

MINUTES OF CEOS SIT-36 - 23-25 March 2021

Executive Summary

1. The **CEOS-GEO** relationship remains a vital one for CEOS, with key support around Sustainable Development Goals (SDGs), and Analysis Ready Data (ARD). Urban resilience is expected to be added as a fourth GEO engagement priority.
2. The update on the **2021 CEOS Chair Priority**, *"Space-based Earth Observation Data for Open Science and Decision Support"* was welcomed.
3. **SIT Vice Chair priorities** were outlined including societal challenges, enlarging user communities, future Copernicus missions, private sector complementarity, and service innovation.
4. The **COAST ad hoc** Team submitted via the Intergovernmental Oceanographic Commission (IOC) as a 'Programme' to the UN Decade of Ocean Science for Sustainable Development. The **COVERAGE** initiative submitted a "COVERAGE Ocean Shot" to the U.S. National Committee on the U.N. Decade of Ocean Science for Sustainable Development. Both submissions will serve as CEOS liaisons to the U.N. Decade of Ocean Science. CEOS has appointed Paul DiGiacomo, Jorge Vazquez, and Vardis Tsontos as joint CEOS liaisons to the Decade to the U.N. Decade of Ocean Science.
5. **COP-26** represents a key opportunity for CEOS to showcase the contribution of Space Agencies, and UKSA is well positioned to support engagement as the host country. CEOS leadership plans to deliver a CEOS statement.
6. CEOS agencies are advancing the definition and development of both **Greenhouse Gas (GHG) and Agriculture, Forestry, and Other Land Use (AFOLU) datasets**, which are relevant to the UNFCCC Global Stocktake process.
7. SIT-36 endorsed the **CEOS Aboveground Woody Biomass Product Validation Good Practices Protocol**.
8. SIT-36 agreed on the need to **revise the Draft CEOS Strategy for the Global Stocktake** document. The SIT Chair will continue to coordinate and support relevant actions now underway.
9. SIT-36 tasked the CEOS **Sustainable Development Goals ad hoc Team** (SDG Ad Hoc Team) to further develop the two most favourable future scenarios that it will ultimately recommend for consideration by the 2021 CEOS Plenary (an SDG Working Group option and a federated option with SDG activities distributed among existing CEOS entities). The *ad hoc* team is to submit its **draft proposal** for discussion and finalisation at the **2021 SIT Technical Workshop**.
10. SIT-36 reviewed the current status of work on the **CEOS ARD Strategy v2.0**. The next status update and community-wide discussion will be at the 2021 SIT Technical Workshop.
11. SIT-36 reviewed progress on **CEOS ARD Beyond Land**. The next status update and community-wide discussion will be at the 2021 SIT Technical Workshop.
12. SIT-36 reviewed and discussed the **CEOS Earth Analytics Interoperability Lab (EAIL)** effort, which is advancing pilots with several CEOS groups.
13. The **WGCapD Vice Chair** (from VAST-VNSC) is not able to assume the role of WGCapD Chair. Efforts are underway to identify a CEOS Agency (Member or Associate) willing to serve in the role of WGCapD Chair in time for the 2021 CEOS Plenary, which is when the leadership succession was scheduled to occur.
14. SIT-36 endorsed the **Earth Observation Training, Education, and Capacity Development Network (EOTEC DevNet)** Implementation Plan proposed by the WGCapD.
15. SIT-36 endorsed both the WGDIsasters **Wildfire Pilot** and **Landslide Demonstrator** Implementation Plans.
16. SIT-36 included a Special Plenary Session during which CEOS formally confirmed **CNES** as the Incoming CEOS Chair for the one-year term that will begin upon the adjournment of the 2021 CEOS Plenary.
17. The **2021 CEOS SIT Technical Workshop** will be a virtual conference during the weeks of 6th and 13th September.

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Tuesday March 23rd

Session 1: Welcome and Opening Session

1.1: Welcome and Opening Remarks [PPT]

Presenters: Alex Held/CSIRO/SIT Co-Chair, Adam Lewis/GA/SIT Co-Chair

Main points:

- Alex welcomed everyone and thanked them for participating.
- Alex reviewed the meeting plan and the three main priorities of the CSIRO/GA SIT Chair Team for 2020-2021, which will all feature throughout SIT-36: Analysis Ready Data (ARD), Carbon & Biomass, Sustainable Development Goals (SDGs).

A brief *tour de table* introduction followed.

1.2: CEOS Work Plan - Highlights [PPT]

Presenter: Marie-Claire Greening/CEOS Executive Officer (CEO)

Main points:

- Marie-Claire thanked Kerry Sawyer for the guidance she provided in the CEO transition phase.
- The CEOS Work Plan is currently tracking 122 active deliverables, and the 2021-2023 revision was endorsed Monday 22nd March 2021.
- Updated deliverables can be viewed at deliverables.ceos.org.
- Following the disrupted 2020 update cycle for the CEOS Work Plan, the quick turnaround 2021 update has now put the Work Plan back on its usual update schedule. Marie-Claire thanked everyone for their timely inputs that made the update possible ahead of SIT-36.

1.3: CEOS-GEO Coordination Update [PPT]

[CEOS-GEO bilateral outcomes meeting report](#)

Presenters: Jonathon Ross/GA/SIT Chair Team, Doug Cripe/GEO Secretariat

Main points:

- Gilberto Câmara will be ending his term as GEO Secretariat Director in June. The new Director will be Yana Gevorgyan.
- GEO's 2021 events, including the GEO Symposium (June) and GEO Week (November) will be held virtually.
- The development of the new 2025 Strategic Plan is an important process for CEOS to engage in and one that will require a lot of effort.
- The annual CEOS-GEO bilateral meeting was held in early February. The meeting summary prepared by Marie-Claire was provided as a reference document for SIT-36.
- A GEO developed paper on open science and decision support was presented at the CEOS-GEO bilateral meeting for CEOS input. The GEO Executive Committee (ExCom) is considering the paper before distributing it across GEO for further input and consideration. GEO is promoting open science as much as possible.
- CEOS ARD was covered at the CEOS-GEO meeting, for which there is broad support across GEO.
- Biomass Reference Network, GEO Community Activity (GEO-TREES) has emerged and is now included in the GEO Work Programme. GEO Secretariat supportive of this activity.
- The request to GEO ExCom for GEO support to the UN Decade on Ocean Science was well received. GEO is currently considering inputs.
- An urban resilience activity was presented to ExCom along with an engagement plan. Widespread support was acknowledged among ExCom. The GEO Programme Board (PB) is now putting together a document for presentation at GEO Plenary which would recommend urban resilience become the fourth engagement priority for GEO.

1.4: CEOS Chair Priorities [PPT]

Presenter: Karen St. Germain/NASA/CEOS Chair

Main points:

- The overarching 2021 Chair Priority is *Space-based Earth Observation Data for Open Science and Decision Support*, with an [implementation plan](#) provided to SIT-36 for information.
- NASA will prioritise:
 - o advancing the CEOS Work Plan;
 - o demonstrating the value of our international cooperation for data users;
 - o focusing on Open Science (a set of 17 objectives have been identified thanks to CEOS feedback - focusing and amplifying our commitment to open science and decision support); and,
 - o raising awareness of CEOS as a world leader for open science in global remote sensing.

Main discussion points:

- JAXA is grateful for NASA's 2021 Chair initiative, and like other agencies has made efforts in Earth observation (EO) for science and decision support. They wish to signal their intention to continue working with agencies in support of the CEOS Chair priority and open science. Developing scientific understanding of climate change and the UNFCCC Global Stocktakes are priority topics for JAXA.

1.5: SIT Vice Chair Update [PPT]

Presenter: Simonetta Cheli/ESA/SIT Vice Chair Team

Main points:

- The five priorities for the 2022-23 SIT Chair Term are:
 - o Support to Societal Challenges;
 - o Create new opportunities for EO space agencies i.e. enlarge communities of users;
 - o Future Copernicus Expansion missions;
 - o Duality Private sector / Space Agencies: Complementarity, expected benefits and added-value; and,
 - o Foster the development and use of innovative Digital Services (data access, data processing,...).
- The implementation of those priorities will rely on the current CEOS groups, their ongoing / planned work and their expertise as much as possible.
 - o e.g. Working Groups (WGs), Virtual Constellations (VCs), SDG *ad hoc* Team (AHT), Coastal Observations Applications Services and Tools (COAST), CEOS Ocean Variables Enabling Research and Applications for GEO (COVERAGE), Systems Engineering Office; no new CEOS entity will be created.
 - o all necessary activities will be captured in the CEOS Work Plan.
- A consolidated Implementation Plan will be presented at CEOS Plenary (October 2021).
- 2022 planning dates:
 - o SIT-37: March 28 - 1 April 2022 at ESRIN; and,
 - o SIT Technical Workshop 2022: 12-16 September 2022 at ESRIN.

Session 2: Oceans and Coasts

2.1 COVERAGE and CEOS COAST [\[COVERAGE\]](#) [\[CEOS COAST\]](#)

Presenters: Vardis Tsontos/NASA/COVERAGE, Paul DiGiacomo/NOAA/CEOS-COAST AHT

Main points:

- **COVERAGE:** Motivation & Goals: Enable more widespread, integrated use of interagency satellite data in support of ocean science & applications for societal benefit.
- Phase B prototype implementation has been completed, delivering a technology platform providing access to complementary satellite and *in situ* datasets and some analytics capabilities.
- Phase C (full implementation) is expected to build on this, looking to higher resolution datasets and more regional use cases.
- Phase C will also include a study of potential operationalisation and efforts on UN Decade for Ocean Science.
- **CEOS COAST Ad Hoc Team:** Terms of Reference submitted in Dec 2020, Phase 2 Implementation Plan was completed in February 2021. Thanks to Merrie Beth Neely for coordinating these documents.
- Kick-off meetings held with several CEOS Work Plan deliverables.
- Monthly calls are ongoing, and the next event will be a joint GEO-CEOS COAST Virtual Stakeholder Engagement Workshop on September 1-2, 2021. This Workshop will seek to connect to GEO initiatives and members. It is expected the regional focus will be increased next year.
- Working with WGISS (Rob Woodcock) and SEO (Brian Killough) to populate Earth Analytics Interoperability Laboratory (EAIL) with data for the pilot activity.

Main discussion points:

- JAXA has joined the COAST team, and wishes to continue contributing, especially with GCOM-C and GCOM-W which can monitor coastal regions, SST, OCR and chlorophyll concentration.
- Steve Volz (NOAA): The UN Decade of Ocean Science for Sustainable Development (the 'UN Decade') is a good engagement opportunity for CEOS with IOC and UN. The CEO has sent a request for agency participation. Steve asked if CEOS or the SIT Chair Team responded to Albert Fischer working with Intergovernmental Oceanographic Commission (IOC) for a formal / more connected CEOS coordinated response to Decade co-design call.

2.2 UN Decade of Ocean Science for Sustainable Development [\[PPT\]](#)

Presenters: Paul DiGiacomo/NOAA/COAST AHT, Vardis Tsontos/NASA/COVERAGE, Marie-Claire Greening/CEO

Main points:

- The UN Decade has good energy. Makes clear the impact EO can have, and highlights the need for better integration of EO data, not just with IOC but other partners. Discussions have been held with IOC, GOOS, WMO about the need to bring together CEOS, CGMS, GEO, and WMO to ensure close integration with *in situ* and forecasting components.
- **COAST** has been submitted via the IOC as a 'Programme' to the UN Decade, while **COVERAGE** has been submitted via the OCEAN Decade US as an 'Ocean Shot'.
- It was agreed that Paul DiGiacomo (NOAA, COAST AHT), Vardis Tsontos and Jorge Vazquez (NASA, COVERAGE) to be joint CEOS liaison points with the IOC and the UN Decade Process. SIT Chair will provide overall guidance, with the CEO providing general advice and guidance (light-touch oversight and providing the pathway for reporting back to CEOS Secretariat/leadership). The CEO is in the process of coordinating the writing of a detailed letter that the SIT chair will send to the IOC confirming CEOS commitment.
- SIT-36 participants are asked to consider potential involvement in CEOS activities as contributions to the IOC and the UN Decade, including as input for the letter.

Main discussion points:

- Mark Dowell (COM, via chat): Asked how having COAST submitted as a "Programme" for the UN Decade fit with its position within CEOS as an AHT. i.e. I'm assuming this is a longer term commitment than originally foreseen for COAST, how do you now see the COAST activities and its place in CEOS evolving? Paul noted that for its first years, COAST has been focused on CEOS coordination. For the mid part of the UN Decade, the focus will be on integration and coupling with the wider community. He is considering COAST sustainment to meet the needs of the commitment to the UN Decade.
- Ken Holmlund (WMO): This is a good opportunity for CEOS, GEO, CGMS, WMO cooperation, with an emphasis on an integrated approach. It fits well into the WMO approach for Earth modelling. He welcomed the end-to-end aspect looking at the whole value chain, noting this is also the WMO approach.

Decision 01	Paul DiGiacomo (NOAA, COAST AHT), Vardis Tsontos and Jorge Vazquez (NASA, COVERAGE) to be joint CEOS liaison points with the IOC and the UN Decade Process. They will have autonomy to manage the relationship and are invited to present on this matter on the agenda of SIT, SIT TW and Plenary as appropriate, and as needed to secure Agency support. SIT Chair shall provide overall guidance and CEO regular general support and advice.
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SIT-36-01	In response to the IOC request to CEOS regarding the UN Ocean Decade, SIT Chair will coordinate a letter from CEOS with inputs from COVERAGE, COAST and other interested CEOS entities.	April 2021
	<i>Rationale: IOC request requires a response.</i>	

Session 3: Carbon and Biomass

Adam Lewis (GA, SIT Co-Chair) introduced the session, noting that the topic is one of the SIT Chair Team's priorities.

3.1 GHG Roadmap Update [\[PPT\]](#)[\[Video\]](#)

Presenter: David Crisp/NASA/Greenhouse Gas (GHG) Task Team

Main points:

- GHG Task Team is focused on development of pilot CO₂ and CH₄ inventory requirements and products. Available data and models limit global inverse models to ~ 2°x2° at monthly time scales (most models run at 4°x5°). The target product will be Flux maps at 4°x5° resolution at monthly intervals adopted to facilitate more complete uncertainty quantification.
- National inventory development requires higher spatial resolution CO₂ flux maps at 1°x1° at monthly intervals.
- If possible, estimates produced by the CEOS Agriculture, Forests and Other Land Use (AFOLU) team will be used to estimate AFOLU contributions to non-fossil fuel flux.
- The flux inventories will comprise:
 - Regional-scale Global CO₂ Inventories, based on OCO-2 Flux products (OCO-2 MIP Team);
 - Regional-scale Global CH₄ Inventories based on CMS TROPOMI flux inversions (J. Worden, JPL); and,
 - Localized Emission Hot Spots - demonstrations provided by individual PI Teams.

Main discussion points:

David addressed some questions (in *italics*) submitted in advance from his presentation:

- *SIT Chair Team: We assume we need a coordinated comms effort targeting COP-26 and the EID? Can SIT Chair and CEOS Chair help coordinate this during 2021?* David confirmed that an integrated and coordinated response will be needed and welcomes help from SIT and CEOS Chair teams. The GHG and AFOLU teams are currently collaborating both in product development and with interactions with the UNFCCC for COP-26 and Earth Info Day (EID). As members of the UNFCCC AHT on Systematic Observations for the Global Stocktake (GST), Osamu Ochiai (AFOLU/GOFI), Joerg Schulz (WGClimate), and David (GHG Task Team) will work with the SIT to coordinate our inputs to the COP-26 and EID.
- Mark Dowell (COM) added: we've become increasingly aware that there are two core use cases where the space agencies will be able to make contributions: direct support to parties; and their reporting obligations and then also these efforts on supporting RSO and verification process. Additional support is needed from space agencies in this synthesis phase (a new requirement that has become clear in the last few months) and CEOS Principals should be aware.
- *SIT Chair Team: Will the June GHG-AFOLU meeting explicitly address the compatibility needed between the atmosphere and land products or do we need some special further effort?* David observed that the GHG and AFOLU teams have already begun discussions, with a plan to generate independent products and compare. It is hoped to have a broader discussion at the GHG-AFOLU meeting. The discussion is in its infancy and expected to continue over the coming years. Mark Dowell added that he hopes that the meeting will consider how datasets are communicated to users and what their needs are, as well as the more technical issues around the datasets used in monitoring and verification systems and how the products are ingested for various sectors.
- *ESA: Could you say something more about the very promising combination of TROPOMI and OCO-2 observations and how these could be used most effectively?* David noted that TROPOMI measures NO₂ (co-pollutant) globally every day, while OCO-2 measures a fraction of a percent of the Earth every month. The existing capabilities (TROPOMI and OCO-2) provide a few dozen opportunities to assess methods for combining near-coincident NO₂ and CO₂ observations. There are a number of independent Principal Investigator (PI) teams combining these datasets to use NO₂ observations to refine wind direction and to identify spatial extent of the co-emitted CO₂ plumes (more clearly identifying plume and background points). Future missions such as GOSAT-GW and CO₂M, which carry both NO₂ and CO₂ instruments, are needed to fully exploit this capability. We are using this to develop methods for two primary purposes: to use NO₂ to inform OCO-2 data findings; and to undertake studies into how these measurements can be used to support one another.
- *ESA: Re COP-26 (references here and elsewhere) could UKSA say something about UK preparations and whether they could afford further opportunities for communications events?* These opportunities will be planned at the discretion of the SIT Chair.
- *UKSA: It would be good if you could comment on whether we should synthesize key results or findings (in addition to data sets) for GHGs in time for COP-26 and how might we do this as CEOS?* We will begin this process prior to COP-26, by identifying key datasets and preliminary findings. By SIT TW we will have some initial GHG and AFOLU products to present. Hoping to assess relative roles of fossil fuels, AFOLU and "Other" emissions on regional scales. Anticipate that this effort will extend through the data collection period, extending thought 2022 and 2023.
- Mark Dowell (via chat) added: "Just to be clear to Principals, COP-26 will be a very visible opportunity for us to provide pilot products for GST1, but we will still have an opportunity to provide updated products in 2022 still useful for GST1 (based on 2021 data)".
- Takeshi Hirabayashi (JAXA) reported that JAXA would like to proactively contribute to local hotspot estimation with GOSAT.
- Albrecht von Barga (DLR): recalled the role of WGClimate in reporting to UNFCCC COP meetings. We need to be ready by the time of SIT TW to plan our inputs.
- Beth Greenaway (UKSA): Noted she will attend WGClimate in April. It remains unclear whether COP-26 will be virtual. Deliberations on the format are still underway and UKSA will come back to CEOS with news.

- Mitch Goldberg (NOAA): noted that NOAA has no dedicated GHG mission, but does have a significant *in situ* network. They will contribute to this effort through their *in situ* network, and are looking at how to grow this network in support of Cal/Val.
- Mark Dowell (COM): suggested a CEOS Principal from a CEOS leadership agency make this statement at SBSTA this year. This should be worked out before SIT TW.
- Simonetta Cheli (ESA): encouraged CEOS collaboration on COP engagement. She noted ESA is willing to support as SIT Chair at the time. ESA is working on both COP and pre-COP activities, and is organising side events and will be present and open to collaboration on all aspects.

SIT-36-02	UKSA and WGClimate to update CEOS SEC on any news regarding the format of COP-26 and the subsequent opportunities for CEOS and its agencies, particularly for the GST datasets and guidance being planned by teams across the CEOS structure. CEO to provide summary emails to the broader CEOS community after monthly SEC meetings on COP-26 planning as updates warrant.	May 2021
	<i>Rationale: Significant investment planned by multiple CEOS Agencies and groups for inputs to COP-26 and GST1. Given the breadth and scale of this effort the SEC would like to remain in direct contact with the UKSA for updates on COP-26.</i>	
SIT-36-03	SIT Chair will confer with WGClimate, GHG Task Team, AFOLU Roadmap Team, SEO and WGISS to ensure a coordinated approach on a web portal communicating the CEOS datasets and guidance for COP-26 and GST1.	SIT TW 2021
	<i>Rationale: SIT Chair is providing oversight on efforts across the organisation in relation to the GST. Effective communication of CEOS contributions has already been highlighted as a priority.</i>	
SIT-36-04	CEOS Chair, in consultation with SEC, to explore options for delivery of the CEOS statement to SBSTA/COP this year given the major inputs being planned.	SIT TW 2021
	<i>Rationale: Traditionally we have sought a speaker from the COP national delegation of the Chair Agency.</i>	

3.2 AFOLU Roadmap Update [\[PPT\]](#)

Presenters: Osamu Ochiai/JAXA/LSI-VC Forest & Biomass Subgroup, Frank Martin Seifert/ESA/LSI-VC Forest & Biomass Subgroup

Main points:

- The top priority in 2021 is availability of relevant datasets in time for COP-26 (early Nov 2021) along with the prototype GHG products. A comprehensive roadmap can follow successful completion of GST1 deliverables
- AFOLU Roadmap Team agreed to focus on a small number of mature AFOLU products, complete with comprehensive guidance and communication materials to the UNFCCC Synthesis Report. Both national and global scale products are in scope.
- The AFOLU Team tasked small expert teams for each key dataset to recommend a viable outcome for COP-26.
- The GST will be an ongoing iterative process and a learning experience for all concerned. Therefore, building user relationships and understanding of our data is important. In some cases, a demo product may suffice with more comprehensive or sophisticated products later.
- GHG Task Team is aiming to provide products for 2015 – 2020 at COP-26, and then extend these products through 2021. Ideally, we would aim to replicate this across the AFOLU set of products. The GHG-AFOLU Workshop planned for June 2021 at JRC (Virtual) will help to build relationships across the different communities.

Proposed Biomass Product (Laura Duncanson/University of Maryland/WGCV Land Product Validation Subgroup, LPV)

- Several biomass products will be publicly available in advance of the GST (e.g. NASA's GEDI, ESA's CCI Biomass); to bolster uptake of these considerable CEOS Agency investments, **a single CEOS-endorsed biomass product is desirable.**
- An Open Science activity is proposed to use ESA-NASA Multi Mission Algorithm and Analysis Platform (MAAP) for inter-comparison and harmonization of biomass products for the GST. Products will be assessed following the WGCV Biomass Protocol using available reference data in pilot USGS SilvaCarbon countries.
- Ambitious timeline to produce input for COP-26, but process expected to continue evolving into 2022.

Proposed Land Cover, Forest, Wetlands and Change Products (Martin Herold/Wageningen University)

- Many agencies producing relevant data and products; the team has suggested a joint effort to provide synthesis of available products and experiences in three main areas:
 - Support of national GHG inventories for activity data estimation;
 - Improved global land change data for AFOLU and modeling assessments; and,
 - Enhancing consistency/comparability of national GHG inventories and global GHG estimates: developing best available global land cover change estimates at regional level for statistical comparison with country-reported data.
- The effort would need expert meetings, coordinated input from CEOS partners, and a synthesis towards a COP-26 presentation. The coordination builds upon GOF-C-GOLD land cover implementation team work.

CEOS GST1 Input - Land Cover, Forest, Wetlands and Change

The following products are proposed as the most suitable choices to present the dedicated CEOS agency support for the GST by UNFCCC COP26 in Nov. 2021:

1. Useful for countries and national reporting:
 - a. **Copernicus annual global land cover service** (2015-onwards, 100 m, EC)
 - b. **WorldCover** (2020, 10 m, ESA)
 - c. **Global Forest Watch tree cover loss** (annual from 2000 onwards, 30 m, NASA)
 - d. **Global Mangrove Watch** data on cover and change (25 m, JAXA)
 - e. **LCLUC Global Mangrove Mapping** data on AGB and Total Biomass (30 m, NASA JPL/GSFC)
2. For (longer-term) global modeling and GHG assessments:
 - a. **LC CCI annual 1992-2015** (now continued under Copernicus climate service C3S until today, 1 km change, ESA/EC)
 - b. **HILDA+ 1960-2019** global, annual land cover change harmonized with FAO statistics (synthesis product for modeling community)
3. For linking national reporting with global estimation (in a statistical sense)
 - a. **Nancy Harris/GFW forest fluxes data 2000-2019** (NASA)
 - b. **Copernicus annual global land cover service and regional land cover change statistics** (using reference data for estimation, EC/ESA)

CEOS GST1 Input - Land Cover, Forest, Wetlands and Change

Mangroves (Forest / OLU-Wetlands)

Activity Data – Global Mangrove Watch (JAXA K&C)

Global maps of mangrove area and annual changes at 25 m derived from L-band SAR and optical data. Open access in public domain.

1996–2018 available for COP-26. 2019-2021 for GST1.

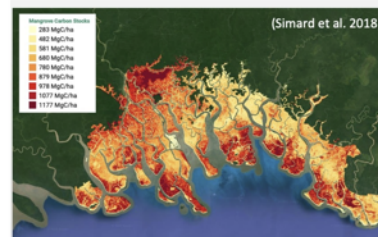
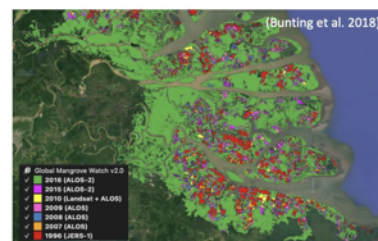
Official UNEP SDG 6.6.1 mangrove dataset.

Emission Factors - LCLUC Global Mangrove Mapping (NASA JPL/GSFC)

Global maps of mangrove Height, AGB and Total Biomass at 30 m. Open access in public domain.

Baseline year 2000 derived from SRTM DEM.



New 2015 baseline at 12 m from TanDEM-X DEM available for GST1.



Proposed Agriculture Products (Brad Doorn/NASA for Ian Jarvis/GEOGLAM)

- GEOGLAM proposes to prioritise the WorldCereal datasets, that will:
 - Produce Global cropland maps at 10 m resolution, accuracies 80% +, on a seasonal basis (2022);
 - Focus on **maize and wheat** for global application;
 - Initiate a global *in situ* reference dataset for agriculture; and,
 - Develop and test state-of-the-art classification algorithms.
- WorldCereal will develop the initial system, but several activities are required to ensure delivery to the GST (a reference network for *in situ* data; harmonized global data sets of Landsat 8 and Sentinel 2; algorithms to address a wider range of crops important for global food security; incorporation of new data streams as they become available; articulation of evolving user requirements for agricultural monitoring; capacity (co)development for LDC's to collect and provide the information needed for their national mitigation and adaptation planning and response programs).

The overall summary of the AFOLU products (baseline and those that would need extra effort) was shown:

 AFOLU Dataset summary 				
	COP-26 (Nov 2021)	GST1 (2021-23?)	Beyond (2024+)	Notes
Biomass	Fall back is individual existing datasets Synthesised biomass product providing estimates at a jurisdictional level globally	Synthesized, jurisdictional level biomass, emission factors (and prototype biomass change)	Synthesized spatially explicit, annual biomass, emission factors and biomass change	Work plan and schedule provided
Land Cover	- Copernicus annual global land cover - C3S/CCI Land Cover - WorldCover, HILDA+	Synthesised map products and estimates of land cover and change at regional, and global levels	Statistically robust activity data estimates (6 IPCC classes) at national and global levels	GOFC-GOLD coordination proposed
Forest & OLU-Wetlands	- Global Forest Watch tree cover loss and forest fluxes - Global Mangrove Watch cover and change (1996-2016) - Global Mangrove biomass (2000)	Global tree cover and forest emissions and removals Global mangrove cover and change at 25 m (2019+) Global mangrove biomass at 12 m (2015)	Global annual forest emissions and removals at 30-100 m resolution. Global annual mangrove emissions and removals at 10-25 m resolution.	In coordination with GMW
Agriculture	Demonstration WorldCereal products for at least 4 countries (Argentina, Spain, Ukraine and Tanzania)	Initial WorldCereal map and analytical system. On-going seasonal analysis products	Continual system improvement and production of seasonal state and change products	In coordination with GEOGLAM
Indicates off the shelf datasets possible. Indicates additional resources needed. 23				

Frank Martin Seifert (ESA) noted that the team will engage with the relevant CEOS Principals to assess the feasibility and interest in the various proposals.

Main discussion points:

- Gilberto Câmara (GEO Secretariat Director): Noted that one strong contribution to the AFOLU roadmap is Digital Earth Africa, which is progressing strongly; enormous amounts of data are available for Africa. They are also working with GFOI to make available the latest generation of ML technologies, FORIS, available on the SEPAL platform. Gilberto also raised the concern that, in matching open science, from the slide on capabilities (13) to the best of Gilberto's knowledge - none of the listed datasets are derived from open-source products - a problem that should be addressed. He asks that all in CEOS consider the open science approach.
- Selma Cherchali (CNES): For the implementation of the biomass protocol, and GEO-TREES, collaborative development of a high-quality reference network is essential for sustainability and open science. Ambitious investment and commitment can only be done collaboratively. The team can count on France's support. On COP-26 products, CNES encourages all agencies to work with the AFOLU team to achieve its vision as best as possible, noting the compressed timescale.
- Takeshi Hirabayashi (JAXA): Noted that JAXA strongly supports this activity and commits SAR satellite data for the process, including 25 years of L-band SAR heritage. By sharing and utilising, they look forward to close collaboration to support the generation of global forest cover and biomass stock and change products. JAXA will also contribute with other data - such as GCOM-C - to derive medium resolution land cover information.

SIT-36-05	AFOLU Roadmap Team to follow up with relevant CEOS Principals on the baseline and additional CEOS products suggested for COP-26 and beyond in order to explore the support available and therefore feasibility of each.	April 2021
	<i>Rationale: An early understanding of the capacity available for the COP-26 target AFOLU is needed to establish a credible plan of action for 2021.</i>	

3.3 CEOS Biomass Protocol [PPT]

[Protocol Document](#)

Presenter: Laura Duncanson/UMD/WGCV LPV

Main points:

- We are at the beginning of a new wave of forest biomass products, with several agencies providing data through new missions, the first of which is NASA's GEDI. With a multitude of new biomass products coming online soon, the biomass protocol seeks to provide good practice guidance on validation, with the goal of facilitating uptake of high-quality products.
- The Protocol provides guidance for map producers on how to estimate, propagate and report errors, and for map users on how to interpret errors. It also provides guidance on how to collect and use reference data (field and airborne lidar) for product validation. It also provides a summary of the state of knowledge, community identified research and tool development priorities, and recommendations for implementation.
- Laura provided a summary of technical recommendations for field measurements, plot sizes, the critical role of airborne lidar for validation and fusion, and conservative estimation of uncertainties and errors.
- There is a new proposed GEO activity, *Forest Biomass Reference System for Tree-by-Tree Inventory Data (GEO-TREES)*, aimed at supporting coordinated collection of new high-quality reference measurements for validation of biomass products. This activity encourages coordination on data collection for biomass validation, and CEOS Agencies are encouraged to engage.

Laura summarised some conclusions and recommendations from the Biomass Community:

- The large number of new biomass data and products could reduce product uptake by the user community unless validation activities are user-friendly, transparent, and well-coordinated.
- Collection of reference data following shared protocols enables data to be used by the global community, not only one mission or agency.
- Where possible, large forest plots, TLS, and airborne LiDAR should be collected following technical guidance in the protocol document.
- The use of airborne LiDAR allows scaling of field data, thus reference sites can validate any resolution of biomass products.
- User-led validation with existing reference data should be conducted with caution given spatial and temporal, and definition discrepancies.
- Reference data should be free and open to allow for transparent, reproducible product validation.
- Laura noted they are **seeking CEOS endorsement of the WGCV LPV Biomass Protocol**.

Main discussion points:

- ESA, JAXA, CSA, EUMETSAT, UKSA, CONAE, AEM, DLR, POLSA, CSIRO, UAE, GISTDA, USGS, INPE, ESSO provided written confirmation in the chat of their endorsement for the Protocol.
- Karen St. Germain (NASA, CEOS Chair) congratulated WGCV on delivery of a ground-breaking technical document and confirmed NASA strongly endorses the document.

Decision 02

CEOS SIT endorsed the CEOS Aboveground Woody Biomass Product Validation Good Practices Protocol (aka CEOS Biomass Protocol) document.

- Sara Venturini (GEO Secretariat, via chat) added details of a related event: an upcoming joint GEO-GFOI Virtual Workshop, with the participation of IPCC TFI (31 May-1 June, tbc): *"Exploring new tools to increase the accuracy of wall-to-wall method for land representation to assess land use*

and land cover changes and produce GHG emission estimates" focused on integrating Data Cubes into the SEPAL platform.

3.4 CEOS Strategy for the Global Stocktake [\[PPT\]](#)

[Strategy Paper](#)

Presenter: Stephen Briggs/SIT Vice Chair Team

Main points:

- Stephen presented on a CEOS Strategy to Support the Global Stocktake of the UNFCCC Paris Agreement. The Strategy includes recommendations that address the areas summarised below.
 - o **Mitigation:**
 - Recommendations 1-2: Check for completeness current requirements for carbon modeling and GHG inversion.
 - Recommendation 3: Concerns communications with UNFCCC Sec., SBSTA/RSO and Parties
 - Recommendation 4: Consider setting up large scale (IMBIE class) field experiments on naturally occurring terrestrial GHG fluxes
 - o **Agriculture, Forests, and Other Land Uses (AFOLU)**
 - Recommendations 5-6: Review requirements for observations for AFOLU, consistency with biogenic emission modelling and pilot implementation with several test countries
 - o **Adaptation**
 - Recommendation 7: Concerns actions of CEOS in support of Adaptation
 - o **Finance and Equity**
 - Recommendation 8: Maintains a watching brief on issues of finance and support to less developed countries.
 - o **Ongoing support to IPCC**
 - Recommendation 9: Continues ongoing support to ECVs for future climate modeling.

Stephen presented a set of proposed actions for discussion.

Mitigation

#	Actionee	Action	Milestone & Deliverable
1	WGClimate GHG Task Team. LSI-VC, GCOS, other relevant CEOS associates, representatives of relevant modelling groups	Develop a statement of products for terrestrial observations needed to support mitigation estimates of biogenic emissions as priors for Monitoring and Verification System (MVS) such as CoMVS	First draft for SIT TW, report to CoP26
2	WGClimate GHG Task Team, Oceans VCs, COAST Team, GCOS, GOOS, other relevant CEOS Associates, representation from GOBM modelling community	Develop a statement of products for ocean models in support of emissions modelling and fluxes	First draft for SIT TW, report to CoP26
3	WGClimate as interface to SBSTA/RSO, CEOS reps to the UNFCCC GST ad-hoc WG: Dave Crisp, Osamu Ochiai, Jorg Schulz. WGClimate Chair.	Deliver results of GST Strategy actions to key meetings in the UNFCCC Calendar, including SBSTA and COP, and meetings of the GST Ad-hoc WG on SO. Early action may be needed to identify and secure event opportunities at COP-26 and the Earth Information Day to promote and communicate the CEOS GST1 datasets. UKSA may be able to assist.	UNFCCC AD Hoc Meetings and SBSTA/RSO meetings
4	CEOS Agencies at SIT, WGCV, WGClimate, LSI-VC, AC-VC..	Discussion among agencies to consider large-scale field experiments on GHG fluxes (cf IMBIE)	SIT & SIT TW

AFOLU

#	Actionee	Action	Milestone & Deliverable
5	LSI-VC Forest and Biomass Team. GHG Task Team	Deliver prototype products for GST1 with associated guidance and communication materials.	COP-26
6	USGS/SilvaCarbon (Sylvia Wilson), LSI-VC Forest and Biomass Team	Establish National Inventory Test User Group and channels for country feedback on CEOS products and their application	CEOS Plenary 2021

Adaptation

7	SIT Chair coordination with thematic contributions: <u>WGDisasters</u> , <u>WGClimate</u> , LSI-VC, GEO Climate WG etc	Identify a specific process to explore requirements and actions for CEOS in relation to adaptation aspects of the GST.	SIT TW
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Finance & Equity

8	SIT Chair, WGCapD	As part of a GST Strategy update, provide periodic updates at Plenary and SIT meetings on CEOS actions relevant to Finance and Equity aspects of the GST, including technology transfer.	update at CEOS Plenary and SIT 2022
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Ongoing support to IPCC

9	WGClimate	Ongoing use of the ECVI and the related analyses to address the climate data record requirements.	Report to CEOS Plenary
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Main discussion points (on the actions):

- Mark Dowell (COM): reminded everyone about the number of discussions at SIT-35 and SIT TW 2020 regarding the way forward for the CEOS Carbon Strategy, which is now 5 years old. There has been a series of successful projects from it, but there is an opportunity to think about the way forward. What was missing was some type of focus to help it evolve. The paper prepared by Stephen provides some insight into how we might go forward with broader contributions from CEOS to carbon etc. The first four actions in particular provide an idea of how to evolve the strategy. The natural evolution could be focused by support to the GST process.
- Jörg Schulz (EUMETSAT): noted that EUMETSAT recognises that contributing requires a broad range of expertise which goes beyond joint WGClimate, and hence they welcome other contributions. Concerning the strategy document, Jörg raised issues. Particularly that a number of suggestions from WGClimate were not reflected in the 9 recommendations, and that the section on implementation of actions is new and was not reviewed by WGClimate. As a result, EUMETSAT, believes that in its current state, the document doesn't constitute a valid basis for decision making and requires more assessment and review by the GST team and WGClimate. He requested that this review be done before any decision making by CEOS.
- Stephen Briggs noted that the proposed actions are for discussion. He stressed the time-critical nature of the process and non-contentious nature of the actions, many of which are already underway. The document itself was only for background, and there is not much purpose in reviewing the details. The actions are the substance and can be taken forward or ignored as desired.
- Gilberto Câmara (GEO Secretariat Director): Commended the work done by the team putting together this document. The document addresses many of our concerns related to actions needed. GEO would be interested in working with CEOS on these matters that are very relevant. One desired outcome of COP-26 is for GEO to become a UNFCCC observer. If CEOS were to formally share the document with GEO Secretariat it would be helpful for GEO to mobilise efforts of its own members and Flagships/Initiatives. GEO supports the recommendations and actions and asks for the paper to be conveyed to GEO formally.

- Selma Cherchali (CNES): Thanked all the contributors and noted that the document is a very good basis for addressing this complex subject which calls for diverse and various expertise. The requirement to bring together all the expertise encourages us all to think about how, based on the existing structures of CEOS, we can evolve them so that this expertise is taken into account and the overall coordination is effective and harmonious.
- Steve Volz (NOAA): Concurred with the EUMETSAT comments. He suggested that the paper is a good thought piece, but not ready for endorsement, nor are the actions and recommendations. CEOS Members can still act as they see fit, but as a community we are not yet ready to formally agree on a common strategy. This paper is not a statement of CEOS and requires further discussion with WGClimat. Regarding Gilberto's request to share the paper, this would imply CEOS endorsement and Steve does not agree with this course of action.
- Mark Dowell (via chat): On Adaptation, the GEO Climate Change Working Group is developing Supplementary Guidance to the formal documentation for the National Adaptation Plan process, starting with a report on Agriculture (by GEOGLAM) which should be delivered by COP-26. This will probably be followed by other areas. CEOS could engage through this process. Sara Venturini can provide additional details.
- Dave Crisp (NASA, GHG Task team, via chat): Commended the SIT Chair Team and Steve Briggs in particular for the effort to coordinate the CEOS contributions to the SIT. In particular, it more clearly defines actions needed to coordinate efforts across CEOS to address the Adaptation and Finance aspects of the GST as well as the Mitigation efforts.
- Osamu Ochiai (JAXA, via chat): JAXA fully supports the GST Strategy document as mid and long-term guidance for CEOS on the GST process. JAXA would like to ensure that CEOS Member contributions will be duly acknowledged in the CEOS outreach to COP-26 and reflected in the UNFCCC GST Synthesis Report.
- Tim Stryker (USGS, via chat): USGS will participate in a 10-year SilvaCarbon anniversary event at the US Pavilion at COP-26. It will also participate in a GFOI-related side event. We'd be glad to use these events to highlight CEOS support of the UNFCCC, as appropriate. Sylvia Wilson (snwilson@usgs.gov) is the USGS point of contact for these activities.
- Klaus Schmidt (DLR): Agreed with NOAA and considers more reflection on the document is required.
- Karen St. Germain (NASA, CEOS Chair): Noted that questions and concerns have been raised and need to be worked through.
- John Remedios (UKSA): Recommended that in the margins of the meeting, or very quickly post-meeting, we should divide actions into those that are supported and those that need further work. We do not want to delay actions unduly that we actually agree on. Adam Lewis (GA, SIT Co-Chair) confirmed that the SIT Chair Team would investigate such an approach.

Wednesday March 24th

Alex Held (CSIRO, SIT Co-Chair) welcomed participants to Day 2 of SIT-36. He briefly reviewed the discussion from Day 1 on the GST Strategy. He noted that from the presentations and comments, it is clear that there is broad agreement that this is an important area, and that we see contributions from many different parts of the CEOS machinery as crucial. COP-26 and the first GST are major opportunities for the whole CEOS family. It is also clear that whilst there has been substantial effort made to frame the issue and draft possible actions (with a particular thank you to the SIT Vice Chair) the sense of agencies is that more time is needed to ensure the context paper and the actions themselves are fully consolidated and reflect the consensus view of agencies. The SIT Chair Team will confer with the SIT Vice Chair Team and work with the GST Study Team, and in consultation with all interested agencies, to revise the paper and actions over the coming weeks and months. The SIT Chair will also continue to support and engage with those across CEOS already working on parts of this effort while this process takes place.

Osamu Ochiai (JAXA, via chat) undertook for the AFOLU team to continue close direct cooperation with the GHG Task Team as they have been doing so far.

SIT-36-06	SIT Chair and Vice-Chair Teams will progress the draft GST Strategy Paper and related actions in consultation with the volunteer team and CEOS SEC.	April 2021
	<i>Rationale: CEOS contributions to the GST process will cut across many CEOS Entities, and broad consultation to achieve a comprehensive consensus view is essential.</i>	

Session 4: Sustainable Development Goals

4.1: SDG Ad Hoc Team (SDG-AHT) Current Work [\[PPT\]](#)

Presenter: Marc Paganini/ESA/SDG AHT

Main points:



- The SDG AHT Work Plan 2020-2021 starts with an analysis of the satellite data needs for four SDG Indicators that are of particular relevance to space-based EO:
 - o 6.6.1 (water-related ecosystems) in partnership with GEO Wetlands, GEO AquaWatch, GEO GLOWS;
 - o 11.3.1 (urban land consumption) in partnership with GEO HPI, GEO GUOI;
 - o 14.1.1 (coastal eutrophication) in partnership with GEO Blue Planet, GEO AquaWatch; and,
 - o 15.3.1 (land degradation) in partnership with GEO LDN.
- The SDG AHT has 11 related CEOS Work Plan Deliverables supporting these analyses.
- There have also been significant contributions from the SEO in relation to Open Data Cube (ODC) including: a Sandbox, user forum, notebooks in relation to Indicator 6.6.1 (Water) and 15.3.1 (Land Degradation), and Sentinel-1 ARD.

4.2: SDG Support Options Paper [\[PPT\]](#)

Presenter: Alex Held/CSIRO/SDG AHT Co-Lead

Main points:

- Informal discussions on SDGs started in CEOS in 2015, with the AHT being established at the 2016 CEOS Plenary. The AHT has been extended since then, though at the 2020 CEOS Plenary it was agreed that a transition plan should be presented at CEOS Plenary the following year.
- A draft options paper was initiated in November and iterated since, and was the topic of a dedicated workshop in February, where three options were presented:

 SDG AHT Future Options <i>Options presented at the workshop</i> 				
#	Future Options	Description	Coordination	Work
OPTION 1	Full-scale option	Create a new CEOS Working Group on SDGs.	<i>The Working Group would perform the full coordination function for CEOS support to GEO on SDGs, including the supervision of the CEOS Work Plan Deliverables and the detailed work plans of the new Working Group</i>	<i>The new Working Group would have its own capacity and resources to perform SDG tasks, in coordination with other CEOS bodies when specific competencies are required and available.</i>
OPTION 2	Federated option	Transfer the CEOS work on SDGs into existing CEOS entities under an internal CEOS coordination mechanism.	<i>There would be an identified SDG Coordinator or Coordination Team (single individual or group of persons) to which the CEOS coordination role on SDGs would be delegated.</i>	<i>CEOS work in support of the SDGs would be fully decentralised and performed across existing CEOS working teams and entities.</i>
OPTION 3	On-demand option	Reduce the scope of CEOS support to GEO on SDGs to a responsive model , in line with CEOS External Request process.	<i>The response coordination will be provided by CEOS, in accordance with the CEOS External Request Process Paper.</i>	<i>CEOS would only take action if requested by GEO or by the SDG community (e.g. UN agencies) and essentially for activities in line with the work plans of existing CEOS entities.</i>

- Based on the workshop, this was narrowed to two options for detailed consideration: the full-scale option; and, the federated option. A set of pros and cons have been developed (in the slides), and the CEOS SDG-AHT invites CEOS Principals to:

*“**endorse** the request from the SDG-AHT to further develop the two most favourable future scenarios (**full scale option and federated option**), through extended discussions with all stakeholders in order to come with a substantiated proposal to be reviewed and finalised*

with all key stakeholders during the CEOS SIT Technical Workshop in September, before its formal submission for approval to CEOS Principals at the 35th CEOS Plenary.”

Main discussion points:

- Takeshi Hirabayashi (JAXA): Encouraged space agencies to explore which datasets can be used for SDG Indicators and statistical information. JAXA also encourages each space agency to engage their National Statistical Offices (NSOs) to promote EO data use for the SDGs. Through these activities it is essential to share good practices and lessons learned. JAXA encourages the SDG AHT to continue working with this in mind and supports the proposal to work towards a decision at SIT TW and Plenary.
- Klaus Schmidt (DLR): Noted that DLR would prefer Option 3 (which has been taken off the table by the February workshop). DLR supports the position of JAXA regarding engagement with NSOs. Any option taken by CEOS must not encroach on official reporting routes. Of the remaining options, DLR is not supportive of establishing a new permanent resource requirement (e.g., a new WG), especially when CEOS is having difficulty sustaining existing Working Groups (WGCapD).
- Marie-Josée Bourassa (CSA): Agreed with Klaus that a WG would take a level of commitment that is not apparently forthcoming. She suggested changing CEOS Governance to create a group that is not as structured as a WG and to transition from an AHT to this instead of a Working Group.
- Steve Volz (NOAA): Concurred with the request to further study the two remaining options. A key activity for the next 6 months will be to understand the resource commitment we are considering here, noting that resourcing is a challenge. We also need to clearly understand the governance differences between the two options that are still on the table.
- Selma Cherchali (CNES): Suggested that in addition to resource issues, another aspect to consider is linkages to other CEOS working teams. CNES favours option #2, but needs to understand how the water and urban indicators in particular are proposed to be delegated within CEOS (to existing working teams).
- Paul Counet (EUMETSAT): Supported the recommendation to further study the options. EUMETSAT supports option #2, but with a certain level of focus/prioritisation to keep resource requirements in check.
- Karen St Germain (NASA, CEOS Chair): Noted that NASA is in favour of further development to explore some of the questions and concerns expressed here.
- Simonetta Cheli (ESA, via chat): Supported the proposal that the SDG-AHT continue studying the two remaining options.
- Tim Stryker (USGS, via chat): Appreciated the work done by the SDG-AHT and supported further study of the two options.

Decision 03	CEOS SIT agreed to focus on the development of two options for the future of the SDG <i>Ad Hoc</i> Team for presentation at Technical Workshop and then Plenary: “Option 1 Full Scale” (i.e. Working Group); and, “Option 2 Federated” (i.e. coordination of existing entities).
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SIT-36-07	The SDG <i>Ad Hoc</i> Team to further develop the two most favourable future scenarios (full scale option and federated option), through extended discussions with all stakeholders in order to come with a substantiated proposal to be reviewed and finalised with all key stakeholders during the CEOS SIT Technical Workshop in September, before its formal submission for approval to CEOS Principals at the 35th CEOS Plenary.	SIT TW 2021
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Rationale: The AHT is scheduled to expire at Plenary, and ongoing extensions are not a sustainable long-term model.

Session 5: Analysis Ready Data and Future Data Architectures

5.1: CEOS ARD Strategy & CARD4L Update [PPT]

Presenter: Andreia Siqueira/GA/SIT Chair Team

Main points:

- The CEOS ARD Strategy has directed CEOS work on ARD since its adoption at the 2019 CEOS Plenary, and covers four main areas:
 - o CEOS ARD User Needs & Specifications;
 - o Assured Production & Access;
 - o Pilots & Feedback; and
 - o Communication & Promotion.
- There are currently four Product Family Specifications (PFS), with five more under development (Aquatic Reflectance, Nighttime Light Surface Radiance, Geocoded SLC (SAR), LiDAR, Interferometric SAR). More information can be found at <http://ceos.org/ard>.
- There are currently two CARD4L compliant datasets: Landsat Collection 2 Surface Reflectance and Surface Temperature, with an additional seven undergoing assessment (from Sentinel-2, ALOS-2, EnMAP, Sentinel-1, NovaSAR-1).
- The assessments are highly cooperative, and WGCV have been pivotal in the peer review process (which is currently being revised for efficiency).
- There have been a number of outreach efforts (e.g., [website](#), [webinars](#), IGARSS session).
- Expansion of the CEOS ARD Framework beyond land is under consideration and will be covered under item 5.3.

5.2: CEOS ARD Strategy v2.0 [PPT]

Presenter: Adam Lewis/GA/SIT Chair Team

Main points:

- The first version of the CEOS ARD Strategy has been a helpful resource to direct and focus CEOS efforts on ARD.
- We are seeing good traction on the development and continued evolution of CARD4L Product Family Specifications. Initial CARD4L assessments have also been completed, with CARD4L products now publicly available (Landsat Collection 2) and an increasing number of assessments in progress.
- Various other outcomes (e.g., reports, outreach activities) have also been achieved.
- An updated CEOS ARD Strategy is planned for endorsement at CEOS Plenary 2021, reflecting all of the great progress made and charting the way forward for future years.
- The SIT Chair Team will seek contributions from all CEOS entities in the preparation of CEOS ARD Strategy v2.0.
- Some early ideas for CEOS ARD Strategy v2.0 were presented as seeds for discussion, broadly covering topics related to accessibility and utilisation of CEOS ARD with the goal of increasing the impact of CEOS data:
 - o Formalisation of a comprehensive framework for CEOS ARD in general (i.e., beyond land);
 - o Continued promotion to users, data providers, data distributors;
 - o Advisory Notes to provide guidance on key topics as complements to the non-prescriptive PFS;
 - o Continued pilot activities (including through the CEOS EAIL); and,
 - o Increased linkages between WGISS systems, CEOS ARD, and the cloud.

Main discussion points:

- Gilberto Câmara (GEO Secretariat Director): Commended the work done on CARD4L to date. In addition to the technical aspects of ARD, he encouraged CEOS to continue working to

understand and respond to the needs of users. GEO is undertaking the same with its members and through its numerous initiatives.

- Robert Woodcock (CSIRO, WGISS Chair, via chat): Stated that WGISS is highly supportive of the ongoing work to advance CEOS ARD and looks forward to contributing to CEOS ARD Strategy v2.0.

SIT-36-08	LSI-VC & SIT Chair Team to progress development of the second version of the CEOS ARD Strategy for discussion at SIT TW, with a view to endorsement at CEOS Plenary.	SIT TW 2021
	<i>Rationale: The first version of the CEOS ARD Strategy has been a helpful resource to direct and focus CEOS efforts on ARD. An updated Strategy is required, reflecting all of the progress made and charting the way forward for future years.</i>	

5.3: CEOS ARD Beyond Land [\[PPT\]](#)

Presenter: Ed Armstrong/NASA/SST-VC Co-Lead

Main points:

- CEOS ARD beyond land presentations from CEOS SIT TW 2020 encouraged a review of CARD4L from non-land discipline perspectives (e.g., SST, atmospheric, coastal and inland waters use cases).
- Decision CEOS-34-13 from the 2020 CEOS Plenary called on the SIT Chair and Ed Armstrong (SST-VC Co-Lead) to form a team of experts to review the CEOS ARD Framework (Definition, Specifications and processes around CEOS ARD) for completeness and suitability (including looking at changes that make it amenable to non-land domains).
- Discussions resulting from CEOS-34-13 have so far concluded:
 - o A need to converge on key data requirements rather than on data packaging or services (for now). This is consistent with CARD4L.
 - o Communities work with different processing levels and datasets that have differing co-registration and accuracy characteristics. Clarity is needed on if and how the CEOS ARD Framework caters for these.
 - o There are, or appear to be, competing and diverging needs in the ARD spectrum. The challenge is to satisfy them.
 - o A significant amount of the discussion is around finding a common language and understanding of the existing CARD4L Framework.
- Next steps in the response to CEOS-34-13 have been identified:
 - o Move the discussion from 'divergence' to 'convergence'.
 - o The LSI-VC and WGCV teams will document and share the governance approach around CARD4L.
 - o Need to converge across different disciplines to 'core' PFS requirements. The LSI-VC team will provide a 'barebones' PFS as a starting point for discussion and further development.

Main discussion points:

- The approach to CEOS ARD beyond land is expected to be presented to SIT TW and Plenary later this year.
- Chris Kidd (P-VC Co-Lead, via chat): Asked if we should be trying to converge the diverse data sets into the CARD4L Framework or instead generate a suite of frameworks (e.g., CARD4Oceans, CARD4Atmosphere)? Adam responded that the goal is not to converge into the CARD4L Framework, we are instead looking at core common elements that can be built upon by each.

SIT-36-09	SIT Chair to coordinate a call between the LSI-VC, SST-VC, and others currently discussing the CEOS ARD beyond land to review the findings to date and discuss an overarching governance framework applicable to all CEOS ARD.	April 2021
	<i>Rationale: Ensure good coordination and review progress between the SIT Chair team, LSI-VC, and SST-VC on ARD beyond land.</i>	

5.4: Future Data Architectures Activity Updates [\[PPT\]](#)

Presenters: Brian Killough/NASA/SEO, Rob Woodcock/CSIRO/WGISS Chair

Main points:

- Open Earth Alliance (OEA): Created by the Open Data Cube (ODC) founding partners to expand the impact of the ODC, support the concept of a regional network of Data Cubes, allow more agility to explore open-source solutions, and attract external funds and cloud credits from interested donors. OEA has launched a new User Forum (<https://www.openearthalliance.org/forum>) to support several ODC initiatives (e.g., Americas, Pacific Islands) and the CEOS Earth Analytics Interoperability Lab (EAIL). A new ODC Sandbox is also nearing release (a free and open programming interface that will connect users to common satellite datasets and analytics).
- CEOS Earth Analytics Interoperability Lab (EAIL): Supports CEOS WG/VC projects in the use of ARD and FDA by deploying via a Cloud-scalable Python-based Earth analytics environment using ODC, machine learning and other scientific libraries. Actual use in real CEOS collaborative projects tests ARD and FDA technologies and specifically interoperability approaches which can be used by WGISS and the SEO to advance CEOS. EAIL is now fully deployed (<https://hub.eail.easi-eo.solutions/>) and users from CEOS projects are being added.
- Changes in Data Discovery: Cloud-based copies of data radically alter the accessibility and cost-of-use of CEOS EO data (e.g., USGS Landsat Collection 2 results in a substantially reduced operating cost for EAIL and ODC related projects). CEOS data discovery systems need to adapt to concepts such as Spatio-Temporal Asset Catalog (STAC), Cloud Optimised GEOTiff (COG), and Cloud-native formats. WGISS is now investigating these issues. The WGISS-51 meeting will have a special session on Cloud formats in use/trial by CEOS Agencies and will consider development of a best practice guide.

Session 6: Working Group Showcase

Working Group on Calibration & Validation

Presenter: Akihiko Kuze/JAXA/WGCV Chair [[presentation](#)]

Main points:

- Some recent Cal/Val results on GHG (OCO-2/3, GOSAT-2, TROPOMI) and protocols (*Soil Moisture Product Validation Good Practices Protocol, Biomass Validation Protocol*) were summarised.
- Further investigations are underway looking at large footprint and BRDF corrections for intercomparison with high spectral resolution spectrometers (GHG), high spectral resolution solar data (GHG), and new products such as SIF (biomass).

Working Group on Capacity Building & Data Democracy

Presenter: Nancy Searby/NASA/WGCapD Chair [[presentation](#)]

Main points:

- The EO Training, Education, and Capacity Development Network (EOTEC DevNet) is focused on providing network to network leadership and coordination, a community of practice for capacity building, and ongoing capacity gap, overlap and resource assessments.
- WGCapD is requesting endorsement of the [EOTEC DevNet Implementation Plan](#). The Plan Pilot focuses on serving as a nexus of sustainability frameworks, and discussions are underway about a pilot around flooding.
- The timeline for the Plan is:
 - o Phase 1 (Mar-Oct 2021) – Initiation, Resources, Flooding focus; and,
 - o Phase 2 (Oct 2021– Mar 2023) – Full pilot focus, Sustainability plan.
- The WGCapD Vice Chair (from VNESC) cannot continue on to be Chair. This leadership issue will be raised during the Plenary session (item 9.1).

Main discussion points:

- Klaus Schmidt (DLR): Supported the endorsement of the EOTEC DevNet Implementation Plan. He also recognised Nancy's excellent work as Chair of the WGCapD and commended NASA for providing the support that has allowed Nancy to maximise the potential of the WG. Klaus encouraged all CEOS Agencies to consider resourcing for future leadership roles, and to reflect on the level of support currently provided.
- Ken Holmlund (WMO): Is very supportive of this initiative. It is very important to take the end-to-end view, from space-based observations to downstream services, users and capacity building as well as taking a synergistic approach across all initiatives.
- Karen St.Germain (NASA, CEOS Chair): Extended congratulations to Nancy on her success as WGCapD Chair and thanked Lawrence Friedl for supporting with needed resources. EOTEC DevNet is an enormous accomplishment.

Decision 04

CEOS SIT endorsed the Earth Observation Training, Education, and Capacity Development Network (EOTEC DevNet) Implementation Plan.

Working Group on Disasters

Presenter: David Green/NASA/WGDisasters Chair [[presentation](#)]

Main points:

- Two pilot Implementation Plans were presented for endorsement:

- Wildfire Pilot (Co-Leads: NRCan, CSA, NASA, UN-FAO): Agreed at CEOS Plenary 2020 to provide a fundamental basis for defining global priorities for active-fire monitoring and characterisation.
- Landslide Demonstrator (Co-Leads: CNRS, NASA, BGC, Terranum): Builds on outcomes of the Landslide Pilot, which established guidelines for the operational use of EO data for landslides.
- WGDIsasters now has Observer status in the International Disasters Charter.
- WGDIsasters is supporting the 2021 CEOS Chair theme on *Space-based EO Data for Open Science and Decision Support* through the Flood Pilot Team in particular.
- Currently recruiting for WGDIsasters Vice Chair and Data Coordination Team Lead roles.

Main discussion points:

- NASA, NOAA, CSIRO, CNES, CSA, ESA, POLSA, and AEM all supported the endorsement of both Implementation Plans.
- Klaus Schmidt (DLR, via chat): Regarding the WGDIsasters Landslide Demonstrator Implementation Plan (v1.0, March 21), DLR kindly asks to be removed from the list of Space Agency Participants on page 1. DLR cannot *a priori* agree to contribute to this activity, because in the field of landslide monitoring there might be overlaps with commercial activities brought forward by DLR's PPP partner (for the TerraSAR-X and TanDEM-X missions) Airbus, and conflicts need to be avoided. Possible data contributions by DLR need to be discussed for specific areas after ensuring a clear scientific purpose.

Decision 05	CEOS SIT endorsed the Wildfire Pilot Implementation Plan of WGDIsasters.
Decision 06	CEOS SIT endorsed the Landslide Demonstrator Implementation Plan of WGDIsasters.

Biodiversity Activities

Presenter: Gary Geller/NASA [[presentation](#)]

Main points:

- Gary stressed the importance of space-based EO for biodiversity monitoring, as it provides periodic, global coverage that complements *in situ* observations.
- The GEO Biodiversity Observation Network (GEOBON) is working on maturing the definition of the Essential Biodiversity Variables and is engaging in "Post-2020" discussions of the Convention on Biological Diversity (CBD).
- The role of EO in biodiversity science and applications is expanding and there is an opportunity for increased CEOS contributions, with increasing capabilities in spectroscopy, increasing importance to society as demands on the natural world increase, and increasing appreciation by society of the importance of biodiversity.

Main discussion points:

- Marie-Josée Bourassa (CSA): Recalled that the 2013 CEOS Plenary in Montreal attempted to gain traction on biodiversity in CEOS, but this was prevented by resource limitations at the time. Canada is currently hosting the Convention on Biological Diversity (CBD) Secretariat. She encouraged CEOS to consider further activities on biodiversity.

Thursday March 25th

Session 6: Working Group Showcase (continued)

CEOS/CGMS Working Group on Climate

Presenters: Albrecht von-Bargen/DLR/WGClimate Chair, Jeff Privette/NOAA/WGClimate Vice Chair
[\[presentation\]](#)

Main points:

- ECV inventory: The gap analysis v3.0 is nearing completion, and in June-July the ECV Inventory v4.0 will be made available with approximately 1600 climate data records (CDRs) expected to be included. Agencies are asked to keep their records up to date on a continuous basis. A gap analysis workshop is planned for Q4 2021.
- Use cases for CDRs have been collected for some time now, and Agencies are invited to contribute. These will be published by WMO and are hoped to help demonstrate the value of the records in climate applications and services.
- The Group is helping to represent CEOS (& CGMS) in the writing team for the synthesis paper on the coordinated contribution of the systematic observation community to the first Global Stocktake, along with the AFOLU Roadmap Team and the GHG Task team.
- The GHG Task Team will have representation from CGMS and the *in situ* community.

Main discussion points:

- Ken Holmlund (WMO): Reemphasized WMO commitment to WGClimate. He encouraged everyone to consider providing use cases that demonstrate the value of CDRs. Ken noted that GCOS requirements will continue to evolve to meet needs.
- Karen St. Germain (NASA, CEOS Chair): Offered NASA expert support for future gap analysis activities and asked when and how these will be published. Albrecht responded that the collection process is underway and the results will be linked to [climatemonitoring.info](#). A selection of these use cases will feature in a WMO publication at the end of this year or beginning of next.
- Mark Dowell (COM, via chat): "As Jörg and Albrecht mentioned at last Plenary, the use cases will become a standing/ongoing activity with periodic publications of new cases".

Session 7: Virtual Constellation Showcase

Atmospheric Composition

Presenter: Ben Veihelmann/ESA/AC-VC Co-Lead [[presentation](#)]

Main points:

- Barry Lefer (NASA) is the new AC-VC Co-Lead succeeding Jay Al-Saadi (NASA, now retired).
- Several activities were summarised: GHG Roadmap implementation (as detailed under agenda item 3); ozone dataset validation, harmonisation, and assessment; and, air quality trace gases and aerosol dataset validation and coordination.
- The AC-VC has been involved in the dashboard by ESA-NASA-JAXA (<https://eodashboard.org>): notably the COVID-19 impact on emissions and of GHG and air pollutants seen by satellite.
- Possible contributions to ARD in the atmospheric domain could be considered, and the Constellation participated in the ARD framework meetings on 21 January and 1 March 2021.

Main discussion points:

- Karen St. Germain (NASA, CEOS Chair): Hopes to see the continued emphasis on the GHG inventory by the GHG Task Team for COP-26. And congratulated Korea on the first geostationary air quality data (GEMS) recently released.
- Osamu Ochiai (JAXA, via chat): Asked about the intention of the aerosol coordination efforts and which instruments are in scope. Ben explained that the emphasis is on aerosols for air quality, notably met imagers that can provide optical depth in near real time. Many sensors are limited vertically, and this is a crucial point - the work is looking at where satellites can contribute.
- Shobha Kondragunta (NOAA, via chat in response to a question from ESA): We are compiling a list of all current and future satellite missions from all space agencies. All assets that can support us for translating satellite observed aerosol parameters to surface PM2.5

Land Surface Imaging

Presenters: Steven Labahn/USGS/LSI-VC Co-Lead, Zoltan Szantoi/COM/LSI-VC Co-Lead, Adam Lewis/GA/LSI-VC Co-Lead [[presentation](#)]

Main points:

- CARD4L product assessments are progressing. USGS Landsat Collection 2 Surface Reflectance / Temperature was the first official CARD4L. ESA Sentinel-2 Level-2A Surface Reflectance, Element-84 Sentinel-2 Level-2A Surface Reflectance, DLR EnMAP Surface Reflectance, JAXA ALOS-2 NRB, S-1 Sinergise NRB and NovaSAR-1 NRB assessments are underway. Interacting with various other data providers (including the commercial sector) about potential assessments.
- WGCV relationship is key for the CARD4L assessment process.
- New CARD4L PFS are under development for: Aquatic Reflectance, Nighttime Light Surface Radiance, Interferometric SAR & Geocoded SLC, and LiDAR.
- The [2nd CARD4L Workshop on SAR](#) was held in February 2021.
- LSI-VC is supporting the CEOS ARD beyond land discussions covered in Session 5.
- LSI-VC is ready to support the AFOLU Roadmap / Global Stocktake work.

Precipitation

Presenter: Chris Kidd/NASA/P-VC Co-Lead [[presentation](#)]

Main points:

- Key workhorse systems are ageing: GPM now 7 years old; DMSP F16 SSMIS now 17+ years old (older than TRMM).
- Several new key systems will be launched, with the TROPICS pathfinder and NOAA GOES-T expected in 2021.

- Data products are being produced by NASA PPS/DISC (ARD data sets and products, pps.eosdis.nasa.gov). AC-VC working with the team looking at CEOS ARD beyond land to explore concept applicability.
- A new GSMap version is due May 2021 via *JAXA Climate Rainfall Watch*.
- NASA, NCEP and NESDIS have ongoing projects to create precipitation climate datasets
- Several webinars have been conducted with strong participation (10's - 100's), and NASA is creating outreach materials published here: <https://gpm.nasa.gov/applications>.

Ocean Colour Radiometry

Presenters: Ewa Kwiatkowska/EUMETSAT/OCR-VC Co-Lead, Marie-Helene Rio/ESA/OCR-VC Co-Lead

Main points:

- Planning a community workshop and whitepaper on Aquatic Carbon from Space - expected in Q1-2022 (under the leadership of ESA and NASA). This will also be the subject of an Earth Sciences Review special issue to be released in Q4-2022.
- Coordination on System Vicarious Calibration infrastructures' activities is ongoing, with a new IOCCG Task Force being formed and key contributions from NOAA, NASA, and Copernicus/EUMETSAT.
- SVC Infrastructure for the Sentinels will start design in Q4 2021.

Main discussion points:

- Mark Dowell (COM): Welcomed OCR-VC efforts on Aquatic Carbon which are very useful and relevant to the discussion we had on Monday on the Global Stocktake - specifically Recommendation 2 in the concept paper i.e. on defining requirements for products.
- Steve Volz (NOAA): On SVC infrastructures, he suggested the VC develop a summary white paper that discusses distribution and coordination of a worldwide calibration system and the net effect of combining assets. This would be a helpful input to space agency forward planning. CNES agreed (via chat). Ewa welcomed the idea and undertook to raise it with the VC.

Ocean Surface Topography

Presenter: Estelle Obligis/EUMETSAT/OST-VC Co-Lead [[presentation](#)]

Main points:

- The selection of international OSTST Principal Investigators/Co-Investigators is ongoing with more than 30 responses received for each of the TOSCA (CNES/EUMETSAT) and ROSES (NASA/NOAA) calls.
- Since launch in November 2020, Sentinel-6 Michael Freilich and its instruments continue to function nominally.

Ocean Surface Vector Winds

Presenter: None present.

Sea Surface Temperature

Presenter: Ed Armstrong/NASA/SST-VC Co-Lead [[presentation](#)]

Main points:

- Christo Whittle (SANSa) joined in October 2020 as new co-Lead.
- SST-VC is co-leading and participating in the ARD framework review team (ARD Beyond Land).
- SST-VC has contributed to ARD workshops within NASA. Will share reports in due course.
- Co-organized ESIP Winter meeting session on "[ARD for science and industry](#)". Feedback on ARD requirements: needs to be clean, standardised, and cloud-optimised.
- SST-VC revised Terms of Reference are on the way to reflect COAST, COVERAGE and ARD activities, and to update the SST core mission portfolio.

Session 8: Working Team Coordination [PPT]

Main points:

- Overlap or duplication identified.
- Current cross-thematic synergies.
- Opportunities for further synergies.
- Working Team engagement with Earth Analytics Interoperability Lab (EAIL).
- Identification of agenda items for Working Teams All Hands Call #4 (WTAH Call #4).
- Updates to <https://ceos.org/observations/>.

Main discussion points:

- Adam Lewis (GA, SIT Co-Chair): ARD theme common across a number of working teams, and it is clear this topic is growing. Currently working with Ed to unpack the current CEOS ARD Framework and to look at commonalities across different thematic areas.
- Gilberto Câmara (GEO Secretariat Director): Welcomes questions presented and their inclusion on the upcoming CEOS WTAH Call #4.
- Alex Held (CSIRO, SIT Co-Chair): Noted ceos.org/observations, and that the purpose is to better understand the breadth and depth of coordination underway. Page intended for a general audience. Welcome Working Teams inputs on the page via the SIT Chair Team.
- Alex: Invited Working Team engagement with Earth Analytics Interoperability Lab (EAIL) via WGISS (Rob Woodcock) and SEO (Brian Killough). Ed Armstrong (NASA, SST VC Co-Lead) suggested that as the EAIL develops, VCs are encouraged to include some of their own datasets on the platform to explore interoperability.
- Mark Dowell (COM): Noted that it is clear that the support to the GST needs broad competencies and datasets are required across CEOS VCs and WGs. (e.g., LSI, OCR, SST, AC VCs WGCV, WGISS at a minimum, on top of WGClimate of course).

SIT-36-10	CEOS Working Teams to review the Thematic Observing Strategies page on the CEOS website (ceos.org/observations) and to notify the SIT Chair Team of any required updates.	May 2021
	<i>Rationale: The Thematic Observing Strategies page aims to provide an efficient overview of CEOS coordination efforts to the website visitors.</i>	

Session 9: Closing

9.1: CEOS Plenary Session

Presenter: Karen St Germain/NASA/CEOS Chair

Main points:

- CNES has offered nomination to serve as CEOS Chair in 2022. This is normally considered during the preceding Plenary, but there was no nomination at that time (October 2020). The nomination is presented today for CEOS Principal consideration and confirmation.
- GA, UKSA, USGS, EUMETSAT, CSA, COM, JAXA, CSIRO, UAE, NOAA, NASA, CONAE, SANSA, ESA, DLR, GISTDA all supported the nomination.
- Karen congratulated CNES and offered NASA Chair Team support in the lead up.
- Selma Cherchali (CNES): Thanked the SIT Chair Team for organising SIT-36, at convenient times for as many as possible, despite late nights in Australia. Selma thanked CEOS for the confirmation, and NASA (CEOS Chair) and ESA (SIT Vice Chair) for their promised support. She looks forward to working with everyone.
- Karen noted the WGCapD leadership situation, where the current WGCapD Vice Chair is unable to take on the Chair role as planned at CEOS Plenary 2021. WGCapD therefore needs a Chair and Vice Chair for November 2021 onwards.

Main discussion points:

- Steve Volz (NOAA): Recognised the value of WGCapD and thanked Nancy. There have been a number of discussions around leadership sustainability, but we continue to struggle to fill positions. He asked if a re-evaluation of how we work with other global agencies/organisations (e.g., GEO, CGMS) is needed. He fully endorses the need to support capacity building, but unclear of the best approach for CEOS.
- Beth Greenaway (UKSA): Agreed with Steve. while noting the value of WGCapD, not clear the need for unique CEOS capacity on this and asked if we could instead pool resources with other initiatives. Fully endorse the concept, but resourcing for this group is a challenge.
- Nancy noted the above concerns, which has been the driver behind EOTEC DevNet. Integrated approach through CEOS has value through connecting with users. EOTEC DevNet will better focus CEOS efforts to ensure there are not overlaps with the other groups noted above.
- Steve Volz (via chat): "For the record, I fully endorse the centralized best practices approach. Expert-led capacity building is not as effective. Not in favour of distributing across other teams, instead suggesting perhaps the effort needs to happen at a higher level. Suggested that if the leadership issue is not resolved, NOAA would be happy to contribute to a study exploring the options along these lines."
- Nancy asked if there is anything that CEOS can do to make it easier for agencies with more limited budgets and resources to take on these leadership positions. Steve Volz (via chat): "Great point. Assumptions of what it means to be a Chair could be revisited. Virtual presence can be effective."

Decision 07

In a CEOS Plenary Session, CNES was confirmed as the Incoming CEOS Chair.

9.2: Closing Discussion [\[PPT\]](#)

Presenter: Adam Lewis/GA/SIT Co-Chair

Main discussion points:

- **Session 2 Oceans**
- Marie-Claire Greening (CEO) provided a point of clarification noting that it is Paul DiGiacomo (NOAA, COAST AHT), Vardis Tsonotos and Jorge Vazquez (NASA, COVERAGE) who are specifically the joint CEOS liaison points with the IOC and the UN Decade Process. It is these specific people, not "COAST and COVERAGE", who are providing the liaison.
- **Session 3 Carbon & Biomass** Albrecht von Barga (DLR) noted the action on COP process updates from UKSA (host country) with updates to suggest.
- Mark Dowell (COM) noted the CEOS statement to COP-26 action is relevant beyond AFOLU (here because it fell in this part of the discussion).
- **Session 4 SDGs** no issues raised.
- **Session 5 ARD** no issues raised.
- **Session 6 WG Showcase** clarified that WGCAPD Vice Chair will continue until Plenary, but will be unable to take over as Chair at Plenary.
- **Session 7 VC Showcase** no issues raised.

9.3: Review of Draft Actions [[PPT](#)][[draft D&A](#)]

Presenter: Stephen Ward/SIT Chair Team

Main points:

- Formal decisions limited to document endorsements.
- Reviewed and revised actions item by item.

Main discussion points:

36-02

- Albrecht von Barga (DLR, via chat): Update of 36-01 "UKSA to discuss with WGClimate engagement opportunities for CEOS and its agencies in next WGClimate meeting 15 April. WGClimate reports regularly on status of preparation to CEOS SEC" (including UKSA)
- Beth Greenaway stressed that they are happy to provide updates on COP planning, but asked that the channel be made clear. John Remedios (UKSA) suggested that COP planning is quite complicated, and suggested a broad range of participants are kept informed.
- Kerry Sawyer (NOAA, via chat): Because of the magnitude of climate and the opportunity we have with COP in the UK and UKSA offering to report regularly, I think it would be in CEOS interest to invite UKSA to participate in the SEC meetings. But the decision is on the CEOS Chair/NASA to determine who to invite to the SEC. Kerry suggested monthly email reports after the SEC to CEOS community on the status of COP-26 planning.
- Mark Dowell (COM, via chat): Another issue to pay attention to on COP-26 is the messaging on how EO can support the convention and the PA/GST process more specifically. I have seen a large number of efforts being proposed, and it is not clear the messaging is always consistent, on what we are doing and why. CNES Selma agreed (via chat).
- Simonetta Cheli (ESA): Noted that in the past CEOS representation at COP has been coordinated via the CEOS Chair and SIT Chair, and suggested this should happen again in this case.
- Albrecht: Noted that they will prepare the report to SBSTA and COP as they have in the past.
- John Remedios: Suggested that the action be revised to read UKSA and WGClimate should update CEOS SEC on news relating to COP.
- Tim Stryker (USGS): Recommended that this be an all hands on deck effort by CEOS, and that there needs to be a clear channel for routine communication and information sharing.
- Jono agreed with Kerry's suggestion that the CEO send a brief update to the CEOS community on COP-26 after each SEC meeting. (Kerry suggested monthly.)

36-03

- Albrecht: Noted climatemonitoring.info and CGMS web suggested as potential inputs.

36-04

- Jörg Schulz (EUMETSAT): Noted it is the CEOS Chair Agencies' country delegation that typically presents the CEOS statement.
- Karen St. Germain (NASA, CEOS Chair, via chat): We will take up the COP-26 question at the next CEOS Troika meeting. Thanks for suggestions and ideas.

9.4: Closing Remarks [\[PPT\]](#)

Presenter: Alex Held/CSIRO/SIT Co-Chair and Adam Lewis/GA/SIT Co-Chair

Main points:

- SIT Technical Workshop 2021 will be a fully virtual event to take place over an approximately two-week period from 6 September to 16 September inclusive.
 - o Week 1 commencing 6 September: Informal time for groups to get together, have discussions and prepare materials on specific topics. Largely "self-organised" by groups themselves providing maximum flexibility. SIT Chair Team representative will call in to sessions whenever possible but there will be no expectation others will.
 - o Week 2 commencing 13 September: Formal whole group sessions focussing on items required for Plenary. During the week there will be 3x2-2.5 hour sessions held in the usual time slots on 14, 15 and 16 September.
- Adam and Alex thanked the SIT Chair Team, and all the contributors to the meeting.
- Suggest consider hybrid meetings in future, and make an effort to make it as easy as possible for virtual participation.
- Karen thanked Alex, Adam, and the SIT Chair Team for the highly productive, focused and well executed meeting. Lots of good work behind the scenes. Also thanked participants and presenters for all of their work. She noted the tentative dates for the 2021 CEOS Plenary: 2-4 November.

APPENDIX A: Attendees

Organisation	Name	Organisation	Name
AEM	Jesús Romero	MoES	Hasibur Rahaman
AEM	Julio Castillo	MoES	Murty Pln
AME	Adrian Guzman	MoES	VS Prasad
BoM (Australia)	Agnes Lane	NASA	Andrew Mitchell
BoM (Australia)	Alessandra Monerrias Belda	NASA	Argie Kavvada
BoM (Australia)	Helen Beggs	NASA	Barry Lefer (AC-VC Co-Lead)
CCMEO	Mathieu Benoit	NASA	Brad Doorn
CEO	Marie-Claire Greening	NASA	Brian Killough (SEO Lead)
CEOS Chair Team	Matthew Steventon	NASA	Chris Kidd (P-VC Co-Lead)
CNES	Aurelien Carbonniere	NASA	Christine Bogner (CEOS Chair Team PoC)
CNES	Eric Brel	NASA	Dave Borges
CNES	Helene DeBoissezon	NASA	David Crisp
CNES	Jerome Chave	NASA	David Green (WGDisasters Chair)
CNES	Perric Ferrier (WGDisasters Vice Chair)	NASA	Diane Davies
CNES	Selma Cherchali	NASA	Ed Armstrong (SST-VC Co-Lead)
COM	Astrid Koch	NASA	Emil Cherrington
COM	Mark Dowell	NASA	Gary Geller
COM	Mauro Facchini	NASA	Hank Margolis
COM	Zolti Szantoi (LSI-VC Co-Lead)	NASA	Jack Kaye
CONAE	Ana Medico	NASA	Jamie Nickeson
CONAE	Laura Frulla	NASA	Jorge Vazquez (COVERAGE Co-Lead)
CSA	Marie-Jose Bourassa	NASA	Karen St. Germain (CEOS Chair)
CSA	Paul Briand	NASA	Kevin Murphy
CSIR	Busisiwe Nkonki	NASA	Kim Holloway
CSIR	Erik Wegman	NASA	Laura Mulvey
CSIR	Marié Botha	NASA	Lauren Childs
CSIR	Nicolene Roux	NASA	Lawrence Friedl
CSIRO	Alex Held (SIT Co-Chair, SDG AHT Co-Chair)	NASA	Michael Falkowski
CSIRO	Cindy Ong	NASA	Nancy Searby (WGCAPD Chair)
CSIRO	Rob Woodcock (WGISS Chair)	NASA	Sandra Cauffman
DLR	Albrecht von Bargaen (WGClimate Chair)	NASA	Vardis Tsontos (COVERAGE Co-Lead)
DLR	Diego Loyola	NASA	Wenying Su
DLR	Klaus Schmidt	NASA	Yazha Moz
ESA	Ben Veihelmann (AC-VC Co-Lead)	NASA/UMD	Laura Duncanson
ESA	Frank Martin Seifert	NIES	Hiroshi Tanimoto (AC-VC Co-Lead)
ESA	Ivan Petiteville	NOAA	Albert DeGarmo
ESA	Marc Paganini (SDG AHT Co-Chair)	NOAA	Alisa Young
ESA	Marie-Helene Rio (OCR-VC Co-Lead)	NOAA	Chuck Wooldridge
ESA/Univ. Reading	Michaela Hegglin	NOAA	Eric Leuliette
ESA	Mirko Albani	NOAA	Haun Meng
ESA	Philippe Goryl (WGCV Vice Chair)	NOAA	Ivan Csiszar
ESA	Simon Pinnock	NOAA	Jeff Privette (WGClimate Vice Chair)
ESA	Simonetta Cheli	NOAA	Ken Casey
ESA	Stephen Briggs	NOAA	Kerry Sawyer
ESA	Susanne Mecklenburg	NOAA	Kevin Gallo
EUMETSAT	Estelle Obligis (OST-VC Co-Lead)	NOAA	Merrie Beth Neely
EUMETSAT	Ewa Kwiatkowska (OCR-VC Co-Lead)	NOAA	Mike Pavolonis
EUMETSAT	Jörg Schulz	NOAA	Mitch Goldberg
EUMETSAT	Paul Counet	NOAA	Nancy Ritchey
EUMETSAT	Robert Husband	NOAA	Paul DiGiacomo (CEOS-COAST Co-Lead)
GA	Adam Lewis (SIT Co-Chair)	NOAA	Shobha Kondragunta
GA	Andreia Siqueira	NOAA	Steve Volz

GA	George Dyke	NRSC	Santhi Sree Basavaraju
GA	Jonathon Ross	POLSA	Anna Stańczyk
GA	Maree Wilson	POLSA	John Hall
GA	Medhavy Thankappan	POLSA	Marta Balcer
GA	Stephen Ward	SANSA	Christo Whittle
GA	George Dyke	SANSA	Imraan Saloojee
GEO Secretariat	Doug Cripe	SNSA	Tobias Edman
GEO Secretariat	Sara Venturini	UAESA	Fatima Al Aydaros
GEO Secretariat	Steven Ramage	UKSA	Beth Greenaway
GEO Secretariat Director	Gilberto Camara	UKSA	John Remedios
GEOGLAM Project Office	Ian Jarvis	UKSA	Svetlana Zolotikova
GISTDA	Boonchoob Boongthong	UNOOSA	Alice Bourdet
GISTDA	Disapat Sawadi	UNOOSA	Coen Bussink
GISTDA	Ditchaphong Phoomikiattisak	UNOOSA	Jorge Del Rio Vera
GISTDA	Pakorn Apaphant	USGS	Chris Barnes
GISTDA	Poramet Thuwakham	USGS	Cody Anderson
GISTDA	Prayot Puangjaktha	USGS	Steve Labahn (LSI-VC Co-Lead)
GISTDA	Raksina Lekthanoo	USGS	Sylbia Wilson
GISTDA	Siam Lawawirojwong	USGS	Tim Stryker
GISTDA	Surassawadee Phoompanich	WMO	Guangxin He
GISTDA	Tatiya Chuentragun	WMO	Kenneth Holmlund
GISTDA	Watchara Kesdech	WMO	Michael Rixen
GISTDA	Woranut Chansury	WUR	Martin Herold
INPE	Gilvan Sampaio		Mihir Rajput
INPE	Lubia Vínhas		
INPE	Luiz Aragão		
INPE	Mônica Rocha		
ISRO	Arundhati Misra		
ISRO	Atul Verma		
ISRO	Mini Raman		
ISRO	Muvva V. Ramana		
ISRO	Nitante Dube		
ISRO	Pradeep Thapliyal		
ISRO	Raj Kumar (OSVW-VC Co-Lead)		
ISRO	Rajeev Jaiswal		
ISRO	Rashmi Sharma		
JAXA	Ake Rosenqvist		
JAXA	Akihiko Kuze (WGCV Chair)		
JAXA	Hiroshi Murakami		
JAXA	Hiroshi Suto		
JAXA	Ko Hamamoto		
JAXA	Koji Akiyama		
JAXA	Makoto Natsuisaka (WGISS Vice Chair)		
JAXA	Osamu Ochiai		
JAXA	Riko Oki (P-VC Co-Lead)		
JAXA	Takeshi Hirabayashi		
JAXA	Toshi Kamei		
JAXA	Yukio Haruyama		

APPENDIX B: Decisions and Actions Record

[Link to stand alone Decisions and Actions document](#)

DECISIONS

Decision 01	Paul DiGiacomo (NOAA, COAST AHT), Vardis Tsontos and Jorge Vazquez (NASA, COVERAGE) to be joint CEOS liaison points with the IOC and the UN Decade Process. They will have autonomy to manage the relationship and are invited to present on this matter on the agenda of SIT, SIT TW and Plenary as appropriate, and as needed to secure Agency support. SIT Chair shall provide overall guidance and CEO regular general support and advice.
Decision 02	CEOS SIT endorsed the CEOS Aboveground Woody Biomass Product Validation Good Practices Protocol (aka CEOS Biomass Protocol) document.
Decision 03	CEOS SIT agreed to focus on the development of two options for the future of the SDG <i>Ad Hoc</i> Team for presentation at Technical Workshop and then Plenary: “Option 1 Full Scale” (i.e. Working Group); and, “Option 2 Federated” (i.e. coordination of existing entities).
Decision 04	CEOS SIT endorsed the Earth Observation Training, Education, and Capacity Development Network (EOTEC DevNet) Implementation Plan.
Decision 05	CEOS SIT endorsed the Wildfire Pilot Implementation Plan of WGDisasters.
Decision 06	CEOS SIT endorsed the Landslide Demonstrator Implementation Plan of WGDisasters.
Decision 07	In a CEOS Plenary Session, CNES was confirmed as the Incoming CEOS Chair.

ACTIONS

SIT-36-01	In response to the IOC request to CEOS regarding the UN Ocean Decade, SIT Chair will coordinate a letter	April 2021
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	from CEOS with inputs from COVERAGE, COAST and other interested CEOS entities.	
	<i>Rationale: IOC request requires a response.</i>	
SIT-36-02	UKSA and WGClimate to update CEOS SEC on any news regarding the format of COP-26 and the subsequent opportunities for CEOS and its agencies, particularly for the GST datasets and guidance being planned by teams across the CEOS structure. CEO to provide summary emails to the broader CEOS community after monthly SEC meetings on COP-26 planning as updates warrant.	May 2021
	<i>Rationale: Significant investment planned by multiple CEOS Agencies and groups for inputs to COP-26 and GST1. Given the breadth and scale of this effort the SEC would like to remain in direct contact with the UKSA for updates on COP-26.</i>	
SIT-36-03	SIT Chair will confer with WGClimate, GHG Task Team, AFOLU Roadmap Team, SEO and WGISS to ensure a coordinated approach on a web portal communicating the CEOS datasets and guidance for COP-26 and GST1.	SIT TW 2021
	<i>Rationale: SIT Chair is providing oversight on efforts across the organisation in relation to the GST. Effective communication of CEOS contributions has already been highlighted as a priority.</i>	
SIT-36-04	CEOS Chair, in consultation with SEC, to explore options for delivery of the CEOS statement to SBSTA/COP this year given the major inputs being planned.	SIT TW 2021
	<i>Rationale: Traditionally we have sought a speaker from the COP national delegation of the Chair Agency.</i>	
SIT-36-05	AFOLU Roadmap Team to follow up with relevant CEOS Principals on the baseline and additional CEOS products suggested for COP-26 and beyond in order to explore the support available and therefore feasibility of each.	April 2021
	<i>Rationale: An early understanding of the capacity available for the COP-26 target AFOLU is needed to establish a credible plan of action for 2021.</i>	
SIT-36-06	SIT Chair and Vice-Chair Teams will progress the draft GST Strategy Paper and related actions in consultation with the volunteer team and CEOS SEC.	April 2021

	<i>Rationale: CEOS contributions to the GST process will cut across many CEOS Entities, and broad consultation to achieve a comprehensive consensus view is essential.</i>	
SIT-36-07	The SDG Ad Hoc Team to further develop the two most favourable future scenarios (full scale option and federated option), through extended discussions with all stakeholders in order to come with a substantiated proposal to be reviewed and finalised with all key stakeholders during the CEOS SIT Technical Workshop in September, before its formal submission for approval to CEOS Principals at the 35th CEOS Plenary.	SIT TW 2021
	<i>Rationale: The AHT is scheduled to expire at Plenary, and ongoing extensions are not a sustainable long-term model.</i>	
SIT-36-08	LSI-VC & SIT Chair Team to progress development of the second version of the CEOS ARD Strategy for discussion at SIT TW, with a view to endorsement at CEOS Plenary.	SIT TW 2021
	<i>Rationale: The first version of the CEOS ARD Strategy has been a helpful resource to direct and focus CEOS efforts on ARD. An updated Strategy is required, reflecting all of the progress made and charting the way forward for future years.</i>	
SIT-36-09	SIT Chair to coordinate a call between the LSI-VC, SST-VC, and others currently discussing the CEOS ARD beyond land to review the findings to date and discuss an overarching governance framework applicable to all CEOS ARD.	April 2021
	<i>Rationale: Ensure good coordination and review progress between the SIT Chair team, LSI-VC, and SST-VC on ARD beyond land.</i>	
SIT-36-10	CEOS Working Teams to review the Thematic Observing Strategies page on the CEOS website (ceos.org/observations) and to notify the SIT Chair Team of any required updates.	May 2021
	<i>Rationale: The Thematic Observing Strategies page aims to provide an efficient overview of CEOS coordination efforts to the website visitors.</i>	