision' tasks for the transition study team will be good to complement the research and development side covered by the demonstrators.
- Roger commended the CEOS Chair on taking advantage of their co-location with UN CBD. The future Biodiversity group would likely support the larger biodiversity community in the long term, but in the shorter term, the focus should be on UN CBD, UN System of Environmental-Economic Accounting (UN SEEA) and the GEO Ecosystem Atlas.
- Alex Held (CSIRO) noted that CSIRO is interested in continuing this work and supporting the next steps through Shaun Levick and others. He questioned framing the team as a 'study team' instead of an 'ad hoc team'. The connection to the SDG Coordination Group should also be explored, as there are quite a few SDG indicators that might be addressed through this work.
- Eric is aware of the official nature of Ad Hoc Teams, but in the recent past CEOS has also had task teams and study teams for this type of work.

- Julie Robinson (NASA) appreciated the thought that has gone into this proposal. NASA would like to ensure the current EETT doesn't lose momentum. The interactions with UN CBD is really important and aligns with overall goals of CEOS better aligning and engaging with end users. NASA is committed to both working on the team as it evolves, but also from a Secretariat perspective, helping to define what is brought to Plenary.
- Julie added that users often don't know how to express needs in an actionable form, and hence NASA is confident that a year is the right amount of time to inform the next steps.
- Marie-Claire Greening (ESA) recalled that CEOS has governance documents to support these processes, which should be followed where appropriate. It is also important to understand what the 'user' is asking from CEOS. CEOS should be aware that maybe a new entity isn't created at the close of the study team, and the activities are instead distributed across the existing groups.
- Osamu Ochiai (JAXA, SIT Chair Team) noted that Biodiversity is the next major issue for the world to tackle, after Climate Change.
- Katy Matthews (NOAA) agreed with the need to follow the process documents. There may also be other things that change the direction of CEOS, including UN CBD COP-16. How will the science needs be balanced in the interim period? Katy also suggested a two-year study team may be necessary, noting the lengthy process needed to establish COAST-VC.
- Ake Rosenqvist (JAXA) drew parallels to the Ramsar convention. The Ramsar standing committee has requested a body similar to the UNFCCC SBSTA to work with the Ramsar Secretariat to provide guidance on EO for wetland observations. There is also an Earth Information Day planned for the Ramsar meeting in December.
- Gary Geller (NASA, EETT Co-lead) recognised one of the key components of the study team's outputs will be an assessment of what CEOS can respond to. With that assessment, CEOS can determine the future direction of Biodiversity work.

SIT-TW-2024-01	CEOS Chair Team to work with Ecosystem Extent Task Team to develop a proposal on the way forward for evolution of the Task Team and a sustained presence for biodiversity in CEOS. The proposal should be informed by, and comply with, CEOS governance documents on new initiatives and entities.	**CEOS Plenary 2024**
	Ecosystem Extent Task Team recommends an expanded mandate to include other aspects of biodiversity, and to continue working over the next year to set a course for CEOS contributions to Biodiversity.	

Session 4: Working Group Priority Topics

4.1: CEOS Engagement with the United Nations' Early Warnings for All (EW4All) Initiative

Presenter: Osamu Ochiai (JAXA, SIT Chair Team), Laura Frulla (CONAE, WGDisasters Chair) *[presentation]*

Main points:

- At SIT-39 an action was recorded (SIT-39-11) for the SIT Chair to confer with WGDisasters Chair and Vice Chair regarding potential CEOS contributions to the UN's Early Warnings for All (EW4All) initiative.
- EW4All was launched in 2022 by the UN Secretary-General, and strives for global early warning coverage by 2027.
- EW4All includes four pillars:

  - Disaster risk knowledge and management (led by UN DRR);
  - Detection, observation, monitoring, analysis, and forecasting (led by WMO);
  - Warning dissemination and communication (led by ITU); and,
  - Preparedness and response capabilities (led by IFRC).

- The 2023-2027 Action Plan for EW4All describes the actions and resources needed to accomplish the goals. Two key action areas have been identified by the SIT Chair Team as relevant for CEOS.
- Thirty initial countries have been identified for coordinated and targeted support. It is unclear to the SIT Chair how the national roadmaps and plans link with the high level Action Plan.
- WGDisasters have begun engaging on this topic, including via a meeting held with SIT Chair, WMO and WGDisasters earlier this year.

Main discussion points:

- Tim Stryker (USGS) asked if CEOS has been asked by a UN organisation to play a role. Osamu Ochiai (JAXA, SIT Chair Team) recalled that WMO had asked for general support, but nothing specific.
- Alex Held (CSIRO) suggested that CEOS should try to understand whether the request is mostly related to climate disasters or if it is more generic.
- Agnes Lane (Bureau of Meteorology) recalled the rapid assessment last year carried out by WMO based on key hazard types. There is some work to identify the satellite data gaps globally, and a number of task teams have been established under WMO. It would be good to have a WGDisasters representative engaged with these task teams.
- Julie Robinson (NASA) recognised the Director-General's request for satellite data can be applicable to several types of warnings handled by different types of remote sensing data, and hence CEOS support could be provided for a number of different aspects. It is not obvious where in CEOS this should live, with immediate relevance noted for WGDisasters and WGCapD. Perhaps a short-term team should be established to understand the low-hanging fruit.
- Flora Kerblat (CSIRO) asked if there had been any feedback on the Tonga pilot.
- Laura Frulla (CONAE, WGDisasters Chair) hasn't seen any feedback yet on the Tonga pilot on how this was received, however it will be on the agenda for WGDisasters-22 next month.
- Katy Matthews (NOAA) recognised that parts of the second pillar are really narrow in scope, notably the goal to 'improve the ability to do watches and warnings'. However, the full scope of EW4All is much broader. CEOS should also make sure to not duplicate the work of CGMS, and CEOS perhaps could focus on the geophysical side if there is interest there.
- Albert Fischer (WMO) recognised that CEOS work is relevant beyond pillar 2. Pillar 1 & 4 may also be relevant, and CEOS should engage with the relevant leads. The priorities of WMO for pillar 2 has been defined through its members, and hence focuses more on weather hazards. WMO is working with its members to understand the gaps, including with satellite agencies. Albert also noted that 2027 is a political goal, as this aligns with the end of Director-General's term, and the work will continue beyond.
- Dave Borges (NASA, SEO) recalled a letter from WMO a year ago with a list of hazards, and questioned whether CEOS responded.
- Osamu Ochiai (JAXA, SIT Chair Team) noted that the SIT Chair will continue to drive this topic forward, and will participate in the dedicated session at WGDIsasters-22. The topic will then be brought to the CEOS Secretariat to discuss further.
- Julie Robinson (NASA) suggested a presentation should be made to CEOS Plenary on this topic, including the information from the letter.

SIT-TW-2024-02	SIT Chair Team to work with the CEOS Secretariat to acknowledge the letter received from WMO regarding CEOS support for Early Warnings for All (EW4All) and to prepare a principal-level discussion at the 2024 CEOS Plenary. The first step is to inform WMO in writing that the matter is being discussed in CEOS at the technical and Principal levels.	**CEOS Plenary 2024**
	CEOS needs to clarify the origin of the EW4All approach for support and to consider the appropriate process for a comprehensive CEOS response. The SIT Chair will take the lead, starting with a review of the letter received from WMO in September 2023. The SIT Chair will also participate in the WGDisasters-22 meeting, noting the intention to have a discussion at that time with representatives of the four EW4All pillars.	

4.2: CEOS Interoperability Handbook v2.0

Presenter: Tom Sohre (WGISS Chair, USGS) and Nitant Dube (WGISS Vice Chair, ISRO) *[presentation]*

Main points:

- The CEOS Interoperability Framework was endorsed by CEOS Plenary in 2023.
- The CEOS Interoperability Handbook Version 2.0 aims to provide guidance to the organisations for development of Interoperable Data and Services, and help assess maturity level.
- The Framework addresses five factors: Vocabulary, Architecture, Interface, Quality, and Policy.

CEOS Initiatives linked to Factors

Factor	Vocabulary (Semantics)	Architecture	Interface (Accessibility)	Quality	Policy
CEOS Initiatives	**CEOS Common Online Dictionary** Cal-Val Terms and Definitions Long term Preservation of Earth Observation Space Data : Glossary of Acronyms and Terms	CEOS-ARD (Guidelines) CEOS Persistent Identifiers Best Practices Data preservation and Management Best Practices WGISS Data Management and Stewardship Maturity Matrix	WCDA, FedEO, CWIC, IDN CEOS Open Search Best Practices STAC Best Practices CEOS Service Discovery Best Practices	CEOS CALVAL & QA4EO FRM Assessment Framework ESA-NASA EO mission Quality Assessment Framework	Data Purge Alert Open Data

- To date, the work has focused on the Vocabulary Factor, which builds on the work done and paper published by Peter Strobl, Emma Woolliams and Katrin Molch. The chapter includes a number of recommendations to follow to build datasets with interoperable vocabulary.
- Demonstrators are planned to understand interoperability based on the handbook recommendations. This include the Earth Observation Plug and Play (EOPnP) modules
- It was recommended that commercial entities be engaged in the development of the handbook. However, the team is unsure how to engage these organisations. Furthermore, there has been a lack of voluntary involvement of contributors within CEOS.

Main discussion points:

- Marie-Claire Greening (ESA) asked what the CEOS community can do to ensure appropriate engagement.
- Tom Sohre (USGS, WGISS Chair) noted that WGISS has circulated some emails in the past asking for volunteers from Agencies and Working Groups / Virtual Constellations. Presenting the status today is an effort to increase outreach to encourage participation.
- Dave Borges (NASA, SEO) asked how WGISS plans to engage commercial entities.
- Tom noted they are looking for more guidance on how to engage the commercial sector, as the team currently doesn't have the right expertise.
- Tim Stryker (USGS) recognised that interoperability is part of the founding Terms of Reference and charter of CEOS. With so many developments in the commercial sector, CEOS needs to ensure divergence isn't occurring as it may hamper future investments. It is imperative that other components of CEOS be engaged and work from a macro level.
- Osamu Ochiai (JAXA, SIT Chair Team) recalled that Working Groups are welcome to involve the commercial sector as necessary in their activities.
- Marie-Claire Greening (ESA) recognised this is an issue that affects all aspects of CEOS, not just WGISS. CEOS should look for the appropriate engagement internally first, then start looking externally.

SIT-TW-2024-03	CEOS Executive Officer to support the WGISS Interoperability team in securing the appropriate engagement across CEOS, as well as identify potential approaches and opportunities for CEOS to consider for engagement with the commercial sector. WGISS to report on progress regularly at CEOS Secretariat meetings.	**SIT-40**
	The Interoperability Handbook in development should have engagement from across CEOS and beyond, as it is an issue that affects all aspects of EO. The CEOS Secretariat is the appropriate forum to discuss if the proposed engagement is advised before proposing it to the broader CEOS community..	

4.3: Draft CEOS-CGMS Statement to UNFCCC COP 29 SBSTA 61

Presenter: Jeff Privette (NOAA, WGClimate Chair) *[presentation]*

Main points:

- UNFCCC's Subsidiary Body for Scientific and Technological Advice (SBSTA) meets annually at the Conference of Parties (COP) and has invited CEOS and CGMS jointly to submit and read a short Statement at the meeting.
- Previous statements emphasised CEOS climate-related activities and accomplishments but recent versions have included stronger advocacy, and Global Stocktake issues.
- The 2024 draft features an educational focus on space-enabled climate discoveries, understanding and advances, and CEOS support to new UN-related GHG programs, including the Global Methane Pledge, UNEP's International Methane Emissions Observatory, WMO's Global Greenhouse Gas Watch, and the Global Stocktake process.
- The draft is open for agency comments until 30 September before a virtual endorsement in early October. CEOS Plenary endorsement in October will largely be ceremonial, as the SBSTA meeting starts 11 November, and the statement is required one month prior.

SIT-TW-2024-04	CEOS Agencies are invited to provide comments on the draft CEOS-CGMS Joint Statement for UNFCCC SBSTA	**30 Sep 2024**

	developed by WGClimate. JAXA is invited to provide a few sentences on a key Land or AFOLU climate discovery/advance enabled by space obs.	
	Comments are needed before 30 September to satisfy the requirements of the schedule for endorsement by the 2024 CEOS Plenary, transmission to the 2025 CEOS Chair (UKSA) as the statement provider at COP, and submission to SBSTA.	

Main discussion points:

- Osamu Ochiai (JAXA) noted that JAXA would like to see representation of land sector issues in the statement. Other CEOS Agencies are invited to contribute to such an addition.

4.4: GCOS Implementation Plan Response and Essential Climate Variable (ECV) Inventory

Presenter: Jeff Privette (NOAA, WGClimate Chair) *[presentation]*

Main points:

- The Space Agency response to GCOS in 2022 was intended to describe the needs and gaps in the Global Climate Observing System. In 2022, GCOS provided 16 Actions, each with multiple activities.
- WGClimate is addressing these with a two-phase response including 21 completed in 2023 and a similar number in 2024. The activity is on schedule for 2025 review and endorsement in line with the CEOS Work Plan.
- The ECV Inventory has evolved over the years, serving as the only international compendium of current and future Climate Data Record (CDR) metadata. It is used internally to determine space architecture requirements to sustain CDRs, and by the CDR application and research community as an authoritative one-stop CDR library.
- V4.1 was released in November 2022 (CDR entries: 870 existing, 381 planned), and V5.0 is expected in November 2024.
- There will be an effort to redesign the Inventory in 2025, seeing a simplified structure easier for providers, maintainers, and reviewers, and to add some new features. The features will be continually updated, rather than the versioning system used previously.
- The purpose of the gap analysis is to identify shortcomings for climate monitoring in the current and future space architecture, as well as opportunities to improve CDR production supporting GCOS ECVs and Fundamental CDRs. The 2024 Gap Analysis Report is currently undergoing internal review, and is expected to be released to Agencies in early-October.
- A series of key needs were outlined aimed at enhancing the integration and effectiveness of global climate observation systems. These are focused on improving frameworks for data requirements, consolidating ECV products into uniform physical quantities, fostering interoperability between major databases, simplifying ECVs for better atmospheric analysis, and operationalising climate data records across various satellite missions for comprehensive environmental monitoring.

Main discussion points:

- Wenying Su (NASA, WGClimate Chair) noted that GCOS has established a team across three panels to discuss the rationalisation of ECVs. Consultation meetings will begin in the October - November timeframe. WGClimate will discuss and provide inputs to the first draft of the rationalisation, and the impact on CEOS work will also be discussed.
- Yasjka Meijer (ESA, GHG Task Team Lead) recognised the WMO Global Greenhouse Gas Watch Implementation Plan contains a foothold for space based observations in a changing climate. Is that being reflected in the gap analysis?

- Jeff Privette (NOAA, WGClimate Chair) clarified that the gap analysis focuses on answering the question of whether we will be able to sustain the current climate observations. Jeff is uncertain how GHGs are currently represented, however the measurement of GHGs is quite recent compared with longer-term CDRs. The commercial sector also hasn't been included in the inventory, which will be considered for the next version.

4.5: Working Group Leadership Changes at Plenary

Presenter: Hironori Maejima (JAXA, SIT Chair) on behalf of Eric Laliberté (CSA, CEOS Chair) *[presentation]*

Main points:

WGCV

- Philippe Goryl (ESA) will step down as WGCV Chair after two years in the role.
- Cody Anderson (USGS) will transition from WGCV Vice Chair to WGCV Chair at CEOS Plenary.
- A nomination has been received from Geoscience Australia for Medhavy Thankappan to take on the role of Vice Chair for 2025-2026, and subsequently Chair for 2027-2028.

WGClimate

- Jeff Privette (NOAA) will step down as WGClimate Chair after two years in the role.
- Wenying Su (NASA) will transition from WGClimate Vice Chair to WGClimate Chair at CEOS Plenary.
- A nomination has been received from ECMWF for Vincent-Henri Peuch to take on the role of Vice Chair for 2025-2026, and subsequently Chair for 2027-2028.

These nominations will be formally approved at CEOS Plenary next month.

Session 5: Climate Policy Impact

5.1: Introduction and Context

Presenter: Osamu Ochiai (SIT Chair Team, JAXA) *[presentation]*

Main points:

- Climate Policy Impact is a priority for the two-year JAXA SIT Chair term, and seeks to address obstacles and opportunities for CEOS Agency data to have maximum impact in key climate policy processes such as the Global Stocktake of the Paris Agreement.
- Need to assess and reflect on whether we are engaging with the right stakeholders in the best way, or whether we might consider alternate or additional strategies.
- The Global Stocktake of the Paris Agreement is a data-driven policy exercise, and is an opportunity for the observations community to play a key role. For GST1, CEOS collaborated with WMO, GCOS and other community players to promote the role of observations in the process producing the “GST-1 synthesis report”. This provided national-scale global budgets of GHG emissions for both anthropogenic and natural GHG sources and sinks of CO2 and CH4.
- Previously, the SIT Chair developed the CEOS GST Strategy to coordinate activities. The GST Portal was published to support the Strategy, which compiles relevant datasets produced by CEOS Agencies.
- Despite this effort, uptake of the derived global products for UNFCCC country reporting on forests has been low, and pilot top-down national GHG products developed for GST1 generated very little traction. Only IPCC inputs appear to have had an impact.
- There have been some significant dialogues with the Global Carbon Project and IPCC/TSU which may help suggest a way forward.

5.2: First UNFCCC Global Stocktake (GST) Lessons Learned Study

Presenter: Wenying Su (NASA, WGClimate Vice-Chair) *[presentation]*

Main points:

- Following the first Global Stocktake (GST1), it is a good time to reflect on whether the current relationships and activities are effective to enhance uptake of CEOS agency data in future GSTs.
- Lessons learned have been summarised in three categories:
  - **Inputs to the GST process:** pilot atmospheric CO_2 and CH_4 budgets delivered to GST1 were well received at UNFCCC COP in 2021 and 2022, however these top-down budgets were not widely used by the national inventory community to compile or validate the inventories submitted to GST1.
  - **Engagement with the UNFCCC (including COP) and stakeholders:** UNFCCC is the facilitator in the GST process and the COP delegations are the decision makers, so there is a need to engage national inventory communities/compilers when developing the flux products. CEOS worked very closely with UNFCCC points of contact who were strong advocates for the RSO community for the first GST, but did not have a close link with COP delegations to foster champions who can advocate for the RSO community.
  - **Communication gaps:** the GST process is not fully understood and is still evolving, so we need to work closely with UNFCCC to stay informed. The national inventory communities/compilers do not fully understand the top-down flux datasets and how to use them together with the bottom-up datasets, and COP delegations are not fully aware of the space-based capability.
- A collection of 16 recommendations are outlined in the slides.
- Feedback on the lessons learned and recommendations are welcome.

Main discussion points:

- Julie Robinson (NASA) commended Wenying and the SIT Chair Team for compiling this work. The recommendations highlight the importance of co-development. Regarding the 2nd recommendation, is there conflict between this and the work done with the GHG Roadmap, in particular regarding the spatial scales?
- Wenying Su (NASA, WGClimate) noted the G3W 1 degree requirement is an initial objective but there are plans to achieve a finer spatial scale. The recommendations should be categorised into long-term and short-term goals, noting the 1 degree scale is the initial short term goal for G3W.
- Yasjka Meijer (ESA, GHG Task Team Lead) recognised the goal of G3W is to support the national institutes, and they need global products to do so. At the country level, finer resolution will be needed, and other stakeholders (e.g. cities) will need observations at ever finer scales.
- Julie Robinson (NASA) acknowledged that if our own countries are not using EO for their reporting, then the capacity development programs need work. However, these are not typically run by space agencies and hence co-development is needed.
- Clement Albergel (ESA) recognised that to track the progress of the Paris Agreement, countries report their own emissions. The goal of G3W is not to replace these reports, but to support them. Reconciling the top down and bottom up estimates is a cross cutting activity, including with aquatic carbon.
- Wenying Su (NASA, WGClimate) is pleased to see some activities have already started. WGClimate is looking to hear feedback and success stories from agencies, including on how top down and bottom up estimates can work together. Some guidelines could be provided for other countries to follow as well.

- Inge Jonckheere (ESA) echoed comments from NASA. There are often very nice CEOS products but they are not what the countries need. Collaboration between the space agencies and the users needs to be strengthened.
- Shobha Kondragunta (NOAA) recognised there is no mandate for reporting nations to use space-based observations. Do we keep doing parallel estimates until we get a buy in? The USA now has a National GHG Strategy, with lots of efforts at the White House level. How should NASA & NOAA engage with the national strategy?
- Wenying Su (NASA, WGClimate Vice-Chair) noted the team took a generic approach, as each country's needs are different. CEOS needs people who see the value of satellite data, who can help advocate for its use.
- John Remedios (UKSA) agreed with the IPCC recommendation, noting it would be worthwhile understanding when nominations are due.
- Wenying Su (NASA, WGClimate Vice-Chair) noted the national inventory community compiles the datasets and submit them to UNFCCC, who then compile and do a global stocktake of emissions. This is then assessed against the goals of the Paris Agreement.
- Inge Jonckheere (ESA) is an IPCC author, however it is an additional job on top of her usual duties. Perhaps CEOS can look into a better way to support individuals involved with IPCC, as it is important to have EO experts involved to advocate for the use of satellite data. In the UK, individuals are supported via a full time post-doc position.
- Yasjka Meijer (ESA, GHG Task Team Lead) recognised the power of EO is the continuous data flow which could shorten the period between global stocktakes by providing reports more frequently. CEOS could work with Annex 1 countries who are required to submit their reports every year.
- Peter Strobl via chat: *This GST discussion reminds me of the SDG oriented 'geospatial reporting indicators' discussion we had yesterday. We should strive to unify the two strains and distinguish between the actual indicators which are under the authority of each reporting country and the contributions to those indicators where satellite EO can deliver very valuable (and objective) inputs (together with in-situ and non EO sources). Our goal should be to provide our CEOS inputs in a standardised way ('ARD'), where appropriate, together with clear and scientifically sound 'best practices' how to derive from them (with the help of other inputs) valid and reproducible indicators.*
- Flora Kerblat responded via chat: *We have had similar discussions indeed in the SDG context also about the best way to promote the use of satellite datasets and EO data (GEO's remit when it comes to include other datasets than satellite) into global reporting. We specifically chose to focus our work on 4 SDG Indicators to respond to national reporting needs into this context, BUT with the view of lobbying about the broader potential of EO in other ways (CEOS Handbook on SDGs, GEO SDG initiative, and more recently with our engagement with UN GGIM to hopefully inject our work/impacts into the global instances which then share best practices with countries (e.g. UNCCD and 15.3.1 for land degradation)*

SIT-TW-2024-05	CEOS Agencies are invited to review and comment on the draft GST Lessons Learned slide deck, in particular the recommendations, to fine tune them for presentation at the CEOS Plenary on October 22-24, 2024.	**4 Oct 2024**
	Comments are needed in time for reflection in the Plenary materials.	

5.3: Discussion on Recommendations from GST #1 Lessons Learned

Moderator: Osamu Ochiai (SIT Chair Team, JAXA) *[presentation]*

Main points:

- Osamu focused on three questions as the basis for discussion in the session:
  1. Assuming we continue to prioritise UNFCCC/SBSTA/COP engagement, what should we do differently regarding that engagement? What is the nature of the engagement with UNFCCC SEC? Are there other stakeholders or possible partners?
  2. Do we have enough clarity on the GST2 process to design a strategy, and if not, how do we? What are our priorities? What inputs do we target and with/for whom?
  3. Do we think that closer collaboration with IPCC will help improve our impact? Which groups and processes are most relevant?
- The schedule for these activities is as follows:

- Based on the lessons learned, which are targeted for completion at SIT-40, the SIT Chair will undertake an update of the GST Strategy for CEOS Plenary 2025.

Main discussion points:

Question 1

- Inge Jonckheere (ESA) recalled that UNFCCC has a GHG course (here) which enables those who complete the course to become a reviewer. With this qualification, individuals can then be nominated by their country as a reviewer for GHG submissions. Space agencies could consider training their representatives as reviewers.
- Stephen Ward (SIT Chair Team) noted the capacity in the UNFCCC secretariat has been poor, and CEOS should work to rebuild the connection there. UNFCCC also posts calls for information and other submissions on their website, which have sometimes been missed by CEOS. Regarding COP, CEOS should aim to improve the signal to noise with a more unified voice from the EO community, perhaps through WMO, and avoid overlapping capabilities, competing products, etc. Stephen also suggested a harmonised theme from the observations community for each UNFCCC COP may help improve the messaging.
- Osamu Ochiai (JAXA, SIT Chair Team) noted that UNFCCC isn't designed to listen to organisations such as CEOS, they listen to the Member States. Should CEOS be a more formalised mechanism to help influence? Developed countries often have their own established mechanisms to develop their GHG inventories, and do not want to use satellite data.
- Julie Robinson (NASA) acknowledged the UN is a country-by-country system and agencies should ensure their delegations adopt the CEOS approaches, products and protocols and across their national efforts, rather than trying to influence IPCC top-down.
- Katy Matthews (NOAA) recognised this is applicable across the whole UN system. As an observer, CEOS can not bring as much impact and any recommendations won't get into final documentation unless they come from Member States. To get increased information about EO datasets in the UNFCCC documentations, interventions will have to be made via national delegations. However, NOAA recognises that it can be hard to get language into state departments interventions at the UN level.
- Flora Kerblat (CSIRO) noted that a similar topic was discussed yesterday regarding the SDGs. The SDG Coordination Group has had similar challenges around getting the messaging right when talking to the UN and working with the national delegations. The team is considering creating a 'CEOS Communique' to be shared with national delegations for relevant UN meetings.

- Tim Stryker (USGS) recognised that engaging in the UN process can be difficult. CEOS doesn't have a legal or national government status, so everything we do has to be done via national delegations, and persistent engagement is necessary.

Question 2

- Jeff Privette (NOAA, WGClimate Chair) recognised a gap between the Level 2 products usually produced by CEOS Agencies and the Level 4 products required for NDCs. Should the inverse modelling community be brought in to close this gap?
- Clement Albergel (ESA) recognised that ESA is working on several projects for the second Global stocktake. The date for submissions is not clear on the UNFCCC website, and it would be helpful if CEOS could share and communicate these deadlines and requirements.

Question 3

- Inge Jonckheere (ESA) recognised that closer collaboration is needed, however not as an observer. The collaboration should be tailored for the specific needs of countries. Need to have products aligned with country needs and suitably endorsed by CEOS collectively.

5.4: Ocean Colour Radiometry Virtual Constellation (OCR-VC)

Presenter: Ewa Kwiatkowska (EUMETSAT, OCR-VC Co-lead) *[presentation]*

Main points:

CEOS Aquatic Carbon Roadmap

- The Aquatic Carbon Roadmap seeks to provide a framework and serve as a guiding vision for long term (15+ years) coordination of CEOS Agency observing programmes in support of the science and policy needs for Aquatic Carbon related information in the context of the CEOS carbon strategy.
- The Roadmap is currently under development. An outline has been drafted, and chapter leads assigned. Contributors are being engaged, and monthly progress meetings have commenced.
- The Blue Carbon from Space Forum took place in May 2024 with the aim to bring together Coastal Blue Carbon experts from different fields (remote sensing, *in situ*, modelling), relevant stakeholders and international initiatives to discuss the state of the art, challenges and opportunities regarding the use of satellite observation to advance Blue Carbon key priority areas. Workshop summary papers will directly contribute to the CEOS Aquatic Carbon Roadmap.
- An initial Aquatic Reflectance CEOS-ARD PFS was endorsed by LSI-VC in 2022. This is now under revision by a team consisting of OCR-VC, LSI-VC and IOCCG, among others The aim is to expand the existing aquatic PFS to apply to all aquatic domains (particularly seas and open oceans). December 2024 is the target for a draft specification.
- In response to VC-20-26, OCR-VC has submitted a White Paper on requirements for global OC-SVC infrastructures to the Bulletin of the American Meteorological Society.

Main discussion points:

- Julie Robinson (NASA) noted that Dr. Jeremy Werdell has been nominated by NASA as a third co-lead of OCR-VC. With PACE launched and doing well, NASA is in a good position to contribute to OCR-VC.
- Marie-Claire Greening (ESA) noted the workload for OCR-VC at the moment is quite heavy, and thanked NASA for nominating Jeremy to support.

5.5: Report on the July 2024 IPCC Expert Meeting on Reconciling Land Use Emissions

Presenter: Giacomo Grassi (EC-JRC) *[presentation]*

Main points:

- The IPCC Expert Meeting on Reconciling Anthropogenic Land Use Emissions took place at JRC/Ispra in July this year.
- The meeting focused on three questions:
    - **Where are we?** Developing a common understanding of the gap in land-use estimates between the communities that support the IPCC Assessment Reports and the National GHG inventories, including its implications for the remaining global carbon budget and net-zero goals.
    - **Where do we want to go?** Setting the basis for greater collaboration between various communities to increase confidence in land-related GHG estimates for assessing collective progress towards the goals of the Paris Agreement.
    - **How do we get there?** Outlining concrete steps forward that each community can take to ensure greater comparability between future IPCC products and national GHG data prepared following the IPCC Guidelines for National GHG Inventories.
- One recommendation focused on improving communication, including within each community (inventories, modelling) and strengthening collaboration across communities.
- The EO community already plays a key role in land use/cover change monitoring and GHG flux estimation, and can act as an independent broker among communities. Specific improvements include cross-comparisons of data, improving transparency and accessibility of data, standardising land use/cover classes, enhancing time-series consistency, better monitoring of forest disturbances and regrowth rates, improved estimation of carbon stock and stock changes, better validation with ground-based data, enhanced guidance and capacity building on how EO data can be integrated into inventories using IPCC methods.
- The Expert Meeting sowed important seeds of cooperation. A much-needed dialogue has begun among communities that had never truly interacted before.
- The first results of this work will be seen in 3-4 years, in the reports from the IPCC 7th Assessment Report, the countries' BTR, and the 2nd Global Stocktake.
- The ultimate aim is to achieve more credible and comparable land-use emission estimates across communities, allowing the next IPCC Assessment Report and Global Stocktake to assess the role of land use with greater confidence.
- A report of the Expert Meeting will be available in mid-October, along with all presentations.

Main discussion points:

- Osamu Ochiai (JAXA, SIT Chair Team) asked Giacomo how he sees the way forward for EO to have a more active role in the IPCC process.
- Giacomo Grassi (EC-JRC) noted the importance in continuing capacity development to help countries use EO data and integrate it into their national inventories using IPCC methods. Crucial to provide data to help verify the national inventory datasets.
- Clement Albergel (ESA) asked how the reporting is organised if there is natural disturbance over managed land?
- Giacomo Grassi (EC-JRC) recognised that each community should each make an effort to understand better the rules followed by the others. There is a broad vision to allow the disaggregation of fluxes, but this is complex. Canada and Australia have managed to do this - emissions due to exceptional events (e.g. fires), with the disaggregation lasting until the same level of carbon removal is reached pre-event.

Thursday September 19th

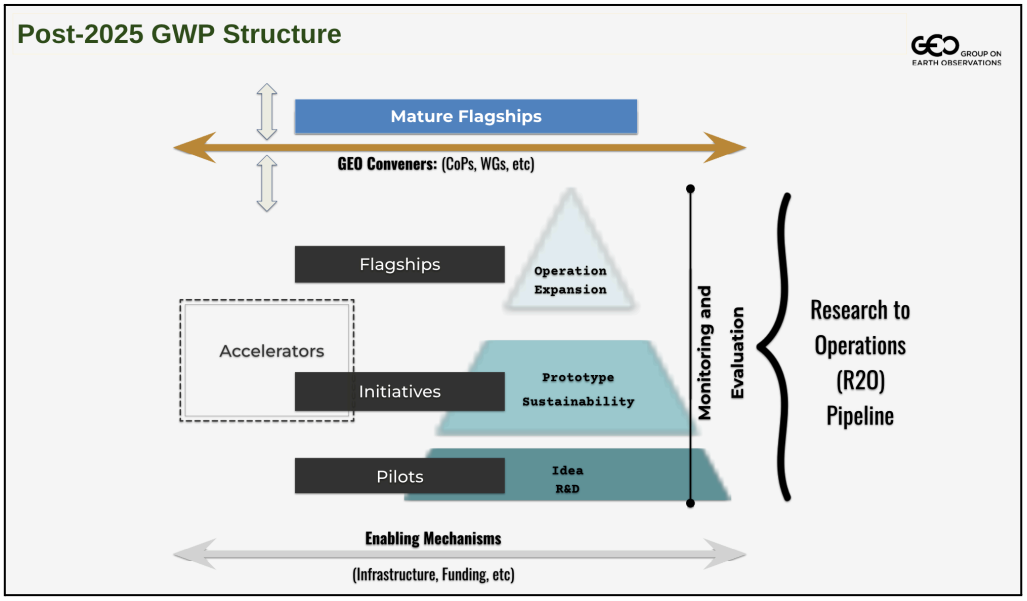
Session 6: GEO Post-2025 Work Programme

6.1: CEOS Interaction with the GEO Post-2025 Work Programme

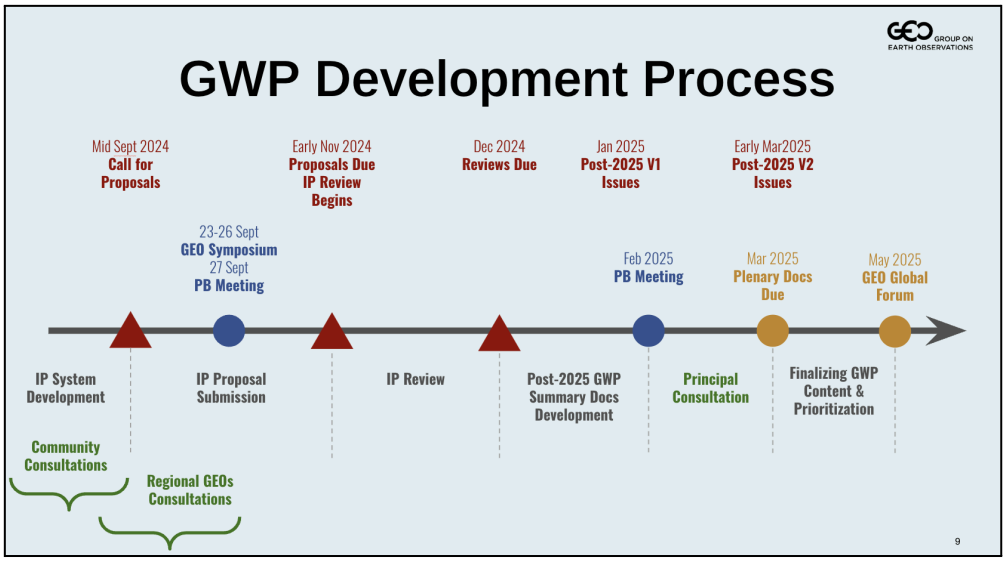
Presenter: Justyna Nicinska (NOAA, GEO Programme Board Co-chair) *[presentation]*

Main points:

- GEO appreciates the continued engagement of CEOS with the Work Programme and the new Post-2025 Strategy.
- Looking to scale the GEO Work Programme to ensure it is manageable in scale and ambition.
- The Programme Board is mapping the existing work programme items against key focus areas for the Post-2025 Strategy, in consultation with the GEO community.
- The key Focus Areas aim to define high-level objectives and encourage integration across GEO. Six thematic areas are included, with two cross cutting areas. Goal is to show the intersection across the different work programme items.



- Mature Flagships are designed to showcase mature GEO activities which deliver services to the global community, ensuring they remain in the GEO family.
- Accelerators replace the previous 'Incubators', and aim to fast track research to operational activities.
- The call for Post-2025 GEO Work Programme proposals was sent out on 16 September 2024, and the deadline for submissions is at the end of October. There are various templates and categories, which are detailed in the email.
- The Implementation Plan will not include annual proposals, but rather an evergreen process with annual reporting.



- There are many opportunities in the Research to Operations pipeline for CEOS to contribute, including data sharing and satellite system interoperability. CEOS input is also welcome to improve the definition of the focus areas.
- GEO-LDN is launching a Dialogue Forum for Pacific Small Island Developing States (PSIDS), with applications open until the end of September.

Main discussion points:

- Osamu Ochiai (JAXA, SIT Chair Team) encouraged everyone to consider the process and the open call for proposals for the Post-2025 GEO Work Programme. The CEOS Executive Officer is the primary point of contact for CEOS to GEO, who will participate in next week's GEO Symposium.
- David Borges (NASA, SEO) recalled a discussion from yesterday regarding capturing impact. This is a topic that the CEOS Communications Team is also exploring, and will be looking at the GEO impact toolkit for guidance.
- Katy Matthews (NOAA) recognised the new GEO Work Programme has the potential to be very transformational for GEO. This is a good opportunity to review how CEOS activities link to GEO, and improve the connection to end users.
- Osamu Ochiai (JAXA, SIT Chair Team) asked whether there is an activity or flagship in the current GEO Work Programme led by CEOS. Should CEOS proactively contribute to the next programme?
- Marie-Claire Greening (ESA) recalled the mapping performed last year by the CEOS Executive Officer of CEOS activities to the GEO Work Programme. CEOS Agencies are represented everywhere individually, but not collectively as CEOS. The CEOS Executive Officer should continue to closely monitor the Work Programme development, and let CEOS know if there is somewhere to contribute.

SIT-TW-2024-06	Post-2025 GEO Work Programme Proposals are due by 31 October. CEOS Agencies, Working Groups, Virtual Constellations, and Ad Hoc Teams are encouraged to propose activities and coordinate inputs with the CEOS Executive Officer Team.	**31 Oct 2024**
	GEO is open to current and new activities. All interested must submit a proposal either as a Convener or part of the Research to Operations pipeline.	

Session 7: Agriculture, Forestry and Other Land Use (AFOLU) (09:20 – 10:30)

7.1: CEOS AFOLU Roadmap

Presenter: Osamu Ochiai (JAXA, AFOLU Co-Lead), Stephen Ward (LSI-VC, Forests & Biomass Team Sec) *[presentation]*

Main points:

- The AFOLU Roadmap was endorsed at CEOS Plenary 2023, and the actions supplement was endorsed at SIT-39 in April 2024. The Roadmap provides long term guidance for CEOS Agencies for their missions and products to ensure continuity of crucial measurements.
- The actions fall into three broad categories:
  - Those pertaining to presently available data to support AFOLU procedures as in the 2006 IPCC Guidelines for National GHG Inventories vol.4, and their 2019 Refinement.
  - Actions to develop new or improved products that would allow more accurate and/or easier implementation of the Guidelines
  - Actions to facilitate greater interaction with the GHG Roadmap and hence improve characterisation of land management emissions through MVS based on satellite-based atmospheric inversions.
- The Biomass Harmonisation work aims to provide the data in a format more easily digestible for policy makers. There have been a few workshops, including an upcoming one in Germany, working with GFOI to ensure Biomass maps for MRV procedures. The team is also working with GEO-TREES to ensure alignment.
- Dedicated in-country demonstrations and field campaigns are supported by the SilvaCarbon work. The areas of impact include mangrove mapping and carbon estimation using global datasets, and biomass estimation and improving emission factors using space data.
- The reconciliation of bottom-up and top-down estimates is a crossroads between the Greenhouse Gas, AFOLU and Aquatic Carbon roadmaps. The Global Carbon Project (GCP) and ESA are developing the RECCAP2 project, to help reconcile the bottom-up and top-down estimates.
- Blue carbon ecosystems is an area where the Aquatic Carbon and AFOLU roadmaps need to coordinate.
- UNEP has been using the Global Mangrove Watch to develop datasets to help countries without their own datasets report on SDG 6.6.1.
- The AFOLU Roadmap team is trying to raise the profile of wetlands in CEOS and encourage additional observations to support mapping. LSI-VC will have wetlands-focused sessions going forward.
- Work will continue to refine and finalise the actions, ensure they are actionable and assigned a suitable POC. They will be tracked via the LSI-VC and the CEOS WP updated accordingly, ongoing.

7.2: Biomass Harmonisation Activity Update

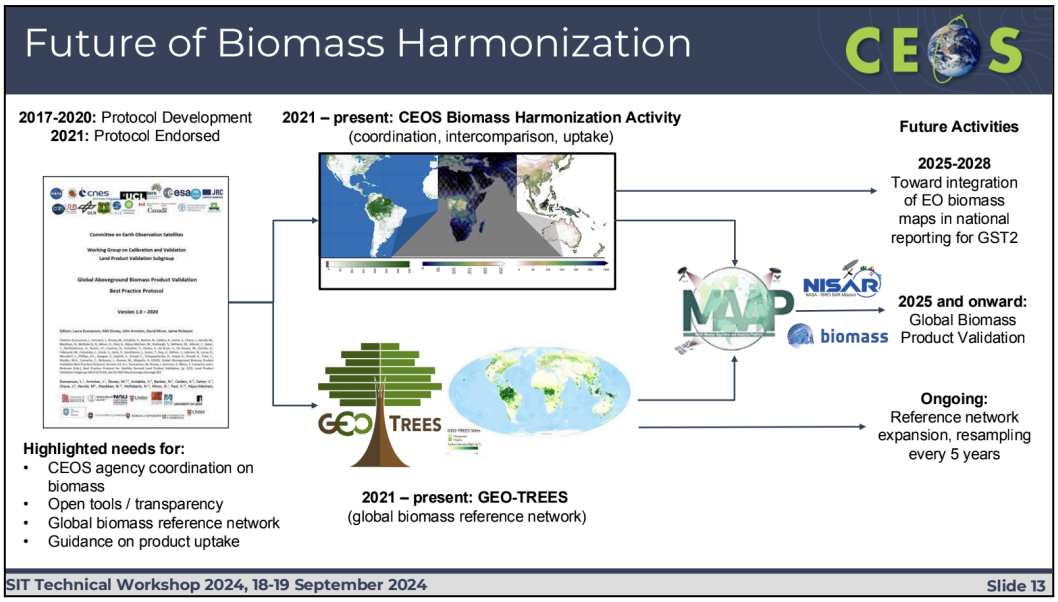
Presenter: Laura Duncanson (UMD/NASA) *[presentation]*

Main points:

- In 2017 WGCV LPV started protocol for the cal/val of biomass products, in anticipation of forthcoming new missions. Enhanced coordination was needed to ensure consistency.
- Three pillars of the subsequent biomass harmonisation activities include:
  - IPCC Tier 1 table for AGBD using EO data - being submitted to IPCC.
  - Enhancing national forest inventories

- Open source code platform

- The validation infrastructure was the key part missing, which GEO-TREES has now filled since 2021.
- There were concerns about a data gap beyond 2030, however now ROSE-L will fill the SAR gap, while NASA is evaluating a new lidar mission, 'EDGE', to provide continuity of lidar measurements.
- GEO-TREES supports critical reference data, and has received funding from the Bezos Earth Fund and the Gordon and Betty Moore Foundation. Continued support from CEOS Agencies is crucial to ensure the project can continue.
- The team is working to merge all of these efforts:



- Hoping to have a few pilot countries using these biomass maps in their reporting for the second global stocktake.
- An increased number of products means that the harmonisation work becomes even more crucial, as mentioned in the AFOLU Roadmap. New biomass missions (NISAR, BIOMASS) will expand capabilities but also strengthen the importance of harmonisation efforts.
- For new GEO-TREES sites being established, CEOS Agencies are requested to arrange observations over those sites. Klaus Scipal (ESA) should be contacted for more details.

Main discussion points:

- Ake Rosenqvist (JAXA, LSI-VC Co-lead) via chat: *Thanks for a nice presentation Laura. Just to note that in addition to the NISAR and BIOMASS missions mentioned in the presentation, ALOS-4 data will also be contributing to the biomass harmonisation activity. Noting that the ESA CCI Biomass maps are primarily based on ALOS-2 data beyond the boreal zone.*

7.3: National Engagement

Presenter: Sylvia Wilson (USGS SilvaCarbon) *[presentation]*

Main points:

- The national engagement work is supported not only by USGS SilvaCarbon, but also FAO, ESA, JAXA and other research institutes.
- SilvaCarbon focus has shifted to exploring different, more complex land cover types such as mangroves, as well as biomass estimation.

- Mangrove workshops, where analytics training was combined with field surveys, were well received and supported by CEOS Agencies. CEOS contributed the global datasets of mangrove extent, mangrove height and carbon sinks.
- In June, there was a CEOS South-East Asia Workshop on Mangroves Mapping and Biomass Estimation. This was a collaborative effort from many different CEOS Agencies.
- SilvaCarbon is working on deforestation alerts for Gabon. The workshops will cover the technical details, importance of near-real time (NRT) data, field visits to deforestation alert sites, and discussions on how to integrate NRT Alert Systems into countries' national forest management services.
- In 2025, SilvaCarbon will focus on forest fires prediction and monitoring.
- The workshops use Google Earth Engine and SEPAL to access and process satellite data. Earth Engine requires coding in javascript, while SEPAL has a graphical interface.

7.4: Discussion

- Julie Robinson (NASA) recognised the connection of the biomass harmonisation work to end users is good to see, alongside the clear role of CEOS. NASA is concerned about the expectation of continuity of lidar and SAR missions to support this work. Are CEOS Agencies aware of this continuity need?
- Laura Duncanson (NASA/UMD) clarified there is no expectation of mission continuity. However, the scientific community hopes by demonstrating the value of these missions, they can make the case for new missions.
- Yasjka Meijer (ESA, GHG Task Team Lead) is involved in a European GHG validation task force, which is also generating a report for AFOLU as well. This is an activity which should be connected to CEOS work as well.

Session 8: Virtual Constellation Priority Topics

8.1: Precipitation Virtual Constellation (P-VC)

Presenter: Chris Kidd (NASA, P-VC Co-lead) *[presentation]*

Main points:

- The main goals of P-VC are around maintaining and enhancing the precipitation constellation, integrating new satellites and sensors, developing and refining retrieval schemes, and validating precipitation products. P-VC is linked to the International Precipitation Working Group (IPWG).
- The GPM 10th Anniversary Symposium was hosted by JAXA in July 2024.
- IPWG recently produced a series of recommendations, including a top-level recommendation to maintain continuity of microwave imagers and promote future passive microwave sensors for precipitation.
- The joint ESA/JAXA Earth Cloud, Aerosol and Radiation Explorer (EarthCARE) carries a Cloud Profiling Radar (CPR) developed by JAXA and NICT. This is the world's first spaceborne W-band (94GHz) radar with doppler capability, and can provide observations of not only clouds but also snowfall and light rainfall.
- Several common themes amongst recent reports have emerged:
    - Passive microwave imagers provide more direct measures of precipitation than passive microwave sounders
    - Continuity of a high quality, wide frequency passive microwave radiometer is critical for intercalibration
    - Better temporal sampling is necessary to capture the variability of precipitation

  - Good spatial resolution is crucial for resolving (convective) precipitation
  - There is a paucity of low frequency passive microwave observations that are critical for accurate retrievals over both ocean and land
  - No commercial providers plan to provide low frequency observations
- CEOS-ARD specifications for Precipitation is being considered. Initial activities will include a poll of existing precipitation products to highlight similarities and differences, and an assessment of current products with current 'standards' in the meteorological and climatological communities. In future, the NASA PPS Version 8 GPM (to be the last version, 2026) would provide an opportunity to generate CEOS-ARD compliant products.

8.2: Enhancing Remote Sensing Observations as a Focus of the United Nations' Ocean Decade Activities (COAST-VC)

Presenter: Merrie Beth Neely (NOAA/GST, COAST-VC) *[presentation]*

Main points:

- One of the final recommendations from the Ocean Coordination Group was to encourage CEOS leadership's engagement with the IOC. COAST-VC is an endorsed contributor to the UN Ocean Decade.
- An analysis of the ten Ocean Decade white papers showed that in situ observations were mentioned far more often than satellite observations.
- COAST-VC has developed talking points to enable CEOS leadership to engage IOC, UN Ocean Decade and GOOS leadership in their countries where relevant. This was developed in collaboration with the other CEOS Ocean Virtual Constellations.
- COAST-VC is willing to accept responsibility for the point of contact with IOC, if CEOS leadership deem it appropriate.
- COAST-VC welcomes review of the talking points document (latest sent earlier today) and confirmation from CEOS leadership whether or not they wish to have CEOS-level engagement with IOC, UN Ocean Decade, and GOOS leadership. Suggest that the initial outreach take place before CEOS Plenary, if agreed.

Main discussion points:

- Marie-Claire Greening (ESA) recalled that IOC is an Associate member of CEOS, and hence should be receiving all CEOS communications. An official letter from CEOS to IOC may help to start the conversation again.
- Alex Held (CSIRO) would be happy to contribute some talking points from the Australian and CSIRO perspective.
- Osamu Ochiai (JAXA) recognised CEOS should be more proactive and try to re-engage IOC and GOOS in CEOS meetings.
- Katy Matthews (NOAA) suggested that the COAST leadership team or SIT Chair Team reach out to the official IOC and GOOS points of contact for CEOS. It is important that the lack of remote sensing mentioned in the Ocean Decade's communication be addressed.
- Christine Bognar (NASA) agreed with the suggestion to contact the CEOS Principals for IOC and GOOS, and offered NASA's support to draft a letter.
- Stephen Ward (SIT Chair Team) recognised that Joanna Post is now working at IOC, who supports Earth observations and would be a good ally for CEOS.
- Yasjka Meijer (ESA, GHG Task Team Lead) recognised that a letter to IOC could also cover other topics as well, including Aquatic Carbon.

- Marie-Claire Greening (ESA) suggested the CEOS Executive Officer work with COAST-VC to understand the identified issues, and reach out to the point of contact at IOC to decide whether a more formal letter would make sense.
- Leftersis Mamais (CEOS Executive Officer Team) supported this approach, and agreed to work with COAST-VC on the next steps.

SIT-TW-2024-07	CEOS Agencies to review and add to the UN Ocean Decade Talking Points developed by COAST-VC, and for use in country-level engagement with the UN Ocean Decade, IOC and GOOS.	**SIT-40**
	One of the recommendations from the Ocean Coordination Group was continued engagement with IOC.	
SIT-TW-2024-08	CEOS Executive Officer and COAST-VC to formulate a letter to IOC/UNESCO to detail opportunities for remote sensing, in particular for activities that will advance goals of the UN Decade of Ocean Science for Sustainable Development (UN Ocean Decade). The letter should encourage IOC and the UN Ocean Decade to highlight remote sensing capabilities in future communications. The CEOS Secretariat will assist with development and final review of the letter and any resulting correspondence.	**SIT-40**
	COAST-VC has identified a marked imbalance in the highlighting of in situ and satellite Earth observations in IOC and UN Ocean Decade communications. Said imbalance underrepresents the significance of satellite Earth Observations and the added value of their complementarity with in situ observations.	

8.3: Joint SST-VC and COAST-VC Statement Recommending Masking Requirements in Coastal Areas for Upcoming SST Missions

Presenter: Misako Kachi (JAXA, SST-VC Co-lead) *[presentation]*

Main points:

- There has been a focus within the SST-VC and the Group for High Resolution Sea Surface Temperature (GHRSST) Science Team on coastal SST.
- In response to the establishment of COAST-VC in April, SST-VC and COAST-VC in collaboration with GHRSST had a special workshop in June during the GHRSST25.
- There is a coming era of novel ultra high resolution TIR measurements less than 100 m such as ECOSTRESS (2018), TRISHNA (2026), LSTM (2028), and SBG (2028).
- The spatial resolution of observation is a key factor but also the size of the area is extremely important so that synoptic ocean observations can be made. However, ocean observation boundaries of existing ultra high resolution TIR missions are quite limited and miss important ocean information.
- The SST-VC is strongly encouraging CEOS members who plan future ultra high resolution TIR missions to provide the opportunity to obtain coastal SST in GHRSST format, covering at least 100 km from the coast. In particular, SST-VC asks the SBG-TIR mission planners and project team to improve the coastal coverage to make it more scientifically useful for coastal ocean applications.

Main discussion points:

- Merrie-Beth Neely (NOAA/GST, COAST-VC) noted COAST-VC is grateful to SST-VC for their collaboration on this important issue. Engaging future missions in a timely fashion is important so they can adjust accordingly.
- Peter Strobl (EC-JRC, LSI-VC Co-lead) recalled there are frequent issues around choosing the right perimeter for the oceans. It would be helpful to have a CEOS endorsed recommendation on the coastal zone definition to provide as input for agency mission planning. Delineating which areas are considered coastal and hence deserve special observations will allow mission planners to plan accordingly.
- Julie Robinson (NASA) noted that a NASA SBG representative is participating in SST-VC, however NASA hadn't heard of this issue before. NASA will reach out to their SBG team and SST-VC representative to understand the gap and requirements.
- Misako Kachi (JAXA, SST-VC Co-lead) noted that there is a discussion going on for 100km coastline requirement , however COAST-VC may have a better definition.
- Yuko Nakamura (JAXA, SIT Chair Team) noted this statement was planned for endorsement at CEOS Plenary, however there may be more discussion and finalisation needed. Deadline for the comments should be at the end of September.

SIT-TW-2024-09	SST-VC to liaise further with member agencies on the issue of coastal SST data coverage, before returning with relevant recommendations to the 2024 CEOS Plenary.	**CEOS Plenary 2024**
	SST-VC has encouraged CEOS members who plan future ultra high resolution TIR missions to provide the opportunity to obtain coastal SST in GHRSST format with enough coverage up to minimum 100 km from the coast, like LSTM and TRISHNA.	

Session 9: Other Business

9.1: CEOS Carbon Roadmap Integration Needs

Presenter: Osamu Ochiai (JAXA, SIT Chair Team) *[presentation]*

Main points:

- There is ambition for CEOS to support carbon monitoring in all domains included in the Global Stocktake, atmosphere, land, and oceans. This is being coordinated through the GHG Roadmap, AFOLU Roadmap, and Aquatic Carbon Roadmap.
- Action SIT-39-14 was for SIT Chair to confer with the leads of the Roadmaps to establish a communication channel, and understand how the Aquatic Carbon Roadmap will link to the others in terms of schedule and timing.
- Two coordination calls with the three CEOS Roadmap leads have been held to share updates on progress. The GHG Roadmap is being updated this year, the AFOLU Roadmap actions are being finalised, and the Aquatic Carbon Roadmap is aiming for completion in late 2025.
- Several issues for discussion have been identified:
    - Need more integration with the inverse modelling community.
    - WMO G3W is a potential gateway to the policy world, and there is an opportunity for us to support G3W. This may benefit from internal alignment between the Roadmap efforts.
    - GOOS may be helpful for the Aquatic Carbon efforts.
    - The GHG team is considering linkages needed with other roadmaps in Issue 2.
    - There are potentially useful linkages via the Global Carbon Project.

    - Could the three roadmaps together study what will be needed from them in future by the inversion modelling community as a strategic endeavour.

- The SIT Chair team will continue to offer coordination calls among the three Roadmap lead teams to facilitate necessary communication.
- WGClimate may look at how to connect their CDR work to needs of the inversion modelling community.

Main discussion points:

- Wenying Su (NASA, WGClimate Vice-Chair) appreciated the SIT Chair Team's efforts to coordinate the roadmaps. The interactions to date have been productive, including with the guest speaker from the inverse modelling community. Looking at how the roadmaps can be linked via the inverse modelling community will be a topic of discussion at the WGClimate meeting in February 2025.

9.2: CEOS Systems Engineering Office (SEO) Report

Presenter: David Borges (NASA, SEO) *[presentation]*

Main points:

- The CEOS Communications Team have been focusing on celebrating the 40th Anniversary of CEOS, including with 24 CEOS Agencies who have contributed video content about CEOS past, future and impact. News posts have focused on CEOS Chair priority of Biodiversity, and SIT Chair priority of GHG Observations. Engagement on LinkedIn is growing (143.02% increase in followers since March), while engagement on Facebook and Twitter is lower.
- Development of the CEOS Analytics Lab (CAL) continues, with the goal to create a resource available internally for the entire CEOS community.
- The SEO has created a home for CEOS on Github with several repositories around ARD, interoperability, and aspects of CEOS work: github.com/ceos-org. This allows for better document versioning, and provides a channel for community outreach. The SEO is looking to provide some training to help ensure all who wish are comfortable using the platform.
- The CEOS deliverable OUT-24-06 is focused on demonstrating the integration of New Space data into the CEOS Analytics Lab and evaluating interoperability with common CEOS datasets which is key for addressing user needs. To address this, the team has engaged with a selection of commercial SAR (ICEYE, Capella Space, iQPS, Synspective, Umbra) and optical (Planet Labs, Maxar, DESIS) data providers.
- An initial assessment of freely available sample data has been carried out, and future steps include possible detailed analysis of the products and metadata, including possible assessment against the CEOS-ARD SAR PFS, an interoperability assessment of New Space SAR data products with CEOS agency datasets (ALOS-2, Sentinel-1) in the CAL, including the publication of examples indexing the data in CAL (e.g. via CEOS GitHub).
- So far, none of the sample products have been found suitable for CEOS ARD assessment. It is important to note that these are not paid products, and perhaps additional processing options are available for paid products.
- An initial assessment for CAL integration of these products has been completed.
- The SEO has worked on the CalValToolbox which provides open, accessible tools for common calibration and validation algorithms. These include a Spectral Response Function (SRF) Comparison Tool, Pixel Value Comparison (PVC) Tool, Edge Spread Function (ESF) Comparison Tool, and a RadCalNet Parser Tool.
- The SEO has recognised a gap in the communication from CEOS around commercial participation in CEOS Activities at the working level, and has been discussing with the CEOS Chair on how to address this.

Main discussion points:

- Osamu Ochiai (JAXA, SIT Chair Team) recognised that some clarity regarding commercial engagement in CEOS would be very welcome, and thanked the SEO and CEOS Executive Officer, CEOS Chair Team for their work to define some rules of engagement.
- Tim Stryker (USGS) noted there are many elements where there is good engagement between CEOS and the commercial sector. However he raised concerns about participation at the SIT and Plenary level. CEOS could try and engage at a higher level, perhaps via a symposium or seminar alongside a major CEOS meeting.
- Dave Borges (NASA, SEO) suggested looking at the existing CEOS process papers and Terms of Reference. A first step might be to clarify that CEOS entities can engage the commercial sector at the working level. Following that, CEOS can then discuss the corporate level.
- Peter Strobl (EC-JRC, LSI-VC Co-lead) recognised a growing interoperability issue between CEOS and commercial platforms. Cross-platform interoperability should be improved to maximise the benefit of CEOS assets.
- Katy Matthews (NOAA) noted an action from the CEOS Secretariat (SEC-324-01) may help address this issue as well. NOAA agreed that CEOS needs to find a way forward here.
- Dave Borges (NASA, SEO) recognised an appropriate mechanism should be used to disseminate the information, and suggested a subpage on the CEOS webpage with agreed words.
- Alex Held (CSIRO) thanked the SEO for their work on the CalValToolbox. This will be very helpful, especially in the context of understanding the capabilities of new hyperspectral missions. Alex also suggested IEEE GRSS could be an intermediary body to help understand and interact with the commercial sector.
- Julie Robinson (NASA) recognised that understanding the breadth of existing engagement is important. In particular, for GHG missions, there are a variety of players from commercial to not-for-profit and research. The latter two may be well aligned to CEOS without the commercial/for profit issues that have come up in the past when CEOS considers engagement with the private sector. She agreed the communication should be clarified in the near-term to help provide transparency.
- John Remedios (UKSA) noted that different commercial companies offer different services, and CEOS should think about this in how the topic is approached.
- Lefteris Mamais (CEOS Executive Officer Team) asked whether the results of the analysis about the companies compliance with CEOS-ARD is being fed back to the companies.
- Osamu Ochiai (JAXA, SIT Chair Team) recognised that one of the NSTT recommendations was for the SIT Chair to continue discussions on this topic at SIT and SIT Technical Workshop meetings.
- Marie-Claire Greening (ESA) questioned what a corporate-level CEOS engagement with the commercial sector would look like, but agreed CEOS should be making it clearer to CEOS entities that they are free to engage the commercial sector in their working level discussions. Communication to the commercial sector on what CEOS does should be improved.
- Barry Lefer (NASA, AC-VC Co-lead) noted that AC-VC has had really vibrant engagement with the commercial sector, and they are contributing to the AC-VC best practices document.

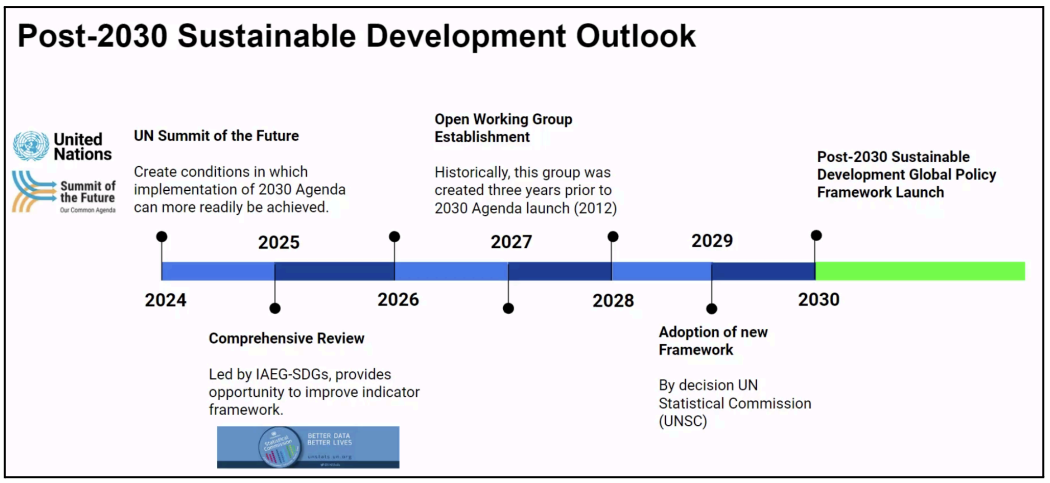
9.3: CEOS Sustainable Development Goals (SDG) Coordination Group

Presenter: David Borges (NASA, SEO) *[presentation]*

Main points:

- CEOS Strategic Priority #4 is to: “Proactively engage in global discussions on the critical challenges that face society, including attaining the 2030 Agenda for Sustainable Development.” CEOS reaffirmed their commitment to this priority at SIT-39.

- SDG relevance at goal, target and indicator levels is now included in the CEOS Deliverable Tracker. The SEO encourages all CEOS entities to use this for any new and open deliverables to help understand CEOS support for the SDGs more broadly.
- The deliverables from the coordination group include the annual updates to the EO Support Sheets for Water (SDG-24-01), Urbanization (SDG-24-02), Coastal Eutrophication (SDG-24-03), and Land Degradation (SDG-23-04). A new EO Support Sheet template has been created, aimed to improve content harmonisation, and to better increase and capture impact.
- There is a White Paper authored by UN-GGIM IAEG-SDG WGGI titled: "Rescuing the SDGs". CEOS is supporting the authoring of this paper to ensure geospatial data broadly, and EO data specifically, play a greater role in SDG national reporting between 2025-2030. Part of the intent of the paper is to strengthen guidance on how SDG indicators can be disaggregated by geographical location, provide better guidance on how geography impacts indicators, and help understand the role of new data technologies and global datasets for enabling national and local SDG monitoring.
- In 2025, the Coordination Group will partner with WGClimate to develop a fifth EO Support Sheet for Indicator 13.2.2: Total greenhouse gas emissions per year.
- On the strategic direction for CEOS SDG work, the 2025 deliverables will include updates to the four existing EO Support Sheets, developing a fifth (GHG Emissions), responding to multiple requests from UNCCD, supporting any follow-on activities to Ecosystem Extent Task Team, establishing how to respond to the "Rescuing SDGs" paper outcomes, and issuing a joint CEOS strategic communique to feed into national delegations to UN-GGIM and similar meetings.



Main discussion points:

- Osamu Ochiai (JAXA, SIT Chair Team) noted that the current indicators don't include EO data as a baseline, so CEOS should endeavour to do more on this before the 2030 timeframe. JAXA would like to contribute more to this topic.
- Katy Matthews (NOAA) recognised that as we look at the policy side, CEOS need to consider what the SDG Coordination Group can do to help member countries with their internal processes.
- Flora Kerblat (CSIRO) asked Agencies for additional support to help the group with its goals and ambitions.

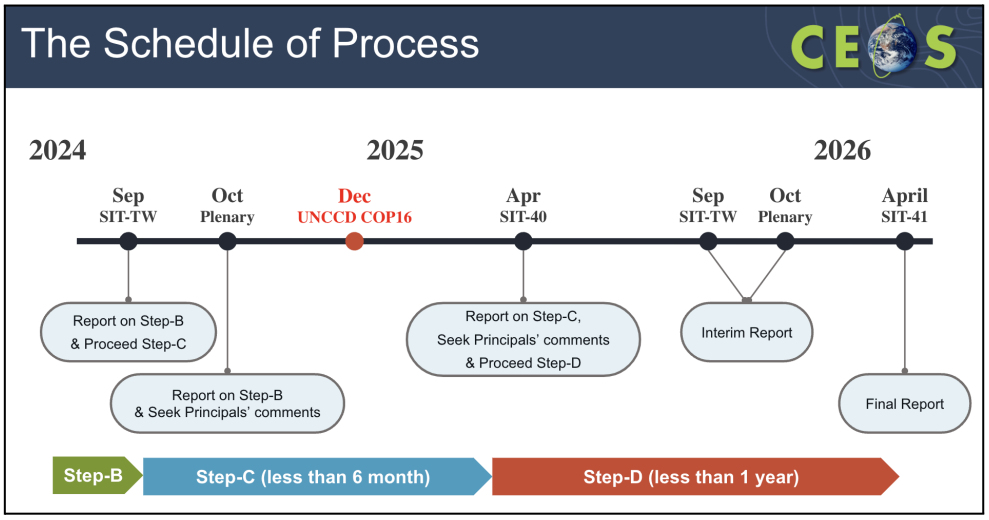
SIT-TW-2024-10	CEOS Agencies are encouraged to consider active participation in and contributions to the CEOS Sustainable Development Goals Coordination Group and its activities.	**CEOS Plenary 2024**
	SDGs remain the least resourced of all four CEOS Strategic Priorities.	

9.4: Letter of Enhanced Cooperation from the United Nations Convention to Combat Desertification (UNCCD) Science, Technology, and Innovation Unit – Update on CEOS External Request Process Paper Progress

Presenter: Masatoshi Kamei (SIT Chair Team) *[presentation]*

Main points:

- CEOS received a Letter of Enhanced Cooperation from UNCCD Science, Technology, and Innovation Unit in May 2024, and this was handled following the CEOS External Request Process Paper process to assess feasibility. A high-level assessment was completed, reported at SEC-322.
- The letter highlighted the value of ongoing support activities of SDG Coordination Group, and requested additional support on several specific topics, such as standardisation and biodiversity.
- Participation from CEOS in the UNCCD COP-16 was requested.
- Feedback on the Step B assessment was received from CSIRO, ESA, NASA, EC and NOAA.
- The plan is to present a report on Step-B at CEOS Plenary for Principals' feedback.



Main discussion points:

- Osamu Ochiai (JAXA, SIT Chair Team) noted there are ongoing activities across CEOS supporting UNCCD (e.g. via the SDG CG), and that this process is to establish a more formal, comprehensive level of support.
- Dave Borges (NASA, SEO) appreciated the feedback received so far, noting CEOS should strive to be a bit more proactive based on the specific requests in the letter. The OGC Geospatial Reporting Indicators (GRI) Standards Working Group (SWG) will present to LSI-VC-16 next week, which will allow for an assessment of the level of support and collaboration opportunities following that. The UNCCD requests should be reflected in the CEOS Work Plan, however an expanded team will be needed to respond comprehensively.
- Ake Rosenqvist (JAXA) asked if this request is limited only to SDG 15.3.1, noting broader collaboration with CEOS would benefit UNCCD. Ake also raised concerns about the two-year length of the process, recognising this would not be compatible with the 3-year work plan cycle of the Ramsar convention if a similar request was received.
- Dave Borges (NASA, SEO) noted that Step D is doing the work, and SIT-41 would be the finish of the work, with an answer to UNCCD expected at SIT-40 if not earlier.
- Masatoshi Kamei (SIT Chair Team) recognised the letter from UNCCD also includes standardisation and biodiversity, so is beyond just the scope of 15.3.1.
- Julie Robinson (NASA) agreed the process is slow, and suggested regular contact with the group who submits a request.

- Osamu Ochiai (JAXA, SIT Chair Team) asked if any CEOS Agencies will be represented at UNCCD COP-16, noting that the European Commission likely will. This is an ongoing topic of discussion within the SDG Coordination Group.
- Alex Held (CSIRO) noted that he and Neil Sims (CSIRO) are seeking approval to travel to UNCCD COP-16. If approved, he would be happy to help transmit CEOS messages.

9.5: CEOS Missions, Instruments and Measurements (MIM) Database Update

Presenter: George Dyke (CEOS MIM Database Team) *[presentation]*

Main points:

- Marie-Claire Greening (ESA) noted ESA is proud to support the database and EO Handbook. The MIM Database has been used to develop the ESA Science Strategy this year, as well as in UNOOSA analysis, among many other applications.
- The CEOS MIM Database can be found online at database.eohandbook.com.
- The annual survey is currently in progress, with 28/40 responses received to date. Five more responses are expected, and the remaining seven agencies haven't responded. The updated database will be published ahead of the CEOS Plenary.
- Quarterly Reports are published every three months, and highlight recent news and upcoming mission launches.
- The team is working on implementing visual enhancements to improve the look, feel and performance of the site.
- WMO OSCAR is an adjacent capability which has a different mandate, but with complementary content. The MIM team is in periodic contact with the OSCAR team. OSCAR has added an API, and the MIM Database has developed a simple demonstration API, which may provide an interesting capability to compare the information.
- The MIM Database supports continuity and planning studies of agencies, such as the recent ESA Science Strategy and Decadal Surveys in the US. The time that agencies invest in updating their records in the MIM underpin these types of analyses and the results are beneficial to all agencies. The CEOS Database metadata is also reflected in the EO Portal.
- Including records on commercial missions can be complex, as they follow a different operational model in terms of future planning.

Main discussion points:

- Osamu Ochiai (JAXA, SIT Chair Team) recognised that this is a fundamental asset of CEOS, and thanked ESA for their continued support of this resource.
- Flora Kerblat (CSIRO) noted that George also presented the MIM Database at the AEO Forum last week in Adelaide. This was a great example of communicating the work of CEOS, and CSIRO encourages other Agencies and countries to do the same when opportunities arise to promote CEOS' profile.
- Osamu Ochiai (JAXA, SIT Chair Team) asked about the mechanism to include commercial missions in the database. George Dyke (CEOS MIM Database Team) noted that there is no systematic way to do it, but the team started with basic records for all missions in the EO Portal. It would be hard to be comprehensive and hard to verify claims. When a point of contact can be made at a specific company, they are often helpful, but it can be hard to find the right contacts.

9.6: AquaWatch Australia Programme

Presenter: Alex Held (CSIRO) *[presentation]*

Main points:

- AquaWatch Australia is a new program being launched by CSIRO with a number of partners, and the objective to develop a new way to develop forecasts for water quality, merging in-situ, satellite data and modelling tools into a data analytics platform underpinned by Data Cube technology. . The project leverages partnerships and relationships formed through CEOS, and the provision of space data from international partners demonstrates the power of cooperation.
- This effort is also a contribution to GEO Aquawatch, monitoring inland and coastal water quality.
- It builds upon the 2018 study under CEOS: CEOS Feasibility Study for an Aquatic Ecosystem Earth Observing System, where the need for modelling and forecasting of water quality was identified by users.
- The programme leverages existing technologies, including the Open Data Cube. Working through practicalities of bringing together a large number of different datasets from different sources.
- The plan by 2026 is to demonstrate pilot sites integrating efficiently various sources of data to deliver meaningful inputs to decision makers, and by 2028 to start scaling up to larger areas and country level.
- The project is bringing together satellite and *in situ* sensors, with about 15 sets of instrument suites deployed across pilot sites.
- AquaWatch has used the MIM database and new constellation builder to look at the data sources that are potentially useful and for what specific applications.
- In addition, CSIRO has launched the CyanoSense mission to carry out testing of a specialised hyperspectral sensor. A follow-on CyanoSense-2 mission is currently being developed.
- A feasibility study for a follow-on mission (AquaSAT-1) has been conducted in collaboration with NASA/JPL and their hyperspectral team, looking at stats around SNR, pixel size, GSD, revisit, etc. The analysis has just concluded and can be shared with anyone that is interested.
- CSIRO is working with GEO AquaWatch and the GEO Indigenous Alliance to ensure what is learnt from this experience is shared with others who may be trying to do the same.
- This activity may provide some ideas for linkages between CEOS and GEO.

Main discussion points:

- Clement Albergel (ESA) suggested it could make sense to include an ancillary variable capturing the effect of burn area on water quality. Alex Held (CSIRO) noted they have a couple of projects funded to look at the issue of water quality following wildfires, and they are happy to collaborate on this topic.
- Merrie Neely (NOAA) indicated that COAST-VC would welcome collaboration with CSIRO and AquaWatch Australia.

Agenda was restructured to accommodate remote presenters. The following items were brought forward.

10.2: CEOS Chair Nominations for 2026+

Presenter: Hironori Maejima (SIT Chair, JAXA) on behalf of Eric Laliberté (CSA, CEOS Chair) *[presentation]*

Main points:

- UKSA has been approved at CEOS Plenary 2023 as CEOS Chair for 2025.
- A nomination for CEOS Chair 2026 has been received from CSIRO, supported by Geoscience Australia and the Australian Bureau of Meteorology. This will be presented for formal endorsement at CEOS Plenary 2024.
- A nomination for CEOS Chair is expected from the Americas region for 2027, and from Europe / Africa for 2028.

10.1: Preliminary Action Review

Presenter: Stephen Ward (SIT Chair Team) *[presentation]*

Main points:

- Reviewed the preliminary actions from SIT Technical Workshop 2024.
- Lefteris Mamais (CEOS Executive Officer) noted potential need for a WGISS related commercial engagement action, and this will be added to the action record when distributed for comments.
- The CEOS Executive Officer will coordinate CEOS representation in the GEO Work Programme (per the existing Secretariat action).

9.7: United Nations Ocean Conference (UNOC) 2025

Presenter: Selma Cherchali (CNES) *[presentation]*

Main points:

- The United Nations Ocean Conference (UNOC) series is dedicated to supporting the Implementation of Sustainable Development Goal 14, seeking to support the reversal of the decline in the health of our ocean for people, planet and prosperity.
- UNOC1 was held in 2017, and UNOC2 in 2022. It was agreed in 2022 to convene the UNOC3 in Nice/France 9-13 June 2025 as a part of the "UN Decade of Ocean Science for Sustainable Development 2021 -2030".
- UNOC3 has three main objectives:
  - To elaborate an action plan of decisive, swift and unified efforts to address Ocean's critical;
  - To Define an Ocean Health indicator as proposed by IPOS (International Panel for Ocean Sustainable), initiated by CNRS, composed of 15 public marine research organisations; and,
  - To Acknowledge Mercator Ocean International to evolve into an Intergovernmental organisation.
- Three side events will be planned:
  - The One Ocean Science Congress (OOSC) organised by CNRS and IFREMER. (4-6 June);
  - The Blue Economy and Finance Forum (BEFF) hosted by the Principality of Monaco (7 June); and,
  - A Summit of Coastal Cities and Regions focusing on Ocean Rise & Resilience (ORR), led by the city of Nice and the Ocean Climate platform (7-8 June).
- CEOS has a key role to play in providing/promoting EO data and derived knowledge information products to address these objectives.
- UNOC3 could support the launch of such an International alliance of space agencies and organisations to act towards SDG14 targets/objectives. This is an opportunity to present space capabilities, discuss new products and monitoring systems, and to present a 'space toolkit' which could support ocean data users.
- Selma is asking for an official position from CEOS SIT, and the preparation of a statement to be presented for endorsement at the CEOS Plenary in October.
- CNES will host a side meeting at IAC in Milan 15 October 2024 (1.30-3pm) to bring stakeholders together.
- At CEOS Plenary in October, CNES will seek endorsement of CEOS representation in the future UNOC3/Ocean Space Alliance.

Main discussion points:

- Julie Robinson (NASA) recognised this is an event that doesn't happen very often, however CEOS leadership is just being exposed to it now and there are a lot of variables to consider. NASA would like to highlight EO data appropriately at this conference, but it will take some time to consult internally with the State Department. CNES will ensure Karen St-Germain is invited to the side meeting at IAC in Milan.
- Katy Matthews (NOAA) appreciated the effort to highlight EO for oceans, and noted the relationship to Ocean Decade issues raised by COAST-VC. Is the Ocean Space Alliance intended to be ongoing, or is it just being set up for UNOC3? Understanding this is important for understanding the resources required.
- Selma Cherchali (CNES) noted the Ocean Space Alliance will not only include space agencies, but also provide important linkages to external stakeholders. CNES would like to establish a mechanism for continuous discussion and exchange, not only for UNOC but to provide services and data.
- Katy Matthews (NOAA) also noted that ahead of Plenary it would be useful to understand why this group is being created, instead of capitalising work done already through CEOS or SCO (Space Climate Observatory).
- Alex Held (CSIRO) suggested CEOS could make a statement on what space-based EO can contribute.
- Marie-Claire Greening (ESA) asked if there was a draft Terms of Reference for the Alliance to help understand what the group will do and to allow CEOS to formulate an appropriate response.
- Osamu Ochiai (JAXA, SIT Chair Team) recognised the need to understand what will be discussed and decided at Plenary, and suggested CNES put together a short paper for CEOS to consider ahead of Plenary.
- Selma Cherchali (CNES) clarified that the main question is whether CEOS is interested in having a representative in the Ocean Space Alliance.
- Flora Kerblat (CSIRO) noted similarities between this and discussions around the SDGs. There is a need for CEOS to agree on some key points which can then be fed to our national delegations.

SIT-TW-2024-11	CNES to prepare a one-page paper outlining the request for CEOS support of the UN Ocean Conference (UNOC) to be held on June 9-13, 2025, in Nice. The topic will be discussed further at CEOS Plenary. CEOS Chair to invite CNES to discuss it at the next Secretariat meeting.	**30 Sept 2024**
	The request from CNES regarding CEOS support of the UN Ocean Conference requires further discussion.	

9.8: Ocean Surface Topography Virtual Constellation (OST-VC) User Requirements Document update

Presenter: Estelle Obligis (EUMETSAT, OST-VC Co-lead) and Yannice Faugere (CNES, OST-VC Co-lead) *[presentation]*

Main points:

- The launch of Sentinel-6B has been confirmed for November 2025. Other Copernicus activities are underway to prepare future Copernicus altimetry missions (Sentinel-3 C/D, Sentinel-6 B/C, Sentinel-3 Topography and Sentinel-6 Next Generation, CRISTAL).
- After the success of the SWOT demonstration, it was decided in May 2024 to fly swath altimetry onboard the Sentinel-3 Next Generation Topography mission.

- OST-VC are updating the "Next 15 years of altimetry – OST Constellation User Requirement Document", last updated in 2009. This new document will be titled "A Coordinated International Satellite Altimetry Virtual Constellation: Toward 2050", and will provide an inventory of current and emerging user needs, as well as identifying gaps in the current international space constellation. A first version will be delivered by the end of 2024, with publication expected in early 2025.

Main discussion points:

- Osamu Ochiai (JAXA, SIT Chair Team) asked if the finalisation of the updated white paper is targeted for endorsement at SIT-40. OST-VC confirmed this would be the right time for the CEOS Community to endorse the document.

9.9: 2025 CEOS Chair Themes

Presenter: Harshbir Sangha (UKSA, 2025 CEOS Chair Team) *[presentation]*

Main points:

- The UKSA CEOS Chair Team consists of six members from across UKSA. Dr. Paul Bate (UKSA CEO) and Harshbir (Director of EO, LEO and SSR) will share the chairing responsibilities over 2025.
- The headline theme is 'Unlocking Earth Observation for Society', and aims to bridge the gap between satellite EO and services.
- This includes four key activities:
  - **Unlocking EO for Public Service**: Identify strategies to better bridge the gap between EO data and services for the public sector.
  - **Unlocking EO for the UNFCCC Global Stocktakes**: Support and encourage sustained discussion and action on GST Lessons Learned recommendations through 2025.
  - **Unlocking EO for the Global Methane Pledge**: CEOS GHG TT methane standards adopted through an update of the Global Methane Pledge at UNFCCC COP30 (Brazil, Nov 2025).
  - **CEOS In Schools and Youth Summit**: Pilot a CEOS mechanism to inspire global youth collaboration in EO.
- The second and third activities will be carried out in collaboration with the JAXA SIT Chair Team.
- The 39th CEOS Plenary and 1st Youth Summit will be held November 4th - 6th, 2025, in Bath, UK.

Main discussion points:

- Osamu Ochiai (JAXA, SIT Chair Team) thanked UKSA for complementing the SIT Chair priorities in their plans, and looks forward to working together.

9.10: CEOS-ARD Strategy 2024

Presenter: Ferran Gascon (ESA, CEOS-ARD Oversight Group Lead) and Matt Steventon (CEOS-ARD Oversight Group Secretariat) *[presentation]*

Main points:

- Two CEOS-ARD peer-review assessments have been completed recently, from ISRO and JAXA. Several self-assessments are ongoing, including: DESIS L2A (DLR), Gaofen-1/6 SR (AIR-CAS), Opera RTC S1 Products (NASA).
- There have been engagements with NSI, Tellus, Synspective, AxelSpace, Planet, EarthDaily Analytics, and Catalyst. In addition, SEO is considering trial CEOS-ARD assessments of some commercial datasets.
- The second commercial engagement workshop next week at LSI-VC-16 in Canberra, involving Esper Satellite Imagery, Geospatial Intelligence, Arlula, Descartes Labs/EarthDaily.

- There is ongoing development of an Ocean Reflectance PFS (with OCR-VC), a combined optical PFS (SR, ST, AR, & NLSR) (USGS), and a Surface Reflectance Equivalence project (GA).
- The 2024 CEOS-ARD Strategy aims to reaffirm the commitment of CEOS Agencies to supporting CEOS-ARD, reflecting on progress to date, take stock of future directions and needs, and confirm our strategy for the next few years. A broad portfolio of CEOS-ARD that is easily discovered, accessed and utilised is the ultimate goal.
- The Strategy activities are categorised into six broad themes:
  - CEOS-ARD Availability, Product Diversity, and Representation
  - CEOS-ARD Framework and Specification Advancement
  - Discovery, Access, Utilisation, and Interoperability
  - Community Engagement
  - Research, Test Cases, and Pilot Activities
  - Commercial Engagement
- The Joint OGC-ISO ARD Standards Working Group (SWG) has experienced multiple core challenges, and hence a proposal has been tabled to strategically pause the SWG activities. With the CEOS-ARD Strategy we seek to maintain leadership of the satellite Earth observation Analysis Ready Data concept through CEOS-ARD, which should serve as the basis for more formal standards at the appropriate time. The team is also considering an OGC 'community standard' approach, which seems more compatible with the format of CEOS-ARD.

Main discussion points:

- Osamu Ochiai (JAXA) asked if there is a summary of what is happening on ARD outside LSI-VC. Matt noted this is represented in the strategy (excerpt of the table is shown below):

Entity	Representative(s)	CEOS-ARD Related Activities
Lead	Ferran Gascon (ESA)	
Secretariat	Matt Steventon	
Land Surface Imaging (LSI-VC)	Christopher Barnes (USGS) Peter Strobl (EC-JRC) Andreia Siqueira (GA) Takeo Tadono (JAXA) Ake Rosenqvist (JAXA)	• Surface Reflectance PFS • Surface Temperature PFS • Synthetic Aperture Radar PFS • Nighttime Lights Surface Radiance PFS • Aquatic Reflectance PFS
Ocean Colour Radiometry (OCR-VC)	Maycira Costa (UVic) Ewa Kwiatkowska (EUMETSAT)	• Ocean Reflectance PFS *(in development)*
Precipitation (P-VC)	Chris Kidd (NASA)	• Precipitation PFS *(in development)*
Sea Surface Temperature (SST-VC)	Edward Armstrong (NASA)	
Ocean Surface Topography (OST-VC)	Mark Higgins (EUMETSAT) Julia Wagemann (ECMWF) Federico Fierli (EUMETSAT)	
Working Group on Calibration & Validation (WGCV)	Philippe Goryl (ESA) Medhavy Thankappan (GA) Peter Harrison (GA) Clement Albinet (ESA)	• Leading peer reviews of CEOS-ARD self-assessments
Working Group on Information, Systems & Services (WGISS)	Makoto Natsuisaka (JAXA) Tom Sohre (USGS) Nitant Dube (ISRO)	• CEOS Interoperability Framework and Handbook
Working Group on Capacity Building & Data Democracy (WGCapD)	Jorge Del Rio Vera (UNOOSA)	
CEOS Systems Engineering Office (SEO)	David Borges (NASA)	• Pilot self-assessments • External stakeholder engagement

Session 10: Closing Session

10.3: Closing Remarks

Presenter: Hironori Maejima (SIT Chair, JAXA), Alex Held (CSIRO), Medhavy Thankappan (GA) *[presentation]*

Main points:

- Hironori thanked all for a productive week, and reminded all of the upcoming meetings:
  - The 38th CEOS Plenary will be hosted by CSA in Montreal, Canada on 22-24 October, 2024.
  - SIT-40 will be hosted by JAXA in Fukuoka, Japan, on 8-10 April, 2025.
  - The 2025 SIT Technical Workshop will be hosted by EUMETSAT in Darmstadt, Germany on 9 - 11 September, 2025.
  - The 39th CEOS Plenary will be hosted by UKSA in Bath, UK on 4 - 6 November, 2025.
- Hironori thanked CSIRO and GA for hosting a wonderful meeting, and wished everyone safe travels home.
- Alex Held (CSIRO) and Medhavy Thankappan (GA) added their thanks to JAXA and all the participants, and wished everyone a safe trip home.

Main discussion points:

- Julie Robinson (NASA) thanked the SIT Chair Team for the extra effort over the last nine months to ensure this meeting was well prepared. She noted that the Australian agencies are a great example for how the national agencies can work together.
- Marie-Claire Greening (ESA) thanked CSIRO and GA for hosting, noting it was nice to have a meeting in Australia after being unable to host the planned meetings during their SIT Chair term in 2020-2021.

APPENDIX A: Attendees

** = virtual participation*

Agency/Organization	Name	Agency/Organization	Name
ASI	Laura Giulia Maria Candela	JAXA	Misako Kachi
Bureau of Meteorology	Agnes Lane	JAXA	Osamu Ochiai
CEOS Chair Team	Matthew Steventon	JAXA	Yuko Nakamura
CEOS Executive Officer	Lefteris Mamais	NASA	Barry Lefer
CEOS Executive Officer	Steven Ramage*	NASA	Christine Bognar
CNES	Aurelien Carbonniere*	NASA	David Borges
CNES	Aurelien Sacotte*	NASA	Gary Geller*
CNES	Selma Cherchali*	NASA	Julie Robinson
CNES	Yannice Faugere*	NASA	Sid Boukabara
CONAE	Laura Frulla*	NASA	Wenying Su
CONAE	Laura Frulla*	NASA / GSFC	Christopher Kidd
CSA	Eric Laliberte*	NASA / JPL	John Worden
CSA	Frederic Fournier*	NASA / UMD	Laura Duncanson*
CSA	Lucie Viciano*	NCEO	John Remedios
CSIRO	Adriana Parra Ruiz	NIES	Fenjuan Wang*
CSIRO	Alex Held	NOAA	Adria Schwarber*
CSIRO	Flora Kerblat	NOAA	Jeff Privette
CSIRO	Mark Cheung	NOAA	Katia Kontar
CSIRO	Michael Terkildsen	NOAA	Katy Matthews
CSIRO	Neil Sims*	NOAA	Shobha Kondragunta
CSIRO	Shaun Levick	NOAA/GST	Merrie Neely
DLR	Albrecht Von Bargen*	NPL	Paul Green
DLR	Klaus Schmidt*	SANSA	Christo Peter Whittle*
ESA	Clement Albergel	SIT Chair Team	David Crisp
ESA	Ferran Gascon*	SIT Chair Team	George Dyke
ESA	Inge Jonckheere	SIT Chair Team	Harvey Jones*
ESA	Marie-Claire Greening	SIT Chair Team	Libby Rose
ESA	Yasjka Meijer	SIT Chair Team	Satoshi Uenuma*
EUMETSAT	Estelle Obligis*	SIT Chair Team	Stephen Ward
EUMETSAT	Ewa Kwiatkowska*	SIT Chair Team	Teppei Sato*
EUMETSAT	Robert Husband*	SIT Chair Team	Toshi Kamei
European Commission, JRC	Peter Strobl	UKSA	Beth Greenaway*
GA	Luane Lollback	UKSA	Harshbir Sangha*
Geoscience Australia	Andreia Siqueira	UKSA	Patrick Gibson
Geoscience Australia	Medhavy Thankappan	UKSA	Shaneigh Turner
GISTDA	Poramet Thuwakham	UNOOSA	Jorge Del Rio Vera*
ISRO	Nitant Dube*	USGS	Kelly Bruno
ISRO	Rashmi Sharma*	USGS	Roger Sayer*
JAXA	Ake Rosenqvist	USGS	Sylvia Wilson*
JAXA	Hironori Maejima	USGS	Timothy Stryker
JAXA	Hiroshi Suto	USGS	Tom Sohre*
JAXA	Mariko Harada	WMO	Albert Fischer*

APPENDIX B: Actions & Decisions Record

CEOS SIT TW 2024 Actions and Decisions v0.0

ACTIONS