2023 CEOS Newsletter No. 59

CEOS Newsletter

The CEOS Newsletter is published by JAXA on behalf of CEOS. It provides regular updates on the activities of CEOS, its agencies, Working Groups, Virtual Constellations, and Ad Hoc Teams.

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36th CEOS Plenary

CNES had the pleasure to host the 36th Plenary in Biarritz, between the 30th of November and December 1st. This meeting was chaired by Dr. Selma Cherchali. More than 70 participants were present in Biarritz in person, and about 30 more attended remotely. It was the first physical Plenary since 2019, the last two meetings being virtual meetings only, due to the sanitary conditions. All attendants enjoyed the opportunity to meet face to face, positively influencing the quality and efficiency of plenary discussions!

Most decisions submitted to the CEOS Principals had been prepared during the SIT Technical Worshop held at ESA/ESRIN in September. In particular, two new task teams had their Terms of Reference endorsed by the CEOS Principals: (i) the "New Space" task team and (ii) the "Ecosystem extent" task team. Discussions confirmed the extensive interest from most CEOS members on the "New Space" topic and the proposed task team, which will explore the opportunities for international cooperation and initiatives on development of "New Space". In addition, the discussion group on Biodiversity proposed the creation of an "Ecosystem extent" task team, whose purpose is to map Ecosystems' extent using space-based observations: a research gap of key importance for biodiversity studies.

During the Plenary the white paper "Monitoring Surface PM2.5 : an international constellation approach to enhancing the role of satellite observations", proposed by the Atmospheric Composition Virtual Constellation, was also endorsed. The extension of both the Ocean Coordination group (6 months) and the COAST Ad Hoc team (1 year) were also decided.

The CEOS Chair presented a summary of the main results obtained within our priorities, under the banner of "Paths to sustainability: from strategy to practical measures". The goal was to focus on the transition from demonstrators to operational services, as illustrated by the "Recovery Observatories" (support of satellite imagery to post-crisis re-construction) or the SCO (Space for Climate Observatory). Chair priorities also included Cal/Val initiatives in the area of thermal infrared observations, or biomass estimates with the GEO-TREES project.

Participants to the 36th CEOS Plenary in Biarritz

CNES, 2022 CEOS Chair Team

In the area of CEOS governance and leadership roles, Wenying Su (NASA) and Cody Anderson (USGS) were respectively confirmed as Vice Chairs of the CEOS-CGMS WG Climate and of the WG Cal/Val. The long-term plan proposed by the Chair to ensure CEOS Executive Officer (CEO) continuity was approved. According to this plan, Eumetsat and ESA will lead a European consortium to cover the 2024/2027 period, and an action was taken by European agencies to confirm their participation to this consortium. Finally, the CEOS principals welcomed GISTDA (Thailand) as 2023 CEOS Chair, while endorsing CSA (Canada) as 2024 Chair.

The Plenary also provided an opportunity to hold some specific events, notably a presentation of the SWOT mission as well as a dedicated joint session with the Oceania Geospatial Symposium (OGS) held in Noumea (New Caledonia) during the same week, supported and co-organized by CNES. The CEOS Chair invited the SWOT Principal Investigator to present the SWOT (Surface Water and Ocean Topography) mission, a few days before the planned launch date. This mission involves NASA, CNES, CSA, UKSA and many other agencies. It is expected to provide unique data and information on land freshwater and oceans. The CEOS/OGS joint session aimed to initiate a dialogue between CEOS and regional stakeholders in the user community. On-going CEOS activities in the indo-pacific region were highlighted, while users expressed their main requirements.

Besides the working sessions, the Plenary provided many opportunities for bilateral meetings and informal discussions during coffee/lunch breaks and the Gala diner. Several participants also took part in an excursion the day following the Plenary, visiting touristic cities and villages around the Basque region. This also makes the core value of in person meetings!

CNES was honored and happy to chair CEOS in 2022 and wished to thank all CEOS entities that have contributed to CEOS activities and to the success of this Plenary. Special thanks to ESA, the SIT Chair, for the quality of our cooperation. We wish to GISTDA a very fruitful 2023 chairmanship.

Dr. Selma Cherchali(2022 CEOS Chair) and GISTDA Team(2023 CEOS Chair)

New CEOS Chair

GISTDA CEOS Chair 2023 : *"Space Technology for Better Environments, Economies, and Humanity"*

The 2022 Committee on Earth Observation Satellites (CEOS) Plenary was held from November 29 to December 1, 2022 in Biarritz, France. During the event, the Geo-Informatics and Space Technology Development Agency (GISTDA) was honored to officially become the CEOS Chair for 2023. GISTDA aims to utilize satellite data for observing and measuring the earth in order to support the transition to a net zero society and generate opportunities for the new space economy.

As for this great opportunity, GISTDA aims to utilize space technology to improve the environment, economy, and well-being of humanity through the use of satellite data for earth observation and measurement. This work aligns with the CEOS's mission of promoting international cooperation in the peaceful use of earth observation satellite systems and data.

Under the theme of *"Space Technology for Better Environments, Economies, and Humanity." GISTDA aims to increase its impact through the following initiatives:*

1. Supporting CEOS Preparations and Inputs to the Global Stock Take of the UNFCCC Paris Agreement
   a. GISTDA, in collaboration with USGS, plans to hold the SilvaCarbon workshop in Thailand under the CEOS brand.
   b. Continued expansion of the offering of CEOS Agency datasets available to support the GST and countries' assessments of their Nationally Determined Contributions (NDCs).
   c. Support the implementation of both the GHG Roadmap and the AFOLU Roadmap.
2. Supporting the SIT Chair's Exploration of New Geometries for Space Agencies and CEOS with New Space Communities
   a. Work with **CEOS New Space Task team led by SIT Chair to develop New Space Economy document** as a means for knowledge sharing with CEOS Agencies.
   b. Facilitate a discussion about New Space Economy during CEOS 2023 timeframe

We, the CEOS Chair Team at GISTDA, would like to extend our sincere appreciation to the esteemed members of the CEOS community for entrusting us with the privilege of serving as Chair for the year 2023. We are deeply honored by this opportunity and are committed to utilizing our position to the fullest extent in order to benefit and advance the interests of all CEOS Agencies. Furthermore, we believe that these themes and priorities will provide a comprehensive and cohesive platform for all CEOS Agencies to contribute and benefit from, and we look forward to collaborating with each and every one of you as we move forward.

the 2022 CEOS Plenary in Biarritz

Once again, we would like to express our gratitude to the CEOS community for this opportunity and we look forward to working with all of you to achieve our shared goals and objectives.

"GISTDA is excited to announce the launch of THEOS-2, its second Thailand Earth observation satellite, scheduled in 2023. THEOS-2 is expected to provide a range of benefits to society through its ability to monitor the Earth's surface, oceans, and atmosphere with high resolution. We hope that THEOS-2 will be a valuable resource for Thailand to make a better future for all."

Pakorn Apaphant, Ph.D.

CLIMATE UNFCCC WGCLIMATE

On the occasion of UNFCCC COP-27

The COP-27 in Sharm-El-Sheikh (Egypt)

The UNFCCC Conference of the Parties (COP) was held in November 2022 at Sharm-El-Sheikh in Egypt. Around 40,000 people met to discuss their achievements, ambitions and goals in the context of the Paris Agreement. Five takeaway messages has been identified from the two-weeks-event:

- Establishing a dedicated fund for loss and damage
- Maintaining an intention to keep 1.5 °C within reach
- Holding businesses and institutions to account
- Mobilizing more financial support for developing countries
- Making the pivot toward the implementation

More in-depth information about the COP-27 takeaways can be found under Five Key Takeaways from COP27 | UNFCCC

The two weeks of the UNFCCC COP are organized as such that during the first week of the UNFCCC COP the sub-ordinated bodies of the COP – the Sub-ordinated Body for Implementation (SBI) and the Sub-ordinated Body for Science and Technical Advice (SBSTA) – convene and prepare the negotiations of the Parties providing further implementation and technical advice including decisions and recommendations.

An important outcome of SBTSA was the decision to forward the new GCOS Implementation Plan on COP level where it has been adopted. The GCOS Implementation Plan contains the definition and requirements of the Essential Climate variables. Each version includes the needed actions for the upcoming years.

During the opening session of the SBSTA meetings, the French delegation on behalf of the CEOS chair (CNES) provided the yearly status of achievements of CEOS and CGMS which had been prepared by the Joint CEOS/CGMS Working Group on Climate (WGClimate) with input by the CEOS and CGMS members. SBSTA well acknowledged the work of CEOS and CGMS. Note that the CEOS Global Stocktake Strategy provides a guideline for collaboration within CEOS with regard to the Paris Agreement and the Global stocktake.

Since various years the Earth Information Day (EID) is part of the SBSTA consultations. Parties are informed about the opportunities of Earth Observations and its tremendous advantages to make use of Earth Observation in achieving the goals of the Paris Agreement. At COP-27 the EID was opened with a report about the state of the climate given by WMO. The topics mitigation, adaptation, and loss and damage were addressed during three panel sessions drawing also the attention to Ocean observations and Early Warning Systems (EWS). The chair of WGClimate joined the panel for mitigation to respond to Parties with regard Satellite-based observations and their capabilities. It is worth to note that that delegates from other CEOS agencies did also join the different panels so that in general CEOS had been well represented.

Before, in parallel and after the panel sessions, a well-visited poster exhibition providing more detailed information allowed more detailed information for the Parties. WGClimate submitted two posters providing in one poster a more general overview what for CEOS and CGMS stand in the context of the Paris Agreement. Another poster was dedicated to mitigation including also the activities of the systematic observation community. It is worth to note that the poster session was also used by several CEOS agencies to present different facets such as top-down Greenhouse Gas observations and bottom-up approaches with respect to above ground biomass and others. More detailed information about the Earth Information Day can be found at Earth Information Day 2022 | UNFCCC (including posters). It relates also to the Earth Information Days held at former COPs.

Finally, it shall be noted that the COP is also an event with a large area of different exhibition booths – National and by organizations. During the whole event, there were several dedicated sessions in these booths with regard space observations allowing in-depth discussions and awareness. CEOS agencies were also very active to organize and contribute to several events making clear that Earth observation is a tremendous asset not only for research but also for monitoring and early warning.

Albrecht von Bargen,
Chair Joint COES /CGMS Working Group on Climate 2020-2022

GISTDA-SilvaCarbon Workshop

the GISTDA-SilvaCarbon Workshop, Chanthaburi Province and Khao Yai National Park, Thailand, February 22 – March 2, 2023.

Satellite-based forest monitoring is integral to tracking and analyzing carbon emissions and other greenhouse gases. The deployment of satellite missions specifically designed to measure land-cover and land-use change and above-ground biomass density is very attractive to forested countries. Using technology that integrates satellite information with data collected on the ground, carbon emissions may be understood more precisely and thoroughly, which is essential for combating climate change

The Committee of Earth Observations Satellites (CEOS) agencies have embarked on a broad range of activities to support forested countries using satellite data, particularly in support of the Global Stocktake (GST) – a fundamental component of the Paris Agreement.

The Geo-Informatics and Space Technology Development Agency (GISTDA) is engaged in advancing satellite technology and its use in various industries, including environmental monitoring. To share its discoveries and ideas with the public, GISTDA has been undertaking seminars on carbon accounting observation from space for policymakers, researchers, and other stakeholders interested in addressing climate change.

GISTDA, as the CEOS chair, partnered with the USGS SilvaCarbon program to conduct a SE Asia regional workshop on “Uptaking Global Datasets”. The workshop was held in Chanthaburi Province and Khao Yai National Park – Thailand, from 22 February to 02 March 2023. During this time participants were able to:

- Learn about the latest AFOLU (Agriculture, Forestry, and Other Land Use) datasets and technologies used for monitoring and assessing forest and land-use changes globally.
- Discuss and exchange knowledge, experiences, and best practices on using AFOLU datasets for land management, conservation, and climate change mitigation.

Participants of field work.

- Participate in hands-on training sessions to develop practical skills and methods for data processing, analysis, and visualization using open-source tools and software.
- Collaborate with experts and stakeholders from different regions and sectors to address common challenges and opportunities related to AFOLU data management and application.

The overall results were an improved awareness and understanding of the potential of AFOLU datasets for monitoring and managing forests and land use at the global scale. The CEOS AFOLU group will continue to work with forested tropical countries to enhance capacity and skills on cutting-edge methods to measure carbon emissions from space in their work, research, and policymaking.

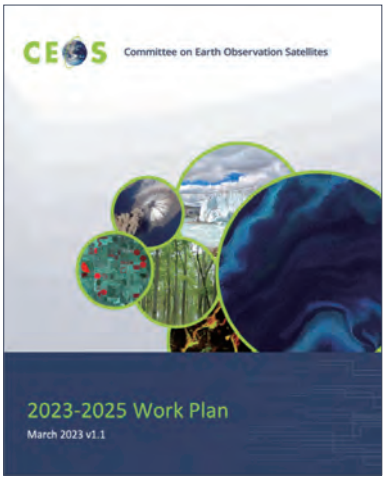
Sylvia N Wilson(USGS), Sitthisak Moukomla(GISTDA)

The CEOS Work Plan

The Committee on Earth Observation Satellites (CEOS) has an established reputation as the primary forum for international coordination of space-based Earth observation (EO). Now in its third decade, CEOS's remit has greatly expanded since the organisation was first established in 1984. As the challenges affecting the planet become more pronounced, more frequent, and more acute, international cooperation is even more decisive. Today, stakeholder awareness of the value of satellite EO for societal benefit is high, and alongside this is an appropriately growing demand for remote sensing as a recognised tool to support users all along the value chain in their response to many important global and local challenges. CEOS is highly effective in delivering on stakeholder needs thanks to its strong leadership and robust internal communication. This allows CEOS to be coordinated in its response to partners and users, and to effectively deliver on its promises.

An important set of tools that support CEOS in its work are a set of governing documents, which provide structure and guidance as the satellite EO community seeks to answer stakeholder needs in a measured and appropriate way. Given that CEOS is a "best efforts" organisation, it needs to remain mindful of the limits of its collective resource capabilities, and good governance is key to this. To support the community at a practical level in clearly defining activities and identifying member contributions, a three-year Work Plan lies at the heart of CEOS governance. The CEOS Work Plan is updated every year, with each annual update covering a forward-looking three-year period. In a fully traceable manner, the Work Plan articulates CEOS commitments by clearly and visibly identifying, formally endorsing, and carefully tracking the implementation of its objectives. The Work Plan is developed from contributions that are collated from across the entire organisation and includes the finer detail of the work done by the various CEOS entities through a set of "deliverables". These deliverables are mapped out in full in a dedicated CEOS deliverables online tracking tool to ensure transparently.

The current CEOS Work Plan covers the period 2023-2025 and represents a full recent annual update by the CEOS community. The CEOS 2023-2025 Work Plan was endorsed by CEOS Principals in March 2023, immediately prior to the 38th CEOS Strategic Implementation Team (SIT-38) meeting. The CEOS 2023-2025 Work Plan contains 132 active deliverables, with 53 newly created for 2023 and the remainder being carried over from the previous year. The Work Plan is always a forward-looking document, though usual practice is that the main body of the work every year is focused on the near-term. Approximately 70% of current activities are due for completion by the end of 2023; the remaining have a longer than one-year timescale. Whilst most activities are by their very nature short-term endeavours, continued longer-term visioning is integral to CEOS's work planning. Horizon-scanning to identify, in good time, any challenges that may affect future work and resource commitments going forwards is always part of the annual Work Plan update considerations.



The CEOS Work Plan represents a huge body of work and effort that is only possible with grateful thanks to the commitment of CEOS Members and Associates. The dedication of the CEOS membership clearly demonstrates, quite dynamically, the organisation's vision:

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

Marie-Claire Greening,
CEOS Executive Officer

38th CEOS Strategic Implementation Team Meeting

ESA was delighted to host the 38th CEOS Strategic Implementation Team (SIT-38) meeting on 29-30 March 2023 at ESRIN in Frascati, Italy. SIT-38 was the first face-to-face based meeting of the SIT since SIT-34, hosted by NOAA in Miami, USA in April 2019. The two-day meeting was attended by more than 70 in person, with a further 50 joining remotely, successfully building on the virtual meeting practice established during the CSIRO / Geoscience Australia SIT Chair term (2020-2021). Simonetta Cheli, ESA's Director of Earth Observation Programmes, opened the meeting which focused on optimising the support Earth observation can provide to societal challenges and global agendas, and how CEOS and its agencies can foster partnerships with key implementers in the community (e.g. the Group on Earth Observations, UN Agencies) and industry (including 'New Space').

A full session was held on CEOS engagement with the Global Stocktake (GST) process, a key component of the Paris Agreement. The first GST will take place in 2023, and CEOS has been laying the groundwork to promote the role of Earth observations via the Greenhouse Gas (GHG) Task Team, and the Agriculture, Forestry, and Other Land Uses (AFOLU) Roadmap Team. At SIT-38, the work of the Ocean Colour Radiometry Virtual Constellation (OCR-VC) on the development of an Aquatic Carbon Roadmap Proposal was presented, and follow-up actions were agreed to assess the resources required to develop such a Roadmap.

In addition, the CEOS connection to several related key activities was revisited, including WMO's GHG Initiative (including results from the recent WMO International Greenhouse Gas Monitoring Symposium), GEO-TREES Forest Biomass Reference

Participants at CEOS SIT-38 Meeting (ESA/ESRIN March 2023)

System (which seeks to implement the recommendations of the CEOS Aboveground Biomass Land Product Validation protocol), and the International Methane Emissions Observatory (IMEO). A 2023 edition of the CEOS EO Handbook will focus on capturing current and future support from satellite Earth observation to the Global Stocktake.

CEOS Principals discussed CEOS support for the UN Sustainable Development Goals, including support for 2023 deliverables in the CEOS Work Plan and sustaining CEOS support for 2024 and beyond. Outcomes from the recent UN Biodiversity Conference (COP 15) were discussed, and CEOS affirmed its support to developing the role of Earth observations in supporting this activity via the Ecosystem Extent Task Team (EETT) which was established at CEOS Plenary 2022, with co-leads from CNES, NASA, CSIRO, and USGS.

CEOS ocean-related activities were the focus of a dedicated session, including the accomplishments over the past five years of the COVERAGE initiative. The Ocean Coordination Group continues to consider how CEOS groups and the CEOS-COAST initiative can most effectively work together to support the UN Decade of Ocean Science and the Paris Agreement. The Ocean Coordination Group is expected to bring a plan to the 2023 CEOS Plenary.

The meeting also covered activities related to industry and New Space, with more CEOS agencies sharing their past experience and industry-related activities. The CEOS New Space Task Team presented their progress towards a decision on next steps at the 2023 CEOS Plenary. It was noted that there are several ongoing CEOS activities which are complementary, including the Working Group on Calibration and Validation's (WGCV) EO Product Quality Assurance framework, the CEOS Interoperability Framework, and engagement with Standards Organisations (including the OGC ARD SWG). The New Space Task Team will consider how these activities fit in the overall CEOS approach.

Several other important topics were discussed at the meeting:

- The Working Group on Capacity Building and Data Democracy (WGCapD) presented an update on progress towards the EOTEC DevNet Sustainability Plan.
- The Precipitation Virtual Constellation (P-VC) highlighted potential gaps that could impact precipitation observation and product continuity, with further follow-up needed.
- A new Rapid Response for Food Security initiative from GEOGLAM was presented, and CEOS was invited to consider engaging and contributing to its establishment process.
- Updates from GEO Secretariat in relation to the Post-2025 Strategy, a discussion around how CEOS will engage with GEO Post-2025, and GEO activities related to CEOS.
- The portfolio of CEOS Systems Engineering Office support was presented, along with potential updates to the CEOS Communications Strategy.

SIT-38 was an important step in rebuilding the energy and momentum in the CEOS community following several years of virtual meetings. While virtual meetings have enabled a greater number and variety of participants, ultimately CEOS is community driven, and so the opportunity to bring together contributors and collaborators is crucial to fostering progress in the field of Earth observation. ESA looks forward to welcoming the community back to ESRIN for the 2023 SIT Technical Workshop, to be held October 17-19.

ESA SIT Chair Team

CLIMATE WGCLIMATE

WGClimate-18 Report

More than 30 scientists met for the 18th meeting of the Joint CEOS-CGMS Working Group on Climate (WGClimate-18) on 28 February– to 2 March 2023 in Tokyo . JAXA hosted the hybrid meeting, and treated participants to keynote science presentations during the 3-day event.

The primary objectives of WGClimate-18 included 1) prioritize items for the 2023 Work Plan and draft schedules and deliverables, 2) identify individuals to lead activities or liaise with other gorups, and 3) bring members up-to-date on activities affecting the Working Group. WGClimate-18 was the first meeting led by new Chair Jeff Privette (NOAA) and Vice-Chair Wenying Su (NASA).

Giving his presentation by WGClimate Chair, Jeff A. Privette

A primary role of WGClimate (i.e., the Group) is to assess and coordinate space agency capabilities to improve the systematic availability of Climate Data Records of the Essential Climate Variables (ECVs) as determined by the Global Climate Observing System (GCOS). As GCOS recently provided an update to its needs (i.e., "Actions") via its 2022 Implementation Plan (GCOS IP), WGClimate-18 participants focused on developing a new IP response approach. This year, the Group will work hand-in-hand with the GCOS Secretariats and Panels to ensure better understanding of the needs and determine the most helpful response. Specifically, WGClimate and GCOS collaboratively formed small teams to address the respective Actions. The official WGClimate response therefore will be a set of team reports, one per Action, developed between 2023-2024.

Also during WGClimate-18, the Group discussed a restructuring of its unique Essential Climate Variable (ECV) Inventory. The Inventory contains metadata about Climate Data Records (CDRs), i.e., long-term homogenized time series data sets from satellites. Although the Group relies on this tool to link space agency capabilities with GCOS needs, its updates and upkeep have been challenging. Through the restructuring, the Group will simplify the architecture and associated processes. Therefore, in 2023, the Group will add a final 45 CDR records to the existing Inventory while simultaneously developing a simplified structure for a 2024 release.

WGClimate-18 also included updates on the CDR Use Case and CDR Taxonomy initiatives. The Group has published 15 Use Cases online, and agreed at the meeting to focus now on wider communication of this collection. The Group will continue to accept new Use Case submissions, however. The Group discussed next steps on a CDR definitions framework, leveraging feedback from a poster at the 2023 American Meteorological Society Annual Meeting. The Group is planning a manuscript available for review later in the year. As per prior years, the Group will develop the 2023 Space Agencies Statement to the Subsidiary Body for Scientific and Technological Advice (SBSTA), part of the United Nations Framework Convention on Climate Change, to be delivered at the 28th Conference of the Parties in November 2023.

Finally, WGClimate-18 featured an update from the Greenhouse Gas (GHG) Task Team (TT) by new TT lead Yasjka Meijer. The TT met in February where it reviewed the GHG Roadmap, focusing particularly on defining metrics and milestones for its activities. In 2023, the TT is reviewing

Onsite participants in the WGClimate-18 enjoying an ice-breaker dinner. Approximately 30 people participated overall, about half of which were virtual participants.

the space observatories needed to better measure both natural and anthropogenic methane and CO2 in the atmosphere. This challenge is complicated by the highly variable biogenic background signal for more abundant CO2, and a comparatively low source signal from methane. Different observatories are tailored to different GHG sources (e.g., cities, smokestack plumes, agricultural emissions). The TT also considered field observation needs to support Monitoring & Verification Support (MVS) capabilities. Finally, the TT will continue to work with the Agriculture, Forestry and Other Land Uses team to align their respective methods.

One challenge the Group endures is having wider agency participation. Currently, there are not enough engaged agencies for the Group to address the many requests within CEOS and from external organizations (e.g., GEO). The Group encourages all CEOS agencies to identify representatives so that it can better partner and contribute to the activities. The Group will next meet in Frascati just before the October Technical Workshop of the CEOS Strategic Implementation Team.

Jeff A. Privette(NOAA),
Joint Working Group Climate Chair

CEOS at IGARSS 2023

The 2023 International Geoscience and Remote Sensing Symposium (IGARSS) was held in Pasadena, California, USA, from July 17-21, 2023. IGARSS is the flagship conference of the IEEE Geoscience and Remote Sensing Society (GRSS), and is aimed at providing a platform for sharing knowledge and experience on recent developments and advancements in geoscience and remote sensing technologies, particularly in the context of earth observation, disaster monitoring and risk assessment. CEOS was well represented at this important community event, with an Exhibition Booth supported by the Systems Engineering Office (SEO), as well as CEOS members chairing three sessions.

The SEO regularly hosts CEOS Booths at major remote sensing conferences, including IGARSS and GEO Week. This ensures CEOS work is visible to the broader EO community, and provides an opportunity to hear from the community on their needs.

For IGARSS, CEOS was represented at the booth by Dave Borges (SEO, NASA), Brian Killough (SEO), Josh Baptist (SEO, AMA), Andrew Cherry (SEO, AMA) and Libby Rose (SEO Comms). Ahead of the exhibition, the team designed and printed flyers with relevant CEOS information, as well as two sticker variations. The stickers were appreciated by all at the conference, making a huge difference as to the amount of people who would approach the booth. The team also produced a new roll-up banner for the occasion, highlighting some of CEOS' work in an 'Ask Us About' format.

The two sticker variations

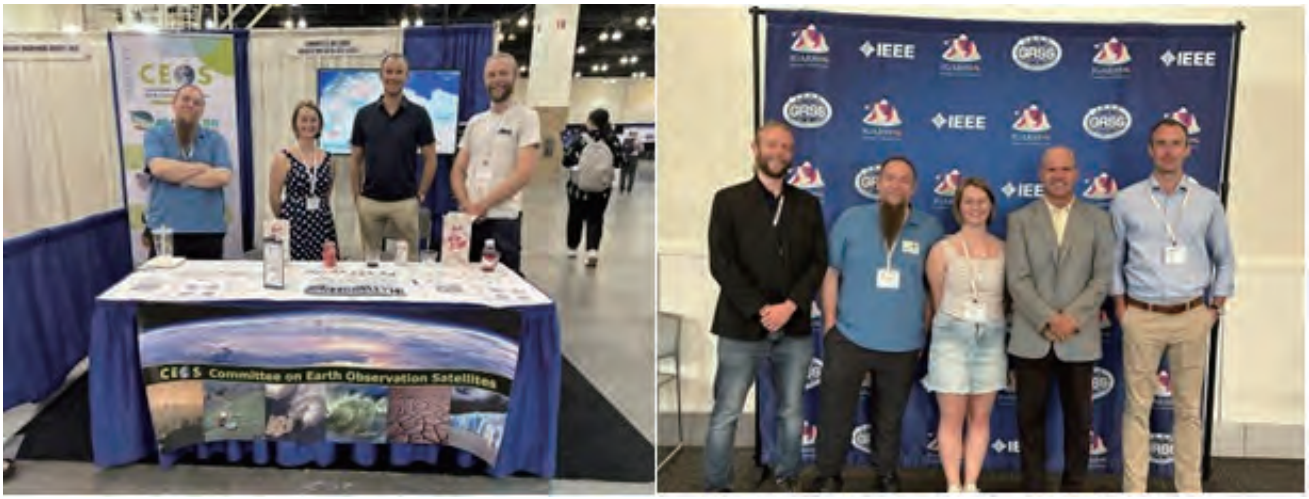
The booth featured a display screen, where a rolling playlist of CEOS content was displayed. WGDisasters contributed some slides on their activities, which was shown alongside the 2022 Year In Review, 2022 launches, CEOS & SDGs, and Introduction to the CalVal Portal videos, as well as some other slides detailing recently launched missions.

For almost every interested person who approached the booth, the team was able to connect their own specific area of interest to some work item within CEOS. This goes to show how broad reaching and comprehensive the work of CEOS is, as the sessions across IGARSS covered a broad range of technical topics on geoscience and remote sensing. Despite this, broad awareness of CEOS as an organisation remains low. Participants would often come up to the booth with a puzzled look, asking what CEOS is. The back page of the flyer was particularly handy for this, to show off all the Members & Associates, to which they would often be surprised how big CEOS was! Pointing out their own space agency logo on the flyer also helped make a more personal connection to CEOS

Some common questions:

- Do you sell data? Do you provide data for free?
- How can I become a member or participate in the discussions?
- Are there other researchers or entities that are associated with CEOS that I can collaborate with?
- How can I get more involved with the Open Data Cube, or build my own?
- How does the CEOS-ARD certification work? What benefit does having this certification have?

Hosting exhibition booths at various events remains a focus for the SEO, with the next event being GEO Week and Ministerial Summit, in Cape Town, South Africa. If anyone has any CEOS-related materials or content to contribute, please contact Dave Borges (david.borges@nasa.gov) or Libby Rose (libby@symbioscomms.com).

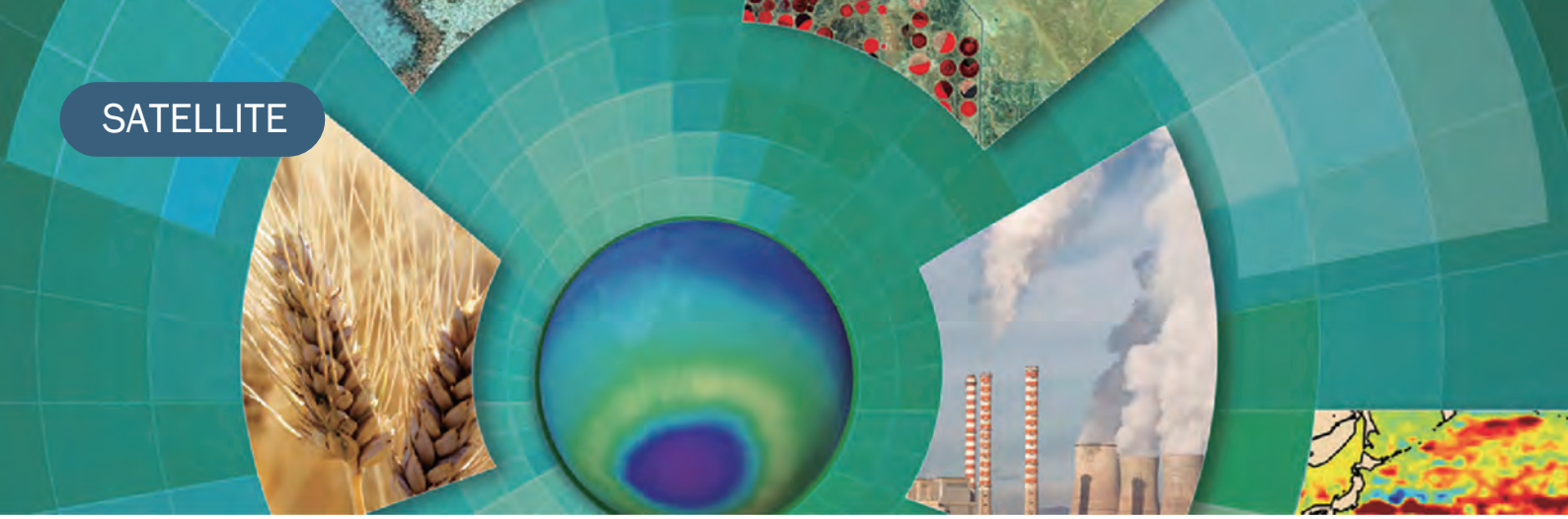


The SEO Team

In addition to the Exhibition Booth, CEOS members also chaired three technical sessions throughout the program, two with a focus on Cloud-based Platform Environments for Earth Observation (EO), and the third on CEOS Analysis Ready Data (CEOS-ARD).

Brian Killough of the SEO and Patrick Griffiths of the European Space Agency (ESA) co-chaired the two IGARSS sessions focused on Cloud-based Platform Environments for EO. These sessions were well attended (over 60 people) and reviewed a mix of EO platforms for enabling science and applications. The papers addressed several ESA-funded initiatives including the Multi-Mission Algorithm and Analysis Platform (MAAP), the OpenEO platform, the Deep Earth System Data Lab (ESDL), and the Euro Data Cube. There were also papers addressing CEOS SEO testing of the Open Data Cube on cloud computing frameworks and the new Digital Earth Pacific initiative. The 10 papers presented in these sessions were great examples of a growing interest in cloud-based computing environments for EO data and how such systems can improve the user experience and produce more efficient and powerful application products.

Andreia Sequira (GA, LSI-VC Co-lead) chaired the CEOS-ARD session, which was attended by about 40 people, and focused on the processes implemented by data providers to process data to CEOS-ARD standards. Sinergise presented their on-demand processing model on Sentinel Hub, while ISRO and DLR each presented some of the challenges they have faced in reaching the threshold level for CEOS-ARD. Ake Rosenqvist (JAXA) provided an update on the SAR ARD product family specifications, and Ingo Simonis (OGC) discussed the challenges faced with the standardisation of data products. Andreia also presented the below poster, which provided an opportunity for one-on-one discussions with participants about the development of CEOS-ARD.

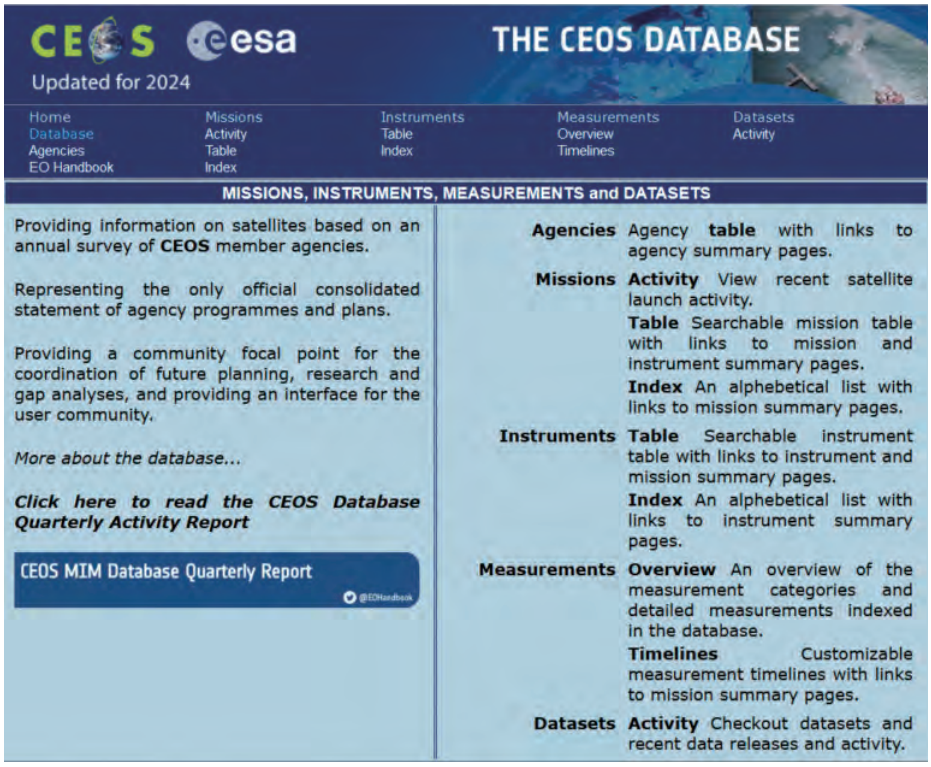


The CEOS Missions, Instruments, Measurements Database Update – 2023

The annual update of the CEOS Missions, Instruments, Measurements (MIM) Database (database.eohandbook.com) has recently been completed. The Database serves as a valuable community resource providing information on Earth observation satellites, their instruments and the measurements that they make in support of society's information challenges. The Database is meticulously updated based on annual survey responses from CEOS Member agencies. It is recognised as the most widely distributed and quoted statement of CEOS Agency plans, and is the only official consolidated statement of all government-sponsored civil satellite Earth observing programs and their capabilities.

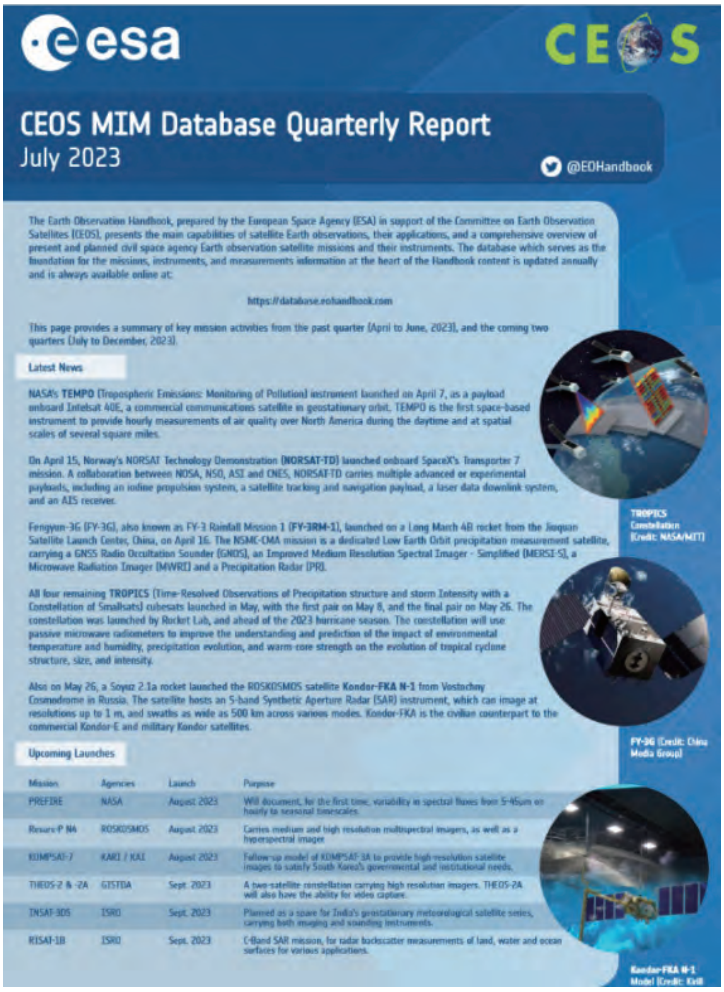
The MIM Database has a number of functions, including:

- Information sharing in support of the coordination of future Earth observation mission, instrument and measurements plans.
- Earth observation measurement gap analyses – including those performed by the CEOS Systems Engineering Office (SEO).
- A connection between the Earth observation user community and satellite-operating agencies of CEOS.
- Generation of content for the Earth Observation Handbook.



The CEOS MIM Database

The MIM Database serves as the foundation for the CEOS EO Handbook, an initiative by the European Space Agency (ESA) in support of CEOS. The Handbook explains the capabilities of satellite Earth observations, their applications, and provides extensive detail of ongoing and planned civil space Earth observation satellite missions and their instruments. A special 2023 edition of the CEOS EO Handbook is being readied to support the inaugural Global Stocktake of the Paris Climate Agreement and will be released ahead of the United Nations Framework Convention on Climate Change (UNFCCC) COP-28 event.



esa CEOS

CEOS MIM Database Quarterly Report

July 2023

@EOHandbook

The Earth Observation Handbook, prepared by the European Space Agency (ESA) in support of the Committee on Earth Observation Satellites (CEOS), presents the main capabilities of satellite Earth observations, their applications, and a comprehensive overview of present and planned civil space agency Earth observation satellite missions and their instruments. The database which serves as the foundation for the missions, instruments, and measurements information at the heart of the Handbook content is updated annually and is always available online at:

https://database.eohandbook.com

This page provides a summary of key mission activities from the past quarter (April to June, 2023), and the coming two quarters (July to December, 2023).

Latest News

NASA's **TEMPO** (Tropospheric Emissions: Monitoring of Pollution) instrument launched on April 7, as a payload onboard Intelsat 40E, a commercial communications satellite in geostationary orbit. TEMPO is the first space-based instrument to provide hourly measurements of air quality over North America during the daytime and at spatial scales of several square miles.

On April 15, Norway's NORSAT Technology Demonstration **(NORSAT-TD)** launched onboard SpaceX's Transporter 7 mission. A collaboration between NOSA, NSO, ASI and CNES, NORSAT-TD carries multiple advanced or experimental payloads, including an iodine propulsion system, a satellite tracking and navigation payload, a laser data downlink system, and an AIS receiver.

Fengyun-3G (FY-3G), also known as FY-3 Rainfall Mission 1 **(FY-3RM-1)**, launched on a Long March 4B rocket from the Jiuquan Satellite Launch Center, China, on April 16. The NSMC-CMA mission is a dedicated Low Earth Orbit precipitation measurement satellite, carrying a GNSS Radio Occultation Sounder (GNOS), an Improved Medium Resolution Spectral Imager - Simplified (MERSI-S), a Microwave Radiation Imager (MWRI) and a Precipitation Radar (PR).

All four remaining **TROPICS** (Time-Resolved Observations of Precipitation structure and storm Intensity with a Constellation of Smallsats) cubesats launched in May, with the first pair on May 8, and the final pair on May 26. The constellation was launched by Rocket Lab, and ahead of the 2023 hurricane season. The constellation will use passive microwave radiometers to improve the understanding and prediction of the impact of environmental temperature and humidity, precipitation evolution, and warm-core strength on the evolution of tropical cyclone structure, size, and intensity.

Also on May 26, a Soyuz 2.1a rocket launched the ROSKOSMOS satellite **Kondor-FKA N-1** from Vostochny Cosmodrome in Russia. The satellite hosts an S-band Synthetic Aperture Radar (SAR) instrument, which can image at resolutions up to 1 m, and swaths as wide as 500 km across various modes. Kondor-FKA is the civilian counterpart to the commercial Kondor-E and military Kondor satellites.

TROPICS Constellation (Credit: NASA/MIT)

FY-3G (Credit: China Media Group)

Upcoming Launches

Mission	Agencies	Launch	Purpose
PREFIRE	NASA	August 2023	Will document, for the first time, variability in spectral fluxes from 5-45um on hourly to seasonal timescales
Resurs-P N4	ROSKOSMOS	August 2023	Carries medium and high resolution multispectral imagers, as well as a hyperspectral imager
KOMPSAT-7	KARI / KAI	August 2023	Follow-up model of KOMPSAT-3A to provide high resolution satellite images to satisfy South Korea's governmental and institutional needs.
THEOS-2 & -2A	GISTDA	Sept. 2023	A two-satellite constellation carrying high resolution imagers. THEOS-2A will also have the ability for video capture.
INSAT-3DS	ISRO	Sept. 2023	Planned as a spare for India's geostationary meteorological satellite series, carrying both imaging and sounding instruments.
RISAT-1B	ISRO	Sept. 2023	C-Band SAR mission, for radar backscatter measurements of land, water and ocean surfaces for various applications.

Kondor-FKA N-1 Model (Credit: Kalt)

In addition to the annual updates, MIM Quarterly Reports provide a quick overview of important mission activities from the previous and the coming two quarters. They also include the latest news on Earth Observation and upcoming satellite launches.

All CEOS Agencies play a role in updating the CEOS MIM database. They have the opportunity to review mission and instrument details relevant to their Agency, as well as the instrument-measurement mappings stored within the database. We extend our sincere gratitude to all CEOS Member Agencies and Associates who have contributed their information.

We are pleased to announce that the 2023 update is now live and is readily available in time for CEOS Plenary 2023. It is available at: database.eohandbook.com. The Database team is always happy to hear from users and the community, and can be contacted at ceos-mim@gmail.com and via X/Twitter @EOHandbook.

Eleni Paliouras
ESA

CEOS SIT Technical Workshop 2023

ESA hosted the 2023 CEOS SIT Technical Workshop (TW) at ESRIN in Frascati, Italy on 18-19 October 2023. It was the last SIT TW under the ESA SIT Chair term. The two-day hybrid meeting brought together over 80 participants. The workshop provided a platform for working-level discussions to set the stage for key decisions at the 2023 CEOS Plenary.

Here we take the opportunity to provide updates on some developments from the workshop:

CEOS Greenhouse Gas (GHG) Roadmap and MIM Database Portal

The GHG Task Team under WGClimate presented an update on the GHG Roadmap, emphasising the importance of stakeholder engagement. The actions annex of the Roadmap is being actively updated to reflect changes in the space. Of note, the annex now includes actions related to the sustainment of critical GHG cal/val network infrastructure.

The recently published CEOS MIM Database GHG Portal, available at ceos.org/ghg, was unveiled at the workshop. Developed with the support of the GHG Task Team, the ESA SIT Chair and JAXA SIT Vice Chair, the Portal aims to provide a comprehensive and up-to-date list of all current and planned satellite missions with the ability to measure greenhouse gases. This includes those planned and operated by both public and commercial organisations, as well as NGOs.

CEOS AFOLU Roadmap

The CEOS Agriculture, Forestry, and Other Land Uses (AFOLU) Roadmap was prepared to be presented for endorsement at the 2023 CEOS Plenary. The overall objective of the roadmap is to ensure that every country has the land satellite data required to report to the UNFCCC under IPCC guidance.

Ocean Coordination Group (OCG) Initiatives

The Ocean Colour Radiometry Virtual Constellation (OCR-VC) Co-leads presented a proposal for the development of an Aquatic Carbon Roadmap, pending resources and support from CEOS Agencies. The proposed roadmap provides a framework and serves as a guiding vision for long term coordination of CEOS agency observations in support of the need for aquatic carbon information in the context of the CEOS Carbon Strategy. The roadmap will focus on improving models, mapping blue carbon ecosystems, and developing tools and indicators for policy support, while also identifying needs, gaps and challenges and ensuring observation continuity.

Earth Observation Handbook

The 2023 edition of the Earth Observation Handbook, titled "Space Data for the Global Stocktake" aims to develop a broad understanding of the importance of satellite Earth Observation (EO) for all stakeholders in the GST process. The handbook seeks to address the major questions that might be faced by different user types when approaching the application of EO satellite data for their climate-related challenges and reporting obligations. The aim is to provide practical examples and leads for further investigation so that the potential of the data available from the world's EO satellites is fully realised.

New Space Initiatives

The New Space Task Team has drafted a white paper with proposed recommendations for CEOS Members and Associates to enhance engagement and collaboration with New Space. Calibration and Validation (Cal/Val) emerged as a key area where CEOS can support the New Space sector, with many activities under the Working Group on Calibration and Validation (WGCV) being relevant to increasing the accuracy and quality of EO data. The CEOS-ARD initiative is encouraged to establish mechanisms for deeper engagement with the New Space sector to improve the complementarity and interoperability of datasets, consistent with the CEOS Governing Documents. CEOS Members and Associates are advised to continue to increase engagement with New Space actors on key topics such as ARD, Cal/Val and data quality via CEOS representation at key meetings including VH-RODA, JACIE, IGARSS, LPS and ARD2x. The white paper and recommendations are set for potential endorsement at the 2023 CEOS Plenary.

Ecosystem Extent Task Team and 2024 CEOS Chair Priorities

The Ecosystem Extent Task Team presented a draft white paper that aims to provide an integrated international perspective on how space-based EO can be used to support ecosystem mapping and monitoring with a focus on ecosystem extent. The white paper recommendations cover three thematic areas. Firstly, it highlights the importance of increasing user engagement with EO and CEOS through workshops and other activities to improve ecosystem extent mapping. Secondly, it underscores the need for technical advances to improve the utilisation of EO for ecosystem mapping. Lastly, it emphasises on increasing the capacity of biodiversity users to utilise EO for ecosystem mapping and monitoring.

The 2024 CEOS Chair, the Canadian Space Agency (CSA), will prioritise the theme of Biodiversity during their term, seeking to reach a consensus on whether and how biodiversity should feature on the CEOS agenda in the longer term.

Ocean Coordination Group

The Ocean Coordination Group (OCG) presented two important documents related to Ocean Coordination Activities, marking the final outcome of the OCG before its closure. The first document, titled "CEOS OCG – Coordination Needs for Upcoming Ocean-related Missions" provides a comprehensive list of all upcoming ocean-related missions along with the coordination requirements among these missions. The second document, titled "CEOS OCG – IOC and UN Ocean Decade Activities" lists CEOS Work Plan activities that are either underway or anticipated that support the UN Ocean Decade and the International Oceanographic Commission mission. It includes the points of contact within CEOS and IOC, along with other relevant details. These documents may potentially play an important role in guiding Ocean Coordination within CEOS and benefiting the EO community going forward.

CEOS Communications

The CEOS Communications strategy was presented by the CEOS Systems Engineering Office (SEO) team as part of their communication initiatives for CEOS. The document aims to provide strategic guidance for CEOS Communications including a clear definition of target audiences, a series of campaigns to focus communications efforts on, and an understanding of how to effectively implement communications for CEOS. The document is set for endorsement at the 2023 CEOS Plenary.

WGDisasters Proposals

WGDisasters proposed the establishment of the Global Volcano Early Warning and Eruption Response System (G-VEWERS) and a Pre-operational Recovery Observatory (2024-2026), with formal support sought at the 2023 CEOS Plenary. G-VEWERS is envisioned as a permanent virtual facility for remote volcano monitoring, operating on biennial renewable quotas similar to Supersites. These quotas will be made possible through best-effort contributions from academic institutions, volcano observatories, and space agencies. The aim is to provide a timely response to hazardous volcanic eruptions, track restless volcanoes and conduct background monitoring of quiescent volcanoes. The Pre-operational Recovery Observatory aims to enable the operational use of Earth observation for Post-Disaster Needs Assessment (PDNA), recovery planning and then monitoring and evaluation of disasters.

Leadership Transition and Recommendations

JAXA will be welcomed as the CEOS SIT Chair for 2024-2025 at the 2023 CEOS Plenary. NASA is nominated as the CEOS SIT Vice Chair during this term, followed by the CEOS SIT Chair from the 2025 CEOS Plenary.

Overall, the workshop highlighted CEOS's commitment to advancing global Earth observation initiatives and fostering collaboration among space agencies. ESA expresses gratitude to all participants and contributors for their support during its tenure as the CEOS SIT Chair and extends best wishes to the incoming SIT Chair and SIT Vice Chair Team.

Image: Pasta-making class, hosted by ESA

ESA SIT Chair Team

BIODIVERSITY TASK TEAM

Ecosystem Extent Task Team Report

Biodiversity is simply the variety of life on earth at the genetic, species, and ecosystems levels. Although it provides a wide suite of benefits to society, ranging from food, fiber, carbon storage, culture, recreation, and aesthetics, it is rapidly deteriorating due to a variety of threats, with land use change and climate change being the most significant. Although CEOS has had a "Biodiversity Activity" for perhaps a decade it has kept a very low profile. However, with the publication of a variety of studies documenting the magnitude of the deterioration, its increasing rate, the lack of sufficient monitoring, and the degree of societal dependence, it became clear that CEOS should explore ways to further engage with biodiversity and the biodiversity community. The Ecosystem Extent Task Team was proposed as an initial vehicle to enable that exploration; it was approved at the 2022 CEOS Plenary for a two year duration and is co-led by Gary Geller (NASA), Shaun Levick (CSIRO), Sandra Luque (CNES/INRAE), and Roger Sayre (USGS).

Ecosystem Extent is the distribution of an ecosystem or ecosystems of interest, perhaps most often captured as a map; for example, the figure shows a map of ecosystems in South Africa. Ecosystem Extent is a key parameter in understanding and monitoring the world's biodiversity—consequently, it is an Essential Biodiversity Variable, a "Headline Indicator" in the Convention on Biological Diversity's Kunming-Montreal Global Biodiversity Framework, and an Ecosystem Account in the UN System of Environmental Economic Accounting. It was selected as the EETT's focus area both because of its importance and because Earth observation is typically its primary input. The EETT's Terms of Reference identify two major deliverables: a white paper that provides an integrated international perspective on how space-based Earth observations can be used to support ecosystem mapping and monitoring with a focus on ecosystem extent, and a demonstrator to highlight the use of EO for ecosystem extent mapping and monitoring. The white paper is now complete and was endorsed by Principals at the 2023 Plenary; it is available here.

Several opportunities for the Demonstrator have been identified and are underway, though at very different stages of maturity; all of them are led and developed by a partner organization. The most mature is under development by Environment and Climate Change Canada as part of the work they are doing in the Hudson's Bay Lowlands, a vast wetland area in northern Manitoba; it will focus on Wapusk National Park and is led by EETT member Jason Duffe. The other two have much shorter timelines due to their funding starts; one focuses on Costa Rica (funded by CNES in November and led by EETT co-lead Sandra Luque) and the other on the Great Western Woodlands in Australia (funded by CSIRO, led by EETT co-lead Shaun Levick, and starting in March 2024). All three projects will continue beyond the two-year timeframe of the EETT, though they would then take on somewhat different roles. As such, they will give any post-EETT CEOS biodiversity activity a head start and serve as examples of the types of activities that CEOS might explore in future years.

It must be mentioned that the Canadian Space Agency, which took over as CEOS Chair at the 2023 Plenary, has selected biodiversity as its theme during their chairship. One priority is exploring a post-2024 strategy for CEOS and biodiversity and the EETT will be supporting CSA during this exploration.

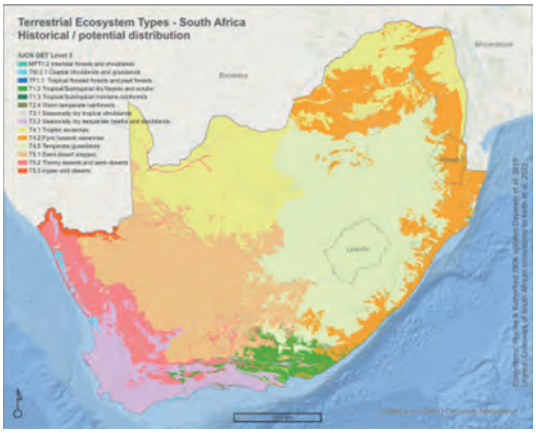
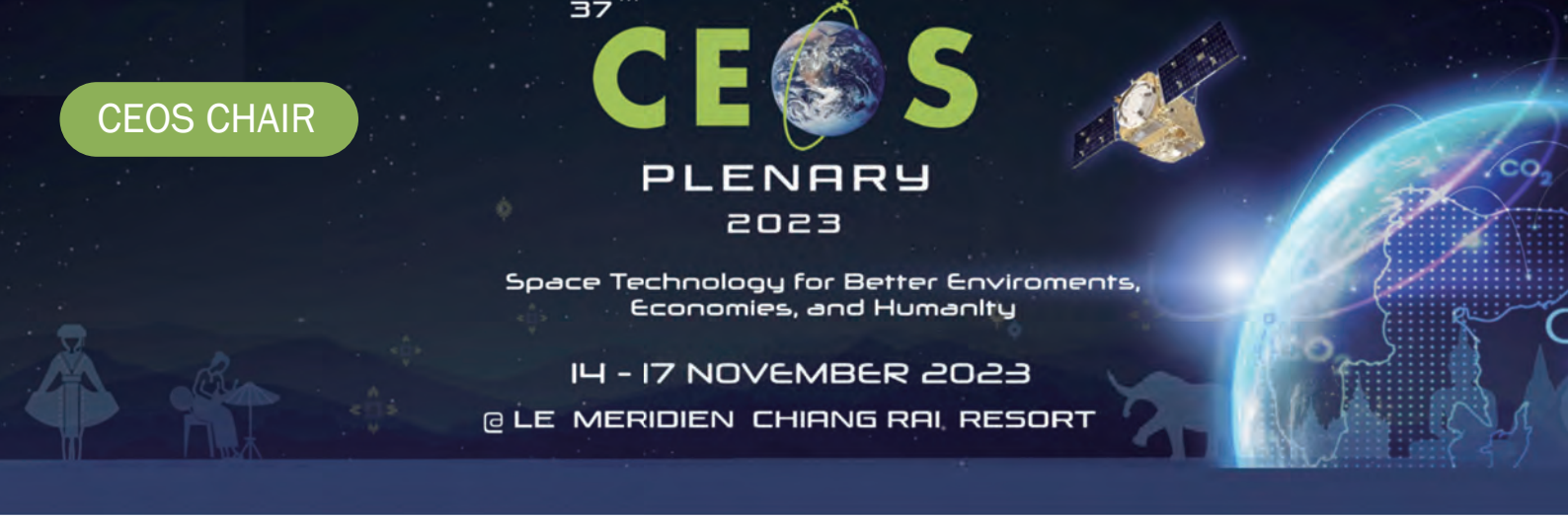


Image courtesy of Andrew Skowno, SANBI

Gary Geller (NASA/JPL)



The 37th CEOS Plenary

Geo-Informatics and Space Technology Development Agency (Public Organization) or GISTDA, Thailand, a chair of the Committee on Earth Observation Satellites (CEOS) in 2023, organized the 37th CEOS Plenary on November 14-16, 2023, in Chiang Rai, Thailand. There were more than 100 participants including principals, contacts, and representatives from 36 CEOS agencies.

During the year of chairmanship, GISTDA prioritized that CEOS shall make best use of space technologies for Better Environments, Economies, and Humanity.

To achieve the purpose of the CEOS 2023 thematic priorities, there were two workshops on Carbon Accounting, which were

Carbon Accounting Workshop held on Nov. 14

organized for delivering the global carbon issue and best practices through EO technology applications. This includes the special side event that was held on November 14th, 2023, to promote the use of Earth Observation satellites for carbon accounting and to provide the opportunity for representatives from government agencies, private sectors, and academic institutions to directly engage with the experts from ESA, JAXA, NASA, NOAA and GISTDA. With the support of the CEOS community, this event has achieved its outcomes and scaled up awareness and knowledge sharing for carbon accounting from space, strengthened collaboration and engagement among CEOS agencies, enhanced data and methodology availability for countries' assessments of their nationally determined contributions, and increased the number of new potential end-users to explore and use EO datasets.

Additionally, the New Space issue had been pushed forward via international seminars and conferences as well as Thailand Space Week 2023, which had bridged space-based global agencies from around the world to extend space economy's potential network. The key outcomes were inputting the content of the 'New Space White Paper', collaborating opportunities, particularly in the Southeast Asia, increasing awareness and understanding of the New Space Economy, having business opportunities from EO data and services, and engaging government and private sectors.

During the 37th CEOS Plenary in Chiang Rai, the high-level executive officers from member agencies also provided opinions and jointly formulated directions, as well as working policies in the field of space missions to support operations related to climate change, changes in ocean and sea conditions, platforms for disaster occurrences, and equitable dissemination of knowledge standardization and exchange of information.

Participants to the 37th CEOS Plenary in Chiang Rai, Thailand

A scene at the CEOS Plenary 2023

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Following a long day of work on the 37th CEOS Plenary, GISTDA invited the CEOS members to experience the local way of life and the surrounding natural environment by visiting around prominent local attractions.

GISTDA would like to express gratitude to CEOS members for harmonized cooperation, which was the result of fruitful cooperation and achieving goals in 2023. At the end of 2023, GISTDA will end its term as the 2023 CEOS Chair, and then this position will be handed over to the Canadian Space Agency (CSA), Canada, which will continue as CEOS Chair in 2024 and continue the prioritized themes. We wish CSA gain fruitful contributions to CEOS 2024, and GISTDA enthusiastically supports the new priority theme.

Group Photo in excursion event on Nov.17

GISTDA 2023 CEOS Chair Team