

MINUTES OF THE 36TH CEOS PLENARY
Version 1.0
30 November – 1 December, 2022
Hosted by CNES

Executive Summary

- Plenary endorsed the Canadian Space Agency (CSA) as 2024 CEOS Chair from the Americas region.
- Plenary endorsed the long-term and equitable plan for CEOS Executive Officer continuity presented by the CEOS Chair Team. A rotating schedule was developed to ensure continuity via a rotation of responsibilities among the five permanent SEC agencies, with slots open for non-SEC agencies.
- The Greenhouse Gas Roadmap update noted [CEOS inputs to the first Global Stocktake](#) and plans for future Roadmap updates to address additional actions that have emerged in recent years, with the ultimate ambition being a fully integrated system in 2035.
- Development of the CEOS Agriculture, Forestry and Other Land Use (AFOLU) Roadmap continues and the team seeks to re-engage key agencies and individuals to meet Roadmap delivery in 2023 (for GST1). A step up in capacity is needed to realise the ambition.
- OCR-VC is progressing towards a CEOS Aquatic Carbon Roadmap as a complement to the GHG and AFOLU Roadmaps.
- CEOS Principals acknowledged the *“Statement Reporting on Progress by the Committee on Earth Observation Satellites (CEOS) and the Coordination Group for Meteorological Satellites (CGMS) on Coordinated Response to UNFCCC Needs for Global Observations”*, which was submitted to the 57th Session of the Subsidiary Body for Scientific and Technological Advice.
- Jeff Privette of NOAA was welcomed as the new WGClimate Chair.
- Plenary endorsed Wenying Su of NASA as WGClimate Vice Chair for 2023-2024, and WGClimate Chair for 2025-2026.
- Philippe Goryl of ESA was welcomed as the new WGCV Chair.
- Plenary endorsed Cody Anderson of USGS as WGCV Vice Chair for 2023-2024 and WGCV Chair for 2025-2026 and endorsed updates to the WGCV Terms of Reference.
- CEOS members will review the proposed EOTEC DevNet Sustainability Plan and consider the outlined approaches to staffing, including in-kind support for the part-time positions of regional community of practice coordinators – in anticipation of further discussion at SIT-38.
- Plenary endorsed the AC-VC white paper *“Monitoring Surface PM2.5: An International Constellation Approach to Enhancing the Role of Satellite Observations”* and acknowledged its 16 recommendations. AC-VC will now lead the development of an implementation roadmap to address the recommendations.
- Plenary endorsed the Terms of Reference for the CEOS ‘New Space’ Task Team. The SIT Chair will convene the Task Team to discuss and agree focus areas, define actions, and work towards a white paper with findings and recommendations for CEOS Plenary 2023.

- The SIT Chair will organise a dedicated session on the topic of CEOS engagement with standards organisations at SIT-38 and invite CEOS entities to present their experience and status, with the aim of creating a snapshot inventory of CEOS engagement on standards.
- CEOS Principals confirmed that coordination of interoperability related work remains within the WGISS perimeter. WGISS was invited to propose an interoperability roadmap at SIT-38, considering the CEOS Interoperability Framework concept developed and presented by LSI-VC.
- The progress of the CEOS Sustainable Development Goals (SDG) Coordination Team was presented, as well as six potential new deliverables for 2023.
- Plenary endorsed the Ecosystem Extent Task Team Terms of Reference. The Ecosystem Extent Task Team Leads will work to confirm the membership of the Task Team, including for the open third Co-Lead position.
- Plenary endorsed the extension of the CEOS Ocean Coordination Group for another six months, to be revisited again at SIT-38. The group seeks to establish the necessary mechanism and leadership to coordinate existing CEOS ocean-related activities addressing the United Nations Decade of Ocean Science for Sustainable Development and the Global Stocktakes, and to serve as a study team to initiate the case towards a more formal solution within the CEOS structure, e.g., a Working Group or other. Paul DiGiacomo of NOAA has agreed to lead the CEOS Ocean Coordination Group beyond CEOS Plenary 2022.
- The COVERAGE team is planning to initiate a discussion on the possible future evolution of COVERAGE for consideration at the SIT-38 meeting in March 2023. They will explore interest and options for further co-development of COVERAGE within CEOS and consider a strategy for possible longer-term sustainability of COVERAGE.
- Plenary endorsed the 1-year extension of the COAST *Ad Hoc* Team, with the understanding that the team will bring to SIT-38 a set of clear, quantifiable recommendations towards the conclusion of the activity.
- Brian Killough is retiring on December 16, 2022 after 35+ years with NASA and 15+ years with the CEOS Systems Engineering Office (SEO). Dave Borges will take over as CEOS SEO lead.
- Reviewed the outcomes of the CNES 2022 CEOS Chair Priority *“Paths to Sustainability: from strategy to practical measures”* in the areas of: Ensuring Long-term Sustainability of CEOS Strategies (e.g., WGDIsasters Recovery Observatory (RO) sustainability subgroup established); CEOS Support to the UNFCCC Global Stocktake (e.g., Biomass mission, GEO-TREES Secretariat, Space Climate Observatory links); Support to CEOS Cal-Val Initiatives (e.g., Network of thermal IR calibration sites).
- Plenary welcomed the Geo-Informatics and Space Technology Development Agency (GISTDA) of Thailand as 2023 CEOS Chair. GISTDA will have Climate / UNFCCC Global Stocktakes and ‘New Space’ as headline priorities for their Chair year.

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Wednesday, November 30

Session 1: Welcome and CEOS Core Business

1.1: Welcome, Opening Remarks, Agency Introductions and Summary of Objectives [[slides](#)]

Presenter: Selma Cherchali (CNES, 2022 CEOS Chair)

Main points:

- Welcomed everyone to Biarritz, France, for the 36th CEOS Plenary and acknowledged the virtual presence of many agencies.
- Invited the head of each agency to provide a summary of their delegations. The complete attendance list can be found in Appendix A.
- Reviewed the objectives for this Plenary, which are detailed in the agenda and in the slides linked above.

1.2: Surface Water and Ocean Topography (SWOT) Mission Pre-Launch Update [[slides](#)]

Presenters: Rosemary Morrow (CNES), Nadya Vinogradova Shiffer (NASA)

Main points:

- The Surface Water and Ocean Topography (SWOT) mission is planned for launch on 15 December, 2022.
- A video message from Nadya Vinogradova Shiffer was played. It can be viewed [here](#).
- SWOT will use SAR interferometry to make global measurements of water elevation over ocean and hydrological surfaces, and will cover the world between 78N and 78S every 21 days.
- SWOT will provide valuable data and information that will benefit society in two critical areas: freshwater on land, and the oceans' role in a changing climate. The mission will observe surface water, ocean topography and coastal / estuarine regions.
- The satellite will carry a Ka-band SAR interferometric (KaRIn) system with two swaths, each 50 km wide.
- SWOT will observe almost 6 million lakes over 0.01 km², and will measure changes in water volume over time for tens of thousands of reservoirs, which water managers can use to understand available resources. This allows for more complete studies of the global water cycle.
- SWOT will provide the first 3D images of floods, which will help to better predict and track changes.
- The SWOT Science Team has been working since 2008, with 58 total members across the U.S., France, U.K., Canada, and many other countries.
- 11 coastal, 23 hydrological, and 18 open-ocean sites, both *in situ* and airborne, have been implemented for calibration and validation.
- The mission marks a number of global achievements, including:
 - First global observations of Earth's water resources using SAR interferometry;
 - First estimate of the flows of all rivers wider than 50-100 m;

- Complete inventory of lakes, reservoirs and floodplains greater than 250m² and their spatio-temporal dynamics;
- First observations of the 2D ocean circulation at fine scale (10 km), and their interactions with the tides.

Main discussion points:

- Steve Volz (NOAA) asked about the timeline for public release of validated data. Rosemary noted that as the mission is a completely new concept, the science teams will take a while to review the data, but expect that around September 2023 the first pre-validated data will be made available to the public. A meeting of the validation team will be held in early 2024, roughly 14 months after launch.
- Beth Greenaway (UKSA) noted that UKSA is excited to be a part of this mission, and have been involved since 2004. The UKSA team is installing new tide gauges to gather *in situ* measurements for the mission. She congratulated the team, and wished them luck for the mission launch.
- Alex Held (CSIRO) offered the support of Australia for calibration and validation of the mission. There are a number of Australian sites which would be suitable for the mission requirements. Rosemary noted the interest in terrestrial water in Australia, especially with the recent floods.
- Anthony Rea (WMO) asked about the latency of data availability. Rosemary noted that near-real time data availability is planned, however this won't be available within the first year, but in the second phase of the mission, after 14 months when the 21-day revisit period is established. Near-real time for this mission refers to an approximate 3-day delay. All data will be publicly available.
- Selma Cherchali (CNES, CEOS Chair) added that, after the calibration and validation period, data is planned to be available within three days, and the infrastructure is being readied for this.
- Mauro Facchini (European Commission) recognised that the Sentinel-3 altimetry next generation missions have a lot to learn from SWOT. For the whole hydrology and ocean community, SWOT marks a step change in what we are able to measure.
- Simonetta Cheli (ESA, SIT Chair) noted the ESA Ministerial was held last week, and a proposal was put forward for Sentinel-3 Next Generation. It was agreed that SWOT should be used as a baseline for this mission. ESA will be keenly awaiting the mission performance review in the northern spring of 2024.

1.3: CEOS Chair Team Review of Matters for Decision or Endorsement [[slides](#)]

Presenter: Selma Cherchali (CNES, CEOS Chair)

Main points:

- Reviewed the matters for decision and endorsement, which are detailed in the agenda and in the slides linked above.

1.4: Agency Nomination for 2024 CEOS Chair [[letter](#)]

Presenter: Éric Laliberté (Canadian Space Agency)

Main points:

- For 2024, the CEOS Chair nominally rotates to an agency from the Americas region. The Canadian Space Agency (CSA) has self-nominated for CEOS Chair for 2024.

- As an active member of CEOS, Canada wishes to renew its appreciation of the work of the organisation as the primary forum for international coordination of civil space-based Earth observation.
- Éric Laliberté is proposed to serve as the CEOS Chair.

Main discussion points:

- Steve Volz (NOAA) thanked CSA for their nomination, and noted NOAA looks forward to their chairmanship.
- Pakorn Apaphant (GISTDA, 2023 CEOS Chair) noted that GISTDA is grateful for the nomination from CSA, and look forward to working together over the coming years.
- Mauro Facchini (European Commission) expressed his support for the CSA nomination.
- Takeshi Hirabayashi (JAXA, SIT Vice Chair) also expressed his support for CSA and their chairmanship.
- Phil Evans (EUMETSAT) thanked Éric and CSA for the nomination.
- Julie Robinson (NASA) endorsed the nomination. NASA thanked CSA for their conversations over the last year and their early planning for the 2024 CEOS Chair year.
- Selma Cherchali (CNES, CEOS Chair) noted their support for CSA and thanked Éric.
- CSA's nomination for CEOS Chair was endorsed by NOAA, GISTDA, European Commission, JAXA, ESA, EUMETSAT, NASA, CONAE and CNES.

Decision 36-01

Plenary endorsed the Canadian Space Agency (CSA) as 2024 CEOS Chair from the Americas region.

1.5: CEOS Executive Officer (CEO) Report [[slides](#)]

Presenter: Marie-Claire Greening (CEO)

Main points:

- Marie-Claire is coming to the end of her second year as CEOS Executive Officer (CEO), however her position has been extended for a further year thanks to the support of NASA and NOAA.
- Reviewed the roles and responsibilities of the CEO.
- Reviewed the organisational structure of CEOS.
- Presented the CEOS Work Plan for 2022-2024, noting that the deliverables outlined in the Work Plan are tracked using the online [CEOS Deliverables Tracking Tool](#).
- CEOS groups have closed 28 deliverables this year, with 9 overdue and 31 due by the end of 2022. 49 are due in 2023, and 13 are due in 2024 and beyond.
- Reviewed the key CEOS meetings held in 2022.

Discussion

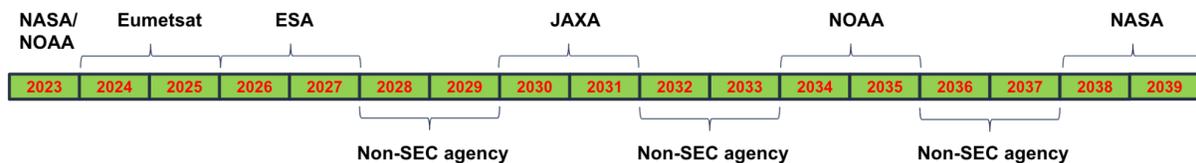
- Simonetta Cheli (ESA, SIT Chair) thanked Marie-Claire for her effort in the role, and noted that the CEO role is becoming increasingly important as CEOS activities grow. Everyone recognises the importance of the CEO role, and hence finding a long-term, sustainable plan for this role is key.

1.6: CEOS Executive Officer (CEO) Continuity [\[slides\]](#)

Presenter: Olivier Marsal (CNES, CEOS Chair Team)

Main points:

- Reiterated the role of the CEO, a key function in the CEOS organisation that provides support to all CEOS Agencies and priorities.
- The CEO Terms of Reference state: *“The CEO is appointed by the CEOS Chair for a two-year term. Every effort will be made to ensure the role of CEO is fulfilled by a direct-hire CEOS Agency employee (not a contractor)”*.
- In recent years, it has become more and more difficult to convince CEOS Agencies to nominate candidates for the CEO role.
- Attempts made by the 2021 and 2022 CEOS Chairs to encourage agencies to nominate a candidate returned no response, with agencies citing a lack of resources as the reason.
- The CNES CEOS Chair led an informal working team with the five permanent SEC agencies, JAXA, ESA, EUMETSAT, NASA and NOAA, to resolve this issue.
- The proposal aims to ensure continuity via the support of the permanent SEC agencies, while leaving open the possibility for and encouraging all CEOS Agencies to nominate a candidate.
- A rotating schedule was developed to ensure continuity via a rotation of responsibilities among the five permanent SEC agencies, with slots open for non-SEC agencies. The agreed schedule is below.



- Commitments will be reaffirmed at each CEOS Plenary, and firm commitments should cover the four-year period following the Plenary.
- NASA and NOAA have announced that they will extend and jointly fund the existing CEO's contract by one year, through the 2023 Calendar Year.
- EUMETSAT and ESA will coordinate their efforts to lead a European consortium to cover the period of 2024-2027. Commitment from other European agencies is essential to confirming this proposal.
- Principals of European agencies are invited to inform CEOS of their position in regard to the proposed scenario for the 2024-2027 period and their willingness to contribute.
- The CNES CEOS Chair Team seeks endorsement of the above scenario by CEOS Principals.

Main discussion points:

- Phil Evans (EUMETSAT) thanked CNES for putting substantial time and effort into resolving this issue. EUMETSAT currently has support from ESA, CNES, DLR, Portugal Space, NSO and the European Commission for the 2024-2027 proposal. Other European agencies are asked to contact EUMETSAT to express their commitment by the end of this calendar year.

- Selma Cherchali (CNES, CEOS Chair) thanked Olivier for the effort to coordinate this proposal, and thanked EUMETSAT and ESA for their support on continuity.
- Beth Greenaway (UKSA) expressed her support for the plan and asked about the plan for the ‘non-SEC’ years on the presented timeline.
- Olivier Marsal (CNES, CEOS Chair Team) noted that the proposal is a compromise aimed at ensuring continuity while also sharing the opportunity.
- Julie Robinson (NASA) noted that NASA supports this proposal to provide the opportunity to all CEOS Agencies, with plenty of time in between to coordinate. Permanent SEC agencies agree to fill gaps if necessary, and the status of nominations will be reviewed yearly. For agencies that are expanding participation in CEOS, the CEO role is a good opportunity to gain experience of the CEOS organisation.
- Beth Greenaway (UKSA) asked which agencies are considered ‘non SEC’ Agencies. Steve Volz (NOAA) clarified that ‘non-SEC’ refers to agencies that aren’t permanent SEC members. Steve noted the importance of the Deputy CEO role also, noting that working with the existing CEO is a great way to learn and get up to speed quickly. He also recalled that in the past non-SEC agencies such as CNES, CSA and USGS, have already occupied the CEO position.
- Tim Stryker (USGS) thanked the permanent SEC agencies and CNES for this proposal that enables both longer-term planning and inclusiveness. The CEO role offers a great opportunity for career path development. This is a good approach to a problem CEOS has had for a while. Tim echoed the importance of the Deputy CEO role and the opportunity for them to learn from the current CEO.
- Takeshi Hirabayashi (JAXA, SIT Vice Chair) noted that JAXA supports the proposal and expressed his thanks towards the CEOS Chair Team. As a permanent SEC member, JAXA will encourage all CEOS members to consider nominating for this position.
- European agencies are asked to contact EUMETSAT to express their willingness to contribute to the CEO role for 2024-2027.

Decision 36-02	<p>Plenary endorsed the long-term and equitable plan for CEOS Executive Officer continuity presented by the CEOS Chair Team.</p> <p><i>CEOS Principals of European agencies are invited to inform CEOS of their position regarding the proposed scenario for the 2024/2027 period and their willingness to contribute.</i></p>
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CEOS-36-01	<p>All CEOS European members who have not yet confirmed their contribution to CEOS Executive Officer continuity to inform EUMETSAT and ESA about commitments to participate in the 2024-2027 consortium led by EUMETSAT and ESA, and to confirm the amount of any contribution, where possible.</p>	31 December 2022
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1.7: Group on Earth Observations (GEO) Secretariat Report [\[slides\]](#)

Presenter: Laurent Durieux (GEO Secretariat)

Main points:

- Yana Gevorgyan (GEO Secretariat Director) sends apologies for her absence, as she is attending the Oceania Geospatial Symposium (OGS) in New Caledonia this week.
- GEO has focused on the theme “*Global Action for Local Impact*”, including at the 2022 GEO Week.
- CEOS and GEO have continued work together on the following activities:
 - o Continued support to GEO engagement priorities of the 2030 Agenda for Sustainable Development, the Paris Climate Agreement and the Sendai Framework for Disaster Risk Reduction.
 - o Support for the new engagement priority on Urban Resilience.
 - o Improved integration of CEOS projects and GEO Work Programme activities.
 - o Extending impacts of CEOS-GEO collaboration to identified synergy opportunities.
 - o Moving from R&D and demonstration activities to applications and services.
 - o Capacity development for the use of EO data to solve identified needs by stakeholders.
 - o Participation of CEOS to the GEO post-2025 strategy and incubators.
- The GEO Wetlands Initiative is a model of collaboration success between GEO and CEOS Agencies, through a dialogue with Ramsar Secretariat and Science and Technical Review Panel (STRP). GEO Wetlands is a topic that could be discussed in the proposed CEOS Ecosystem Extent Task Team.
- The GEO Work Programme for 2023-2025 includes 5 flagships, 19 initiatives, 20 pilot initiatives, and 4 regional GEOs. There are also 5 potential incubators.
- The proposed CEOS Ecosystem Extent Task Team is a key area for future CEOS-GEO collaboration. GEO is supporting its own three-phase programme proposal on ecosystems:
 - o Phase I: Mapping Global Ecosystems (2023-2024)
 - o Phase II: Developing and Accessing the Atlas (2024-2025)
 - o Phase III: Increasing Uptake and Developing Capacity (2025-2027)
- The Post-2025 GEO Strategy aims to:
 - o Build on 17 years of success, with ideas behind the vision still valid.
 - o Make GEO fit for purpose.
 - o Utilise accompanying factors to propel GEO towards their vision.
 - o Respond more effectively to user needs: e.g., facilitating access to more high-resolution data.
- CEOS is represented in the Post-2025 GEO Working Group by Marie-Josée Bourassa (CSA).

Main discussion points:

- Selma Cherchali (CNES, CEOS Chair) noted that the collaboration between CEOS and GEO is key to both organisations’ success. CEOS is the ‘space arm’ of GEO.

- There will be a role within the GEO Secretariat dedicated to providing technical solutions, dealing with observations and derived products. CEOS and GEO should consider their evolution of this relationship alongside the evolution of GEO.
- Simonetta Cheli (ESA, SIT Chair) thanked Laurent for the overview of GEO, and noted that GEO is a key conduit for user requirements for CEOS. GEO is currently evolving, and CEOS should consider the evolution of the relationship between CEOS and GEO. The increased impact of the private sector also needs consideration.
- Steve Volz (NOAA) agreed with CNES and ESA, and welcomes the shift in GEO focus towards end users. With their historical connection with providers of data and institutional users, GEO can provide information on end users' needs that CEOS doesn't normally have a direct connection with.

Session 2: Climate and Carbon

1.8: SIT Chair Climate & Carbon Priority Synthesis Report [\[slides\]](#)

Presenter: Stephen Briggs (ESA, SIT Chair Team)

Main points:

- Climate and Carbon is one of ESA's SIT Chair priorities.
- The Global Stocktake (GST) Strategy Document version 3.1 was approved at the 35th CEOS Plenary in November, 2021.
 - o The document contains nine recommendations for specific actions on CEOS Agencies and CEOS entities to support the Global Stocktake (GST) of the Paris Agreement.
 - o Actions derived from the recommendations are included in the overall CEOS Work Plan and are complementary to those already carried out by CEOS bodies in support of the GST. Ongoing work contributes significantly in areas such as adaptation.
 - o Many different entities of CEOS contribute to the Strategy.
- A number of actions have been taken to address the CEOS GST Strategy recommendations. These include:
 - o Various workshops held over the last year to support recommendations 1 & 2.
 - o Multiple contributions to Earth Information Day at UNFCCC COP 26 and 27, held in Glasgow and Sharm El-Sheikh, respectively.
 - o NASA, ESA, CNES and DLR conducted a joint Arctic Methane and Permafrost Challenge (AMPAC) campaign aimed at understanding methane emissions from tundra under warming conditions. An AMPAC Training Course was held in September 2022, Norway. There is a possible extension of AMPAC to the 2023 season.
 - o A joint AFOLU-GHG workshop was held at the European Commission Joint Research Centre in November, 2021.
 - o SilvaCarbon has worked on demonstrators of EO for national reporting under AFOLU, with local training courses held in 2022.
 - o The SIT Chair collaborated with GEO on adaptation through GEO's Climate Change Working Group Adaptation sub-group, which reported to COP 27.

- At the CEOS-GEO annual coordination meeting in February 2022, a joint activity on climate finance was proposed.
- There has been cooperation with GCOS on the 2022 GCOS Implementation Plan satellite elements, with the satellite supplement coming soon.
- The CEOS Global Stocktake Portal can be found at ceos.org/gst. Existing dataset profiles and guidance were updated in 3 languages in 2022. A new section on ‘User Stories and Inspiration’ was also implemented, which includes examples of how countries and agencies are using the datasets.
- The GEO-TREES initiative is being led by CNES, with Iris-Amata Dion serving as GEO-TREES Executive. The Governance and Implementation Plan draft documents are ready, and the Trust Fund process has begun, which will be managed by GEO and audited by WMO.
- IMEO was invited to participate in both SIT-37 (virtual) and SIT Technical Workshop 2022, to identify areas of potential collaboration with CEOS. The SIT Chair Team sees significant potential in an effective working relationship between CEOS and IMEO.

Main discussion points:

- Pakorn Apaphant (GISTDA, 2023 CEOS Chair) noted that the Global Stocktake is one of GISTDA’s CEOS Chair priorities. He is keen to understand how best GISTDA can support this topic over the next year.
- Stephen Briggs (ESA, SIT Chair Team) asked for additional support for the AFOLU Roadmap. The team is meeting on 6 December, with the goal to complete the Roadmap in a year’s time.
- Pakorn Apaphant (GISTDA, 2023 CEOS Chair) noted the workshop GISTDA is hosting next year with SilvaCarbon on AFOLU topics, with a focus on mangroves and national forest inventories.
- Referring to the GHG Roadmap, Stephen Briggs (ESA, SIT Chair Team) noted that the current investment is aimed at developing a prototype GHG system by 2026, however the long-term goal is to make the suite of satellite observations and ground-based observations part of the integrated forecasting system of ECMWF. This planned to be a continuing activity with no endpoint. However, it is not just observations of greenhouse gases which need to be made, terrestrial and ocean observations are also needed to understand different processes in the carbon cycle, hence the effort on the AFOLU Roadmap and early discussions of an Ocean Carbon Roadmap.
- Jorge Del Rio Vera (UNOOSA, WGCapD Chair) noted Recommendation 7 (data requirements) and highlighted that WGCapD are trying to help space agencies with different data products and user requirements and could offer assistance in this area.
- UNOOSA hosts the UN-SPIDER platform, which gathers requirements from different countries. It is mainly focused on disaster management and emergency response, but also considers climate adaptation. UNOOSA can perhaps engage with the SIT Chair Team on this topic.
- Stephen Briggs (ESA, SIT Chair Team) noted that another important part of the Paris Agreement is equity, and WGCapD is mentioned in the CEOS GST Strategy regarding this.

1.9: Greenhouse Gas (GHG) Roadmap Update [\[slides\]](#)

Presenter: Mark Dowell (EC-JRC)

Main points:

- The WGClimate GHG Task Team develops and maintains the GHG Roadmap, defining the overall distributed work plan and coordinating relevant activities with CEOS and CGMS.

- Action F5 of the new [GCOS Implementation Plan](#) (GCOS-244) calls for the development of an integrated greenhouse gas monitoring infrastructure.
- The Task Team's inputs to the first Global Stocktake can be viewed at ceos.org/gst/ghg. The pilot products are intended to start a conversation with stakeholders and users to establish the utility and best practices for combining bottom-up and top-down products to enable a more complete Global Stocktake.
- The transition from the 1st to 2nd Global Stocktake has been considered, with critical actions including: Standards for operational products; QC and Calibration and Validation framework; Identifying continuity issues and making proposals for contingency planning; Training and end user support.
- The Atmospheric Composition Virtual Constellation (AC-VC) supports the efforts to integrate carbon dioxide and methane based inventories using fluxes from total column data and fossil emissions from high-resolution plume mappers, as well as the efforts to develop greenhouse gas information systems.
- AC-VC is also working on an intercomparison between CEOS AFOLU estimates and top-down forestry net carbon exchange using atmospheric GHG measurements, and will host a workshop on evaluating and attributing uncertainties in top-down carbon dioxide and methane emissions.
- Updates to the GHG Roadmap include: Low latency product demand; Commercial sector data and products; Standards; New calibration and validation opportunities.
- Linking the GHG and AFOLU Roadmaps will need consideration of data and standards, engaging the carbon cycle community, prioritising research needs, and working towards a common system. The ultimate ambition should be a fully integrated system in 2035. We need to ensure internal consistency, avoid double accounting and ensure seamless interfaces to users, but need a stepwise approach, with near to mid-term parallel activities but with periodic joint discussions to check interfaces.
- WGClimate has approved a new lead for the GHG Task Team – Yasjka Meijer of ESA.
- A one-day WGClimate GHG Task Team meeting is planned in Geneva on 2 February 2023, following the WMO GHG Conference (30 January to 1 February).

Main discussion points:

- Selma Cherchali (CNES, CEOS Chair) thanked Mark for his leadership over the past three years, and welcomed Yasjka to the role of GHG Task Team lead. This is a key contribution from CEOS to a very important global topic.
- Simonetta Cheli (ESA, SIT Chair) also thanked Mark, and congratulated the team on their excellent work. Within the Copernicus Expansion missions, there is a dedicated mission in preparation for these observations (CO2M). At the Ministerial last week, there was strong support shown for the climate space initiative, which will further enhance collaboration in the context of climate and activities related to greenhouse gases.
- Mauro Facchini (European Commission) thanked Mark. He noted an increase in policy legislation regarding the integration of EO missions for GHG measurements.
- Selma Cherchali (CNES, CEOS Chair) noted that beyond CO2M, within the CEOS community, there are many other greenhouse gas missions. This is very much a collective effort.

- Akihiko Kuze (JAXA, WGCV Chair) noted that WGCV is happy to support the calibration and validation aspects of GHG data, especially with joint campaign data – including both ground and airborne datasets.

1.10: AFOLU Roadmap [[slides](#)]

Presenter: Ben Poulter (NASA)

Main points:

- The 34th CEOS Plenary in 2020 agreed to a CEOS AFOLU Roadmap, as an initiative to support the UNFCCC Global Stocktake.
- In 2021 and 2022 the team has completed the following:
 - o Assessment of latest AFOLU products (land cover, agriculture and biomass) that could be readied for COP 26 (2021).
 - o Biomass harmonisation exercise on ESA/NASA MAAP.
 - o Coordination with SIT Chair and GHG Task Team on the new CEOS GST Portal – as a unified point of entry to explain and offer CEOS data (ceos.org/gst).
 - o New engagement axis with national inventory users via SilvaCarbon, building on our GFOI experience and in the spirit of the ambition cycle of the Paris Agreement to learn together and grow together.
 - o Significant input to the synthesis report on “*The Role of Systematic Earth Observations in the Global Stocktake*” for UNFCCC.
 - o Contributions to COP 27 and its Earth Information Day.
- Regarding biomass, NASA and ESA researchers are collaborating on several activities related to the generation and validation of forest aboveground biomass products. This includes the bilateral Multi-Mission Algorithm and Analysis Platform (MAAP), which provides a new tool for open science biomass product development, and cross-agency collaboration.
- Regarding land cover, the group is identifying forest, land and wetland cover and change essential for national GHG inventories as activity data inputs for global AFOLU modelling and assessments.
- Regarding mangroves, the Global Mangrove Watch activity led by JAXA and the LCLUC Global Mangrove Mapping led by NASA/JPL are the key foci.
- Regarding agriculture, GEOGLAM and ESA’s WorldCereal project are the key foci.
- The CEOS-TOPC (GCOS Terrestrial Observation Panel for Climate) AFOLU Workshop was held in September 2022, at ESA ESRIN. The key outcome was the identification of a workflow for integrating the GHG and AFOLU Roadmaps and activities of CEOS, IPCC and WMO for an operational GHG monitoring, reporting and verification (MRV) system.
- The focus for 2022 and 2023 is the development of a CEOS AFOLU Roadmap document to provide a framework for long-term coordination of CEOS Agency observing programmes in support of the needs of society for AFOLU-related information; a guiding vision for long-term space agency coordination around AFOLU; an effective means for communicating CEOS intentions to society, UNFCCC, national inventory community etc.; and to address basic observation continuity and the necessary agency coordination.

- The emerging vision for the AFOLU Roadmap affirms that this is a generational challenge that CEOS and public EO programmes must rise to. The revised contents of the AFOLU Roadmap are:
 - o Define the 2035 observing system required to address the AFOLU information needs of society.
 - o Consider the technologies and systems needed to realise this observing system.
 - o Identify the stakeholders required at different stages of the value chain to ensure it can be sustained in the long-term (i.e., users, service providers, data product producers, observation providers).
 - o The technology development programmes and investments needed by space agencies to achieve the needs, and the programmatic commitments that will be needed to get there.
- Thematic teams are already doing important relevant work (e.g., GEOGLAM for agriculture) that the Roadmap should harness.
- Roadmap delivery is aimed for 2023, for the 1st Global Stocktake.
- The Roadmap will primarily be an internal document, but it will also communicate CEOS's intent for public EO missions to serve society and these policy processes.
- A step-up in capacity is needed to realise this ambition. The AFOLU Roadmap Team welcomes support from all CEOS Agencies.

Main discussion points:

- Beth Greenaway (UKSA) noted that the UK is prioritising where they channel their efforts, and wants to put more effort into this area.
- Stephen Briggs (ESA, SIT Chair Team) noted the plan to hold an AFOLU Roadmap meeting on Tuesday December 6, and invited anyone interested to contact him for details.

1.11: CEOS Cooperation with IMEO [[slides](#)] [[IMEO-MARS Video](#)]

Presenter: Stephen Briggs (ESA, SIT Chair Team)

Main points:

- IMEO is a data-driven, action-focused initiative by the UN Environment Programme (UNEP) with support from the European Commission to catalyse dramatic reduction of methane emissions, starting with the energy sector.
- The Australian SIT Chair Team first reached out to the International Methane Emissions Observatory (IMEO) for a report on their work to the SIT Technical Workshop in 2021, recognising the central role of satellite EO in their work, and the potential high impact of EO on emissions reduction.
- The ESA SIT Chair agreed the importance of CEOS-IMEO cooperation and undertook activities to provide continuity in these discussions.
- The IMEO team has since participated in a number of CEOS groups and meetings, including SIT-36, AC-VC, WGClimate, and the 2022 SIT Technical Workshop.
- IMEO's data product, the Methane Alert and Response System (MARS), was announced at UNFCCC COP 27.

- The first phase of the MARS platform will use satellite remote sensing for detection and attribution of methane plumes from point-sources (energy sector) and will also include notification and mitigation-tracking workflows.
- The MARS project currently uses Sentinel-5P TROPOMI, GHGSat, PRISMA, EnMAP, EMIT, AHSI, Sentinel-2 and Landsat data to develop the data products. MARS uses different data types, including area flux maps, hyperspectral imagery and multispectral imagery.
- IMEO has made some requests to CEOS Agencies through the SIT Chair. Including:
 - o Access to hyperspectral imaging missions to explore their plume measurement capabilities.
 - o Dialogue with ESA/EC regarding expediting a TROPOMI Near Real Time methane product to support the rapid timescales involved in MARS.
 - o Involvement in SWIR band selection for global imaging multispectral missions (e.g. Landsat Next and Sentinel-2 series) to take into consideration the potential for methane detection and measurement.
- DLR and IMEO are engaged in a constructive discussion around EnMAP data access for MARS support. DLR is keen to support and are seeking clarification of IMEO requirements. The dialogue continues as MARS enters its operational phase.
- ESA has invited and received a formal letter from IMEO requesting a TROPOMI near-real time product.

Main discussion points:

- Simonetta Cheli (ESA, SIT Chair) noted that the SIT Chair team sent letters to various agencies during the summer, and thanked DLR for contributing EnMAP products as requested. There are ongoing discussions with the European Commission on their contributions.
- Beth Greenaway (UKSA) noted that the UK is interested in playing a bigger part in the IMEO-MARS project. It was clear at COP 26 in Glasgow last year that science is a key enabler for these discussions. There is an ongoing UK machine learning activity to find methane plumes, using Sentinel-2 data. On the quality assurance side, the UK National Physical Laboratory (NPL) is developing a framework for methane, similar to a U.S. activity. This will be published shortly.
- Joost Carpay (NSO) noted that it is very nice to see this use of TROPOMI data, which is a contribution of NSO with ESA and the European Commission. Being able to report this use of the data is very helpful to NSO.
- Steve Volz (NOAA) asked about the heterogenous form of MARS data types, and whether there is scope for CEOS involvement in defining an optimal approach for the next generation of the system.
- Selma Cherchali (CNES, CEOS Chair) highlighted the articulation of needs with key private entities who are creating methane products, and asked how CEOS could deal with both private and institutional requests from IMEO.

CEOS-36-02	SIT Chair to raise with IMEO their perception of future needs, with a view to maintaining an ongoing discussion with IMEO at an appropriate level about	SIT-38
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	considering their requirements in future designs of relevant missions.	
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- Stephen Briggs (ESA, SIT Chair Team) agreed that if IMEO could provide more information on future data needs that would help CEOS Agencies respond and plan.
- GHGSat, supported by CSA, is providing data to IMEO. It is an encouraging development to see the different datasets together. Providing information to companies on methane leaks is a win-win: financial benefits for companies, and benefits for the environment.
- The different MARS datasets are quite heterogeneous, and can be integrated into whichever direction is needed, whether that is for products targeted at the private sector or for the public, policy makers, etc.
- Ivan Petiteville (ESA, SIT Chair Team) noted that IMEO's MARS uses TROPOMI data to help guide high resolution follow-up acquisitions by GHG satellites. This is a great example of using both public and private data together.
- Selma Cherchali (CNES, CEOS Chair) encouraged CEOS to continue the foundation of observations that underpin activities like IMEO. This is particularly relevant to the New Space priority.
- Julie Robinson (NASA) noted that with their EMIT instrument onboard the ISS, they have had some experience over the last few months with methane plumes. Amalgamated datasets from different sources are compelling, however the validation underneath is challenging.
- CEOS has a clear role in supporting IMEO, both in acquisitions and cal/val, among other areas.

1.12: New GCOS Implementation Plan and Satellite Support [\[slides\]](#)

Presenter: Anthony Rea (WMO)

Main points:

- Produced every 5-6 years, the GCOS Implementation Plans: Are submitted to UNFCCC and the GCOS sponsors; Provide recommendations for a sustained and fit for purpose Global Climate Observing System; Cover climate monitoring needs over the entire Earth system from the atmosphere to the oceans, cryosphere, and biosphere; Encompass the water, energy and carbon cycles.
- The 2022 GCOS Implementation Plan has a different form to earlier plans, with: Fewer, more focused, and integrated actions; Clearer means of assessment; Clearer identification of the stakeholders who need to respond to the actions.
- The updated ECVs requirements are presented in a separate document – The 2022 GCOS ECV Requirements ([GCOS 245](#)).
- A wide range of inputs and views were included in the Implementation Plan, which encompasses six themes: Ensuring sustainability; Filling data gaps; Improving data quality, availability and utility, including reprocessing; Managing data; Engaging with countries; Other emerging needs.
- There are a number of different organisations involved in the actions outlined in the Implementation Plan – including CEOS and WGClimat.

- There was a formal decision from COP 27 on the implementation of a global climate observing system. The GCOS IP was welcomed and acknowledged by Parties, and the systematic observation community was noted.
- There are a number of actions relevant to CEOS Agencies in the new GCOS IP, across all themes. These are detailed in the slides linked above. In particular, Action F5: *Develop an Integrated Operational Global GHG Monitoring System*, which came out of the panels of GCOS and the workshop held earlier this year. There will be a symposium at WMO early in 2023 focused on this topic.

Main discussion points:

- Selma Cherchali (CNES, CEOS Chair) thanked GCOS for the return of the satellite supplement, which is a very helpful document for space agencies.

1.13: Joint CEOS / CGMS Working Group on Climate (WGClimate) [\[slides\]](#)

Presenter: Albrecht von Barga (DLR, WGClimate Chair)

Main points:

- WGClimate was represented at COP 27 in Egypt. The headline outcomes of COP 27 are as follows:
 - o Clear statements during the world leaders summit by G-7, IPCC, and private initiative representatives, highlighting that now is the time to act.
 - o Focus on financial balance / transfer.
 - o Trust fund initiated by the European Union and others.
 - o Future role of development banks shall be adapted to the incorporation of Paris Agreement goals.
- During SBSTA-57, the CEOS / CGMS statement was provided by the French delegation at the opening session.
- During COP-27 / SBSTA Earth Information Day, WGClimate, CEOS Members and Associates participated in all the panels. WGClimate presented two posters, also on behalf of the systematic observation community (which can be viewed in the slides linked above). In addition, posters were provided by other CEOS Agencies which demonstrated the broad variety of Earth observation contributions.
- Regarding the GCOS Implementation Plan, WGClimate will prepare a comprehensive response for CEOS and CGMS based on the satellite supplement and the full plan. WGClimate have decided to align the response with the gap analysis workshop outcomes in order to be consistent and complete.
- After reorganisation in WMO, new points of contact at the GCOS Secretariat have been identified for WGClimate.
- The ECV Inventory describes current and planned provision of ECVs, and the WGClimate gap analysis is used to address actions, and provide a basis for recommendations for CEOS and CGMS Agencies. Data access is free and open for more than 98% of the records. Analysis of Global Stocktake CDR-related needs may extend the variable set beyond current GCOS-listed ECVs (e.g., mangroves and agriculture). Version 4.1 of the ECV Inventory was announced on November 29.
- The ECV Gap Analysis Workshop was held in May 2022, with a focus on ECVs driving the Earth's Climate and Carbon cycle. The workshop was in hybrid format, with excellent expert attendance.

- WGClimate is collecting use cases for Climate Data Records, with a tool available at climatemonitoring.info. More than 20 use cases have been reviewed, and a continuous publication process is ongoing. There are discussions regarding linking the activity with similar activities at ESA/CCI and ECMWF.
- WGClimate is engaged with the AFOLU Roadmap team, and also attended the WGDIsasters and WGCV plenaries, where topics for interaction were identified. These opportunities will be elaborated in 2023. WGClimate is also involved in the CEOS Ocean Coordination Group.
- WGClimate confirmed on October 13, 2022, Yasjka Meijer (ESA) as Chair of the Greenhouse Gas Task Team. Deputy Chair is the Vice Chair of WGClimate (ex officio).

Main discussion points:

- Selma Cherchali (CNES, CEOS Chair) thanked Albrecht for his term as WGClimate Chair and DLR for their support, and welcomed Jeff Privette as the new Chair.
- The statement to SBSTA-57 was endorsed by the CEOS Secretariat via email.
- Simonetta Cheli (ESA, SIT Chair) thanked Albrecht, welcomed Jeff Privette, and thanked NASA for their nomination of Wenying Su as WGClimate Vice Chair.
- Tim Stryker (USGS) thanked Albrecht and DLR for stepping in when USGS was unable to take on the chair role as planned.
- CEOS Principals acknowledged the *“Statement Reporting on Progress by the Committee on Earth Observation Satellites (CEOS) and the Coordination Group for Meteorological Satellites (CGMS) on Coordinated Response to UNFCCC Needs for Global Observations”* which was submitted to the 57th Session of the Subsidiary Body for Scientific and Technological Advice.
- Jeff Privette of NOAA was welcomed as the new WGClimate Chair.

Decision 36-03

Plenary endorsed Wenying Su of NASA as WGClimate Vice Chair for 2023-2024, and WGClimate Chair for 2025-2026.

1.14: UNOOSA Space and Climate Activity Report [[slides](#)]

Presenter: Beth Greenaway (UKSA)

Main points:

- The UNOOSA Space and Climate Activity Report was published last week at COP 27. This was the joint work of UKSA and UNOOSA, and presents an overview of who is doing what for climate in the space sector.
- The mapping exercise shows that there is a wealth of ongoing and existing initiatives using space technology for climate action. On the other hand, in the area of climate services and capacity-building, a comparable solid coordination and collaboration structure does not currently exist.
- The report can be found [here](#).

Main discussion points:

- Jorge Del Rio Vera (UNOOSA, WGCapD Chair) thanked UKSA for presenting and for their support to realise the report. The context of the report is to provide information to policy makers on what can

and has been done using space technologies and applications to support climate adaptation, mitigation, monitoring and resilience.

Session 3: CEOS Working Groups and Virtual Constellations

1.15: Working Group on Calibration & Validation (WGCV) [[slides](#)]

Presenter: Akihiko Kuze (JAXA, WGCV Chair)

Main points:

- WGCV is seeking endorsement for two matters:
 - o Nomination for WGCV Vice Chair (Cody Anderson of USGS; [Letter](#))
 - o [Updated WGCV Terms of Reference](#)
- The changes to the Terms of Reference were agreed by WGCV members to reflect the reality of hybrid meetings and the consequences for the WGCV Vice Chair voting procedure.
- WGCV-51 agreed to the followed change to the Terms of Reference:
 - o *"... voting rights for future WGCV Chair selections will be assigned if a person/agency has attended two out of the last three WGCV Plenary meetings, with at least one of those being in person attendance. It was clarified that each vote is per agency, not person, so the vote can be earned by and delegated to another agency representative."*
- As Vice Chair and subsequent Chair of WGCV, Cody Anderson hopes to focus on: Analysis Ready Data and interoperability; Reference calibration and validation networks; Top of atmosphere and surface reflectance temperature; Commercial engagement.
- WGCV-51 was held in Tokyo from 3-6 October 2022, alongside a joint session with WGISS. WGCV-52 is proposed to be held at ESA ESRIN from 5-9 June, 2023.
- The IVOS Subgroup met in September, 2022, in the U.S.A., while the SAR Subgroup met in October, 2022, in Canada.
- Jean-Christopher Lambert (BIRA-IASB) was approved as the next Chair of the Atmospheric Composition Subgroup.
- The CEOS Cal/Val portal (calvalportal.ceos.org) serves as the main forum for exchange and information sharing for the CEOS Working Group on Calibration and Validation.
- WGCV supported CEOS Chair Priority #3, through the discussion of a new network of instrumented sites dedicated to the radiometric calibration of EO thermal IR optical sensors, providing brightness temperature at top of atmosphere for TIR calibration.
- Discussing potential framework for assessment of Fiducial Reference Measurements (FRM) (documented SI traceability, uncertainty budget, accessible to researchers)
- WGCV has also started discussing SITSATs (SI Traceable Satellites), which are spaceborne missions specifically designed, characterised and documented to provide high accuracy SI-traceable reference measurements. WGCV plans to establish a dedicated team to consider matters related to SITSATs.
- Progressing Cal/Val Maturity Matrix work with WGISS, incorporating ESA (EDAP) and NASA Cal/Val Maturity Matrix measures of quality.

- WGCV has closed three deliverables since the last CEOS Plenary, and has an additional eight open and in-progress.
- Philippe Goryl (ESA) will take on the role of WGCV Chair as of the close of this CEOS Plenary.

Main discussion points:

- Selma Cherchali (CNES, CEOS Chair) thanked Akihiko Kuze and JAXA for their support and hard work for the last two years as WGCV Chair, and welcomed Philippe into the role.
- Steve Volz (NOAA) asked about the intended end user of the Cal/Val Maturity Matrix, and its applicability for the commercial sector. Philippe Goryl (ESA, WGCV Vice Chair) noted that mission managers are a key audience for the WGISS Maturity Matrix – which WGCV aims to add to with specific cal/val and quality measures. The Cal/Val Maturity Matrix is potentially a useful tool for CEOS engagement with the commercial sector and a means for communicating quality needs in a consistent manner. It was developed in the context of New Space (and other) mission evaluation (ESA's Earthnet Data Assessment Project, EDAP). If CEOS were to agree on this approach it could be a very useful tool for CEOS engagement with the commercial sector / New Space.
- Philippe noted the maturity matrix is used by NASA and ESA as a communication tool with New Space. This could be a very good topic for the New Space Task Team to follow up.
- Selma Cherchali (CNES, CEOS Chair) suggested that it would be nice to see concrete examples of the Cal/Val Maturity Matrix and its application in the above context at SIT-38.

CEOS-36-03	SIT Chair Team to consider a WGCV agenda item for SIT-38 on the application and potential uses of the cal/val maturity matrix for CEOS engagement with the commercial sector / New Space, e.g., as a means for communicating data quality needs in a consistent manner.	SIT-38
Decision 36-04	Plenary endorsed Cody Anderson of USGS as WGCV Vice Chair for 2023-2024 and WGCV Chair for 2025-2026.	
Decision 36-05	Plenary endorsed the updates to the WGCV Terms of Reference .	

1.16: Working Group on Information Systems & Services (WGISS) [[slides](#)]

Presenter: Makoto Natsuisaka (JAXA, WGISS Chair)

Main points:

- WGISS promotes collaboration in the development of systems and services that manage and supply Earth observation data.
- WGISS-53 was held online, from 22-24 March 2022, and WGISS-54 was held in Tokyo, from 4-7 October 2022.
- WGISS had ISO TC211/OGC liaison reports at WGISS-53 and WGISS-54.

- WGISS is also involved in the CEOS-ARD Oversight Group, CEOS Ocean Coordination Group, and in the proposed LSI-VC CEOS Interoperability Framework. WGISS is following the discussion around CEOS engagement with standards organisations.
- CGMS (Working Group IV) requested a short presentation from WGISS on best practice for “Long Term Data Preservation” during its meeting on 28-29 April, 2022. Both groups identified common interests on data stewardship and are planning to have a joint symposium in the future.
- Data Quality Assessment and Indicators and DMSMM Maturity Matrix was discussed in the joint session with WGCV at WGISS-54.
- The Data Discovery and Access Interest Group increases the visibility of CEOS Agency data through WGISS data assets. A *Service Discovery Best Practices* document will be released soon.
- OGC STAC implementation for CMR was proposed and a volunteer from CWIC providers was solicited. The results will be summarised as “STAC Implementation Best Practices”.
- The CEOS Earth Analytics Interoperability Laboratory (EAIL) is a cloud-based system led by the previous WGISS Chair, Robert Woodcock of CSIRO, as a means to demonstrate interoperability of data and use. The cloud service enables big data archives and co-use in the cloud, as well as hyper computing in the cloud.
- The Technology Exploration Interest Group has been working on a Jupyter Notebook initiative as a collaboration with the SEO and WGCapD. The Jupyter Notebook Day was held on 21 October 2022, and a white paper will be issued which summarises the outcomes.
- An AI/ML initiative was proposed at WGISS-54, where EO-related use cases, technologies, platforms, etc., will be surveyed. Participation from other CEOS entities is welcomed.
- WGISS-55 will be held 18-20 April 2023, hosted by CONAE. This will include a joint session with WGDisasters.
- WGISS-56 will be held 24-26 October 2023, hosted by CNES.

Main discussion points:

- Brian Killough (NASA, SEO) noted there are ongoing discussions about the sustainability of the CEOS EAIL, as there is a lot of interest in the platform. Brian and Alex Held (CSIRO) are working together to try and ensure sustainability, and have agreed in principle to do that.
- Jorge Del Rio Vera (UNOOSA, WGCapD Chair) welcomed further WGISS collaboration with WGCapD.

1.17: Working Group on Capacity Building and Data Democracy (WGCapD) [\[slides\]](#)

Presenter: Jorge Del Rio Vera (UNOOSA, WGCapD Chair)

Main points:

- WGCapD have completed 10 deliverables so far in 2022.
- The next WGCapD annual meeting will be held 1-3 March 2023, in Vienna.
- Looking for a new Vice Chair between now and Plenary. Making a call today for nominations for WGCapD Vice Chair 2024-2025.
- WGCapD has focused on developing the Earth Observation Training, Education, and Capacity Development Network (EOTEC DevNet). EOTEC DevNet plays a unique role in fostering collaboration

and eliminating duplication among space-based asset providers and others engaged in EO-related capacity building.

- EOTEC DevNet has established functional global and regional structures, including a Global Task Team and Leadership Group coordinating efforts across partner networks, and four regional Communities of Practice (CoPs) who meet regularly and are co-led by participants from the region. Preliminary needs have been identified by the CoPs and assessment is in progress for these needs.
- The [flood tools tracker](#) has been developed by EOTEC DevNet, with support from the CEOS SEO. They are also working on a global flood extent use case.
- EOTEC DevNet are working on their communication platforms, with an independent website under development. Content is currently hosted at ceos.org/eotec. A Twitter account has been launched: [@EOTECDevNet](https://twitter.com/EOTECDevNet).
- The EOTEC DevNet [Sustainability Plan](#) recommends that EOTEC DevNet continue to function as a best-efforts network-of-networks initiative, with each member network making a specific contribution (monetary or in-kind) towards achieving one or more of the program's goals and related deliverables. These contributions include assigning or funding personnel, offering support for the development of specific products and/or covering certain program expenses (e.g., marketing materials or costs of travel).
- EOTEC DevNet asks CEOS Agencies to help grow the effort through participation in EOTEC DevNet's regional communities of practice and thematic working groups. Meeting details are available at ceos.org/eotec. CEOS Principals are also asked to review the proposed [sustainability plan](#) and consider outlined approaches to staffing, including in-kind support for the part-time positions of regional community of practice coordinators.
- At SIT-38, pending a satisfactory Phase 2 report (will include monitoring and evaluation data, network analysis), CEOS Principals will be asked to consider endorsement of EOTEC DevNet's progression to Phase 3.
- WGCapD asks the following questions of the Plenary:
 - o What other global or regional education, training and capacity development efforts should be incorporated into EOTEC DevNet?
 - o How can we get more space agencies to participate in EOTEC DevNet communities of practice?
 - o Any suggestions for potential donors/supporters for EOTEC DevNet Phase 3?

CEOS-36-04	CEOS members to review the proposed EOTEC DevNet Sustainability Plan and consider the outlined approaches to staffing, including in-kind support for the part-time positions of regional community of practice coordinators – in anticipation of further discussion at SIT-38.	SIT-38
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Main discussion points:

- Julie Robinson (NASA) encouraged CEOS to think about the questions posed regarding potential donors and supporters for EOTEC DevNet.

- Selma Cherchali (CNES, CEOS Chair) asked about the connection of EOTEC DevNet with other ongoing WGCapD activities. Jorge clarified the initiative was born in WGCapD, but also contains members from other organisations, including GEO, WMO and CGMS. EOTEC DevNet was born in CEOS, but in the future it is meant to be self-sustaining.
- Laurent Durieux (GEO Secretariat) noted that on the GEO side they have a capacity development coordination activity, and Laurent will put the relevant person in contact with Jorge. GEO is looking for support and donors.

1.18: Working Group on Disasters (WGDisasters) [[slides](#)]

Presenter: Helene De Boissezon (CNES, WGDisasters Chair)

Main points:

- WGDisasters has been working closely with the CNES team on their 2022 CEOS Chair Priorities, focusing on operational uptake of WGDisasters' successes to increase resilience. WGDisasters has also been strengthening ties to GEO WGs through increased visibility and impact of WGDisasters activities within GEO. Also exploring linkages to climate-related activities, especially through the impacts of climate change relating to extreme weather events – focused on local impacts and links with WGClimate and SCO.
- The Geohazards Supersites and Natural Laboratories (GSNL) aims to improve geophysical scientific studies and geohazard assessment, promoting rapid and effective uptake of new science results for enhanced societal benefits in DRR. The voluntary international partnership is supported by CEOS satellite data.
- The Volcano Demonstrator aims to evaluate the utility of remote sensing data for anticipating, detecting, and tracking volcanic eruptions, and supports EO applications that promote volcanic disaster risk reduction worldwide. The current approach would lead to the creation of the *International Virtual Volcano Observatory* by 2024.
- The Landslide Demonstrator aims to demonstrate the effective exploitation of satellite EO across the cycle of Landslide disaster risk management, including the possibility of multi-hazard focus on cascading impacts and risk.
- The Recovery Observatory (RO) demonstrator aims at providing EO support to all stages following a natural disaster. The RO has been activated four times so far, including for the Haiti Earthquake and Grace tropical storm from 2021-2022. The fourth RO demonstrator was triggered on 20 September 2022, and is ongoing. Following the demonstrator, the goal is to have the RO integrated into the operational recovery process.
- The SAR Flood Pilot explores and demonstrates best practices for combining diverse optical and radar data sources to improve current abilities to map flood extent and depth, and improves understanding of how hazard science can be better integrated with vulnerability and exposure information. The current approach would lead to more targeted demonstrator focusing on integrated flood solutions in specific geographies.
- WGDisasters is working on developing a Federated Digital Twins solution between NASA IDEAS (Integrated Digital Earth Analysis System) and Space for Climate Observatory (SCO) / CNES FloodDAM for alert systems and flood risk maps on local and global scales using space.

- The Wildfire Pilot provides a fundamental basis for defining global priorities, and explores existing gaps in wildfire EO capabilities. The current approach does not foresee a demonstrator – the pilot results will instead inform decisions in the global wildfire community (e.g., GOFI/GOLD).
- WGDIsasters is working on resolving sustainability challenges, as most of the valuable solutions rely on the integration of free and open data with commercial data sets, but data cost and value adding remains a hurdle for long-term solutions (especially for disaster risk reduction). WGDIsasters will work with hotspots to showcase projects that are more affordable, but scalable in the long-term, and focus on integrated solutions while bringing clear cost-benefits showing how using commercial datasets augment overall benefits.
- Another challenge is that awareness of the actual benefits of these activities is still low. For partners financing disaster risk reduction, there needs to be more emphasis on identifying benefits from a stakeholder viewpoint, while for organisations managing risk, cost savings, and cost-benefit wins should be identified.

Main discussion points:

- Selma Cherchali (CNES, CEOS Chair) thanked WGDIsasters for contributing to the 2022 CEOS Chair theme.
- Mauro Facchini (European Commission) asked about the target audience for these efforts. Helene responded that the work focuses on Disaster Risk Management (DRM) decision makers and civil protection agencies. The goal is to ensure continuity across management teams, as they frequently change during the recovery period. EO-derived information should be adapted to each category of user, with the same data sources used but processed in different ways.

1.19: Virtual Constellation (VC) Synthesis Report [[slides](#)]

Presenter: Ivan Petiteville (ESA, SIT Chair Team)

Main points:

- Ivan summarised the updates provided by each of the seven Virtual Constellations (as below). He noted that the SIT Chair has continued to invite VC representatives to each CEOS Secretariat meeting to ensure a strong linkage with CEOS leadership.
- ceos.org/observations has been updated for 2022. Thanks to everyone, particularly the VCs, for their inputs.

Atmospheric Composition (AC-VC)

- AC-VC has contributed to the implementation of the GHG Roadmap with Global Stocktake prototype products and guidance. Publications on country-specific carbon dioxide and methane emissions have been released.
- Regarding tropospheric ozone, AC-VC is working to understand wide distributions and trends across various observation systems and is seeking to harmonise tropospheric ozone data sets. Publications on methods to harmonise ozone profile products and on combining data sets have been released.
- Regarding air quality, AC-VC is supporting the coordination of calibration and validation plans and AO Calls, focusing on the constellation of TEMPO, GEMS, Sentinel-4, and GeoXO.
- Expansion of infrastructure for validation is ongoing, building on the Pandora network.

- Regarding aerosol air quality, AC-VC is seeking to strengthen the role of satellite missions with aerosol observation capabilities in monitoring particulate pollution of air (see agenda item 1.20).

Land Surface Imaging (LSI-VC)

- Three new CEOS-ARD Product Family Specifications (PFS) were published in 2022: Aquatic Reflectance, Nighttime Lights Surface Radiance, and Ocean Radar Backscatter.
- There are now seven CEOS-ARD datasets, with four more under peer review, and many more under self-assessment. See ceos.org/ard for more information.
- LSI-VC is working on establishing a CEOS Interoperability Framework, for a better understanding of EO interoperability, to coordinate and link CEOS activities, and improve CEOS dataset interoperability for increased impact.
- For ARD standardisation, LSI-VC is engaging in community discussions (e.g., OGC ARD SWG / ISO, IEEE), aiming for increased uptake of CEOS-ARD concepts and reach across communities – including the commercial and ‘New Space’ sectors.
- The LSI-VC Forests & Biomass Subgroup is leading the CEOS AFOLU Roadmap and considering LSI observation continuity and agency coordination.
- The LSI-VC GEOGLAM Subgroup is focusing on Essential Agriculture Variables, and will work with the LSI-VC on the CEOS strategic response to the updated statement of GEOGLAM requirements.

Ocean Surface Vector Winds (OSVW-VC)

- OSVW-VC is engaged in the CEOS Oceans Coordination Group.
- ISRO has identified a new co-lead for the OSVW-VC.
- ISRO’s Oceansat-3 mission launched on Saturday 26 November 2022. It is dedicated to meteorology and physical/biological oceanography related understanding and applications.

Ocean Colour Radiometry (OCR-VC)

- OCR-VC is exploring the idea of a CEOS Aquatic Carbon Roadmap to complement the GHG and AFOLU Roadmaps.
- The Ocean Carbon from Space workshop was held in February 2022, with the summary and recommendations published in *Frontiers in Marine Science* and a community white paper. The *Earth Science Reviews* special issue on *Aquatic Carbon From Space* is expected to be finalised in early 2023.
- OCR-VC is advancing its Fiducial Reference Measurement (FRM) work as well as capacity building through summer schools and online resources.
- OCR-VC is contributing to several themes of the current UN Decade of Ocean Science, advocating for a clean, safe, healthy and resilient, predictable, and transparent ocean.

Ocean Surface Topography (OST-VC)

- The Ocean Surface Topography Science Team (OSTST) meeting was held in Venice from 31 October to 4 November, 2022. The theme was “*Continued, enhanced ocean altimetry and climate monitoring from space*”. The event had 269 attendees representing 100 organisations from 20 countries.
- Two OST-VC meetings were held on the side of the OSTST meeting, in hybrid mode. The meetings agreed that an updated requirements white paper outline and title should be agreed by the end of

2022, with an editorial team also formed. OST-VC notes it is very ambitious to deliver the white paper by Q4 2023, but they are still targeting the current deadline.

- Sentinel-6 Michael Freilich has become the reference altimetry mission following Jason-3.
- SWOT launching 15 December, 2022.

Precipitation (P-VC)

- GPM (Global Precipitation Mission) constellation currently consists of GPM (Core observatory), AMSR-2, SSMIS-F16/F17/F18, NOAA-NPP/NOAA-20 and NOAA19/MetOp-B/C (as of 2 September, 2022).
- The NASA PPS/DISC reprocessing of TRMM/GPM products (to V07) has been completed (see pps.eosdis.nasa.gov). JAXA has also completed a new GSMaP version, with the JAXA Climate Rainfall Watch program. NOAA is reprocessing the Snowfall Rate (SFR) and MiRS Rain Rate products.
- The white paper *“The Global Satellite Precipitation Constellation: Current Status and Future Requirements”* (Bulletin of the American Meteorological Society, Kidd et al. 2021) provides recommendations to ensure the long-term continuity of global satellite precipitation observations based on current and planned precipitation missions.
- A NASA-led study on the Earth Science Decadal Survey Aerosols and Clouds, Convection, and Precipitation designated observables resulted in the Earth System Observatory/Atmosphere Observing System (ESO/AOS).

Sea Surface Temperature (SST-VC)

- SST-VC is an active member of the CEOS-ARD Oversight Group and is contributing to CEOS-ARD Product Family Specification (PFS) evolution.
- SST-VC is also engaged in, and a stakeholder of, the CEOS Oceans Coordination Group, and is contributing to the CEOS COAST *Ad Hoc* Team and COVERAGE.
- SST-VC is a Data Coordination Committee member for the UN Decade of Ocean Science.
- A GHRSSST federated discovery and search catalogue prototype has been established.
- The GHRSSST Science Team / CEOS SST-VC joint meeting will be held in October 2023.

Main discussion points:

- Selma Cherchali (CNES, CEOS Chair) thanked the SIT Chair Team for engaging with the Virtual Constellations. She also noted the standing invitation for Virtual Constellations to report at monthly CEOS Secretariat meetings, which has helped engagement between the VCs and CEOS leadership.

1.20: Atmospheric Composition Virtual Constellation (AC-VC): Monitoring Surface PM_{2.5}: An International Constellation Approach to Enhancing the Role of Satellite Observations [\[slides\]](#)

Presenter: Ben Veihelmann (ESA, AC-VC Co-Lead)

Main points:

- AC-VC has developed the white paper, titled *“Monitoring Surface PM_{2.5}: An International Constellation Approach to Enhancing the Role of Satellite Observations”*.
- The objective is to strengthen the role of satellite missions with aerosol observation capabilities in monitoring particulate pollution of air, especially by particles having a diameter of 2.5 micrometre or

less, and that are the most health-damaging for the population. The suggestion is for a collaborative constellation approach. Satellite observations, with ground-based observations and atmospheric modelling.

- The paper cites 46 authors from both academia and space agencies, led by Shobha Kondragunta (NOAA) and Ben Veihelmann (ESA).
- The 42 pages cover status, needs, and best practices, including in-depth discussions on: Satellite sensors that bring particulate matter information; Satellite products and consistency; Approaches to constraining particulate pollution levels; Validation; and Outlook.
- The white paper includes 16 actionable recommendations for CEOS consideration.
- A draft was presented at SIT Technical Workshop 2022 and the joint AEROSAT and AEROCOM Workshop in October 2022.
- Following endorsement of the white paper, the next steps involve coordinating activities within the satellite remote sensing and air quality modelling community, as well as joint efforts addressing cross-cutting issues, and building and enhancing satellite-informed PM2.5 products.
- AC-VC also hopes to build use cases for emerging satellite-informed PM2.5 products, for operational air quality services, and also to demonstrate added value for users.

Main discussion points:

- Selma Cherchali (CNES, CEOS Chair) congratulated AC-VC on their work.
- Ben noted that this is a large endeavour, and each recommendation will have many related actions.
- Ivan Petiteville (ESA, SIT Chair Team) congratulated the AC-VC team, noting they have presented very clear ideas on what has to be done next.
- Ben confirmed that the next steps would be to define a roadmap or action plan, detailing who does what for each recommendation. The paper names some partners who might help implement the recommendations, including WGCV, AEROCOM and AEROSAT, as well as space agencies with supporting and funding activities to enhance satellite products.
- Selma Cherchali (CNES, CEOS Chair) suggested AC-VC provide the CEOS community with a roadmap for the 16 recommendations, detailing an actionable plan for each one.
- Klaus Schmidt (DLR) congratulated AC-VC. If CEOS Plenary endorses this, agencies are committing resources to the implementation of the recommendations. The working teams and others identified as actionees need to be given a chance to review and confirm resourcing. It is very well to endorse the recommendations, but we need a clearer understanding of the implications and follow-on actions.
- Vincent-Henri Peuch (ECMWF) noted these satellite observations are especially essential in parts of the world that have no *in situ* observations. The work of CEOS in this area has tremendous implications.
- Phil Evans (EUMETSAT) agreed this is a very important issue and a scientific challenge, and supports the effort to define a roadmap of actions.
- Julie Robinson (NASA) appreciated the work put into this substantial document, and congratulated the team.

- Steve Volz (NOAA) endorsed the paper and its recommendations, noting however that specific actions in response to the recommendations are not yet identified or resourced and further action will require an identification of specific actions in a roadmap / implementation plan.
- Ivan Petiteville (ESA, SIT Chair Team) noted that addressing the recommendations will also require input from those outside of CEOS.

Decision 36-06	<p>Plenary endorsed the AC-VC white paper “Monitoring Surface PM2.5: An International Constellation Approach to Enhancing the Role of Satellite Observations” and acknowledged its 16 recommendations.</p> <p><i>The paper is endorsed understanding that specific actions in response to the recommendations are not yet identified or resourced and further action will require an identification of specific actions in a roadmap / implementation plan.</i></p>
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CEOS-36-05	<p>AC-VC to lead the development of an implementation roadmap to address the recommendations from the “Monitoring Surface PM2.5: An International Constellation Approach to Enhancing the Role of Satellite Observations” white paper, which has been endorsed by CEOS. The goal will be to identify specific actions.</p>	Draft for SIT Technical Workshop 2023, Final for CEOS Plenary 2023
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Session 6: CEOS Agency Reports (Brought Forward)

2.11: CEOS Agency Reports

European Commission (Mauro Facchini) [[slides](#)]

- Working on the continuation and evolution of Copernicus to the next generation. This includes the Copernicus Hybrid Constellation, which is made up of the Sentinels, New Space and Expansion missions.
- Upcoming launches include Sentinel-1C in May-June 2023.

UKSA (Beth Greenaway) [[slides](#)]

- Earth observation is a priority within the UK government’s National Space Strategy to support a thriving space sector in the UK.
- UKSA has many international partnership missions, including MicroCarb, TRUTHS and SWOT.
- UKSA also has a key role in the Copernicus program, as well as other ESA EO programmes.
- UKSA has a number of programs for data, EO technology and climate.

ESA (Simonetta Cheli) [[slides](#)]

- Living Planet Symposium 2022 was held in Bonn in May.
- Vega-C successfully launched in July 2022. This will be the European launcher for a lot of Earth observation satellites in future.

- Unexpectedly, Sentinel-1B ended its mission in December 2021. ESA together with the European Commission and their partners have made many efforts to anticipate the launch of Sentinel-1C, now planned in the May/June 2023 timeframe.
- Meteosat Third Generation Imager-1 (MTG-I1) is scheduled for launch on 13 December, 2022.
- The ESA Ministerial Summit was successfully held last week, where very strong political support was given by member states. Several EO programmes were oversubscribed, and the overall subscription reached close to 90% of the proposed EO package.

NSO (Joost Carpay) [[slides](#)]

- The SPeXone spectropolarimeter mission is under development, with the objective to understand and quantify the climate effect of aerosols and clouds.
- TANGO (Twin Anthropogenic Greenhouse gas Observers) will monitor anthropogenic greenhouse gas emissions from point sources. This will contribute to the second Global Stocktake in 2028.
- NSO is also investigating user needs and obstacles to EO use in government.

NOAA (Steve Volz) [[slides](#)]

- NOAA's 2030 Vision Statement is *"A thriving Nation whose prosperity, health, security, and continued growth benefit from and depend upon a shared understanding of, and collective action to reduce, the impacts of climate change"*.
- Alongside their JPSS series and GOES series, NOAA is developing the next generation of satellites (GeoXO, LEO and SW Next) for observations through to 2040.
- NOAA also presented the NESDIS Common Cloud Framework, which is a framework of services that can change to meet the organisation's mission and science needs. The NCCF is a secure, scalable, fault tolerant, data source agnostic solution that is capable of processing near real-time data flows.

GISTDA (Tanita Suepa) [[slides](#)]

- GISTDA has three satellites, THEOS (launched in 2008), and THEOS-2 and THEOS-2A (both to launch in Q1 2023).
- GISTDA provides solutions for agriculture, disasters, water management, mapping, natural resources, and urban areas.

Day 1 Close

Selma Cherchali (CNES, CEOS Chair) thanked everyone for participating in the first day of the 2022 CEOS Plenary.

Thursday, December 1

Session 4: New Space and Related Topics

2.1: SIT Chair 'New Space' Synthesis Report [[slides](#)]

Presenter: Ivan Petiteville (ESA, SIT Chair Team)

Main points:

- The SIT Chair identified the need for CEOS to discuss the changing composition of the EO space, covering governmental and commercial roles across the entire value chain.
- SIT-37 and SIT TW 2022 sessions were used to gather experiences of CEOS Agencies (USGS, ESA, GISTDA, NASA, CSA, CNES, COM, NOAA) and activities (CEOS-ARD, WGCV) to inform a CEOS response.
- Key findings were: Public-Private Partnerships are key and underpin market sustainability; CEOS 'standardisation' and cal/val efforts are an important contribution; Smallsat constellations improve agility, resilience and cost reduction; Complementarity of commercial data; EO is a small fraction of the commercial space market; Most EO purchases are from governments; Copernicus is a key enabler of EO New Space in Europe.
- There was a proposal for a New Space Task Team that would explore the principle of shared value between public and private commercial space services in delivering public benefit.
- Terms of Reference for a New Space Task Team have been developed and presented to Plenary for endorsement (item 2.3).
- At SIT-38, the plan is to continue sharing agency experiences, but also focus on defining specific actions.

Main discussion points:

- Akihiko Kuze (JAXA, WGCV Chair) reaffirmed WGCV support for the New Space Task Team proposal.
- Beth Greenaway (UKSA) expressed support for the New Space Task Team. CEOS needs to embrace the change in the landscape and start interacting. Learning from others about how we interact is critical. The business models are useful to share, particularly around data policies, and help us understand how public money flows into the private sector.
- Frameworks for EO standards are a good contribution from CEOS to the industry as a whole.
- For ESA's Third Party Missions, ESA performs quality checks before datasets become part of the program (through EDAP). This provides confidence for both agencies as well as users. TRUTHS will also come online soon to allow for improved calibration of data.
- Joost Carpay (NSO) suggested that we have to consider where we can help New Space and where they can help us. Free and open data is essential for many applications, and a big asset of satellite agencies. NSO is interested in participating in the Task Team.
- Alex Held (CSIRO) supported the cal/val and quality control ideas presented. Australia is investing in a unification of its vicarious cal/val infrastructure, with mechanisms for easier access to data and tools. The data will be free and open for all to use for their cal/val, with the goal of making all missions and data more accurate and useful.

- The Open Data Cube is another CEOS backed asset that could be discussed in the frame of the New Space Task Team.
- Steve Volz (NOAA) thanked the SIT Chair Team, and recognised that SIT-38 is a good time to come back on next steps, noting that CEOS should keep focus narrow enough to have impact. Cal/val and standards is a good place for CEOS to start. Regarding open data policies, Steve encouraged CEOS to support GEO's goals.
- Julie Robinson (NASA) supports CEOS engaging in this area. At NASA they see a role for agencies in leading licensing agreements, and there is a role for CEOS agencies in block buying data and establishing end-user licensing agreements (EULAs). Julie noted NASA's EULA work via the Commercial Smallsat Data Acquisition (CSDA) Program, which incorporates data sharing clauses and seeks to prevent duplicate data buys, etc. CEOS Agencies are major block buying players and therefore have sway in writing EULAs that serve the community.
- Phil Evans (EUMETSAT) noted that this is an important initiative, and potentially an incredibly broad area. CEOS should carefully choose its focus to maximise benefits. Some of the areas of activity in New Space are a little different to normal CEOS business. CEOS should be careful to not lose sight of core CEOS elements.
- Laurent Durieux (GEO Secretariat) noted that open and free data is one aspect, but GEO data sharing principles are broader. GEO flagged the need for support and making the situation clear for end users.
- Pakorn Apaphant (GISTDA, 2023 CEOS Chair) thanked the SIT Chair Team and noted that New Space is one of GISTDA's priorities for their CEOS Chair term. GISTDA will work on strengthening EO communities.
- Selma Cherchali (CNES, CEOS Chair) noted the strong support for this new activity area and thanked ESA for developing this initiative.
- Ivan Petiteville (ESA, SIT Chair Team) asked for all these suggestions to be repeated when the SIT Chair sends around the survey for ideas for the New Space Task Team.

2.2: SEO Report on the SatSummit 2022 Conference [[slides](#)]

Presenter: Brian Killough (NASA, SEO)

Main points:

- SatSummit 2022 was held in Washington, D.C., USA. It was a gathering of satellite industry and global development leaders. There was high interest in new, interoperable measurements (e.g., IoT, drone data, etc.).
- Pecora 22 was held in Denver, Colorado, USA, and was attended by many data providers and users. There was high CEOS participation, with common topics including ARD, STAC, ODC and SDGs.
- Some common 'New Space' related themes include:
 - Impression that the New Space industry is keen to collaborate and learn from CEOS Agencies.
 - Value propositions are distinct but also parallel, and some synergies exist.
 - Licensing is complicated – opportunity for mutual benefit by working on this together.

- Analysis Ready Data: If CEOS doesn't lead this, the community will. Getting data into the most usable format is critical. CEOS should avoid a situation where the community diverges from CEOS by prioritising CEOS-ARD and working closely with the broader community.
- Cloud computing is the only realistic way forward, given data volumes and processing requirements.
- There is a heavy representation of Jupyter Notebooks for end-user analyses.
- ESG (Environmental, Social, Governance) is a key driver for the commercial community – analogous to SDGs in our community.
- Need to understand how CEOS data connects with that from New Space and to understand how CEOS can help these companies confirm what they are seeing from EO, e.g., via cal/val. This is a key area where CEOS can help.
- CEOS needs to be part of the AI/ML movement – “the future is forecasting”.
- The landscape is a bit chaotic, with rapid growth occurring. This is an opportunity for CEOS to be a leader, to help connect, and to pursue new things.

Main discussion points:

CEOS-36-06	USGS to share outputs from Pecora 22 and the International Workshop held alongside as input to New Space Task Team information gathering.	December 2022
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- Steve Volz (NOAA) recognised that there is an interest in selling data by the pixel and on demand. ‘On-demand’ data is a paradigm shift and opens new opportunities. CEOS could help set guidelines and standards that would help this mechanism on behalf of public users, perhaps in partnership with GEO.
- Pakorn Apaphant (GISTDA, 2023 CEOS Chair) noted that this is a very good example of how CEOS can join these meetings and present findings from the Task Team, and get feedback from industry to grow our input. GISTDA is hoping to host a south-east Asia regional workshop next year focused on this topic. New Space is a priority for GISTDA in 2023 for CEOS Chair year.
- Selma Cherchali (CNES, CEOS Chair) suggested that while exploring this New Space angle, CEOS should not lose sight of the core of its work.

2.3: Proposal for a ‘New Space’ Task Team [\[slides\]](#)

Presenter: Ivan Petiteville (ESA, SIT Chair Team)

Main points:

- The New Space Task Team will explore collaboration opportunities in relation to New Space that bring mutual benefit to all parties, including the identification of concrete initiatives that will drive the agenda forwards.
- The Task Team will be led by the CEOS SIT Chair who provides strategic guidance on the direction, progress, and status of implementation activities in relation to the established priorities, commitments, and partnerships of the CEOS organisation.

- Membership is open to all CEOS Agencies and Leads of CEOS entities.
- The Task Team will be initially established for a period of one year, until the 2023 CEOS Plenary, where the progress of the group will be reviewed and the need for an extension considered.
- The objectives of the group are to:
 - o Share experience between CEOS Space Agencies.
 - o Define and propose actions within the CEOS framework that aim to enhance the outcomes of CEOS entities (WGs, VCs, AHTs) enabling new opportunities with New Space companies.
- The Task Team will assess common areas, issue a white paper, develop objectives and activities that will guide CEOS in fostering the combined use of public and private EO New Space capabilities, both upstream and downstream.
- CEOS Working Groups, Virtual Constellation, *Ad Hoc* Teams, and other groups will play a key role in the definition and implementation of activities.
- The SIT Chair will report on the activities of the Team at CEOS Secretariat teleconferences, and also at CEOS Plenary, SIT and SIT Technical Workshop, including on matters requiring discussion or decision by CEOS Principals – ensure that there is Principal support for all new initiatives.
- After CEOS Plenary, the Team will: Make a call to CEOS Agencies for participation in Task Team; Survey all CEOS entities and Task Team members to collect ideas of activities to be undertaken within CEOS framework and that can benefit all New Space companies such as ARD, cal/val in support to smallsats, Maturity Matrix, SDGs, IMEO, GST, etc.; Present proposed activities at SIT-38; At SIT-38, continue sharing of agency experiences, but shift the focus to defining actions.

Main discussion points:

- Selma Cherchali (CNES, CEOS Chair) thanked GISTDA for their support of this activity as the incoming CEOS Chair, and for organising the side meeting earlier in the week.
- Selma recalled that CEOS is a best efforts organisation, and as such we need to work efficiently on the most important matters.
- Phil Evans (EUMETSAT) recognised that this issue is clearly very important, increasingly so, but also a bit chaotic. Identifying areas where there are common interests is an important first step. Taking perspectives of national governments is also important. Then, the work should be implemented in a flexible way based on what this first assessment discovers.
- Takeshi Hirabayashi (JAXA, SIT Vice Chair) agreed this work is important, and JAXA endorsed the Terms of Reference. He noted that JAXA would like to participate in the Task Team.
- Helene De Boissezon (CNES, WGDisasters Chair) confirmed WGDisasters' interest in participating in the Team. Several of their members use 'New Space' data, and they can bring a practical view of applications within this domain. 'New Space' is not just restricted to upstream data, but also downstream applications.
- Beth Greenaway (UKSA) reiterated that CEOS should remain flexible, as this is a very fast moving industry. The team should meet regularly.
- Steve Labhan (USGS, LSI-VC Co-Lead) applauded Ivan's leadership on this difficult topic, and noted his interest in being a part of this Team.

- Alex Held (CSIRO) expressed that CSIRO would like to be a part of this team, and will nominate someone. CSIRO has been considering the relevance of the CEOS Earth Analytics Interoperability Lab (EAIL) and Open Data Cube (ODC).
- Selma Cherchali (CNES, CEOS Chair) noted the importance of cal/val to this activity.
- Jorge Del Rio Vera (UNOOSA, WGCapD Chair) confirmed the participation of WGCapD, particularly to represent users from the developing world.
- Hugo Costa (Portugal Space) noted (via chat): *“Portugal would also like to thank the work on New Space and we would like to join the Task Team.”*

Decision 36-07	Plenary endorsed the Terms of Reference for the CEOS ‘New Space’ Task Team .
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CEOS-36-07	All CEOS members and working entities to flag to the SIT Chair Team their interest in New Space Task Team participation.	December 2022
CEOS-36-08	SIT Chair Team to survey the CEOS Working Groups, Virtual Constellations and other working teams regarding activities which could become a focus of the New Space Task Team.	December 2022

2.4: CEOS Standards Organisation Engagement [\[slides\]](#)

Presenter: Andreia Siqueira (GA, LSI-VC Co-Lead)

Main points:

- Action SIT-TW-2022-02 from the SIT Technical Workshop asked LSI-VC Co-Leads, supported by the CEOS-ARD Oversight Group Lead and WGCV Chair, to prepare an agenda item for the 2022 CEOS Plenary formulating an action for CEOS to prepare a way forward for increased coordination of CEOS engagement with standards organisations.
- CEOS, through its member agencies, has representation in numerous standards body discussions, across numerous topics (particularly related to WGISS and WGCV activities) but this is seemingly in an *ad hoc* fashion. There is a lack of coordination and unified CEOS input to these processes.
- A coordinated approach for CEOS would have the benefit of ensuring consistent messages and positions across CEOS, clarity on the status of CEOS Agency engagement, and possibility for a coordinated CEOS input.
- Other potential benefits of increased coordination include: clarifying CEOS resourcing, avoiding duplication of effort, giving CEOS Principals visibility over the breadth of CEOS representation to these bodies, and would ensure a CEOS position is formulated and heard in all relevant fields.
- A possible way forward for CEOS could involve constructing a registry (CEOS-wide) of who does what to see where CEOS already has overlap between CEOS work and standardiser activities. The next step could be to identify those standard areas considered most relevant to CEOS and the involved

agencies and people consulted on whether they could imagine a common CEOS approach in their field.

- While this discussion was catalysed by LSI-VC as a result of looking at standardisation of CEOS-ARD concepts, this activity is much broader, and any next steps need an interested ‘cross-cutting’ group in CEOS to take this forward.

CEOS Engagement on Analysis Ready Data Standards

- Feedback from industry has broadly been that formal standards are needed for ‘ARD’, as government and commercial entities find it difficult to take action and commit funds unless they have gone through an open standards process.
- Standards built on the foundation of CEOS-ARD would be helpful, as it will increase the reach of the concepts of CEOS-ARD.
- LSI-VC and the CEOS-ARD Oversight Group have been exploring the possibility of standardisation for the CEOS-ARD specifications, through formal standards organisations (e.g., ISO, IEEE).
- If CEOS doesn’t engage, it is clear these efforts will proceed regardless. For example, the Open Geospatial Consortium (OGC) has initiated a process to work toward ARD standards with ISO, and will use CEOS-ARD as a basis.
- CEOS representatives (the CEOS-ARD Oversight Group and LSI-VC in particular) have provided inputs on the initial OGC ARD Standards Working Group Charter and ISO New Work Item Proposal (NWIP) and await further developments.

Main discussion points:

- Ivan Petiteville (ESA, SIT Chair Team) highlighted that this topic is broader than ARD. CEOS has several groups active in standards, however there is no common oversight. It was suggested that each currently active group continue to have their own interactions with these standards organisations, but CEOS could establish a regular reporting opportunity at CEOS Plenary / SIT TW. Until now, it has been unclear of the status of CEOS groups interactions with standards organisations. Giving a set and regular opportunity for CEOS groups to report on this topic could bring clarity.
- Tim Stryker (USGS) agreed with Ivan. The USGS concern is making sure CEOS is not missing out on opportunities, as there could be gaps in which CEOS is not represented. It is important to understand who from our agencies have representation in these groups.
- Steve Volz (NOAA) urged greater caution. There are many people engaged with standards organisations, so asking for regular reporting is perhaps burdensome. The first step of an inventory is important.
- Klaus Schmidt (DLR) agreed that an inventory is the first step, and then CEOS should consider its perspective. Klaus stressed the need for an organised and efficient process, and an existing Working Group should coordinate and filter the level of report given to CEOS leadership.
- Anthony Rea (WMO) noted this is a very complicated issue and spans measurements, data, taxonomy, quality systems, etc. Therefore, this requires a lot of different expertise and many different people across and within agencies. A good point to start is with an inventory. Principles should be established in the early stages to ensure a coordinated approach.
- Akihiko Kuze (JAXA, WGCV Chair) noted that WGCV and WGISS have discussed this topic, but have identified that the matter needs additional resources to address it.

Decision 36-08	CEOS Principals decided that coordination with standardisation bodies remains at the level of the CEOS groups in their field of expertise.	
CEOS-36-09	SIT Chair to organise a dedicated session on the topic of CEOS engagement with standards organisations at SIT-38 and invite CEOS entities to present their experience and status, with the aim of creating a snapshot inventory.	SIT-38

2.5: CEOS Interoperability Framework [\[slides\]](#)

Presenter: Peter Strobl (European Commission, LSI-VC Co-Lead)

Main points:

- Given the scope of the EO data interoperability problem, with numerous components distributed across many CEOS groups (e.g., LSI-VC, WGISS, WGCV, etc.), it is proposed that a robust framework and coordination mechanisms are needed to address the problem in a systematic and comprehensive manner.
- CEOS-ARD is a first step on the interoperability spectrum, but only covers a subset of what needs to be considered.
- Possible Framework Components:

Terminology / Semantics / Data Context <ul style="list-style-type: none"> • CEOS Common Dictionary 
Structural / Data Architecture <ul style="list-style-type: none"> • CEOS-ARD <ul style="list-style-type: none"> ◦ Minimum Data Processing Level + Documented ◦ Uncertainty measures ◦ Consistent / Interoperable Metadata • MRI Framework and PFS parameters? • Authoritative data certification
Common References: Grids, DEM, GCP (?) <ul style="list-style-type: none"> • Discrete Global Grid System (DGGS)
Formats / Syntactic / Data Language <ul style="list-style-type: none"> • COG / Cloud-enabling
Accessibility / System / Data Presentation <ul style="list-style-type: none"> • STAC • Cross-cloud data access and discovery

- Action SIT-TW-2022-09 from the SIT Technical Workshop asked LSI-VC Co-Leads to prepare an agenda item for the 2022 CEOS Plenary formulating an action for CEOS to further define and develop the concept of a CEOS Interoperability Framework with other interested parties (e.g., WGISS, WGCV) and to bring a concrete proposal for consideration at SIT-38.

- LSI-VC are asking Principals to consider resourcing staff to participate in an Interoperability Task Team under LSI-VC to develop the initial concept of a CEOS Interoperability Framework.
- Between Plenary and SIT-38, the Task Team aims to propose an appropriate high-level framework, identify necessary components of the framework (e.g., see diagram above), and make a preliminary mapping of CEOS activities / groups / people to each interoperability component.
- The team will come to SIT-38 ready to discuss the suggested components of the framework and consider resources for the various activities, and agree the 'home' for each of these components in the CEOS organisational structure.
- CEOS should also agree on the oversight/coordination mechanism for implementation – perhaps a continued Interoperability Task Team under LSI-VC?
- Principals are also asked to consider resources to progress the first core piece of Interoperability Framework: a CEOS Common Dictionary. This will underpin all further activities. The suggestion is that CEOS Principals resource additional people to contribute to this activity already underway (a joint WGCV / WGISS / LSI-VC activity).
- LSI-VC has prepared a [discussion paper on this topic](#).
- CEOS needs to enable interoperability in an open way for maximum uptake and societal benefit of its datasets.

Main discussion points:

- Steve Volz (NOAA) remarked that this is a really good effort to find clarity in the chaos, and appreciated that while this came up under LSI-VC, the intention is to cover a broad range of data types. However, as this is broader than LSI, he suggested that WGISS might be best to take this forward.
- Steve Labhan (USGS, LSI-VC Co-Lead) added that LSI-VC is willing to shepherd the activity to SIT-38, a process WGISS will certainly be a part of, however it is not proposed that LSI-VC own this work in the long-term.
- Peter Strobl (European Commission, LSI-VC Co-Lead) noted that LSI-VC is already coordinating closely with WGISS and WGCV. This work needs representation from many groups across CEOS.
- Selma Cherchali (CNES, CEOS Chair) asked whether this has already been conducted within WGISS, and suggested WGISS should continue the work.
- Plenary recommended that WGISS take this topic forward.

Decision 36-09	CEOS Principals confirmed that coordination of interoperability related work remains within the WGISS perimeter.	
CEOS-36-10	WGISS is invited to propose an interoperability roadmap at SIT-38. Any CEOS member / entity wishing to contribute is invited to contact WGISS.	SIT-38

CEOS-36-11	CEOS members to consider nominating individuals to the ongoing WGCV / WGISS / LSI-VC effort to define a CEOS common dictionary of terms.	SIT-38
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Session 5: Sustainable Development, Biodiversity and Oceans

2.6: CEOS Sustainable Development Goals (SDG) Coordination Team [\[slides\]](#)

Presenter: Brian Killough (NASA, SEO)

Main points:

- The [CEOS Support for the SDGs](#) video was shown.
- The CEOS SDG Coordination Group communicates internally across the CEOS community, and externally, and seeks to better understand the evolving needs of U.N. Custodian Agencies and country-based users to address the U.N. Sustainable Development Goals (SDGs), including through liaison with GEO.
- Leveraging five years of work by the former *Ad Hoc Team on the SDGs (SDG-AHT)*, the SDG Coordination Group has been meeting monthly, making excellent progress on the planned deliverables (with 8 of 9 complete) since its creation at the CEOS Plenary in late 2021.
- Communications with GEO have been reassessed, and close collaboration with GEO through various activities has been established, including the joint session organised with OGS earlier this morning to better connect with Pacific Island end-users.
- Two face-to-face side-meetings at SIT TW and CEOS Plenary have been held, and the group have agreed on new and impactful deliverables for 2023 and beyond.
- To highlight the impact of EO data for end-users in the SDG framework, the SDG Coordination Group facilitated an external presentation at the SDG side meeting on Tuesday, November 29. Attendees heard from Stuart Crane, from UNEP (United Nations Environment Programme), describing their Freshwater Ecosystem Explorer: www.sdg661.app, a tool which is used by all U.N. member countries for reporting on Indicator 6.6.1.
- In addition to the team's deliverables, two key CEOS SDG documents were published in March 2022:
 - ***What can CEOS do to support the U.N. 2030 Agenda and SDGs?*** A high-level guide for discussions between GEO and Custodian Agencies regarding CEOS support of SDGs, with references to the CEOS External Request and New Initiatives Process Papers.
 - ***CEOS expectations for GEO regarding support of the SDGs*** Defines the expectations of CEOS regarding GEO communications with Custodian Agencies. CEOS depends on GEO to maintain those interactions and represent CEOS' capabilities.
- Four technical resources "EO Support Sheets" have been published over 2022, on Water (SDG 6.6.1), Urbanisation extent (SDG 11.3.1), Coastal pollution(14.1.1), and Land Degradation (SDG 15.3.1) to help users better understand how, when and which EO satellite datasets can provide relevant information to monitor progress. These are available at ceos.org/sdg
- Communications efforts have included a new dedicated SDG page on the CEOS website which includes updated materials and links to past resources; regular news articles published throughout the year to support the CNES Chair priority: *"Paths to Sustainability: from strategy to practical*

measures”; and the SDG video released at the GEO Plenary to showcase CEOS contributions to the 2030 Agenda, attracting many visitors to the CEOS booth.

- Six new deliverables are proposed for 2023: Land Degradation Neutrality, sponsored by Neil Sims (CSIRO) and the CEOS SEO; COAST Bathymetry Project, sponsored by Emily Smail (NOAA); Ecosystem Extent Demonstration, sponsored by Gary Geller (NASA) and working with the new Ecosystem Extent Task Team; Open Data Cube Applications, sponsored by Brian Killough (CEOS SEO); Wetland Inventories, sponsored by Marc Paganini (ESA); SDG Dashboard, sponsored by Marc Paganini (ESA).
- The SDG Team is hoping to connect with more UN Custodian Agencies in 2023.

Main discussion points:

- Steve Volz (NOAA) applauded Brian, Ivan and the team for their work on this topic. The close coordination with GEO is good, with the CEOS SDG Team being a member of GEO’s EO4SDG group.
- Ivan Petiteville (ESA, SIT Chair Team) agreed that the interface with Custodian Agencies is GEO’s role, and CEOS is happy to support GEO in these discussions where necessary.
- Brian Killough (NASA, SEO) confirmed that GEO and EO4SDG in particular are more connected to the end users, as CEOS doesn’t have the capacity to do this. The deliverables defined by CEOS aim to show what can be done, and the group will see how it goes as time evolves.
- Jorge Del Rio Vera (UNOOSA, WGCapD Chair) was impressed by the work, and noted there have been collaborations before with WGCapD for training, which should be investigated in future. The EOTEC DevNet platform could be useful.
- Brian Killough (NASA, SEO) noted that a lot of the Custodian Agencies have created their own platforms for reporting, but there are areas for the CEOS SDG Coordination Team and WGCapD to contribute.
- Jorge Del Rio Vera (UNOOSA, WGCapD Chair) noted that it is important the work is known widely so it is used. Jorge suggested this work be included in next year’s CEOS presentation / statement to UN-COPUOS.
- Laurent Durieux (GEO Secretariat) noted that the SDG team at GEO are very happy with the support from the CEOS SDG Coordination Team.

CEOS-36-12	WGCapD Chair and SEO to discuss training and capacity development opportunities for CEOS SDG work in the context of EOTEC DevNet.	SIT-38
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2.7: CEOS & Biodiversity [[slides](#)]

Presenter: Gary Geller (NASA/JPL)

Main points:

- At the 2021 CEOS Plenary, a discussion group was formed to discuss the future of Biodiversity activities in CEOS. At the 2022 SIT Technical Workshop, a focus on Ecosystem Extent was proposed, and an action taken to develop Terms of Reference for an Ecosystem Extent Task Team.
- The Task Team’s purpose is to assess the utility for mapping Ecosystem Extent using current and new space-based observations that will become available in the next 10 years.

- An Ecosystem Extent dataset outlines one or more ecosystems of interest, with discrimination based on ecosystem characteristics.
- There are a number of stakeholders for this activity, including the Convention on Biological Diversity (CBD), Ramsar Convention on Wetlands, Sustainable Development Goals (SDGs), and SEEA (System on Environmental-Economic Accounting) Ecosystem Accounting.
- The Task Team will first aim to:
 - o Develop a white paper that will provide an integrated international perspective on how space-based Earth observations can be used to support ecosystem mapping and monitoring with a focus on ecosystem extent.
 - o Explore and propose an initiative to demonstrate the use of EO for ecosystem extent mapping and monitoring.
- Membership of the team will be formed from individuals nominated by CEOS Members and Associates, as well as other invited experts.
- The team will be led by two to three Co-Leads, with the first two being Gary Geller (NASA/JPL) and Marie-Josée Bourassa (CSA). Principals are asked to consider nominations for a third Co-Lead.

Main discussion points:

- Stephen Briggs (ESA, SIT Chair Team) noted that the SIT Chair Team is very supportive of this initiative. CEOS can be fairly confident they can provide the sufficient land cover satellite data, but he questioned whether there is enough detail for the additional needs related to discrimination of specific ecosystems.
- Gary noted the team will be considering additional *in situ* measurements, but aren't sure yet if it will be possible to discriminate all of the desired ecosystem types. Gary thinks it is likely we can do a lot, but probably not all, and it will take some experimenting. The most interesting area is in ecosystem processes and services, where hyperspectral EO data may be able to add a lot of value.
- Stephen Briggs (ESA, SIT Chair Team) suggested that the parameters used to identify ecosystem processes could be similar to GHG measurements.
- Steve Volz (NOAA) endorsed the Terms of Reference, and requested that the Task Team share the current list of team members with CEOS Principals so they can identify expertise gaps and suggest additional nominations.
- Éric Laliberté (CSA) offered to support the secretariat of the Task Team.
- Beth Greenaway (UKSA) noted UKSA's support for the biodiversity work, and will ensure the UK Department of Environment is also aware of the work in CEOS.
- Akihiko Kuze (JAXA, WGCV Chair) confirmed the support of WGCV for this work, noting the Land Product Validation (LPV) subgroup can likely offer useful input.

Decision 36-10	Plenary endorsed the Ecosystem Extent Task Team Terms of Reference .
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CEOS-36-13	Ecosystem Extent Task Team Leads to communicate the currently identified membership of the Task Team	December 2022
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	so that CEOS members can identify suitable nominations, including for the open third Co-Lead position.	
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2.8: Coordination of CEOS Ocean-Related Activities [\[slides\]](#)

Presenter: Ivan Petiteville (ESA, SIT Chair Team)

Main points:

- The Ocean Coordination Group has good membership from across CEOS ocean-related activities, with five coordination group calls and a side meeting at SIT Technical Workshop 2022 taking place.
- An information gathering exercise has been conducted across CEOS ocean-related activities, converging to the main focus of coordinating CEOS efforts to support the UN Decade of Ocean Science for Sustainable Development and the 2023 and 2028 Global Stocktakes (GST).
- The Ocean Coordination Team recommends continuing the efforts for another 6-12 months, reporting recommendations back to SIT-38. The main objectives of this extension would be to:
 - o Establish the necessary mechanism and leadership to coordinate existing CEOS ocean-related activities addressing the United Nations Decade of Ocean Science for Sustainable Development and the Global Stocktakes.
 - o Serve as a study team to initiate the case towards a more formal solution within the CEOS structure, e.g., a Working Group or other.
- Paul DiGiacomo (NOAA, CEOS COAST AHT Lead) has agreed to lead the CEOS Ocean Coordination Group beyond CEOS Plenary 2022.

Main discussion points:

- Julie Robinson (NASA) expressed her thanks to Ivan and Paul DiGiacomo, and supported the proposed extension.

Decision 36-11	Plenary endorsed the extension of the CEOS Ocean Coordination Group for another six months, to be revisited again at SIT-38.
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2.9: CEOS Ocean Variables Enabling Research and Applications for GEO (COVERAGE) [\[slides\]](#)

Presenter: Vardis Tsontos (NASA/JPL)

Main points:

- COVERAGE is a cross-cutting, collaborative CEOS initiative, involving the CEOS Ocean Virtual Constellations, GEO-MBON and GEO-Blue Planet.
- The goals of COVERAGE are:
 - o Implement a cloud-enabled technology platform to provide harmonised access to complementary satellite and *in situ* datasets from distributed sources via value-added data services enabling Open Science and interdisciplinary marine applications.

- Improve access to a coherent, curated set of global, interagency data products from the four ocean VCs at common resolution as a baseline dataset, with additional support for select higher resolution and *in situ* datasets.
- Demonstrate the utility of the system in the context of two pilot thematic marine ecosystem applications for societal benefit in support of UN SDG 14 (Life Below Water) and the UN Biodiversity Beyond Areas of National Jurisdiction (BBNJ) policy framework.
- COVERAGE was highlighted as a focal development area for the United Nations Decade of Ocean Science for Sustainable Development in the recent report by the National Academies of Sciences U.S. Committee on Cross-Cutting Themes for U.S. Contributions to the U.N. Ocean Decade. This can be found at: <https://doi.org/10.17226/26363>
- Ongoing UN Decade program engagement on behalf of CEOS and a successful ‘Ocean Shot’ concept.
- COVERAGE is partnering with two intergovernmental agencies: Sargasso Sea Commission (SSC) and the Inter-American Tropical Tuna Commission (IATTC), to support emerging ecosystem-based management approaches that include remotely sensed environmental data in assessment frameworks. Strong endorsements were received for COVERAGE continuation by the SSC and there is community interest in the platform’s novel technical capabilities.
- Data included in the platform includes sea surface temperature, ocean colour, ocean surface winds, ocean surface topography and sea surface salinity.
- The plan is to initiate a discussion on the possible future evolution of COVERAGE for consideration at the SIT-38 meeting in March 2023. Will explore interest and options for further co-development of COVERAGE within CEOS and consider a strategy for possible longer-term sustainability of COVERAGE.

Main discussion points:

- Steve Volz (NOAA) noted that COVERAGE should be involved in the collective effort to address the CEOS way forward on ocean coordination, and should work closely with the SIT Chair Team.

2.10: CEOS Coastal Observations Applications Services and Tools (COAST) *Ad Hoc* Team [\[slides\]](#)

Presenter: Paul DiGiacomo (NOAA)

Main points:

- As written in the CEOS Governance and Processes, each *Ad Hoc* Team will have an initial two-year term and will be required to report at the CEOS Plenary after completion of their first year on progress and expectation to meet objectives by the end of the two-year term.
- COAST has had a productive first two years, and are requesting a one-year extension of the team from CEOS Plenary.
- During 2023, the Oceans Coordination Team, led by Paul DiGiacomo, will identify a governance framework best suited to COAST and other CEOS ocean-related work activities.
- At SIT-38, the coordination team will propose a governance solution to sustain COAST and possibly other activities for consideration at CEOS Plenary 2023.

Main discussion points:

- Steve Volz (NOAA) acknowledged his critique of *Ad Hoc* Team extensions in the past, and noted that this is not an indefinite extension. NOAA endorsed the 1-year extension, with the understanding that CEOS should reach a concise set of conclusions on how to proceed. Steve asked whether there is

capacity in the group to reach a set of final recommendations by CEOS Plenary 2023, with the engagement of the Virtual Constellations.

- Paul DiGiacomo (NOAA) noted that the team is very close to reaching a set of recommendations, with the next step being to socialise COAST with the existing Virtual Constellations and Working Groups. Paul has no doubt that there will be a preferred option put on the table for SIT-38.
- Marie-Claire Greening (CEO) confirmed that the target for the next step is SIT-38.

Decision 36-12

Plenary endorsed the 1-year extension of the COAST *Ad Hoc* Team, with the understanding that the team will bring to SIT-38 a set of clear, quantifiable recommendations towards the conclusion of the activity.

Session 6: CEOS Agency Reports (Continued)

2.11: CEOS Agency Reports

Main Points:

NIER (Jaehoon Jeong) [[slides](#)]

- GEMS (Geostationary Environment Monitoring Spectrometer) launched on 19 February 2019, onboard GEO-KOMPSAT-2B.
- There are 20 countries covered by GEMS, across eastern and central Asia.
- Data can be accessed at <https://nesc.nier.go.kr/>

CNES (Selma Cherchali) [[slides](#)]

- As heard yesterday, SWOT is a breakthrough mission for CNES, scheduled for launch on 15 December.
- CNES has a number of other missions under development, including:
 - Microcarb, measuring carbon dioxide from space - cooperation with EUMETSAT and UKSA.
 - MERLIN, measuring methane from space - cooperation with DLR.
 - TRISHNA (Thermal infraRed Imaging Satellite for High resolution Natural resource Assessment) – cooperation with ISRO.
 - IASI-NG, the next generation infra-red sounder to be flown on the EUMETSAT EPS-SG satellites for climate, operational meteorology and atmospheric chemistry.
- CNES is also engaged in several mission concept studies matching the highest priorities of the French scientific community: contribution to the AOS mission (Atmospheric Observation System, led by NASA), C3IEL (clouds and precipitation), DAMONA (hydrology), and a cooperation with NASA/JPL on ODYSEA (ocean winds and currents).
- CNES is strongly engaged in the Data Terra initiative, jointly led with the main French institutes involved in environmental issues, with the aim of implementing an e-research infrastructure for integrated studies of the Earth system. CNES also wants to boost economic and societal development via the development of a new community of users with the “*Connect by CNES*” initiative.

NASA (Julie Robinson) [[slides](#)]

- NASA announced the cancellation of GEOCarb on Tuesday, due to multiple factors and cost overruns. Their plan is to replace this mission with commercial data buys and extending of the OCO-2 and OCO-3 missions.
- Two cubesats of the TROPICS mission were lost during launch earlier this year, and the remaining four have been booked for launch in time for the next hurricane season.
- The launch of NISAR is now targeted for 2024.
- Landsat Next passed the Key Decision Point (KDP) A on Tuesday, 29 November 2022.
- ESO - 1, 2, 3, 4 are four place-holder missions for the Earth System Observatory mission, NASA's next major missions, as recommended in the 2017 Decadal Survey. These include Surface Biology and Geology; Surface Deformation and Change (NISAR); Mass Change; Aerosol and Cloud, Convection and Precipitation (ACCP).
- These core missions will be supplemented by Innovation and Competition Earth Explorer missions.

GA (Andreia Siqueira) [[slides](#)]

- GA is supporting Australia's National Space Program for Earth Observation (NSP-EO), announced in March as Australia's first civil satellite program, and led by the Australian Space Agency with core partners GA, CSIRO and the Bureau of Meteorology.
- At the core of NSP-EO is a series of four Satellite Cross-Calibration Radiometer (SCR) missions. Data from these satellites will be global and distributed on a full, free and open basis. The target schedule is currently being reviewed.
- GA has established a new dedicated Space Division, including a dedicated Satellite Land Imaging Collection (SLIC) branch coordinating GA's activities under NSP-EO.
- Australia's Earth Observation from Space Technology Roadmap continues to provide a clear sense of priorities for GA's efforts. The Roadmap also provides a reference point for areas ripe for international collaboration, such as advanced gravity sensing and inland water quality monitoring.

CSIRO (Alex Held) [[slides](#)]

- The Australian Space Agency published the *"National Earth observation from Space Roadmap"* (2021-2030) in November 2019. Led by the ASA, the document was co-developed with other partners including CSIRO, BOM and GA. The Roadmap identified two main observational priorities: water quality and wildfire fuel condition monitoring.
- The AquaWatch Australia mission aims to establish a ground-to-space national water quality monitoring system, to safeguard freshwater and coastal resources, and grow Australia's high-tech space industry. This programme has been established as a collaboration across industry, academia and government, and has started with pilot projects, including five international sites (US-California, Colombia, Chile, Malaysia and Vietnam) and aims to be scaled-up (pending further funding).
- CSIRO also hosts the NovaSAR-1 National Facility and is leading calibration and validation activities, including the AusCalVal project.
- Alex focused CSIRO's update on these main topics/slides, but further information on CSIRO EO updates are available at the end of the set of slides.

EUMETSAT (Phil Evans) [[slides](#)]

- Currently operating 9 satellites, with Metop-A and Meteosat-8 ending their missions recently.
- Preparing for the launch of the first Meteosat Third Generation satellite planned for 13 December (MTG-Imager 1).
- EUMETSAT is planning for EPS-Sterna, a constellation of microwave microsattellites, and EPS-Aeolus, for atmospheric winds using a doppler wind lidar.

USGS (Tim Stryker) [[slides](#)]

- 2022 marks 50 years of the Landsat program, a significant achievement for the global EO community.
- Landsat 7 (1999 - 2022) was recently lowered into a storage orbit, and is awaiting NASA satellite rendezvous and refuelling. Landsat 8 and 9 are operational, each collecting more than 700 scenes per day.
- 10 million unique Landsat scenes are available in the 50-year Landsat archive, with well over 100 million downloads since Landsat data became freely available in 2008. The reprocessed CEOS-ARD-compliant “Collection 2” is now available on the Amazon cloud.
- NASA and USGS have determined the Landsat Next mission concept, with a target launch readiness date in 2030.

UNOOSA (Jorge Del Rio Vera) [[slides](#)]

- CEOS is an observing member to UN-COPUOS (Committee on the Peaceful Uses of Outer Space).
- The Space2030 Agenda was adopted by the UN General Assembly on 25 October 2021.
- UNOOSA and the United Kingdom jointly worked on a strategic mapping exercise on international efforts to support climate action, published as *Space for Climate Action*, and are developing a website for this activity.
- The Space4Water Project, launched in January 2018, is an interdisciplinary multi-stakeholder project fostering knowledge exchange between actors in the space and the water related sectors.

DLR (Klaus Schmidt) [[slides](#)]

- The EnMAP hyperspectral imager mission launched in April 2022. The free and open data is available here: <https://planning.enmap.org/>
- DLR operates missions focused on Earth’s surface (TerraSAR-X and TanDEM-X), environment and resources (EnMAP), climate (MERLIN), weather (METimage) and gravity / hydrology (GRACE-FO).

CSA (Éric Laliberté) [[slides](#)]

- CSA is developing WildFireSat, which aims to monitor the radiated power from active wildfires in Canada from space, daily and in near-real-time (approximately 30 minutes). The mission will also monitor smoke and air quality conditions.
- The HAWC (High-Altitude Water quality and Cloud) mission will comprise three instruments: an Aerosol Limb Imager (ALI), Spatial Heterodyne Observations of Water (SHOW) and Thin Ice Cloud in Far InfraRed Emissions (TICFIRE). ALI and SHOW will be hosted on a Canadian satellite, while TICFIRE will be hosted on a NASA satellite.

JAXA (Takeshi Hirabayashi) [[slides](#)]

- JAXA has EO missions covering six sectors: land, water cycle, precipitation, vegetation, aerosols and clouds.
- ALOS-3 is scheduled for launch onboard the maiden flight of the new H3 rocket, to be launched in March 2023. The data will be high resolution, at 0.8m for panchromatic. While not completely free and open, the data will be provided to emergency organisations free of charge.
- ALOS-2 data is in the process of becoming free and open, and is under assessment as CEOS-ARD.
- JAXA has established the Consortium for Satellite Earth Observation (CONSEO) for industry, academia and government partnership in Japan.

ASI (Laura Candela) [[slides](#)]

- COSMO-SkyMed Second Generation (CSG) will ensure operational continuity to the currently operating constellation, and achieve a step ahead in terms of functionality, performance and system services for users. The second satellite in the series launched in January 2022.
- ASI are also developing GEOSAR, a geosynchronous SAR mission, and PLATIINO-1, a mono/bi-static X-band SAR mission.
- PRISMA is a hyperspectral mission funded by ASI.
- ASI is collaborating with NASA on MAIA (Multi-Angle Imager for Aerosols) and the SBG-TIR-Multispectral mission.

Session 7: CEOS Leadership Transition and Closing Business

2.12: 2022 CEOS Chair Priorities – Report on Outcomes [[slides](#)]

Presenter: Selma Cherchali (CNES, 2022 CEOS Chair)

Main points:

- The [2022 Year in Review video](#) was shown.
- The CNES CEOS Chair chose to focus on the theme: *“Paths to Sustainability: from Strategy to Practical Measures”*.
- Priority #1: Ensuring Long-term Sustainability of CEOS Strategies
 - The WGDisasters Recovery Observatory (RO) was cited in the Space2030 Agenda of the UN, and the RO sustainability subgroup was established at WGDisasters-17 in March.
 - WGDisasters have also established links with WGCapD.
- Priority #2: CEOS Support to the UNFCCC Global Stocktake
 - The Biomass mission will be launched between Q3 2023 and Q1 2024. However, biomass data will not be optimised until GEO-TREES can establish new reference sites to develop plot coverage with LIDAR and NISAR data.
 - CNES will use its position as GEO-TREES Secretariat to work in particular on the governance of the project and ensuring strong links with CEOS.
 - The Space for Climate Observatory (SCO) is part of the wider EO global community as a GEO Participating Organisation. Its Charter gathers over 31 partners including 21 space agencies, and

offers applications with a sustainable framework, providing operational tools at a local scale to answer specific needs suited for specific geographical areas.

- CNES is providing an in-depth analysis of possible ties for SCO with different CEOS Working Groups.
- Priority #3: Support to CEOS Cal-Val Initiatives
 - There has been strong interest in the joint WGCV Land Product Validation (LPV) and Infrared and Visible Optical Sensors (IVOS) team that will focus on the development of a network of thermal IR calibration sites.
 - LPV and IVOS subgroups would also represent an interesting perspective for Thermal Infrared sensors, with the upcoming TRISHNA mission being a focus for CNES.

2.13: CEOS Systems Engineering Office (SEO) Annual Report [[slides](#)]

Presenter: Brian Killough (NASA, SEO)

Main points:

- The CEOS Systems Engineering Office (SEO) was established in April 2007 (sponsored by NASA) to support the CEOS organisation and facilitate global space agency initiatives.
- The SEO technical functions include: developing systems engineering tools and solutions, conducting requirements and gap assessments, data acquisition planning, and special projects (e.g., Open Data Cube).
- The SEO management functions include: improving communications through web-based tools, managing CEOS social media, meeting logistics, and developing education and outreach products.
- The SEO has been testing several cloud computing frameworks to understand CEOS data access and technology capabilities, including those of Google, Amazon, Microsoft, and Sentinel Hub.
- The SEO supports regional data cubes including Digital Earth Africa, Digital Earth America and Digital Earth Pacific.
- The [Open Data Cube \(ODC\) Sandbox](#) has 19 applications on GitHub. This open source tool is a great example of Open Science and has gained significant popularity as an educational and research tool. The SEO worked with Digital Earth Africa to develop their ODC applications and tools, who recently released more than 100 application notebooks focused on satellite datasets, real-world examples, and the SDGs.
- The SEO also works with CEOS-ARD, SDG Coordination Team, Earth Analytics Interoperability Lab (EAIL), COVE Tool (ceos-cove.org), WGCAPD and WGISS on a variety of projects.
- The CEOS SEO Communications Team have published a number of new articles on ceos.org/news, and manage the CEOS social media accounts (Twitter: [@CEOSdotOrg](https://twitter.com/CEOSdotOrg), Facebook: [@socialceos](https://www.facebook.com/socialceos)).
- The SEO hosted a CEOS Booth at GEO Week in Ghana. Training and data access were the most popular topics.
- Brian Killough is retiring on December 16, 2022 after 35+ years with NASA and 15+ years with the CEOS SEO. Dave Borges will take over as CEOS SEO lead.

Main discussion points:

- Julie Robinson (NASA) thanked Brian for his years of service with CEOS, and presented him with a gift from CEOS.
- Selma Cherchali (CNES, CEOS Chair) noted Brian's extensive work across the whole EO community. The SEO function has become an integral part of the CEOS organisation. She welcomed Dave into the role.
- Ivan Petiteville (ESA, SIT Chair Team) noted that working closely with Brian since the inception of the SEO, as Ivan served as CEO during that time, has been a great privilege. He added that people in CEOS are all motivated, but very few have the energy and enthusiasm of Brian and are capable of motivating all those who are working with him.
- Tim Stryker (USGS) thanked Brian for his guidance during Tim's term as CEO, and thanked NASA for continuing to support this key role.

2.14: CEOS Missions, Instruments and Measurements (MIM) Database Annual Report [[slides](#)]

Presenter: Ivan Petiteville (ESA)

Main points:

- A significant ESA contribution, the CEOS MIM (Missions, Instruments, Measurements) Database remains a key 'connective tissue' across the CEOS community (CEOS Work Plan: 'Core Service #7').
- 2022 update survey completed with 36 new missions and 47 new instruments.
- 33 agencies responded to the 2022 Agency survey, with 24 providing updates:
 - o 36 new mission records added, and 324 mission records updated.
 - o 47 new instrument records added, and 177 instrument records updated.
 - o 103 new instrument-measurement mappings added.
- The quarterly reports and key tables for 2023 can be found at ceos.org/mim-report-archive
- An improved link between the CEOS MIM Database and the [ESA eoPortal](#) has been implemented from August 2022. This link has resulted in a 168% growth in traffic to the CEOS MIM Database, increasing awareness of CEOS Agency activities. The CEOS Database is also expanding commercial mission content in support (records not visible online).
- The CEOS Database and SEO teams have released an initial set of analysis tools for the CEOS Database. They are available [here](#).
- 11 CEOS missions have been launched since the 2021 CEOS Plenary, with SWOT and the first Meteosat Third Generation Imager satellite expected to launch before the end of this year.

2.15: CEOS Chair Transition

Presenters: Selma Cherchali (CNES, 2022 CEOS Chair) and Pakorn Apaphant (GISTDA, 2023 CEOS Chair)

Main points:

- The CNES CEOS Chair Team welcomed the GISTDA CEOS Chair Team into the role of 2023 CEOS Chair.


Decision 36-13

Plenary welcomed the Geo-Informatics and Space Technology Development Agency (GISTDA) of Thailand as 2023 CEOS Chair.

2.16: GISTDA 2023 CEOS Chair Presentation [[slides](#)]

Presenter: Pakorn Apaphant (GISTDA, 2023 CEOS Chair)

Main points:

- The GISTDA 2023 CEOS Chair will focus on the theme: *“Earth Observation for a Better Environment, Economy, and Humanity”*
- The two headline priorities are:
 - Supporting CEOS preparations and inputs to the Global Stocktake of the UNFCCC Paris Agreement
 - Supporting exploration of new geometries for space agencies and CEOS with ‘New Space’
- GISTDA will host a joint workshop with SilvaCarbon on 23 February to 3 March 2023. The agenda and description can be found [here](#). All CEOS members are welcome to attend.
- Regarding the Global Stocktake, GISTDA will focus on:
 - Supporting the AFOLU and GHG Roadmaps.
 - Ensuring the CEOS Global Stocktake Portal is up to date.
 - Supporting a workshop on Ocean Carbon from Space.

- The 2023 CEOS Chair encourages all CEOS Agencies, Working Groups, Virtual Constellations, and other CEOS groups to support the Global Stocktake activities, and will encourage this over the coming year.
- In Thailand, activities on the Global Stocktake focus mostly on GHG emissions from forest fires. GISTDA is working with the GHG management agency in Thailand to make sure EO is contributing to carbon credits, etc. To help this process, GISTDA asked for coordination and support from CEOS.
- The New Space topic is very important to GISTDA. The CEOS Chair will work closely with the SIT Chair to develop recommendations based on the shared experiences of CEOS Agencies. The 2023 CEOS Chair welcomes CEOS Agency identification of key activities, and hopes to produce a useful document as an output for the community.
- GISTDA will organise a regional workshop on New Space for South-East Asia.
- The 37th CEOS Plenary will be held 13-16 November 2023, in Chiang Rai, Thailand, with the 13th reserved for side meetings, and the CEOS Plenary held 14-15 November. On 16 November, an excursion will be organised.

Main discussion points:

- The GISTDA 2023 CEOS Chair Team presented the outgoing CEOS Chair Team with some gifts, and thanked CNES for their work over the last year.

2.17: Summary Presentation / Review of Session Outcomes [\[slides\]](#)

Presenter: Matt Steventon (2022 CEOS Chair Team)

Main points:

- The meeting summary was presented, including the preliminary action and decision record. The final action and decision records can be found in Appendix B and C below, respectively.

2.18: Closing Remarks

Presenter: Selma Cherchali (CNES, 2022 CEOS Chair)

Main points:

- This Plenary has shown that coordination works best when CEOS can meet in person.
- The CEOS Chair has thoroughly enjoyed the last few days, and noted the importance of the agency reports, which provide an opportunity for agencies to present their recent and upcoming activities.
- CEOS is the place where partnerships and coordination are strengthened.
- The CEOS Chair thanked the SIT Chair Team, in particular Simonetta Cheli and Ivan Petiteville. There has been good coordination between the SIT Chair and CEOS Chair teams over the last year.
- Ivan Petiteville (ESA, SIT Chair Team) thanked the CNES CEOS Chair Team, in particular Olivier, for all of their work over the last year, and welcomed GISTDA into the role.
- Highlighted the special joint session with OGS as another example of ways to enhance collaboration with GEO, and thanked CSIRO (Flora Kerblat in particular) and the SEO (Brian Killough) for the session's organisation and delivery.
- As CNES closes their term as CEOS Chair, they stressed the importance of regional support.

- The relationship with GEO is an important priority for CEOS, and CNES encouraged GISTDA to continue prioritising this relationship.
- The WGDIsasters Recovery Observatory is an important CEOS activity that should continue to be developed to ensure sustainability.
- CEOS should also foster long-term research and demonstration support.
- CNES is proud to have helped find a long-term and equitable solution for continuity of the CEO position.
- Selma thanked her team, in particular Olivier Marsal and Aurélien Sacotte.
- Selma thanked all CEOS Agencies for participating, both in person and online.
- The 2022 CEOS Plenary was adjourned.

APPENDIX A: Attendees

In-person

Organisation	Name	Organisation	Name
ASI	Laura Candela	European Commission	Mauro Facchini
CEO	Marie-Claire Greening	GA	Andreia Siqueira
CEOS Chair Team	Libby Rose	GEO	Laurent Durieux
CEOS Chair Team	Matt Steventon	GGOS	Richard Gross
CNES	Annick Sylvestre-Baron	GISTDA	Atipat Wattanuntachai
CNES	Aurelien Carbonniere	GISTDA	Nuttavipa Thanthawewut
CNES	Helene De Boissezon	GISTDA	Pakorn Apaphant
CNES	Steven Hosford	GISTDA	Raweevan Nutpramoon
CNES	Rosemary Morrow	GISTDA	Tanita Suepa
CNES / CEOS Chair	Selma Cherchali	JAXA	Akihiko Kuze
CNES / CEOS Chair Team	Aurélien Sacotte	JAXA	Takeshi Hirabayashi
CNES / CEOS Chair Team	Linda Tomasini	JAXA	Osamu Ochiai
CNES / CEOS Chair Team	Olivier Marsal	JAXA / RESTEC	Toshi Kamei
CSA	Alexandra André	NASA	Brian Killough
CSA	Éric Laliberté	NASA	Christine Bognar
CSA	Marie-Josée Bourassa	NASA	Christopher Kidd
CSA	Mérodie Hébert-Heydra	NASA	David Borges
CSIRO	Alex Held	NASA	Gary Geller
CSIRO	Flora Kerblat	NASA	Julie Robinson
DLR	Albrecht Von Bargaen	NASA	Wenying Su
DLR	Klaus Schmidt	NIER	Jaehoon Jeong
ECMWF	Vincent-Henri Peuch	NOAA	Charles Wooldridge
ESA	Alexis Sarraute	NOAA	Katy Matthews
ESA	Ben Veihelmann	NOAA	Stephen Volz
ESA	Philippe Goryl	NSO	Joost Carpay
ESA / SIT Chair	Simonetta Cheli	UKSA	Beth Greenaway
ESA / SIT Chair Team	Ivan Petiteville	UNOOSA	Jorge Del Rio Vera
ESA / SIT Chair Team	Stephen Briggs	US DoS	Fernando R. Echavarria
EUMETSAT	Paul Counet	USGS	Steve Labahn
EUMETSAT	Phil Evans	USGS	Timothy Stryker
European Commission	Astrid Koch	WMO	Anthony Rea

Online

Organisation	Name	Organisation	Name
AEM	Kesneil Bravo	NASA	Woody Turner
CNES	Carole Deniel	NASA	Yasha Moz
CNES	Stephen Ward	NASA	Nancy Searby
CONAE	Ana Medico	NASA / JPL	Edward Armstrong
CONAE	Laura Frulla	NASA / JPL	John R Worden
EC / JRC	Mark Dowell	NASA/JPL	Vardis Tsontos
ESA	Ferran Gascon	NOAA	Shobha Kondragunta
ESA	Frank Martin Seifert	NOAA	Jeff Privette
ESA	Marc Paganini	NOAA/NESDIS/STAR/SOCD	Merrie Neely
EUMETSAT	Robert Husband	NOAA/NESDIS/STAR/SOCD	Paul Digiacomio
European Commission	Peter Strobl	NSMC	Jinlong Fan
Gorska University of Jena	Martyna Stelmaszczuk	POLSA	Oskar Zdunek
JAXA	Hiroshi Murakami	Portugal Space	Hugo André Costa
JAXA	Makoto Natsuisaka	SANSA	Christo Whittle
JAXA	Misako Kachi	UAESA	Hamda Al Shehhi
JAXA	Yuko Nakamura	UKSA	Svetlana Zolotikova
JAXA / RESTEC	Yukio Haruyama	UKSA / DEFRA	Melanie Hutchinson
JAXA / RESTEC	Satoshi Uenuma	UKSA	Shaneigh Turner
NASA	Amanda Koltz	USGS	Tom Sohre
NASA	Barry Lefer	WGCapD	Erin Martin
NASA	Benjamin Poulter		

APPENDIX B: Actions Record

No.	Action	Due Date
CEOS-36-01	All CEOS European members who have not yet confirmed their contribution to CEOS Executive Officer continuity to inform EUMETSAT and ESA about commitments to participate in the 2024-2027 consortium led by EUMETSAT and ESA, and to confirm the amount of any contribution, where possible.	31 December 2022
CEOS-36-02	SIT Chair to raise with IMEO their perception of future needs, with a view to maintaining an ongoing discussion with IMEO at an appropriate level about considering their requirements in future designs of relevant missions.	SIT-38
CEOS-36-03	SIT Chair Team to consider a WGCV agenda item for SIT-38 on the application and potential uses of the cal/val maturity matrix for CEOS engagement with the commercial sector / New Space, e.g., as a means for communicating data quality needs in a consistent manner.	SIT-38
CEOS-36-04	CEOS members to review the proposed EOTEC DevNet Sustainability Plan and consider the outlined approaches to staffing, including in-kind support for the part-time positions of regional community of practice coordinators – in anticipation of further discussion at SIT-38.	SIT-38
CEOS-36-05	AC-VC to lead the development of an implementation roadmap to address the recommendations from the “Monitoring Surface PM2.5: An International Constellation Approach to Enhancing the Role of Satellite Observations” white paper, which has been endorsed by CEOS. The goal will be to identify specific actions.	Draft for SIT Technical Workshop 2023, Final for CEOS Plenary 2023
CEOS-36-06	USGS to share outputs from Pecora 22 and the International Workshop held alongside as input to New Space Task Team information gathering.	December 2022

CEOS-36-07	All CEOS members and working entities to flag to the SIT Chair Team their interest in New Space Task Team participation.	December 2022
CEOS-36-08	SIT Chair Team to survey the CEOS Working Groups, Virtual Constellations and other working teams regarding activities which could become a focus of the New Space Task Team.	December 2022
CEOS-36-09	SIT Chair to organise a dedicated session on the topic of CEOS engagement with standards organisations at SIT-38 and invite CEOS entities to present their experience and status, with the aim of creating a snapshot inventory.	SIT-38
CEOS-36-10	WGISS is invited to propose an interoperability roadmap at SIT-38. Any CEOS member / entity wishing to contribute is invited to contact WGISS.	SIT-38
CEOS-36-11	CEOS members to consider nominating individuals to the ongoing WGCV / WGISS / LSI-VC effort to define a CEOS common dictionary of terms.	SIT-38
CEOS-36-12	WGCapD Chair and SEO to discuss training and capacity development opportunities for CEOS SDG work in the context of EOTEC DevNet.	SIT-38
CEOS-36-13	Ecosystem Extent Task Team Leads to communicate the currently identified membership of the Task Team so that CEOS members can identify suitable nominations, including for the open third Co-Lead position.	December 2022

APPENDIX C: Decisions Record

Decision 36-01	Plenary endorsed the Canadian Space Agency (CSA) as 2024 CEOS Chair from the Americas region.
Decision 36-02	Plenary endorsed the long-term and equitable plan for CEOS Executive Officer continuity presented by the CEOS Chair Team. <i>CEOS Principals of European agencies are invited to inform CEOS of their position regarding the proposed scenario for the 2024/2027 period and their willingness to contribute.</i>

Decision 36-03	Plenary endorsed Wenying Su of NASA as WGClimate Vice Chair for 2023-2024, and WGClimate Chair for 2025-2026.
Decision 36-04	Plenary endorsed Cody Anderson of USGS as WGCV Vice Chair for 2023-2024 and WGCV Chair for 2025-2026.
Decision 36-05	Plenary endorsed the updates to the WGCV Terms of Reference .
Decision 36-06	<p>Plenary endorsed the AC-VC white paper “Monitoring Surface PM2.5: An International Constellation Approach to Enhancing the Role of Satellite Observations” and acknowledged its 16 recommendations.</p> <p><i>The paper is endorsed understanding that specific actions in response to the recommendations are not yet identified or resourced and further action will require an identification of specific actions in a roadmap / implementation plan.</i></p>
Decision 36-07	Plenary endorsed the Terms of Reference for the CEOS ‘New Space’ Task Team .
Decision 36-08	CEOS Principals decided that coordination with standardisation bodies remains at the level of the CEOS groups in their field of expertise.
Decision 36-09	CEOS Principals confirmed that coordination of interoperability related work remains within the WGISS perimeter.
Decision 36-10	Plenary endorsed the Ecosystem Extent Task Team Terms of Reference .
Decision 36-11	Plenary endorsed the extension of the CEOS Ocean Coordination Group for another six months, to be revisited again at SIT-38.
Decision 36-12	Plenary endorsed the 1-year extension of the COAST <i>Ad Hoc</i> Team, with the understanding that the team will bring to SIT-38 a set of clear, quantifiable recommendations towards the conclusion of the activity.
Decision 36-13	Plenary welcomed the Geo-Informatics and Space Technology Development Agency (GISTDA) of Thailand as 2023 CEOS Chair.