MINUTES OF THE 29th CEOS PLENARY MEETING
v1.0

5th – 6th November 2015
Kyoto, Japan

Main Outcomes from the 29th CEOS Plenary:

1. **AEM (Mexico), AGEOS (Gabon), ANGKASA (Malaysia)** and **BOM (Australia)** were welcomed as the newest Associates of CEOS, bringing the total number of CEOS Agencies to 59 (31 Members and 28 Associates).
2. The **CEOS Statement to SBSTA-43** was endorsed (attached in Appendix E).
3. Revised Terms of Reference and a new Implementation Plan for the **Land Surface Imaging Virtual Constellation** (LSI-VC) were endorsed, and new Co-Leads appointed**.**
4. **Three proposals from WGDisasters were endorsed:** the creation of a new Multi-hazard Pilot on Landslides; a revised procedure for triggering of the CEOS Recovery Observatory; and a two-year extension of the Hawaii and Iceland permanent Supersites.
5. Endorsed the **SDCG/GFOI Acquisition Strategy Implementation Report for 2014.**
6. Endorsed the **CEOS Strategic Response to GEOGLAM Requirements**; and the new **Scope of Work document for the CEOS Ad Hoc Working Group on GEOGLAM.**
7. **Welcomed the appointment of new Working Group Chairs** for WGDisasters (Stéphane Chalifoux, CSA), WGISS (Andy Mitchell, NASA), WGCapD (Jane Olwoch, SANSA) and WGClimate (Pascal Lecomte, ESA), and endorsed the nominations for Vice-Chairs for those groups (there was no change this year for WGCV).
8. Endorsed the **CEOS Response to the GEOSS Water Strategy Report Recommendations**.
9. **Approved** a one-year extension of the Water Strategy Implementation Study Team (WSIST) to conduct a **Water Constellation Feasibility Study**. Plenary tasked the WSIST to work with CEOS leadership to identify a Lead for the WSIST.
10. Plenary endorsed a **CEOS Social Media Strategy.**
11. Plenary endorsed the **CEOS Statements to the GEO-XII Plenary and GEO Ministerial Summit, as well as the overall CEOS Position**.
12. Plenary confirmed the **continuation for another year of the Space Data Coordination Group (SDCG) for the Global Forest Observations Initiative (GFOI)** and confirmed **Professor Masanobu Shimada (JAXA) as the new CEOS Lead for GFOI.**
13. Plenary **confirmed the continuation of the CEOS Ad Hoc Working Group on GEOGLAM.**
14. Plenary endorsed the establishment of two new ad hoc teams to support 2016 CEOS Chair initiatives: **Future Data Architectures** and **Non-meteorological Applications of Next-generation Geostationary Satellites**.
15. CEOS Plenary adopted the **Kyoto Statement** (attached in Appendix B).
16. **CEOS Plenary formally welcomed CSIRO as the 2016 CEOS Chair; ESA was welcomed as the Strategic Implementation Team Chair (SIT Chair) for the term from November 2015 to November 2017; and USGS was announced as the 2017 CEOS Chair.**

Thursday 5th November

Welcome and Opening Session

1 Welcome and Opening Remarks

Shizuo Yamamoto (JAXA, CEOS Chair) welcomed attendees to the 29th CEOS Plenary in Kyoto. He wished all attendees an enjoyable and productive meeting.

Naoki Okumura (JAXA President) added his welcome to the 29th CEOS Plenary and to Kyoto. He noted that JAXA is pleased to contribute through the ALOS, GCOM and GOSAT series and collaborations such as GPM and EarthCARE. JAXA strongly supports the objectives of CEOS and GEO to ensure optimal planning and application of programmes for maximum societal benefit and cost-efficiency. He commended the new CEOS Data Applications Report and noted the importance of collaboration and cooperation to overcome barriers that might hinder the efforts of individual agencies.

Akinori Mori (MEXT) thanked the CEOS community for the opportunity to host the 29th CEOS Plenary meeting in Japan – the first time in 14 years. MEXT is working with JAXA to promote a space development and utilization policy that helps solve global issues. He remarked that coordinating bodies such as CEOS and GEO are becoming increasingly important as the world works to address global challenges, including climate change and natural disasters.

Mr. Yamamoto then invited the delegates to introduce themselves via a tour de table.

2 CEOS Chair Perspective on the 29th CEOS Plenary

Shizuo Yamamoto (JAXA, CEOS Chair) reviewed some of the key CEOS activities undertaken in 2015, in particular outreach to key international frameworks via input to the UN WCDRR Sendai Framework, the GEO Strategic Plan 2016 - 2025, COP-21 and the UN 2030 Agenda for Sustainable Development.

Mr. Yamamoto also noted the very successful and well-received JAXA CEOS Chair priorities:

- Data Applications Report and Symposium;
- Input to the 3rd UN World Conference on Disaster Risk Reduction; and,
- Contributing to the GEO Blue Planet Symposium and related follow up.

3 Membership Matters – Applications for Associate Status

Shizuo Yamamoto (JAXA, CEOS Chair) introduced the four applicants for CEOS Associate status, and each organisation presented a summary of its activities, in particular those that are complementary to the mission of CEOS.

Agensi Angkasa Negara (Malaysia)

Maszlan Ismail represented the National Space Agency of Malaysia (ANGKASA), which was established in 2002 with the goal of harnessing space as a platform for knowledge generation, wealth creation and societal well-being. They have three main areas of activity: education and space science, development and operation of space systems, and space application and technology development.

ANGKASA's potential contributions to CEOS include access to archive data from two past missions (TiungSAT-1 and RazakSAT) as well as data contributions from a new Earth observation (EO) satellite, RazakSAT-2, which is expected to launch in 2017/18. ANGKASA also has substantial EO infrastructure, including ground stations and an optical calibration

laboratory, and it is able to contribute resources and expertise to the CEOS Working Groups and Virtual Constellations.

ANGKASA hopes to receive guidance from CEOS to improve its EO missions and grow its international collaboration.

Agence Gabonaise d'Etudes et d'Observations Spatiales (Gabon)

Aboubakar Mambimba Ndjoungui of AGEOS noted that the agency was established in 2010 to help Gabon apply space technology to a number of national challenges. AGEOS is a public agency and has the goal of establishing a national space infrastructure and providing space-derived data to national projects. Operational data services are being established for forestry, fisheries and disaster risk reduction, among others. AGEOS promotes a free and open data policy within the country and operates an X-band ground station. AGEOS hopes to participate in a number of the CEOS Working Groups to support its further development and capacity building.

Bureau of Meteorology (Australia)

Agnes Lane presented on behalf of the Bureau of Meteorology (BOM), Australia's national weather, climate and water information agency, which works in close collaboration with CSIRO and Geoscience Australia. BOM has substantial experience with big data and the development of innovative EO solutions, and strongly advocates for the importance of openly sharing information and data, especially through international forums such as GEO, GCOS and WMO.

BOM offers a continental-scale direct reception network, including a ground station for COSMIC-2 and TARS in support of Feng Yun-2. BOM places emphasis on helping the user community access and utilise data, and it operates a regional training centre that supports south Pacific nations.

During its first year of membership, BOM will partner with CSIRO on the study of Non-meteorological Applications for Next Generation Geostationary Satellites, which follows BOM's participation in a workshop held in August 2015 (co-hosted with JAXA and CSIRO) to identify observational gaps and user requirements. Agnes confirmed BOM's intention to regularly contribute to CEOS post-2016 by continuing to promote the exchange of space-based data for decision-making; optimizing the benefits of space-based EO; identifying important observational gaps based on user needs; and contributing to efforts that build capacity to use products from the next generation of satellites. In particular, BOM plans to contribute to WGClimate and Blue Planet.

Agencia Espacial Mexicana (Mexico)

Julio César Castillo, on behalf of the Agency Head, reported that AEM is a governmental organisation that started operations in November, 2011. AEM aims to advance its own capability to design and build small EO satellites by 2018 (in cooperation with international agencies, institutions and companies), including ground segment and associated Geographical Information Systems (GIS). By 2030 it is expected that Mexico will have developed its capacities for designing, constructing and launching space systems for small payloads. AEM looks forward to being an active contributor to a range of CEOS activities and outcomes, including the Virtual Constellations.

Membership Decision

At the request of the CEOS Chair, the representatives of the applicant agencies left the room and the floor was opened for comment:

- Marie-Josée Bourassa (CSA, CEO) confirmed that the presentations had been reviewed and that all applicants meet the criteria in the current CEOS Terms of Reference to become CEOS Associates;
- Mike Freilich (NASA) commended the presenters on the scope and specificity of their presentations, and in particular, the attention each organization gave to identifying both, objectives it hopes to achieve through CEOS membership and potential contributions to CEOS. He then confirmed NASA's support for all four applications for CEOS Associate membership.
- Volker Liebig (ESA) and Alain Ratier (EUMETSAT) expressed support from the European representatives to CEOS SEC for the applications;
- Chu Ishida (JAXA) noted JAXA's existing cooperation with ANGKASA and confirmed support for the application for CEOS Associate status.
- Caiying Wei (NSMC-CMA) noted CMA's long collaboration with BOM and supported their application to CEOS.

With strong support and no objections expressed, the CEOS Chair welcomed AGEOS, ANGKASA, BOM, and AEM as the newest Associate Members of CEOS, and invited their representatives to join the remainder of the Plenary. He encouraged all four organisations to actively participate in relevant CEOS groups and activities. The representatives of the new Associates expressed their gratitude to the CEOS Plenary for their admission and said they looked forward to beginning the collaboration.

Decision 1	**AEM, AGEOS, ANGKASA, and BOM are accepted as Associates of CEOS.**

4 Previous CEOS Plenary Action Status

Marie-Josée Bourassa (CSA, CEO) led a review of the 10 actions from the 2014 CEOS Plenary, noting that all ten actions will be closed by the end of the 2015 Kyoto Plenary. A summary is attached in Annex C.

Some key outcomes of the actions included:

- Increased recognition of the substantial CEOS contribution to GEO Task IN-01 in the new GEO Strategic Plan;
- Formulation of statements/interventions for GEO-XI Plenary and Ministerial Summit;
- Advancement of the LSI-VC, resulting in presentation of renewed Terms of Reference and Implementation Plan to the Plenary for endorsement;
- Confirmation that appropriate implementation arrangements are in place for the CEOS Strategy For Carbon Observations from Space;
- Establishment of the CEOS Water Strategy Implementation Study Team and the completion of the CEOS Response to the GEOSS Water Strategy Report Recommendations; and,
- The CEOS Data Applications Report and Symposium.

5 Introduction of the Draft Kyoto Statement

Nobuyoshi Fujimoto (JAXA) introduced the draft Kyoto Statement. It focuses on CEOS contributions to significant 2015 events: UN WCDRR, GEO Ministerial Summit, COP-21, and the UN 2030 Agenda for Sustainable Development. CEOS Plenary participants were invited to comment on the draft Kyoto Statement, and Nobuyoshi noted that it would be updated during the course of the Plenary to reflect comments received, and subsequently presented for endorsement under agenda item 31.

Alain Ratier (EUMETSAT) suggested that Plenary ensure clarity in the wording of the statement in relation to the respective roles of CEOS and GCOS. Kerry Sawyer (NOAA) noted that we should ensure the four new Agencies are included as well as update the names of some of the Agencies that were incorrect in the draft statement.

6 Presentation of the CEOS 3-Year Work Plan Annual Update

Marie-Josée Bourassa (CSA, CEO) presented the CEOS 3-Year Work Plan and gave a status update. The CEOS 3-Year Work Plan is consistent with guiding documents, focuses on objectives and deliverables, and defines time scales and responsibilities for implementation – facilitating an overall measurement of the progress of CEOS. The CEO Team updates the Plan annually in consultation with CEOS entities and stakeholders.

The SEO has developed an online action tracking mechanism (http://www.ceos-deliverables.org/) that is working well, with updates being provided regularly by CEOS entities. The current status of the actions is as follows:

		Due by Q4 2015	Due by Q4 2016
	Completed or on track	39	14
	Material delays	9	2
	No progress or other issues	1	3
	No update	2	1

The CEO Team has developed a plan for the next update, which will follow the 2015 CEOS Plenary and take into account new initiatives, changes in deliverables, updated priorities and Plenary outcomes. The new CEOS 3-Year Work Plan is targeted for release by February 28, 2016.

Stakeholder Session: Climate and COP-21/SBSTA-43

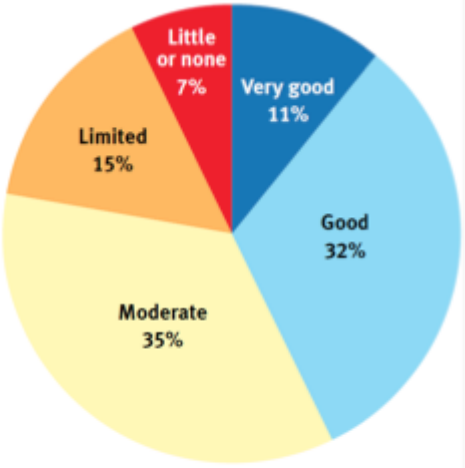
7 GCOS Status and Plans

Carolin Richter (GCOS) recalled the recent review of GCOS by the programmes sponsors. Strategic recommendations included: an emphasis on terrestrial climate observations; a strategic approach to capacity building; the need for a joint strategic plan to define the functions of GCOS in Global Framework for Climate Services (GFCS); and further development of the Essential Climate Variable (ECV) concept. GCOS has addressed how climate services can support adaptation and mitigation through a series of workshops with GOFC-GOLD, IOC, UNEP and others. GCOS was invited to submit a report to SBSTA-43 on the

GCOS Workshop: *Enhancing Observations to Support Preparedness and Adaptation in a Changing Climate.*

Following the second Adequacy Report in 2003, GCOS produced: an Implementation Plan (2004); a supplement to the IP on specific requirements for satellite-based data products (2006); a Progress Report (2009); an updated IP (2010); and an updated Satellite Supplement (2011).

UNFCCC/SBSTA welcomed the 2010 IP and urged Parties to work towards its implementation. It invited a subsequent progress report and encouraged a review of adequacy and welcomed the timetable proposed by GCOS for a Status Report (2015) and new IP (2016).



Overall progress of actions from the 2010 Implementation Plan

Carolin recalled that GCOS fulfils the responsibility to review and assess the development and implementation of the component parts of the climate observing system and to report to its sponsors, partners and the UNFCCC. CEOS is responding to the GCOS Implementation Plans and related Supplements.

A *Status of the Global Observing System for Climate* report has been prepared during the period from May to October 2015 with contributions from panels and external experts, including input from CEOS-CGMS. It was submitted for public review during summer 2015 and delivered to SBSTA on the 20th of October 2015, for presentation at COP-21 in Paris. It will be published for wider distribution in early 2016.

Principal findings related to space-based observations for climate are:

- The new and planned generations of operational meteorological satellite systems offer improved quality and a broader range of measurements. China is becoming established as the provider of a third pillar in the constellation of polar-orbiting systems.
- The European Copernicus programme is producing additional observations on an operational basis, with increased coverage and quality of measurements, and accompanying service provision.
- There have been increases in the numbers of national providers, cooperative international missions and other collaborative arrangements.

- New observational capabilities have been demonstrated, and others are being prepared for demonstration. Future deployment is uncertain for some of the demonstrated capabilities, for example for monitoring cloud and aerosol profiles, sea-ice thickness and soil moisture.
- The generation and supply of products derived from space-based observations have progressed well, with increasing attention paid to documenting product quality and uncertainty.
- Inter-agency cooperation has been effective in product validation and in starting to develop an architecture for climate monitoring from space and an inventory of products.
- Data access is becoming more open, although there is still progress to be made. Some data remain to be recovered from early missions, and long-term preservation of data, including occasional reprocessing, is not yet fully ensured.

In particular, the report notes that:

- **There has been very little progress on the continuation of limb sounding and the establishment of a reference mission.**
- **Continuity of measurement is at risk for solar irradiance and sea-surface temperature at microwave frequencies.**

The new GCOS Implementation Plan, requested at SBSTA-37, is expected in December 2016. There is consideration of whether the Satellite Supplement can be published in parallel with the new IP and whether WGClimate can support this schedule. The new Implementation Plan will:

- Broaden its scope to Earth`s global environmental cycles (i.e. energy, carbon and water), and take into account Sustainable Development Goals, climate services, Climate Indicators and relevant outcomes of discussions during COP-21;
- Advise on new requirements for measures needed for adaptation to, and mitigation of the impacts of, a changing climate;
- Lay out a new strategic approach to further implement the Global Climate Observing System; and,
- Introduce sections on crosscutting disciplines and scientific/technological challenges.

Carolin closed by noting that the GCOS Science Conference will be held 2nd – 4th March 2016 in Amsterdam (www.gcos-science.org) and it is supported by EUMETSAT.

Teruyuki Nakajima (JAXA EORC) noted that the collaboration between meteorological and non-meteorological space agencies is important and highlighted the expected constraints on non-meteorological missions within the Japanese space programme.

Stephen Briggs (ESA) noted that the upcoming GCOS Science Conference has a very limited number of places (200) and as such anyone interested in joining should register soon. The goal of the Conference is to ensure that the wider community has sufficient input to the new IP.

Mark Dowell (EC) recalled the question regarding the timing of the Satellite Supplement and the CEOS Response, suggesting that it would be optimal to aim for a synchronised effort so that the two reports are released at the same time.

29-1	*WGClimate Chair to collaborate with GCOS Secretariat on an integrated work plan and schedule for the updated GCOS IP and its Satellite Supplement and CEOS Response.*	**December 2016**

Kerry Sawyer (NOAA) asked if there would be any new ECVs identified in light of the focus on energy, water and carbon. Carolin Richter (GCOS) confirmed that there will be no new ECVs in the updated IP; the goal is to better communicate the existing ones. She added that it is not possible to prioritise ECVs as they are all equally important by definition.

8 WGClimate Report

John Bates (NOAA, WGClimate Chair) reviewed the main activities of the WG since the last CEOS Plenary, including:

- Report to and review of feedback from COP-20/SBSTA-41 in response to the GCOS requirements outlined in the GCOS IP Satellite Supplement. The GCOS IP Satellite Supplement defines specific requirements for satellite observations based on UN framework guidelines;
- Significant progress has been made on the ECV Inventory, including advancements in version control, reference assessment and compliance against the GCOS guidelines, and a reference gap analysis has been proposed;
- Significant progress on case studies linking Climate Data Records (CDRs) to societal applications and informed policy decisions; and,
- Significant interactions with the climate services, mitigation, and adaptation communities.

CEOS Work Plan action CMRS-7 calls for the production of a CEOS Response to the GCOS IP and Satellite Supplement. This has been submitted to GCOS for communication at COP-21, meaning this item is now complete.

Significant progress has been made on assessment of the ECVs and existing Climate Data Record (CDR) gap analyses made using the ECV Inventory. WGClimate has found generally high compliance in their ECV Reference Assessment (which compared CDR parameters with the GCOS guidelines) and Pilot ECV Gap Analyses are ongoing.

John suggested that WGClimate might explore complementary ways to accomplish the next steps in the ECV Inventory cycle. Past responses to calls for inputs to the ECV inventory have been mixed. Space agencies might be asked to consider implementing the ECV gap analysis as part of their programme planning and WGClimate is considering hosting a periodic gap analysis workshop to help facilitate this (possibly co-hosted with GCOS).

29-2	*WGClimate Chair to liaise with GCOS Secretariat to form a task team defining the ECV Land Surface Temperature and organise a workshop on ECV albedo, LAI and FAPAR, and possibly soil moisture.*	**Q2 2016**

As of Plenary, the WGClimate Chair will be in Europe (ESA then EUMETSAT) for a period of four years, and this opportunity will be used to address some of the longer-term objectives and activities of the Working Group (now consolidated within a four-Year Implementation Plan). An integrated team is being assembled for these four years to ensure a seamless implementation (including the EC-funded support to the inventory development) and each WGClimate Chair will have the responsibility to complete one ECV Inventory cycle (questionnaire, gap analysis, action plan, etc.).

The incoming Chair and Vice-Chair of WGClimate are Pascal Lecomte (ESA) and Jörg Schulz (EUMETSAT) respectively. The next WGClimate meeting will be hosted by CNES in Paris (7-9 March, 2016).

GCOS has prepared a provisional draft of the Climate Indicators, which will be discussed further in the following months and at the GCOS Science Conference (2-4 March 2016, Amsterdam). These Indicators have been built into the framework of the architecture for climate monitoring from space and the ECVs will remain central to future uses such as the Indicators (which themselves are a secondary/derived product).

Shizuo Yamamoto (JAXA, CEOS Chair) asked NASA and ESA for their thoughts on how to define a coordination strategy that will address existing gaps. Michael Freilich (NASA) recalled that this is the role of CEOS and WGClimate – to coordinate work to minimise gaps and maximise knowledge acquisition – and as such, the responsibility lies with all CEOS Agencies. Volker Liebig (ESA) and Mauro Facchini (EC) noted that such gap analyses are informing the definition of future Sentinel missions.

Alain Ratier (EUMETSAT) recalled the utility of the Virtual Constellations for addressing gaps and noted the issue of a gap in precipitation data with the loss of the SSM/I and GCOM-W measurements. Stephen Volz (NOAA) added that climate monitoring not only requires satellites but also substantial ground infrastructure, and as such there is plenty of potential for agencies that do not fly a mission of their own to contribute to the CEOS climate architecture by addressing gaps, assessing data, and forming partnerships to meet measurement requirements that cannot be met alone.

Eric Laliberté (CSA) asked whether there is any indication of how close CEOS is to addressing the major requirements of climate information from space and whether there are any large outstanding gaps or areas that need to be prioritised by space agencies. John Bates (NOAA, WGClimate Chair) reported that while all ECVs are considered to be equally important, previous GCOS Implementation Plans have attempted to cross-cut cycles and identify specific variables that are particularly important to closing budgets (e.g. the water cycle budget) which is in effect a prioritisation. Carolin Richter (GCOS) strongly suggested that CEOS Agencies read the full GCOS Status Report, rather than just the Executive Summary, as it includes a comprehensive ECV status report that covers these types of questions.

Stephen Briggs (ESA) noted that each agency has its own priorities and stakeholders and it is very difficult to coordinate all of these, however this is a key area where CEOS, through WGClimate, adds value. Mark Dowell (EC) noted that the new GCOS IP will present more information on prioritisation, map ECVs to different Earth system cycles, and also provide a description of how the existing ECVs are of use to other conventions (such as the SDGs).

Shizuo Yamamoto (JAXA, CEOS Chair) thanked John Bates for his significant contribution to CEOS activities during his leadership of WGClimate these past two years. Stephen Volz (NOAA) noted the increasingly close and effective working relationship between CEOS, CGMS and GCOS and thanked John for his leadership of WGClimate.

9 CEOS Preparations for COP-21

Pascale Ultré-Guérard (CNES, SIT Chair) presented the CEOS and space agency plans for the United Nations Framework Convention on Climate Change (UNFCCC) 21st Conference of the Parties (COP-21), which will be held in Paris from November 30th to December 11th 2015. The ambition of France is to agree on a global climate change agreement which aims to obtain credible and fair emission reductions and legally binding commitments by all countries, to limit the maximum increase of global average surface temperature to two degrees Celsius.

The period being considered would begin in 2020 and the proposed mechanisms will focus on assurances to limit emissions to the targets that have yet to be fixed.

In advocating the role for space at COP-21, CEOS has:

- Arranged side events on Climate at the COPUOS (June 2015);
- Arranged the CNES "Climate Dome" at Paris Air Show as well as the CEOS Round Table on Space and Climate (June 2015);
- Published the CEOS Earth Observation Handbook Special 2015 COP-21 Edition (ESA, September 2015);
- Contributed strategic climate messages text to the IAA Head of Agencies Declaration adopted in Mexico (September 2015);
- Organised for CNES and ESA exhibitions on the Champs Elysées during the COP (October/November 2015);

Ongoing initiatives include:

- The climate materials library being coordinated by Kerry Sawyer (NOAA);
- Preparation of a poster derived from the COP-21 EO Handbook (to be displayed at the ESA booth during the COP);
- Preparation of a dedicated CEOS website page for COP-21; and,
- CEOS report to SBSTA.

During COP, the ESA booth will host the CEOS EO Handbook poster, which includes QR codes that will direct people to the dedicated CEOS website page for COP-21 as well as the online versions of the Handbook. CEOS will host two TweetChats on Twitter during COP-21, featuring CEOS climate experts and agency Principals.

10 CEOS Preparation for SBSTA-43

John Bates (NOAA, WGClimate Chair) reviewed the preparation of the CEOS-CGMS report to SBSTA-43. SBSTA-41 noted the importance of continuing and sustaining satellite Earth observations on a long-term basis and welcomed the efforts to develop an architecture for climate monitoring from space. They also called for an 'Enhancing Observations' Workshop to be held. WGClimate has worked with the SBSTA Secretariat to coordinate and submit inputs, and the national delegation of the CEOS Chair country (Australia) will be invited to read a statement at the opening of SBSTA-43. The proposed text for this statement was submitted to CEOS Plenary for endorsement. WGClimate will respond to the final report and recommendations from SBSTA-43.

John clarified that the CEOS report is based on the activities undertaken by WGClimate since SBSTA-41 to progress the climate observing system and is organised using the 4 pillars of the climate monitoring architecture. Chu Ishida (JAXA) noted the focus of the report on coordination and he queried whether the magnitude of the CEOS community contribution in support of climate information is adequately conveyed to the COP through the document. John noted that this is the formal and technical report and is suitable for that purpose, and that other materials such as the Earth Observation Handbook handle the broader and less technical outreach.

Kerry Sawyer (NOAA) asked agencies to submit any materials for COP-21 to herself and Kim Holloway (NASA/SEO) for inclusion on the CEOS website COP-21 page.

Decision 2	**The *'Statement from CEOS Regarding Progress Report by the Committee on Earth Observation Satellites (CEOS) and the Coordination Group for Meteorological Satellites (CGMS) on an integrated response to UNFCCC needs for global satellite observations'* is endorsed for delivery at SBSTA-43.**

Stakeholder Session: Group on Earth Observations (GEO)

11 GEO Secretariat Report

Barbara Ryan (GEO Secretariat Director, joining by teleconference) gave an update on behalf of the GEO Secretariat. She noted there are now 100 GEO Member States and 87 Participating Organizations. However GEO still has some work to do to engage countries in the Pacific and Africa.

Since the introduction of the 'brokering approach' in 2010, GEO has seen a rapid increase in the number of assets available via the GEOSS Common Infrastructure (GCI). The GEOSS data sharing principles promote full and open exchange of data, release of data and products with minimum time delay and at minimum cost, free of charge or at cost of reproduction. Barbara advocated for continued opening of space agency data policies and cited the conclusions of economic analyses that support the cost-effectiveness of this approach.

Barbara presented on a range of GEO activities, including:

- Two flagship GEO initiatives: the Global Forest Observations Initiative (GFOI) and the Global Agricultural Monitoring initiative (GEOGLAM);
- Efforts related to water observations (now a key focus for GEO, and CEOS has contributed to this area, most notably through the development of the proposed CEOS Strategy For Water Observations From Space); and,
- Cold regions (GEO anticipates increased efforts in the near future).

The GEO Strategic Plan 2016 – 2025 was developed following the extension until 2025 of GEO's mandate and consists of three parts: a strategy document covering the Societal Benefit Areas (vision, missions, and values); an Implementation Plan; and a reference document. Four implementation mechanisms are envisioned: GEO Community Activities, GEO Initiatives, GEO Flagships and Foundational Tasks. All SBA's are being addressed by the 71 Tasks proposed for the GEO Transitional Work Programme 2016, and further contributions are still welcome.

The GEO-XII Plenary, Ministerial Summit, and associated side meetings will be held from the 9th to 13th of November 2015 in Mexico City, and will see the endorsement of the GEO Strategic Plan 2016 – 2025 and further clarification on the introduction of the newly proposed Programme Board, the status of Observers, and of Participating Organizations on the GEO Executive Committee (ExCom).

Jiashen Zhang (NSMC-CMA) asked about the figures quoted regarding the economic value of Landsat data. Barbara Ryan agreed to pass on the Landsat report/economic analysis.

12 SIT Report – CEOS Contributions to the GEO Work Plan 2012-2015

Pascale Ultré-Guérard (CNES, SIT Chair) reviewed the CEOS contributions to the GEO Work Plan 2012 – 2015, in particular CEOS leadership of GEO Infrastructure Task component IN-01-C2 (Development and Coordination of Space-based Observing Systems). CEOS supports 44% of GEO Tasks (11 as a POC, 7 as Lead, and 10 more as a Contributor) and has 3 members serving on GEO Boards.

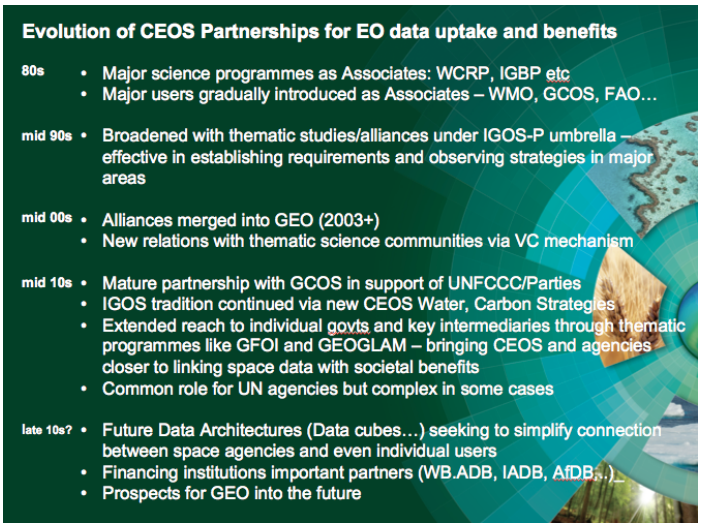
Task component IN-01-C2 will be transitioned to a standalone foundational 'space Task' GD-5 (GEOSS Satellite Earth Observations Resources) in the future GEO Work Programmes. This new Task, dedicated to space-based observations, is well aligned with CEOS's goals and Work Plan.

The IN-01-C1 Task component (Development, Maintenance and Coordination of Surface-based Observing Networks (*in situ* and airborne)) will be transitioned to a dedicated '*in situ* Task' GD-6 (GEOSS non Space-based Earth Observations Resources) ensuring this important topic gets the required attention. Brian Killough (NASA/SEO) will lead an *in situ* side meeting at the GEO Plenary to support the transition for this group and provide guidance for future coordination of this community.

The IN-01-C3 Task component (Promotion and Coordination across Surface-based and Space-based Observing Systems) will be treated as a general role for GEO rather than a specific activity, and the IN-01-C4 Task component (Radio-Frequency Protection) will be managed through a standalone Foundational Task (GD-09).

13 CEOS Position and Declaration at GEO-XII Plenary

Stephen Briggs (ESA) reviewed the evolution of CEOS' partnerships for EO data uptake and benefit (below), noting that GEO is the latest and most enduring in a long line of CEOS partnerships, starting with the CEOS Associates in the 1980's, the IGOS Partnership in the 1990's, and the Virtual Constellation process in the 00's. He noted his desire for the inclusion of financing institutions via the GEO process, starting with admission of the World Bank as a GEO Participating Organization in the near future.



Jonathon Ross (DCEO) noted that the new GEO Strategic Plan 2016-2025 (comprising descriptions of both overall strategy as well as implementation) replaces the previous GEO Implementation Plan, and will be implemented through a set of activities within specific timeframes as defined in the Work Programmes. CEOS provided significant input to the development of the GEO Strategic Plan 2016 – 2025, and thanked the IPWG for their efforts to consider CEOS's input in a constructive manner

The key changes to the Strategic Plan are outlined in the Transition Plan, and include more emphasis on:

- Identifying user needs and addressing gaps in the information chain;
- Implementing sustained global and regional services (through GEO initiatives and Flagships);

- Knowledge base development and a stronger focus on communication and engagement;
- Improving links with UN institutions and programmes;
- Seeking to mobilise resources from 'outside GEO' including via the private sector, development banks, and philanthropic organisations; and,
- Defining and prioritising requirements by SBA, with deeper end-user engagement.

Participating Organizations (POs) will be able to participate in GEO governance and leadership, through the new Programme Board and, for a smaller number, by serving as Observers on the GEO Executive Committee. The CEOS position on all of the aforementioned points needs careful consideration, as CEOS has advocated for some of these outcomes and now needs to respond to them.

Jonathon noted that the changes in the Strategic Plan are overall very beneficial and supported by CEOS, however CEOS's strategy for engaging with the changes needs to be developed in more detail. The incoming SIT Chair will lead engagement with GEO and will be supported by a group of key people working to address the short-term issues that come out of the upcoming GEO meetings.

A remaining key area of CEOS concern is the definition of the indicators that will used to track implementation of the new Strategic Plan, and the need to have a separation of *in situ* and satellite-based Earth observation indicators, to prevent confusion and mischaracterization at the ministerial level, as occurred during the years when the CEOS contribution as the space arm of GEO was rated as being less than successful because it was grouped under the same GEO Task with *in situ* Earth observations, which were not performing well. CEOS must remain engaged to ensure that this issue is addressed satisfactorily.

Other areas of concern remaining include:

- The Communities of Practice are treated very passively and there is no proactive effort proposed to establish and nurture them;
- The document still refers to GEO as 'delivering' without mention of the role of contributors such as POs; and,
- There is a continued lack of clarity about the private sector, and confusion between the private sector and development banks.

Jonathon closed by noting that the next decade of GEO is emerging as one in which CEOS can deliver on its desire to strengthen its role in GEO and the GEOSS. He encouraged Plenary to support the CEOS delegation, to enthusiastically support the GEO Strategic Plan 2016-2025 at GEO-XII Plenary and the Mexico City Ministerial Summit, and he proposed that CEOS Principals back the CEOS delegation to intervene on identified areas of concern where suitable.

14 CEOS Position – Proposed GEO Rules of Procedure

Jonathon Ross (DCEO) presented an analysis of the proposed changes to the GEO Rules of Procedure. He noted that the creation of a GEO Programme Board gives CEOS a good opportunity to play an important role in stewarding GEO activities and to ensure the overall coherence and alignment of the GEO Work Programmes with GEO's Strategic Objectives. However, participation in the Programme Board will be a very significant commitment and the proposed *ad hominem* approach for nomination to the Programme Board, and representation on ExCom, is considered to be unworkable and inappropriate; potentially requiring the same individual that serves on the Programme Board to serve on the ExCom,

which does not reflect the materially different role of these two GEO entities. Under the proposed rules, if a nominated individual cannot attend a given meeting, no substitute can be provided.

The proposal of the CEOS leadership is that CEOS should embrace the opportunities that are being presented, and increase its contribution to GEO governance and leadership. CEOS should seek to remain continuously represented on both the Programme Board and the Executive Committee. Ideally, subject to Agency constraints, CEOS nominees would be:

- GEO Executive Committee: SIT Chair (with substitutes of Principal standing, if required);
- Programme Board: current or former members of the SIT Chair Team and/or CEOS Executive Officer Team.

Jonathon suggested that CEOS Agencies, working with national delegations, and the CEOS delegation to GEO Plenary, should seek to have Programme Board nomination rules modified so that:

- Programme Board members come from a cross-section of Members and POs that represent the full breadth of GEO contributors and stakeholders;
- Suitable representation can be provided to both ExCom and the Programme Board, in recognition of their distinct roles;
- PO's are able to adopt suitable internal processes to ensure appropriateness of representatives on each body and to assure continuity; and,
- They are more practically workable, including through a provision that would allow for substitutes.

Stephen Briggs (ESA) suggested that CEOS should feel overall positive about these developments and should look forward to engaging with GEO in new ways over the coming years. He hopes that there will be a wider representation of development banks and UN frameworks in GEO in the future, as having them present during key debates is very important. Stephen noted that many of the GEO planning and procedural issues recognised by CEOS have already been addressed, and the suggested changes to the Programme Board have been proposed to allow CEOS to be as effective as possible in support of GEO.

Barbara Ryan (GEO SEC) welcomed the summary of the CEOS position, and acknowledged the issues being raised. She hopes that these can be resolved during the upcoming GEO meetings in Mexico.

Michael Freilich (NASA) expressed his concern about the apparent lack of document consistency leading up to the GEO Plenary and Ministerial Summit. He stressed the importance of CEOS stating clearly its objectives for the GEO Plenary by defining minimum necessary outcomes, and he asked the CEOS Plenary to articulate and formally confirm its collective aspirations.

CEOS Principals agreed to revisit the individual bullet points of the proposed CEOS Position for GEO Plenary and to classify them as desirable/compulsory. It was noted that not all of these points would be resolved during GEO Plenary and that some may not be finalised until 2016.

During the discussion, it was noted that there are a few different avenues for intervention on any of these points, including via the CEOS delegation to GEO Plenary; the EUMETSAT, ESA and CGMS representatives; and through the national delegations of agencies' countries. Ivan Petiteville (ESA) supported lobbying via national delegations.

Michael Freilich (NASA) recalled the key negotiating points: CEOS' request for a seat on the Programme Board and the necessary changes related to ad hominem representation.

Stephen Volz (NOAA) stressed the importance of CEOS having leverage, and he suggested that CEOS consider and agree what this might be ahead of GEO Plenary.

Osamu Ochiai (GEO SEC) noted that the current draft of the GEO Rules of Procedure indicated that the Participating Organizations (POs) on the Programme Board would select representatives to serve as Observers on ExCom from among themselves.

Christine Bognar (NASA) suggested that CEOS consider a formal statement to express and capture for the record the consensus at this CEOS Plenary that CEOS representation on the GEO ExCom and Programme Board are essential for a continued and effective CEOS-GEO partnership.

Stephen Briggs (ESA) cautioned that most agencies are part of a national delegation and as such must abide with their Government's position. Barbara Ryan (GEO SEC) noted that the following countries are currently on the ExCom: Egypt, South Africa, Colombia, Mexico, United States of America, Australia, China, Japan, Korea, Russian Federation, Germany and Italy (as well as Europe via the EC).

The SIT Chair and CEO Teams agreed to collaborate on a short internal note summarising the CEOS Position for GEO Plenary (to serve as a mandate for the CEOS delegation). The CEO Team took an action to draft a slide set that was presented/discussed during Item 27.

15 CEOS Position – GEO Ministerial Summit Declaration

Brent Smith (NOAA) has served as CEOS representative on the GEO Ministerial Summit Working Group since January last year. The Declaration for GEO Ministerial Summit was drafted by the WG and has been iterated with GEO Members/POs, the ExCom and GEO Co-Chairs.

CEOS provided a number of inputs, and suggested further strengthening around three key points:

- GEO Members should leverage their UN institutional memberships to establish mechanisms to enable more effective GEO and UN interaction;
- Governments should commit to share their data, and data created by their agencies;
- GEO Members/POs should commit to address priority gaps, sustain EO systems and provide data access to inform planning, policy, and management.

The CEOS feedback was reflected as follows:

- In Paragraph 7, a second sentence was added: "Urge governments to promote GEO nationally, and through their representation in international organizations, to realize a more effective collaboration with GEO."
- In Paragraph 10, a fourth sentence was added: "Call upon the global Earth observations community to make, to the largest extent possible, Earth observation data available and accessible through the GEOSS."
- In Paragraph 11, the first sentence now reads: "Resolve to sustain and develop the observing systems required to provide high-quality reference data and time-series Earth observations; address observation gaps; maintain and evolve the GEOSS common infrastructure as a public good to deliver data, information, and knowledge that responds to stakeholders' requests and informs their decision-making processes."

While legal issues (particularly those of the GEO Co-Chairs) constrained the acceptance of "commit" language in the Declaration, a good faith effort was made by the Ministerial WG to take on the CEOS recommendations and to find appropriate language to accommodate them. There was also significant discussion as to whether "Participating Organizations" would be explicitly identified in the Declaration text; they are in fact noted in paragraph 4. In any case, CEOS is itself well-situated as it has its membership linked to government agencies.

Brent recommended that CEOS endorse and support the GEO Ministerial Declaration. No objections were raised by the Plenary.

16 CEOS Position – GEO Transitional Work Programme 2016

Jonathon Ross (DCEO) summarised the priorities of the CEOS engagement of/input to the new GEO Work Programme, including:

- The inclusion of a well-structured 'Space Task' to highlight the critical importance of the work to systematically implement the space component of GEOSS;
- The inclusion of the new CEOS proposal: GEO-DARMA; and,
- A smooth transition for existing and significant CEOS contributions, such as GFOI, GEOGLAM, Blue Planet, energy, and capacity development, among many others.

The Work Programme is currently in its third revision. Jonathon noted there is less rigidity in roles in the document, and the structure and content is still somewhat inconsistent. The next iteration will take place after GEO Plenary, so an opportunity remains to propose new activities. CEOS Agencies are invited to identify or propose additional contributions to the GEO Work Programme.

Jonathon highlighted the new 'Space Task' (GD-05), which focuses on the long-term work required to develop a comprehensive and sustained 'space component' of the GEOSS. It reflects the major contributions CEOS makes to GEO/GEOSS through the Virtual Constellations and the work of CEOS Working Groups to make space data more accessible and actionable. A separate 'Space Task' provides an opportunity to more clearly communicate and promote the accomplishments of the space segment of GEOSS.

Jonathon summarised the proposed position of CEOS leadership to GEO Plenary on the Work Programme:

1. CEOS welcomes its ability to contribute through both the dedicated space-task, as a long-term effort to build the space segment of GEOSS, and through specific activities, initiatives and flagships.
2. CEOS notes that the more flexible approach to description of activities, and to their internal management, can offer value;
3. However, CEOS also notes that recognition of contributions, both at a leadership level and a working level, must be clear to all.
4. CEOS notes that the document is still very much a work in progress, and suggests that a further iteration be completed prior to it coming into effect for 2016.

These four points were agreed by the Plenary.

Mark Dowell (EC) noted the removal of the Climate SBA in the transitional (and future) Work Programmes. Barbara reported that this should not be looked upon negatively, as the SBA will be absorbed into other SBA tasks. Mark stressed the need for a well defined process to ensure that the task is effectively taken on board by other SBA's and to ensure that the best

practices and cross cutting processes will be adequately addressed. Barbara noted that there are efforts ongoing in this direction.

17 CEOS Participation at GEO-XII Plenary and Ministerial Summit

Alex Held (CSIRO) confirmed that he will lead the CEOS delegation at the GEO meetings and will advocate for good outcomes on the GEO Strategic Plan 2016 – 2025 and Ministerial Summit Declaration. The other members of the CEOS delegation are Chu Ishida (JAXA), Jonathon Ross (GA/CEO), Marie-Josée Bourassa (CSA/DCEO), Brian Killough (NASA/SEO), Brent Smith (NOAA), Arnold Dekker (CSIRO/CEOS Chair Team) and Eric Wood (USGS).

CEOS representatives will attend the GEO Plenary side event on non space-based observation coordination to try and help identify a pathway forward to improve *in situ* coordination.

The CEOS exhibition booth will be staffed by Brian Killough (SEO) and Eric Wood (WGCapD) and is funded by the SEO and CSIRO. It will present a number of outreach materials, including the CEOS Newsletter; Data Cube brochure; four theme charts on climate, disasters, deforestation and food security; as well as information on recently launched CEOS Agency missions, newly released datasets (e.g. SRTM, ALOS mosaics, SPOT World Heritage), and contributions to the GEO Flagships and Initiatives (GFOI, GEOGLAM, GEOBON, GEO-DARMA).

18 Preparation for GEO Sustainable Development Goals Side Event

Arnold Dekker (CSIRO) presented on the GEO Plenary Sustainable Development Goals side event. Member States are defining an ambitious framework for the global development agenda, and the indicator framework is a prime opportunity for CEOS Agencies to contribute, with EO directly applicable to 8 of the 17 Goals. The Goals have been established, however the targets and indicators are still being defined.

A November 10th GEO Plenary side event related to SDG's is scheduled for Mexico City, and titled: *'Sustainable Development Goals: EO in Service of Global Development'.* The aim is to produce recommendations on specific approaches and to identify activities for GEO to pursue in supporting and building capacity in the use of EO to monitor progress on the SDGs. Arnold reviewed the agenda and the opportunities for CEOS participation.

The draft GEO Transitional Work Programme 2016 contains a candidate GEO initiative on SDGs (GI-14: GEO and SDGs). The stated goals of the initiative are:

1. *To engage with Member States, the UN Statistics Division and other partners in the development of the indicators supporting the SDG Goals and Targets to be approved by the UN Statistical Commission in March 2016.*
2. *Develop pilot projects in one or more GEO Member countries focused on integrating Earth observations with national statistical accounts to better measure, monitor and achieve the SDGs.*

Arnold summarised the opportunities for CEOS:

- Support and attend the SDG side event at GEO-XII Plenary;
- Work with GEO to formulate pilot projects in selected countries to demonstrate SDG indicator monitoring with satellite EO;
- Develop a strategy and messages to facilitate consistent communication within national ecosystems;
- Analyse how space-based EO can support the implementation of the indicators;
- Develop a capacity building strategy and other materials, in support of the significant implementation challenge national statistical offices will face.

He noted that national statistical offices are key players in the SDG framework, and represent a new group for CEOS engagement. Statistical agencies are struggling to deal with the volume of data being provided by space agencies, and as such there is a key role for CEOS to play in resolving the issue.

Other opportunities for CEOS engagement are through the GEO pilot projects in selected countries and the development of a strategy and messages to facilitate consistent communication within national ecosystems.

Chu Ishida (JAXA) noted that JAXA has been trying to make a connection with the SDG framework and he is very pleased to see that GEO, CEOS and the UN are working together to organise the SDG side event. Chu thanked NASA (in particular Lawrence Friedl) for their help organising the session.

Ivan Petiteville (ESA) cautioned that this is yet another draw on CEOS resources that needs to be carefully considered.

Adam Lewis (GA) noted that Geoscience Australia has been working to foster closer links with the Australian Bureau of Statistics. He suggested that it is in the best interest of CEOS to consider the SDG topic early, as it is likely that statistical agencies will seek CEOS support in the near future.

Jane Olwoch (SANSA, WGCapD Chair) reported that WGCapD welcomes this initiative and is ready to contribute.

SIT, Virtual Constellations (VCs), Working Groups (WGs) and Ad-hoc Initiatives Session

19 Virtual Constellation Report

Pascale Ultré-Guérard (CNES, SIT Chair) presented on the interactions between the SIT Chair Team and the Virtual Constellations, noting the biannual coordination teleconferences and the VC/WG Day. Pascale provided a brief update on the status and issues of each of the VCs (summary of key points below).

VC	*Report*
ACC-VC	– An *Air Quality Constellation Geophysical Validation Document* is being prepared based on mission-specific requirements developed by the respective agencies. – Past and upcoming airborne field campaigns offer potential for ongoing collaborative GEO mission preparation and possibly early Sentinel-5P cal/val. – ACC-VC is responding to the CEOS Strategy for Carbon Observations from Space through activities related to a GHG constellation. – ACC-VC is working on long-term ozone data set harmonization. **Issues:** – **ACC-VC has noted that a limb/occultation measurement gap is imminent.**
P-VC	– Data Portal Phase 2 developments have been completed. – P-VC is working to respond to GCOS Action A8 (ensure continuity of satellite precipitation products). – Advocating for a post-GPM phase Precipitation Virtual Constellation (preparing a White Paper for submission in response to the 2017 NRC Earth Science Decadal Survey RFI). – P-VC will lead/support the CEOS response to five of the recommendations identified in the GEOSS Water Strategy. **Issues:** – **There are concerns regarding microwave imager continuity (GCOM-W2/W3, DMSP FO) and precipitation radar measurements following GPM Core.**
OSVW-VC	– The addition of RapidScat provides the first opportunity to look into the diurnal cycle. – ScatSAT launch and validation is expected in early 2016. – OSVW-VC is working to update the IDN for ASCAT data sets. – International Ocean Vector Wind Science Team (IOVWST) Working Groups have followed up on data formats and standards, climate data sets, and high winds characterisation and validation.
SST-VC	– SST-VC meeting #4 took place at ESA-ESTEC on 24th July 2015. – Participating in the Satellite Oceanography User Workshop, Melbourne, Australia, 9th – 11th November 2015.

	– Possible SST-VC presentation to IOVWST. – 81 Group for High Resolution SST (GHRSST) products are now in the GHRSST Long Term Stewardship and Reanalysis Facility (LTSRF) archive at NOAA/National Centers for Environmental Information (NCEI), supporting CEOS Work Plan deliverable VC-1. Activities will continue in 2016. – The first draft of a white paper, supporting CEOS Work Plan deliverableVC-19, is in progress (expected by end 2015). **Issues:** – **Redundant capability of passive microwave radiometers with 6 GHz channel is needed (e.g. continuation of GCOM-W).** – **More interactions are required between the VCs on common issues.**
OCR-VC	OCR-VC provided the following CEOS Work Plan deliverable updates: – VC-7: Agency mapping exercise (catalogue of cal/val infrastructure and activities) has been completed. The IOCCG now has a permanent seat on WGCV. – VC-8: Implementation plans for Blue Planet are being formulated/executed. OCR-VC agencies actively support the GEO Blue Planet Components. – VC-9: INSITU-OCR is moving forward with modular implementation. The ultimate goal is to enable communication on the refinement of *in situ* measurement protocols and to reduce redundancy in efforts, fill gaps, and better target opportunities and key players. – VC-10: Implementation plans for the Water Quality Community of Practice are being formulated/executed.
OST-VC	– No dedicated OST-VC meeting is planned in 2015. – Jason-3 launch postponed, Sentinel-3A launch postponed, Sentinel-6/Jason-CS approved by ESA and EUMETSAT. – OST-VC will be updating the Constellation User Requirements document using on-going studies.

20 New ToR and Implementation Plan of the Land Surface Imaging Virtual Constellation (LSI-VC)

Tom Cecere (USGS) presented some of the background on the LSI-VC. The Land Surface Imaging Virtual Constellation exists to maximize the value derived from CEOS agency land surface imaging assets and activities by providing an overarching coordination role. The responsibility of the LSI-VC is to facilitate coordinated and optimized land surface imaging contributions from CEOS agencies to enable access to fundamental measurement products in support of confirmed/validated requirements linked to adopted CEOS priorities. These priorities are typically derived from key stakeholders, such as UN agencies/programmes and GEO.

Revised Terms of Reference (ToRs) were drafted in time for SIT-30 and efforts to date have focused on confirming strong membership and plans with the rest of the CEOS community. Three co-leads have been identified: Adam Lewis (GA), Bianca Hoersch (ESA) and Jennifer Lacey (USGS). Representatives from CSA, CNES, CSIRO, EC, ISRO, JAXA, NASA, NOAA and USGS have already confirmed their participation.

The LSI-VC Implementation Plan is phased for delivery over a nominal three-year period, and has the following proposed themes:

- Optimising and harmonising (where feasible) global data collections (with an ever increasing volume expected);
- Promoting analysis-ready data (with the goal of minimising the need for the end user to understand satellite/pass/sensor-specific processing);
- Exploring how new approaches to management/analysis of large data structures (e.g. Data Cubes) can be implemented and sustained;
- Addressing the actions identified for LSI-VC by the CEOS Strategy for Carbon Observations from Space, as a pathfinder to broader approaches to analysing land surface imaging requirements.

Chu Ishida (JAXA) thanked all of those involved with organising the LSI-VC, and reported that JAXA fully supports the ToR and Implementation Plan.

The new ToR and Implementation Plan for the Land Surface Imaging Virtual Constellation were endorsed. The Plenary congratulated Tom and the rest of the team on their success redefining the LSI-VC.

Decision 3	**Plenary endorsed the new TORs and Implementation Plan for the Land Surface Imaging Virtual Constellation.**

21 Outcomes of the 3rd UN WCDRR

Yuki Matsuoka (UNISDR) joined CEOS Plenary to speak about the outcomes of the 3rd UN World Conference on Disaster Risk Reduction (WCDRR) and she thanked CEOS for the opportunity to present. 6500 delegates from 185 countries attended the 3rd UN WCDRR in Sendai, making it the largest UN conference ever held in Japan. The Sendai Declaration and Sendai Framework for Disaster Risk Reduction 2015-2030 were adopted at the conference.

The Sendai Framework has the overarching goal of preventing new and reducing existing disaster risk. It promotes a shift from disaster loss to disaster risk, from disaster management to risk management. The four priorities for action are: understanding disaster risk; strengthening disaster risk governance to manage disaster risk; investing in disaster risk reduction for resilience; and enhancing disaster preparedness for effective response, and to 'build back better' in recovery, rehabilitation and reconstruction.

Thanks to the efforts of the CEOS WCDRR Task Team, there are three specific references to the use of space technology in the Sendai Framework related to the enhancement of measurement tools and the collection, analysis and dissemination of data.

Space agencies are requested to: support disaster risk management, support risk assessments, provide user friendly data and products, support risk informed decision making, support recovery efforts, and to share progress in global and regional fora.

22 Introduction of JAXA's DRR Related Activities

Chu Ishida (JAXA) explained the heritage of the cooperation between JAXA/CEOS and UNISDR in preparing for the 2015 UN WCDRR in Sendai and thanked Yuki Matsuoka (UNISDR) for her support. He reported that Margareta Wahlström (Special Representative of the Secretary-General (SRSG) for Disaster Risk Reduction) was very enthusiastic about CEOS's interest to contribute to DRR efforts.

Chu explained the Sentinel Asia regional disaster risk reduction system and listed the 18 activations since the WCDRR event. Sentinel Asia includes Working Groups for research as well as capacity building efforts.

Chu summarised by noting that:

- 2015 saw the establishment of an excellent partnership between UNISDR and CEOS;
- Sentinel Asia provides Asian-region space-based DRR support, covering the full cycle of DRM from preparedness to recovery;
- Sentinel Asia brings together and enhances regional capabilities; and,
- JAXA is committed to the implementation of Sentinel Asia in cooperation with other partners.

23 GEO DARMA

Ivan Petiteville (ESA, WGDisasters) updated Plenary on the proposed GEO-DARMA initiative, which was drafted following the WCDRR. Ivan led the CEOS Delegation at the Sendai WCDRR, and the following recommendations were raised at the conference:

- Raise the awareness of decision-makers and key stakeholders on the need to use all data sources in order to take appropriate DRR and resilience measures (in all phases, not only during crises);
- Sustain end-to-end solutions with the involvement of all relevant actors from the data/information providers down to final end users; and,
- Expect an increase in the number of countries using space-based observations for better-informed decision-making in the coming years.

A single initiative will be insufficient to meet the post-WCDRR ambitions, and it is expected that a number of remote sensing related projects will be established in the coming months. Good communication is vital to prevent overlap and duplication of efforts. GEO-DARMA, a new GEO initiative has been proposed to: “Enhance the use of EO data for better-informed Disaster Risk Reduction and Resilience decision-making” by establishing an international cooperation of stakeholders and a series of end-to-end best-effort projects that address unique, high priorities of the Sendai Framework.

During the prototyping phase, the GEO-DARMA team will perform a realistic assessment of recommendations from regional institutions, given resources from the potential actors (e.g. data providers, value-added information providers, etc.) and will define and implement possible prototype projects at country level to address the recommended priorities. This will include progressive extension to neighboring countries where applicable and if a prototype project is successful, and there is a strong request from end users, an assessment will be made to decide whether a transition to operations (including identification of donors) is feasible.

GEO-DARMA has been endorsed by CEOS and features in the GEO Transitional Work Plan 2016. Following acceptance by GEO at the GEO-XII Plenary, GEO-DARMA will be refined and consolidated in the coming months.

Mauro Facchini (EC) asked whether there is a plan/outline of how existing initiatives will be integrated into GEO-DARMA. Ivan reported that WGDisasters performed an audit of all major initiatives three years ago and the findings will be considered on a case-by-case basis. Ivan added that representatives of the Copernicus EMS Risk & Recovery team participated in the last meeting of WGDisasters (September 2015) – presenting their activities and stating their interest in contributing to WGDisasters projects.

24 WGDisasters

Ivan Petiteville (ESA, WGDisasters Chair) presented on behalf of the Working Group. WGDisasters has defined a series of ongoing single hazard pilot projects (planned to end in 2017) to demonstrate the benefits of satellite EO to the field. A new pilot on Landslides has been proposed due to the large number of existing efforts within CEOS Agencies, the potential for exploitation of existing and upcoming meetings, and the fact that clear requirements have already been defined during the Santorini conference organised by ESA. There is also strong overlap between the landslides and earthquakes regions, facilitating data sharing between the pilots.

The objectives of the new landslides pilot are as follows:

1. Establish effective practices for merging different EO data (e.g. optical and radar) to better manage landslide detection, mapping and monitoring;
2. Create integrated products and services for practices such as landslide inventories, to support the full DRM cycle for multi-hazard and cascading landslide events;
3. Test the pilot in multi-hazard risk regions/conditions, including areas exhibiting: high relief and complex topography, intense or prolonged precipitation, earthquake potential, and socio-economic and social vulnerability;
4. Exploit the experiences and lessons learned from existing pilots (i.e., seismic hazards, floods, volcanoes); and,
5. Engage and partner with brokers and end users to understand user and service requirements, user expectations, and to get their feedback throughout the activities.

The key pilot outputs and deliverables are:

A. Report on “Recommended practices for the combined exploitation of SAR and optical imagery and technologies for landslide detection, mapping and monitoring”.
B. Report on “Effective methodologies and strategies for considering multi-hazard and cascading aspect of landslides through interactions with the volcano, flood and earthquake pilots”.
C. Produce a landslide event inventory and activity maps using optical and SAR imagery and technologies, and their combination, for selected case studies/geographical areas.
D. Report on “End user engagement strategies” and characterize “Enablers and challenges or barriers to effective transfer of information, knowledge and technologies”.

Ivan reported that several agencies have already expressed their interested in contributing to the Landslides Pilot, including: ASI, CAS, CNES, CNR (Italy), CSA, ESA, GFZ (Germany), NASA, NRCAN (Canada), NRSC (India), USGS, The University of Oregon, and The University of Washington, NOAA, and DLR (TBC). Potential user implementation leads include: UNESCO and regional end user groups such as ICIMOD (Nepal) and RCMRD (Africa). The Pilot has three co-Leads: Dalia Kirschbaum (NASA), Fausto Guzzetti (Director of the Italian Research Institute for Geo-Hydrological Protection, CNR) and Jonathan Godt (USGS).

WGDisasters are also operating a number of Multi-hazard Pilot Projects and CEOS has delivered data to all of these supersites.

Stéphane Chalifoux (CSA) will be the new WGDisasters Chair. The Plenary was requested to endorse the nomination of Simona Zoffoli (ASI) as the new WGDisasters Vice-Chair. Plenary was also requested to:

– Endorse the creation of the new Pilot on Landslides;

– Endorse the updated Recovery Observatory Triggering Procedure; and,

– Endorse the two-year extension of both the Hawaii and Iceland permanent supersites.

Mauro Facchini (EC) suggested that WGDisasters investigate the Copernicus Emergency Management Service (EMS) further. It was noted that potential overlaps may exist between the operational services of EMS and the activities of the WGDisasters Pilots, however there are distinct differences in the regions being covered by both programs.

Laura Candela (ASI) acknowledged the achievements of WGDisasters and thanked Ivan for his leadership since 2011. Laura also confirmed ASI's support of all of the requests for endorsement and reaffirmed the agency's commitment to WGDisasters. Eric Laliberté (CSA) and Chu Ishida (JAXA) expressed thanks to Ivan for leading WGDisasters over the past years.

Decision 4	**Plenary endorsed the creation of a new WGDisasters Multi-hazard Pilot on Landslides, the updated Recovery Observatory Triggering Procedure, and a two-year extension of both the Hawaii and Iceland WGDisasters Permanent Supersites.**

25 SDCG/GFOI

Stephen Briggs (ESA) presented an update on the Global Forest Observations Initiative (GFOI). GFOI aims to foster sustained availability of satellite and ground observations in support of national forest information systems and to support countries in the use of observations. Five components fulfil the work of GFOI: Space Data, Capacity Building, MGD, R&D and the GFOI Office.

Stephen noted the key achievements for 2015: Version 1 of the GFOI Methods and Guidance Documentation (MGD) was made available in French and Spanish; global baseline acquisitions continued; the R&D Element found a new lead in GOFC-GOLD, supported by ESA; and coordination of capacity building between SilvaCarbon, UN-REDD and FCPF continued.

In 2016 and beyond: the GFOI office will relocate to UN FAO in Rome; baseline mapping with global acquisitions from Landsat-7/-8, Sentinel-1A and Sentinel-2A are in good shape (providing multiple global coverages per year); Version 2 of the MGD (including interactive portal) is expected in June 2016; an updated R&D programme (in coordination with GOFC-GOLD) will hold two expert workshops in 2016; the 3rd GFOI Plenary Meeting will take place at ESA ESRIN in February 2016 (includes SDCG-9); and improved component coordination with an emphasis on outreach and country engagement will be pursued.

Stephen Ward (GFOI Office) presented an update on the Space Data Coordination Group for GFOI, which coordinates the satellite data acquisition and supply that is fundamental to GFOI objectives and supports all countries' reporting. SDCG is co-chaired by ESA and USGS, and has the following CEOS Agencies as members: ASI, CNES, CONAE, CRESDA, CSA, DLR, INPE, ISRO, JAXA, NASA. Stephen noted the three Elements of the CEOS Space Data Strategy for GFOI: a baseline, coordinated global data acquisition strategy involving a number of 'core data streams' that can be used free-of-charge for GFOI purposes; a coordinated strategy for national data acquisitions; and data supply in support of GFOI R&D activities.

Stephen Ward noted the progress on the Space Data Services, following the endorsement of its Strategy at SIT-29. The Strategy aims to remove obstacles related to country uptake of satellite data through cloud computing, storage, novel computing and database technologies, so that countries can focus on data applications rather than handling. Pilot projects are underway (Colombian and Kenyan Data Cubes, ESA's Thematic Exploitation Platform on Forestry) and a new GFOI Website Space Data Portal is being developed.

Stephen, on behalf of the SDCG for GFOI, asked CEOS Plenary to endorse the 2014 Global Baseline Data Acquisition Strategy Implementation Report and provided an updated 3-year Work Plan (per the SIT-30 action) for reference. SDCG also requests its renewal as a CEOS ad-hoc Group.

Mark Dowell (EC) reported that the Copernicus Global Land Service commencing in 2016 (http://land.copernicus.eu/global/) will have a new component on hotspot monitoring, which might prove to be a useful resource for GFOI.

Michael Freilich (NASA) raised concern about the current lack of a successor to the CEOS Lead for GFOI position. He seconded Stephen's request that the Plenary seriously consider the options. Adam Lewis (GA) asked if there is any possibility that Australia might be able to step up to the position. Stephen Briggs noted that Australia is already involved in a number of ways, and that the political landscape in Australia introduces uncertainty. Stephen instead advocated for a key GFOI data-providing agency to take on the Lead role.

Decision 5	**Plenary endorsed the SDCG/GFOI 2014 Global Baseline Data Acquisition Strategy Implementation Report.**

26 CEOS Ad Hoc Working Group on GEOGLAM

Brad Doorn (NASA, Co-lead) presented an update on the CEOS Ad Hoc Working Group on GEOGLAM, noting some recent revisions to the GEOGLAM Component Structure and said efforts within GEOGLAM have focused on the establishment of an Advisory Committee, which aims to bring more clarity to the direction and goals of GEOGLAM.

Two documents are being presented for CEOS Plenary endorsement: An updated *CEOS Response to GEOGLAM Requirements* and a new accompanying *Ad-Hoc Team for GEOGLAM Scope Document.* The new document is a brief 2-pager that outlines the current and proposed scope of the ad hoc Working Group (WG) and encompasses the acquisitions; strategic relationships; and data access, availability, dissemination, and usability.

Brad reviewed some of the key achievements of the CEOS Ad Hoc Working Group on GEOGLAM:

- Identified and evaluated missions that meet GEOGLAM's Earth Observation (EO) data requirements and organised GEOGLAM's long-term acquisition requirements;
- Coordinated EO data for core GEOGLAM requirements (such as JECAM R&D and Asia-RiCE);
- The CEOS SEO worked with JAXA, RESTEC and CSA to provide a cloud-hosted suite of SAR tools and data (RADARSAT-2) for Asia-RiCE using the Space Data Management System (SDMS);
- Added features to the COVE Tool to support agricultural data acquisition and applications;
- Developed, with GEOGLAM, a multi-user, multi-site user agreement to utilize RADARSAT-2 restricted data for JECAM; and,
- Engaged commercial satellite agencies to contribute data to JECAM (e.g. BlackBridge).
- Asia-RiCE is aiming to scale up to 'wall-to-wall' coverage (cropland area extent) for select countries (Indonesia, Thailand, Vietnam) and the CEOS ad hoc WG and Asia-RiCE will be working to evaluate CEOS capacity to meet these requirements.

– CSIRO is continuing its work on a new GEOGLAM initiative on Rangelands and Pasture Productivity (RAPP) and an assessment of the unique data requirements and CEOS capacity will be performed shortly.

Brad reviewed some of the new and ongoing areas in which CEOS agencies can best contribute to GEOGLAM. In particular, it would be useful for agencies to assist in the development of standard data request processes as well as to expand the use of multi-user, multi-site data distribution agreements. Brad said the ad hoc WG annually reviews its goals, and once complete it is envisioned that the WG's activities will be transitioned to the LSI-VC and SEO.

Adam Lewis (GA) commended the approach of the CEOS Ad Hoc Working Group on GEOGLAM, stating that it is clearly a well-structured initiative and that he would be happy to see its activities transitioned into the LSI-VC in the future. Volker Liebig (ESA) also expressed his ongoing support for the CEOS Ad Hoc Working Group on GEOGLAM; noting that food security is one of the major challenges faced by humanity. Michael Freilich (NASA) emphasized the importance of ensuring a smooth and coordinated transition into a permanent CEOS structure in order to maintain the momentum and coordination established by the ad hoc WG.

Decision 6	**Plenary endorsed the *CEOS Strategic Response to GEOGLAM Requirements* and the *Scope of Work* document for the CEOS Ad Hoc Working Group on GEOGLAM.**

Friday 6th November

SIT, Virtual Constellations (VCs), Working Groups (WGs) and Ad-hoc Initiatives Session (continued)

27 CEOS and GEO (revisited)

Jonathon Ross (GA, DCEO) opened the session (a follow-on to yesterday's discussion during Item 14), stating that the purpose is:

– For the 29th CEOS Plenary to clearly state the position of CEOS on the next decade of GEO and the CEOS-GEO relationship, including a general position on GEO's future direction and structure as well as specific positions on key issues;

– To adopt the CEOS Statements to GEO-XII Plenary and the Mexico City Ministerial Summit.

– To identify concrete near-term actions that can be taken to support and promote the above.

Jonathon presented the proposed set of statements (final versions are attached in Appendix F-H) for discussion and raised some draft supporting actions for the Plenary (the final three actions are presented under Item 37).

Alain Ratier (EUMETSAT) confirmed support for the positions proposed, however he urged that CEOS must carefully consider the available resources to make sure that it can deliver on all proposed actions. He added that strong communication and feedback from the CEOS delegation to GEO Plenary is essential.

Volker Liebig (ESA) supported the position and advocated for CEOS Agencies to reach out to their national delegations and communicate the final points.

Joost Carpay (NSO) also confirmed his support and echoed Volker's suggestion that national delegations be adequately briefed. Joost also suggested softening some of the wording, noting that there seemed to be statements that had CEOS making specific recommendations to GEO on topics outside of the remit of CEOS.

Beth Greenaway (UKSA) supported the statements and confirmed that UKSA will do their best to communicate them to their national delegation, noting however that the tight timeframe might make this difficult.

Klaus Schmidt (DLR) supported the overall statements, noting the remaining need to resolve the Programme Board issues. Laura Candela (ASI) confirmed that ASI fully supports the statements presented.

Jane Olwoch (SANSA) supported the statements overall, however she recommended revising dot point two under the second statement to reduce the focus on *in situ* data, consistent with the point raised by Joost.

Michael Freilich (NASA) supported the present form of the statements, but seconded Jane Olwoch's recommendation to remove the reference to *in situ* coordination under the second statement. Michael supported the call for CEOS Agencies to communicate the final version of the statements to their national delegations, adding that any feedback should be relayed to the CEOS delegation.

Stephen Volz (NOAA) confirmed NOAA's support and agreed with the need for all feedback coming out of GEO Plenary to be clearly communicated to CEOS Agencies.

Frank Kelly (USGS) supported the statements and suggested that the goals and objectives for the inclusion of CEOS on the GEO PB and ExCOM also be clearly stated.

Éric Laliberté (CSA) confirmed that the agency supports the statements, and he seconded NASA's call for CEOS Agencies to provide feedback from their national delegations to the CEOS delegation as soon as possible.

NRSCC, NSMC-CMA, ISRO, ROSCOSMOS and JAXA all confirmed their support for the statements, after the aforementioned points are addressed.

Stephen Briggs (ESA) suggested changing the preamble of Statement 2 to better reflect that the statement is made by CEOS with the intention of having mutual benefits for both CEOS and GEO.

Stephen Briggs explained that one of the key priorities for CEOS is to have GEO improve the effectiveness of its strategic partnerships with UN agencies, investment banks, and international programmes and agencies.

Adam Lewis (GA) agreed with the suggestion to soften the wording and suggested that CEOS carefully assess its resources when seeking increased engagement in GEO.

Brent Smith (NOAA) confirmed that the statements are consistent with previous wording and are well formulated. He suggested that printed copies of the CEOS positions and statements be circulated to delegates at the GEO meetings. Stephen Briggs (ESA) agreed that CEOS positions should be communicated, but thinks that distributing paper copies to delegates may not be productive.

The CEO Team agreed to revise the positions/statements taking into account the feedback received. The final statements were presented for endorsement under Item 37.

28 WGISS Report

Richard Moreno (WGISS Chair, CNES) reported:

- On technology exploration: WGISS is a forum where new technologies and future architectures are discussed and presented. Current work includes: distributed architectures; big data technologies; cloud computing; and distribution protocols. The GA Data Cube is a technology that is being explored and discussed within WGISS.
- On the WGDisasters Recovery Observatory (RO): WGISS development ended during summer 2015 and the RO is ready for triggering. This was used operationally by the KalHaiti project within CNES. The project remains open in WGISS, awaiting triggering and slight modification if necessary.
- On interoperability and the CEOS WGISS Interoperability Client (CWIC): this implements CEOS OpenSearch and enables access to over 1900 collections and over 70 million granules. FEDEO (the Federated Earth Observation Gateway System) provides brokered discovery, access and ordering capability to European and Canadian EO mission data, based on HMA standard interfaces. FEDEO implements the CEOS OpenSearch interface and provides access to 477 collections and 6 million + granules.

The CEOS IDN has been upgraded with a new look and capabilities as well as new data. Efforts to ensure that CEOS agency and VC data collections are present are succeeding and ongoing.

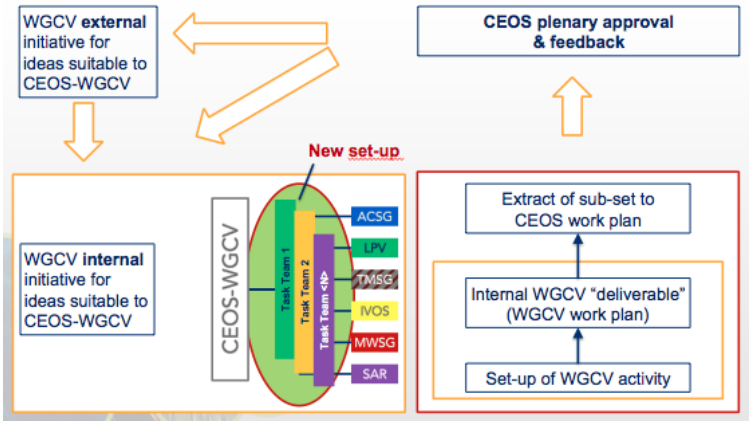
WGISS has issued five new data stewardship documents: *Data Preservation Guidelines; Preservation Workflow; Generic EO Dataset Consolidation Process; Persistent Identifiers Best Practices; Preserved Data Set Content (PDSC)*. The *Data Purge Alert Procedure* aims at preventing the loss of archived EO data and replaces the out-dated *WGISS Purge Alert Service*.

A new task within WGISS, led by CSIRO, USGS and CNES, will explore future data access systems including Data Cubes. This task will support the CEOS Chair initiative (Study of Future Data Access and Analysis Architectures), the Carbon actions, and the DATA-03 CEOS Work Plan Objective being lead by the SEO.

The incoming WGISS Chair is Andy Mitchell of NASA and the Vice-Chair is Mirko Albani (ESA). Shizuo Yamamoto (JAXA, CEOS Chair) thanked Richard for his very effective leadership of WGISS over the past two years.

29 WGCV Report

Albrecht von Bargen (DLR) presented the WGCV report and covered an overview of the CEOS-WGCV meeting schedule in 2015. Albrecht reviewed the structure of the WGCV, noting in particular the establishment of a new 'Task Team' approach.



The Task Team approach was adopted because of the many cross-cutting topics included in the agenda of CEOS-WGCV and allows cross-interaction with other entities on specific topics and opens up more opportunities for members and scientists to work on specific items. Each Task Team has a Work Plan, two Leads, and a minimum duration of two years, with deliverables expected to be a part of the CEOS Work Plan. The approach will be formalised in the updated WGCV ToR.

The 39th WGCV Plenary was held in Berlin, Germany from May 6th to 8th. The meeting included a special session on ocean colour/calibration and validation, an interaction with GSICS/GRWG and discussions on governance and the update of the future Task Teams.

An 'Action Group', which has the responsibility of consolidating the Carbon Action items, was also discussed at the Plenary. The Action Group has been established as the original table of Carbon actions could not be easily assigned within the WG, as some are subgroup specific or cross-cutting. The work of the Action Group is ongoing and the output will be in a format that allows the WGCV and SIT Chair to track implementation progress.

Albrecht reported that there has been good progress on the CEOS Work Plan actions, with 5 closed, 3 partially completed, and 3 remaining open. The next WGCV meeting will take place in Canberra, Australia, March 14th to 18th (in conjunction with WGISS Plenary and hosted by GA and CSIRO).

Frank Kelly (USGS) said that he supports WGCV's activities to the largest extent possible, as keeping data in the most useable and consistent form possible will only become more important in the near future, especially with the emergence of many new small satellite missions.

30 WGCapD

Jane Olwoch (SANSA) reviewed the recent activities of the Working Group, including the 4th WGCapD Annual Meeting and noted in particular the significance and importance of the two SRTM Workshops held in Pretoria, South Africa and Puebla, Mexico.

The WGCapD/WGDisasters free Webinar Series on Remote Sensing Technology for Disaster Management was well attended, with a total of 145 students registering. 46 students representing 19 countries successfully completed the course.

WGCapD have been supporting the SEO with the preparation of the CEOS exhibition booth for GEO-XII Plenary and GEO Ministerial Summit. The booth will focus on new missions launched since the last GEO Ministerial Summit; new datasets released by CEOS and other major contributions from CEOS to GEO; and will have an overall theme of climate change,

disaster response, deforestation, and food security. WGCapD will also represent CEOS at the AfriGEOSS and AmeriGEOSS side meetings.

WGCapD will continue to support GeoCaB (Earth observation Capacity Building Portal) by contributing CEOS capacity building materials wherever possible. WGCapD are also supporting the School Labs initiative (with ESA and DLR), the Kenyan Data Cube (in collaboration with the SEO) and SAR capacity building activities (building upon the SANSA/JICA/JAXA training activities in South Africa).

The next annual meeting of WGCapD will take place at NASA Langley, Virginia, USA from March 29th to 31st 2016.

Jane will take over the Chair position of WGCapD from Eric Wood (USGS) and ISRO has officially supported their candidate for the role of WGCapD Vice Chair. Jane asked CEOS Plenary to endorse Dr. Senthil Kumar (ISRO/IIRS) for the role.

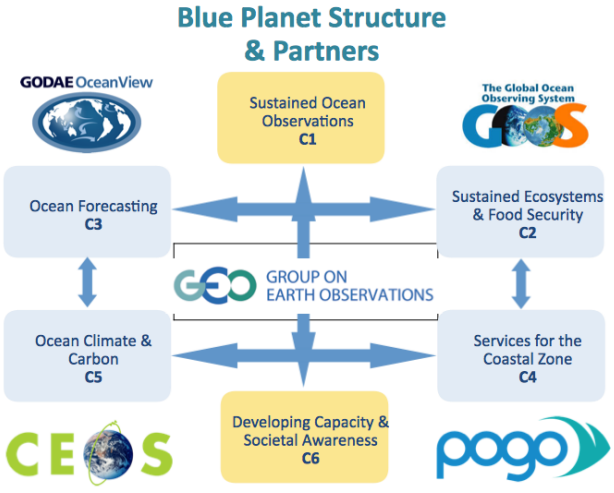
Ivan Petiteville (ESA) thanked WGCapD for their support to the disaster management webinar series. Brent Smith (NOAA) and Éric Laliberté (CSA) expressed their gratitude to the current and past Chairs of the Working Group. Rajeev Jaiswal (ISRO) reaffirmed ISRO's support for Dr. Senthil Kumar to take on the Vice-Chair role.

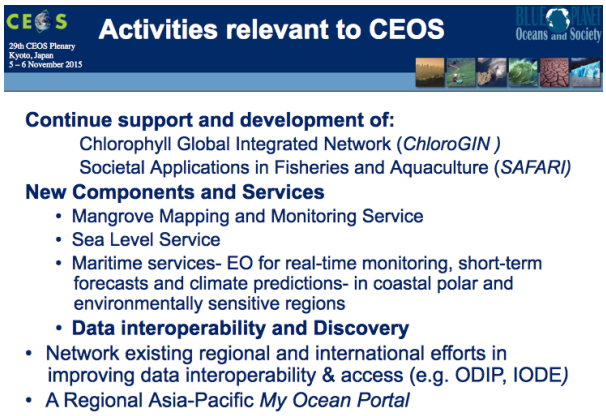
Decision 7	**Plenary welcomed the appointment of the new Working Group Chairs: Pascal Lecomte (WGClimate), Andy Mitchell (WGISS), Jane Olwoch (WGCapD), Stéphane Chalifoux (WGDisasters); and endorsed the nominations for Vice Chairs: Jörg Schulz (WGClimate), Mirko Albani (WGISS), Senthil Kumar (WGCapD), Simona Zoffoli (WGDisasters).**

31 Blue Planet

Andy Steven (CSIRO) presented on the Blue Planet initiative, including its history, timeline, vision and mission. Blue Planet seeks to integrate the complex ocean observations community as well as add value through coordination. Blue Planet's mission is:

- To advance and exploit synergies among the many observational programmes devoted to ocean, coastal and inland waters;
- To improve engagement with a variety of users for enhancing the timeliness, quality and range of services delivered; and,
- To raise awareness of the societal benefits of ocean observations at the public and policy levels.





CEOS (represented by Chu Ishida, JAXA; and Alex Held, CSIRO) presented a keynote at the 2nd Blue Planet Symposium, held in Cairns, Australia from May 27-29, 2015. The key message presented was that CEOS would be best positioned to support Blue Planet when there is a clear understanding and rationale for requirements and priorities. CEOS also identified three topics of particular interest for participation in Blue Planet:

- Establishing a space-ocean alliance to develop ocean information services in cooperation with related organizations, responding to ocean needs;
- Opportunities to leverage next-generation GEO satellites, including in combination with LEO missions; and,
- Next generation architectures for distribution and analysis of large volumes of space data.

CEOS could contribute to Blue Planet by:

- Providing increased coordination on satellite observation data to respond to ocean ECV requirements/priorities;
- Providing coordination on missions, calibration/validation, products and services by Virtual Constellations; and,
- Helping coordinate and optimize satellite observations across key communities: Carbon, Climate and Water.

At the conclusion of the Symposium it was agreed that Blue Planet would apply to be an Initiative in the new GEO Work Programme and that the mission statement should be revised to include more emphasis on user engagement. The third Blue Planet Symposium will be held in March/April 2017 in the USA.

Carolin Richter (GCOS) asked for clarification on the relationship between CEOS and GOOS. Chu Ishida (JAXA) noted that there is communication and collaboration between CEOS and GOOS, and that they both contribute to the overarching Blue Planet initiative. He added that CEOS and GOOS together could be a driving force for Blue Planet.

Chu Ishida (JAXA) and Alex Held (CSIRO) met with the leadership of GOOS in the sides of the recent Blue Planet Symposium held in Cairns, Australia. CEOS and GOOS agreed to strengthen ties, in particular on user requirements analysis, making use of CEOS resources such as the MIM Database and COVE tool. Jonathon Ross (CEO, GA) noted that GOOS is a very good partner for CEOS, as they have a very well validated set of requirements. Follow up meetings between CEOS and GOOS leadership are planned.

Shizuo Yamamoto (JAXA, CEOS Chair) asked whether Andy is aware of any plans to apply the Data Cube to studies of the ocean. Andy hasn't considered the application in detail but is

aware of the Data Cube developments and potential, in particular for mangrove applications.

Chu Ishida (JAXA) closed by noting that ocean monitoring is a high priority for JAXA, and they believe that the Blue Planet initiative is a good relationship for CEOS to foster.

32 Data Applications Report

Naoko Matsuo (JAXA) and Chu Ishida (JAXA) reported on the Chair's 2015 publication project: *Applications of Earth Observations from Space: Serving Humanity, Society, and Industry.* The target readership is policymakers, international organisations active in key application areas, and donors such as The World Bank and Asian Development Bank. It aims to provide evidence of the importance and necessity of satellite EO to governments and to improve their understanding.

JAXA collected 49 case study articles and 5 background articles. The Committee selected 11 articles for the Summary Brochure, which is now available in print form and will be distributed at GEO and other international events. A Full Report including all 49 case study articles is available as a PDF on the CEOS website (www.ceos.org/dar2015). JAXA arranged a Symposium in Tokyo to present the Report, and this was attended by 250 participants including several government members and the US Ambassador to Japan. Shizuo Yamamoto (JAXA, CEOS Chair) thanked CEOS members for their participation in the Tokyo Symposium.

Chu noted that public use cases dominate the applications of data provided by CEOS space agencies, however commercial services to government and other commercial sectors are growing. The past decade has seen great innovation in the application of Earth observation technology, including: Earth surface deformation monitoring using Interferometric SAR; ground water monitoring using highly-sensitive gravity measurement instruments; GHG monitoring using satellite instruments to fill gaps in ground observations of CO_2 and CH_4.

Chu concluded by noting that JAXA will continue further analysis on the collected applications, which are now available on web. JAXA plans to apply successful application practices to its application program, including: development of ocean information services in partnership with government, commercial sectors and academia; contribution to the SDGs (Sustainable Development Goals) through global, regional and national indicators; expanded partnerships with stakeholders, including the private sector, development banks and development assistance agencies, UN and international organisations.

John Bates (NOAA) congratulated JAXA on the Data Applications initiative, and noted the striking similarity between the value chains of many different initiatives. John suggested that a 'generic' value chain schematic/plan might be a worthwhile resource for CEOS.

Éric Laliberté (CSA) also thanked JAXA for their efforts and stated that CSA share the viewpoint promoted by JAXA, calling for continued emphasis on the end-user/applications within CEOS.

33 Carbon Strategy Implementation

Stephen Briggs (ESA) reminded Plenary of the context of the CEOS Strategy for Carbon Observations from Space that was endorsed at SIT-29. A Carbon Strategy Implementation Study Team was formed to analyse the recommendations of the CEOS Carbon Strategy and propose a concrete way forward. CEOS-28 in Tromsø agreed to instruct the identified CEOS entities to prioritise and include relevant CSIST-identified actions in their programs of work and to establish SIT Chair oversight of all Carbon actions (CARB-08) and requested regular consolidated status reporting.

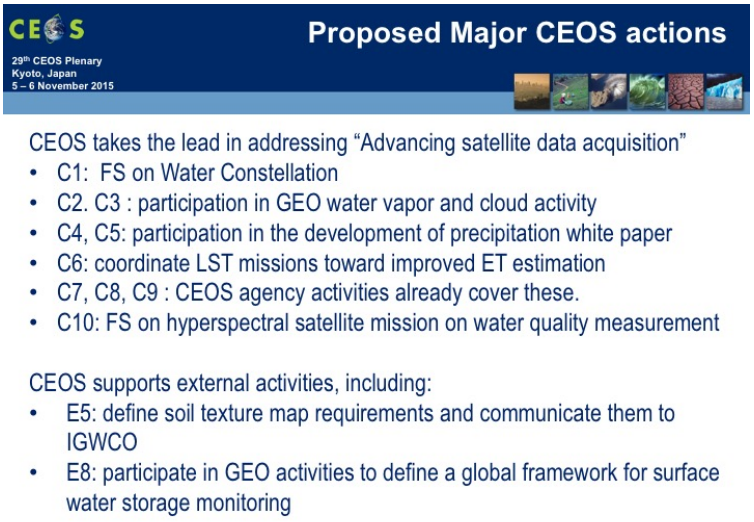
Progress reports were provided at the SIT Technical Workshop in Darmstadt. Limited concrete progress has occurred and it was noted that the broad nature of some of the actions was presenting planning challenges. VCs and WGs were reassured that Principals understand that 'finishing' many of the actions is a long-term effort and that an 'agile' approach is appropriate. Noting the need to build momentum the SIT Vice Chair suggested in Darmstadt that: VCs and WGs focus on specific near-term (1 year) steps that are achievable and will show progress; and that Principals be engaged to determine their support for these proposed 'next steps'. The VCs and WGs have agreed to propose such next steps with a 1-year time horizon, for consideration at SIT-31. The Incoming SIT Chair will retain an oversight role.

Stephen noted that the current process is providing valuable lessons on responding to a cross-cutting external mandate which will help as this becomes more common in the next decade of GEO, with its increased focus on defining SBA-level requirement sets.

34 CEOS Strategy For Water Observations From Space

Chu Ishida (JAXA) recalled the heritage of the CEOS Water Strategy Implementation Study Team (WSIST), including the presentation of the interim report to SIT-30 (April 2015), the presentation to the IGWCO-COP meeting (June 2015) and the review at the SIT Technical Workshop (September 2015). The GEOSS Water Strategy contains 58 recommendations, 22 of which have been identified as relevant for CEOS to address. In each case, the WSIST has reviewed the 22 recommendations and identified potential contributions that CEOS Agencies could provide in response to the recommendations. For each proposed contribution, the Team identified the associated actions and proposed CEOS organisational mechanisms for both action implementation and action monitoring.

Chu showed the major proposed CEOS actions in the CEOS Water Strategy (see below). Should CEOS Plenary endorse the WSIST report, the next steps will be to identify a Chairperson to serve for a further year of WSIST effort, to firm up the approach and participation in the Water Constellation Feasibility Study, to implement the proposed CEOS actions in cooperation with WGs and VCs, and to report progress at the CEOS SIT-31 meeting.



On the topic of the Water Constellation Feasibility Study, Chu recalled GEO Water Strategy Recommendation C1: *The feasibility of developing a Water-Train satellite constellation*

should be assessed. This suite of satellites would be modelled after the A-Train, providing a space segment of an observation system that would capture all fluxes and stores of the water cycle using a diverse suite of platforms and instruments. This system would operate as a Virtual Water Cycle Constellation.

Detail should be agreed by the extended WSIST, but JAXA suggested that Plenary provide guidance on priority areas, suggesting that the following parameters might be an appropriate focus: precipitation, soil moisture, evapotranspiration, groundwater, river discharge and water storage. Chu hoped that the study could establish a clear sense of priorities and socio-economic benefit variability across combinations of parameters and variations in measurement characteristics (spatial, spectral, temporal frequency etc). It will be essential to have a solid foundation of community-validated requirements to inform space infrastructure analysis and to make best use of existing requirement work (e.g. post-GPM study, GCOS ECV). Strong user community participation should be arranged, and the Study should also:

- Establish a full understanding of current and planned capabilities – including the impact of next-generation geostationary satellites;
- Postulate benefits from different levels of coordination (orbits, co-flights, new capabilities, GEO-LEO synergies, etc.); and,
- Perform a ROM comparison of status quo cost-capability versus several (simple) model scenarios for a 'Water Constellation'.

Ivan Petiteville (ESA) suggested that an expansion of the P-VC could be a suitable option/home for the Feasibility Study.

Chu confirmed that the Plenary is being asked to endorse an extension of the Water Strategy Implementation Study Team, under the continued interim leadership of JAXA, until such time as a new lead is found, in order to complete the Water Constellation Feasibility Study. Michael Freilich (NASA), Volker Liebig (ESA), Stephen Volz (NOAA) and Joost Carpay (NSO) all confirmed their support for the Water Strategy and extension of the WSIST under the aforementioned conditions.

Decision 8	**Plenary endorsed the CEOS Response to the GEOSS Water Strategy Recommendations.**	
Decision 9	**Plenary endorsed a one-year extension of the WSIST to conduct the Water Constellation Feasibility Study.**	
29-3	*JAXA, supported by CEOS SEC, to identify candidates for leadership of the extended Water Strategy Implementation Study Team. In the interim JAXA will initiate work of the WSIST on the Water Constellation Feasibility Study endorsed by Plenary.*	**December 2016**

35 SEO Report

Brian Killough (NASA) reviewed some of the key CEOS SEO accomplishments for 2015, including:

- Supporting WGClimate on the ECV Inventory and transition to ESA/EUMETSAT;
- Supported annual updates and enhancements to the MIM Database (with ESA);
- Data acquisition planning and system analyses (GFOI country reports, GFOI Data Flow Study, JECAM data sharing agreement for RADARSAT-2, sustained support to GFOI and GEOGLAM);
- Data Cube research and development in collaboration with GA and CSIRO;

- Enhanced COVE tool (including improved support for GFOI and GEOGLAM);
- Annual mission updates to the Data Policy Portal;
- Supported/supporting CEOS outreach at IGARSS, GEO Ministerial Summit and COP-21; and,
- Developed new outreach materials and expanded the impact of CEOS through social media.

In 2016 the SEO will be continuing these activities, and:

- Developing several Data Services Prototypes for cloud-based storage;
- Processing and distributing country-specific data for GFOI and GEOGLAM;
- Undertaking significant work planned for the two Data Cube prototypes (Kenya and Colombia);
- Advancing the COVE tool (more missions, instruments and operating modes; more links to mission data archives; more data overlays; and conversion of the interface from Google Earth to Caesium); and,
- Explore plans to link the Data Policy Portal and MIM (with ESA).

Kim Holloway (NASA) continues to manage the CEOS website (including the document management system, deliverable tracker and mailing lists); develops outreach materials; and supports data acquisition analyses. She has been working with WGCapD to produce outreach materials for the GEO Ministerial Summit and has assisted SilvaCarbon with training and capacity building activities.

Brian gave a brief overview of the COVE Tool and Data Policy Portal. The COVE Tool includes 254 missions and 692 mission-instrument combinations, and had 5800+ unique users in 2015. More overlays are being developed including for global phenology (NDVI) and GEOGLAM Mission Combination Revisit Analysis. It currently includes direct links to archives for Landsat, SPOT, Pleiades, RADARSAT-2 and ALOS-1 (Sentinel-1A/2A coming soon). The Data Policy Portal includes all 135 currently operating CEOS missions, 71% of which have open data access. Brian also reviewed the details of the Data Services Prototypes being developed for Kenya and Colombia (Data Cube), and Asia-RiCE and JECAM (SDMS).

Kim presented the CEOS Social Media Strategy for Plenary endorsement, and gave a brief outline of the content and purpose. The Strategy outlines the target audience, implementation and governance of efforts to engage the community, create/discover collaborative opportunities, share news and information, and manage the reputation of CEOS. Following endorsement of the Strategy, an editorial calendar will be established and implementation will commence. Kim welcomed contributions from everyone and asked that anyone interested in assisting to please get in contact.

Kim closed with the presentation of the second ‘Faces of CEOS’ video featuring Pascale Ultré-Guérard (CNES), which was very well received.

Kerry Sawyer (NOAA), Alex Held (CSIRO), Volker Liebig (ESA) and Chu Ishida (JAXA) expressed their support for the CEOS Social Media Strategy, and it was subsequently endorsed.

Decision 10	Plenary endorsed the new social media strategy for CEOS.

36 EOHB

Ivan Petiteville (ESA) spoke briefly about the two Earth Observation Handbooks (EOHB) produced in 2015: one in support of the 3rd UN World Conference on Disaster Risk Reduction and the other for UNFCCC COP21. The EOHB aims to raise the awareness of politicians and decision-makers on the benefits satellite EO can bring to society. In 2015, two multimedia eBook versions (iPad, Android, Kindle) were produced in addition to the print and web versions. Around 250 print copies will also be distributed at GEO Plenary.

Ivan also reported on the recent Missions, Instruments and Measurements (MIM) database update, noting that:

- Responses were received from 36 CEOS Agencies;
- 37 new mission records added, 144 existing records updated;
- 41 new instrument records added, 164 existing records updated;
- Currently features 296 Earth observing satellite missions and 830 instruments operating or planned for launch in next 15 years;
- Information on 170 completed missions also included; and,
- The database website has seen a 10.7% boost in visitors in the last 12 months (thanks in part to the WCDRR and Climate content).

In 2015/16 the climate section of the website will be expanded in coordination with WGClimate – including integration of the new GCOS documents and ECV inventory when released.

Pascale Ultré-Guérard (CNES), Chu Ishida (JAXA) and Volker Liebig (ESA) expressed their thanks to Ivan and the EO Handbook team and acknowledged the EOHB and MIM Database as key outreach materials.

Stephen Briggs (ESA) suggested distributing a couple of hundred copies at the GCOS Science Conference (2nd to 4th March 2016, Amsterdam).

37 CEOS and GEO (revisit #2)

CEOS Plenary endorsed revised CEOS Statements to GEO-XII Plenary and GEO Ministerial Summit, as well as the overall CEOS Position, attached in Appendices F to H.

Decision 11	Plenary agreed CEOS's position on the next decade of GEO and the future CEOS-GEO relationship, in the context of the forthcoming commencement of the second decade of GEO.
Decision 12	Plenary endorsed CEOS contribution for the proposed GEO Transitional Work Programme 2016 and agreed not to propose any additional contributions.
Decision 13	Plenary agreed that CEOS Agencies and the CEOS Delegation to the GEO-XII Plenary and Mexico City Ministerial Summit should take action to pursue the agreed position.

The following near-term actions (to support and promote the above statements/position) were also adopted by the Plenary:

29-4	*CEOS Agencies will brief their national GEO delegations on the CEOS positions on the future CEOS-GEO relationship agreed by the 29th CEOS Plenary Meeting. Specifically, in relation to CEOS's desire to participate in future GEO governance, CEOS Agencies will advocate within respective national GEO delegations support for the agreed 29th CEOS Plenary Resolutions. CEOS Agencies will advise the CEOS Secretariat upon completion of this action.*	**9 Nov 2015**
29-5	*The CEOS Delegation to GEO-XII Plenary will promote the CEOS positions on the future CEOS-GEO relationship agreed by the 29th CEOS Plenary through all available channels at GEO-XII Plenary and the Mexico City Ministerial Summit. The Delegation will ensure printed copies of the CEOS Written Statement and Kyoto Statement will be distributed to all Delegations.*	**14 Nov 2015**
29-6	*The head of the CEOS Delegation will advise CEOS Principals of the outcomes from the GEO-XII Plenary and the Mexico City Ministerial Summit and the implications for CEOS, paying particular attention to the positions on the future CEOS-GEO relationship agreed by the 29th CEOS Plenary.*	**SEC-208**

38 CEOS Agencies New/Future Mission Plan

ASI

Laura Candela (ASI) gave a brief overview of the COSMO-SkyMed SAR constellation as well as the Open Call for Science, which has been established to promote R&D on new technologies, algorithms, methods and applications. Laura also reviewed the plans for the follow-on COSMO-SkyMed Second Generation (CSG), planned for launch from 2017 to provide operational continuity to 2025; and the new hyperspectral national mission PRISMA.

ESA

Volker Liebig (ESA) reviewed the future mission plans of ESA, focusing on the Sentinel series. Volker reviewed the recent launch of Sentinel-2A, noting that good products are being generated and the feedback from the user community has been overwhelmingly positive. Sentinel-3A is the next upcoming launch (by end 2015) and will provide continuity of ENVISAT class measurements for Copernicus. Other upcoming missions include ADM-Aeolus, EarthCARE, the 7th Earth explorer mission (Biomass, P-band SAR), and one of the 8th Earth Explorer candidates: FLEX or Carbonsat.

European Commission

Mauro Facchini (EC) reviewed the key features and milestones of the Copernicus programme. In addition to the Sentinel satellites, there are a number of additional sources of data, in particular *in situ*. The currently planned missions will be launched by 2020, however there are a number of additional missions under consideration for the post-2020 timeframe, which will be chosen using gap analysis techniques.

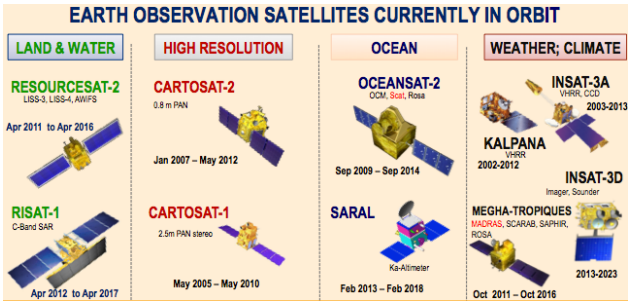
EUMETSAT

Alain Ratier (EUMETSAT) reviewed some recent and upcoming launches. MSG-4 was launched on the 15th of July 2015 and upcoming launches include Jason-3, Sentinel-3A, MTG, Jason-CS/Sentinel-6 and EPS-SG. EUMETSAT has also recently finalised data redistribution agreements with China (HY-2A), India (INSAT-3D) and Japan (GPM-Core, Himawari-8 select channels, and GCOM-W1).

ISRO

Rajeev Jaiswal (ISRO) opened by noting the Indian Prime Minister's recent call urging the Department of Space to proactively engage all stakeholders to maximise the use of space science in governance and development. He reported that this has spurred increased utilisation of EO by many ministries and departments across various application areas (in some cases for the first time).

He reviewed the existing and upcoming ISRO missions (below) and noted some of the criteria for mission development: ensuring data continuity for operational applications, meeting data requirements of the user community, improvements in observations/data services, enabling R&D, technology demonstration and international collaboration.



NASA

Michael Freilich (NASA) reviewed the current and upcoming fleet of NASA Earth observation satellites, noting that NASA is utilizing the International Space Station where feasible. He highlighted the fact that over half of the missions are achieved thanks to international collaboration. Michael discussed the recent failure of the SMAP mission radar, but pointed out that the radiometer is providing very high-quality data.

Michael showed a compelling animation that combined SMAP soil moisture data with GPM precipitation measurements and pointed out some observations that become very clear when multiple measurements are integrated, highlighting once again the importance and great utility of international cooperation.

NOAA

Stephen Volz (NOAA) reviewed the upcoming missions from NOAA, noting in particular GOES-R, Jason-3 and JPSS. NOAA-NESDIS primary activities are on-orbit satellite operations

(GEO, Polar), acquisition of next generation satellites, long-term data stewardship, and research and development operations.

Steve spoke about the NOAA-NESDIS data flow architecture, which supports NOAA's objectives of producing useful, operational and transparent products and services to users. The agency is now looking at how future data flows may change as both the NOAA and global constellations evolve. NOAA also recently integrated three National Data Centers into the new National Center for Environmental Information (NCEI), which was done to improve product development and distribution.

Steve closed by summarising some of the current activities at NOAA, noting in particular that they are working to cooperate more closely with the private sector as well as working to plan the follow-on mission to DSCOVR.

NSMC-CMA

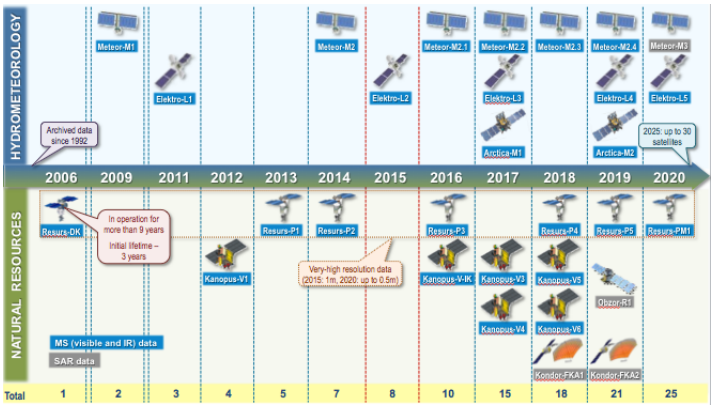
Caiying Wei (NSMC-CMA) provided an update on China's FY-series meteorological satellites. The FY-series consists of six operational satellites, with the latest (FY-2G) in operation at 105E since June 2015. FY-2G has significant improvements over its predecessor in terms of both calibration and application. In particular, Caiying demonstrated the increase in temporal resolution from six to three minutes.

The first operational satellite of the FY-3 series (FY-3C) began providing services at the end of 2014. The future plans of the FY-3 & FY-4 series have been officially established and will provide continuity for the next 10+ years. Great progress has been made on the first experimental satellite of the GEO FY-4 series (FY-4A) and it is expected to launch at the end of 2016.

ROSCOSMOS

Kirill Emelyanov (ROSCOSMOS) gave a brief overview of the Russian EO landscape. He noted that the agency is being restructured and consolidated. The ROSCOSMOS State Space Corporation will now incorporate the Russian Federal Space Agency, Rocket-Space Industry and EO satellite operations. The Russian Federal Space Program 2016-2025 is now being designed. He added the Russian Government has lifted a ban on the dissemination of high-resolution data.

He reviewed the Russian mission timeline and satellite specifications, in particular the Resurs-P, Kanopus-V, Meteor-M, Elektro-L, Kondor-FKA and Obzor-R series.



Significant developments are also expected in Russian ground infrastructure, with the following aimed for operational status from the beginning of 2016: an integrated geographically distributed Information system of EO (more than 10 centers), a bank of basic products for interdepartmental use (preliminary thematic data processing: NDVI, NDSI and albedo, among others), a free data portal (30m and lower resolution data from Elektro-L, Meteor-M and Resurs-P), and a data validation system. These data services are integrated in the ROSCOSMOS Geoportal (www.gptl.ru).

Kirill closed by summarising ROSCOSMOS' contributions to CEOS, noting that they are actively contributing to four of the five Working Groups (WGISS, WGCV, WGCapD and WGDisasters) and also assist the annual update of the MIM Database.

UNOOSA / UNISPACE+50

Yasushi Horikawa (UNOOSA) reviewed the key priorities and themes of the UNISPACE+50 conference. The 50th anniversary of the first UNISPACE conference is an opportunity to consider the current status and chart the future role of COPUOS at a time when more actors, both governmental and non-governmental, are increasingly involved in ventures to explore space and carry out space activities. The agenda will include discussions on the accommodation of the post-2015 development agenda (including SDGs), the 3rd UN World Conference on Disaster Risk Reduction and Sendai Framework for Disaster Risk Reduction 2015-2030, and COP-21.

Yasushi noted that CEOS will be invited to participate in a dedicated commemorative segment of COPUOS in June 2018.

DLR

Klaus Schmidt (DLR) gave a quick summary of DLR's existing and upcoming missions including TerraSAR-X, TanDEM-X, EnMAP, MERLIN (a CNES/DLR collaboration and the first space borne methane Integrated Path Differential Absorption (IPDA) LIDAR), METimage and HRWS.

39 Finalisation of the Kyoto Statement

The Kyoto Statement was discussed and edited, with slight adjustments made to the grammar. It was subsequently endorsed by the Plenary.

Decision 14	**Plenary endorsed the CEOS Kyoto Statement.**

40 SIT Accomplishments 2014 – 2015

Pascale Ultré-Guérard (CNES) noted that the CNES SIT Chair term followed a significant period of operations review under NASA. The CNES SIT team adopted an evolutionary, rather than revolutionary strategy, and has endeavoured to balance managing change while continuing to deliver on CEOS 'core business'.

Two main themes were pursued: the implementation of the CSSII recommendations and supporting GEO in showing concrete progress (focusing on GFOI, GEOGLAM, disasters, and improving access to space based EO data). A survey of the CEOS community indicated that nearly all respondents (97 to 100%) were very satisfied with the SIT Chair team's effort in each of these areas.

Pascale closed by reviewing some of the major CEOS achievements during the CNES period as SIT Chair:

- Consolidated regular interactions with VCs and WGs (six-monthly teleconferences, VC/WG day);
- Revival of the Land Surface Imaging Virtual Constellation;
- Creation and build up of WGDisasters (including the Recovery Observatory);
- Successful participation at the 3rd UN WCDRR (Earth observation is cited explicitly 3 times in the Sendai Framework for Disaster Risk Reduction 2015-2030);
- Promoting space for better understanding of climate trends in the build-up to COP-21;
- The CEOS Climate Roundtable at the Paris Airshow Le Bourget;
- IAA Head of Agencies Declaration on space's contribution to climate change and disaster management;
- Consolidation of IDN;
- CEOS Opensearch; and,
- SPOT World Heritage Programme.

Volker Liebig (ESA) thanked the SIT Chair team for their efforts and noted the significance of having a French SIT Chair in the lead up to COP-21. Michael Freilich (NASA) commended the CNES SIT Chair team and noted their ability to manage significant change while advancing CEOS priorities. Chu Ishida and Shizuo Yamamoto (JAXA, CEOS Chair) also expressed their gratitude to the CNES SIT Chair team.

Pascale Ultré-Guérard (CNES) thanked the SIT Chair and CEO Teams for their support.

41 SIT Chair Handover to ESA

Stephen Briggs (ESA) assumed the role of CEOS SIT Chair and thanked CNES for their efforts over the last two years. Noting that the primary goal is to ensure success of all ongoing CEOS activities, Stephen outlined the priorities of the incoming ESA SIT Chair Team:

- Ensure the success of ongoing CEOS priorities that have been promoted through recent systematic procedures;
- Ensure full access to and exploitation of Copernicus Sentinel data in support of the aforementioned priorities;
- Further develop the CEOS-GCOS-IPCC-UNFCCC relationship for climate measures, observations and indicators with WGClimate and through the GCOS Implementation Plan (2016), Satellite Supplement (2016) and CEOS Response (2017);
- Maintain and improve the effectiveness of strategic partnerships with UN agencies, investment banks, international programmes and agencies, and ensure that GEO is an effective instrument in building and maintaining these relationships; and,
- Support the initiatives of the incoming CEOS Chairs in 2016/2017.

During its term, the ESA SIT Chair Team will place emphasis on:

- Maintaining and respecting procedures developed and carefully codified over the last few years; and,
- Re-establishing the relative roles and functions of the SIT and CEOS Plenary meetings, with appropriate attendance:

- Plenary (October/November): define the strategic direction for CEOS by setting priorities and assigning targets;
- Strategic Implementation Team (SIT) Meeting (March/April): set the direction for implementation of the priorities set by Plenary;
- SIT Workshop (September): technical meeting to track progress against objectives in advance of Plenary to identify any specific resource constraints for the attention of Principals, as well as to generally prepare for Plenary.

The SIT Chair serves as the CEOS-GEO interface, and Stephen noted:

– There is an additional draw on resources of the SIT Chair emerging from the new GEO process;

– There is a need to establish an appropriate modus operandi for CEOS GEO Programme Board participation;

– SIT Chair will pursue an Observer position on the GEO Excom for CEOS;

– There is a need to establish appropriate representation for CEOS at the Programme Board and Excom at/before GEO Plenary.

Stephen reminded the Plenary that a SIT Vice Chair 2016-2017 is yet to be identified and announced the planned SIT meeting dates:

– SIT-31: 18th – 20th April 2016, ESRIN, Frascati, Italy.

– SIT Technical Workshop: 13th – 15th September 2016, Oxford/Harwell, UK.

Stephen closed by noting that ESA will be repeating their very successful online course, *Monitoring Climate from Space (https://www.futurelearn.com/courses/climate-from-space)*, starting on November 30th to coincide with COP-21, and he encouraged everyone to join and promote the initiative.

29-7	*CEOS Agencies to consider nominations to serve as SIT Vice-Chair and subsequently SIT Chair.*	**ASAP**

42 Continuation of CEOS Ad Hoc Teams

Marie-Josée Bourassa (CEO) confirmed that the Plenary has renewed the mandates of all ad hoc initiatives and that the Water Strategy Implementation Study Team will be extended for one year to allow the completion of the Water Constellation Feasibility Study. Shizuo Yamamoto (JAXA, CEOS Chair) announced that Professor Masanobu Shimada will serve as CEOS Lead for GFOI, succeeding Professor Stephen Briggs (ESA).

Decision 15	**Plenary confirmed Prof. Masanobu Shimada as the new CEOS Lead for GFOI.**
Decision 16	**Plenary confirmed the continuation of the following ad-hoc teams: Space Data Coordination Group (SDCG) for the Global Forest Observations Initiative (GFOI); CEOS Ad Hoc Working Group on GEOGLAM; and the Water Strategy Implementation Study Team (WSIST).**

43 Announcement of CEOS Chair 2017

Frank Kelly (USGS) announced that he will serve as CEOS Chair in 2017. Frank thanked JAXA for their efforts in 2015 and said that he is honoured to take on the Chair role in 2017.

Frank will also be serving as Chair of the International Charter Space and Major Disasters in 2016. He reported that he will use the experience to help formulate the CEOS Chair priorities

for 2017 and he has also been in close contact with CSIRO to ensure that there is sufficient follow up for their 2016 initiatives.

The 31st CEOS Plenary is planned to take place at the Black Hills National Forest, Rapid City, South Dakota, in October 2017.

44 Confirmation of Decisions and Actions

Stephen Ward (JAXA) reviewed the actions of the 29th CEOS Plenary. The final action record is attached in Appendix B.

45 CSIRO Priorities and Expected Outcomes for 2016

David Williams (CSIRO) introduced the two CEOS Chair Initiatives for 2016: *Non-meteorological Applications for Next Generation Geostationary Satellites* and *Future Data Access & Analysis Architectures.*

There was strong support for the two proposed initiatives. Alain Ratier (EUMETSAT), Volker Liebig (ESA), Chu Ishida (JAXA) and Eric Laliberté (CSA) all confirmed that they would seek to nominate members for both initiatives.

Stephen Volz (NOAA) will nominate a co-Chair for the *Non-meteorological Applications for Next Generation Geostationary Satellites* initiative. Caiying Wei (NSMC-CMA) noted that NSMC-CMA has substantial experience in this field as well as new, upcoming GEO capabilities, and are interested in joining this initiative.

Richard Moreno (WGISS) reported that WGISS plans to participate in the *Future Data Access & Analysis Architectures* initiative and has already established an internal working team.

Mauro Facchini (EC) reported that the European Commission supports both initiatives and will nominate members for the *Future Data Access & Analysis Architectures* initiative, given their involvement and interest in 'big data'.

Decision 17	**Plenary endorsed the establishment of two ad-hoc teams proposed by the incoming CEOS Chair CSIRO in relation to: Future Data Access & Analysis Architectures and Non-meteorological Applications for Next Generation Geostationary Satellites.**

46 CEOS Chair Handover

Shizuo Yamamoto (JAXA, CEOS Chair) thanked CEOS for the opportunity to serve as Chair in 2015 and reported that he is extremely happy with the outcomes of the 2015 CEOS Chair priorities. He closed by thanking the CEO Team, CEOS Secretariat, SIT Chair Team and the JAXA CEOS Chair Team for their hard work over the last 12 months. Chu Ishida (JAXA) also expressed his gratitude to the JAXA CEOS Chair team.

David Williams (CSIRO) assumed the position of CEOS Chair and thanked the CEOS community for the opportunity. He reaffirmed CSIRO's commitment to CEOS and thanked JAXA for their Chair period.

47 Adjourn

Shizuo Yamamoto (JAXA) closed the meeting by thanking everyone for their attendance and wished all participants safe onward travels.

Appendix A. List of Participants

Organization	Participant	Organization	Participant
AEM	*Julio Castillo*	GA	*Jonathon Ross*
AFSIS	*Montol Jeamchareon*	GCOS	*Carolin Richter*
AGEOS	*Aboubakar Mambimba Ndjoungui*	GEOSEC	*Alyssa Whitcraft (GTM)*
ANGKASA	*Maszlan Ismail*	GEOSEC	*Barbara Ryan (GTM)*
ASI	*Laura Candela*	GEOSEC	*Osamu Ochiai*
ASI	*Sveva Iacovoni*	Indonesian MoA	*Rizatus Shofiyati*
Australian BOM	*Agnes Lane*	ISRO	*Rajeev Jaiswal*
CNES	*Mireille Paulin*	JAXA	*Chu Ishida*
CNES	*Pascale Ultre-Guerard*	JAXA	*Daisuke Tajiri*
CNES	*Richard Moreno*	JAXA	*Hiroshi Imamura*
CNES	*Steven Hosford*	JAXA	*Kei Oyoshi*
CNES/Embassy of France	*Pierre-Henri Pisani*	JAXA	*Mami Sasamura*
CSA	*Éric Laliberté*	JAXA	*Masuo Takahashi*
CSA	*Marie-Josée Bourassa*	JAXA	*Matthew Steventon*
CSA	*Stéphane Chalifoux*	JAXA	*Naoki Okumura*
CSIRO	*Alex Held*	JAXA	*Naoko Matsuo*
CSIRO	*Andy Steven*	JAXA	*Nobuyoshi Fujimoto*
CSIRO	*Arnold Dekker*	JAXA	*Norimasa Ito*
CSIRO	*Caroline Bruce*	JAXA	*Nozomi Tomizawa*
CSIRO	*David Williams*	JAXA	*Shizuo Yamamoto*
CSIRO	*Flora Kerblat*	JAXA	*Stephen Ward*
DLR	*Albrecht von Bargen*	JAXA	*Takeo Tadono*
DLR	*Klaus Schmidt*	JAXA	*Teruyuki Nakajima*
EC	*Mark Dowell*	JAXA	*Yasushi Horikawa*
EC	*Mauro Facchini*	JMA	*Toshiyuki Kurino*
ESA	*Ivan Petiteville*	MEXT	*Akinori Mori*
ESA	*Josef Aschbacher*	NASA	*Andrew Mitchell*
ESA	*Pascal Lecomte*	NASA	*Bradley Doorn*
ESA	*Simonetta Cheli*	NASA	*Brian Killough*
ESA	*Stephen Briggs*	NASA	*Christine Bognar*
ESA	*Volker Liebig*	NASA	*Christopher Blackerby*
EUMETSAT	*Alain Ratier*	NASA	*David Green*
EUMETSAT	*Paul Counet*	NASA	*David Jarrett*
EUMETSAT	*Robert Husband*	NASA	*Kim Holloway*
GA	*Adam Lewis*	NASA	*Kurtis Thome*

NASA	*Matthew Koeppe*	RESTEC	*Masatoshi Kamei*
NASA	*Michael Freilich*	RESTEC	*Shinichi Sobue*
NASA	*Richard Eckman*	RESTEC	*Yukio Haruyama*
NOAA	*Brent Smith*	Roscosmos	*Kirill Emelyanov*
NOAA	*John Bates*	SANSA	*Jane Olwoch*
NOAA	*Kerry Sawyer*	SANSA	*Mahlatse Kganyago*
NOAA	*Stephen Volz*	SANSA	*Phila Sibandze*
NRSCC/AOE, CAS	*Chuanrong Li*	U.S. DoS	*Fernando Echavarria*
NRSCC/AOE, CAS	*Lingli Tang*	UKSA	*Beth Greenaway*
NSC	*Anja Strømme*	UKSA	*Charles McCausland*
NSC	*Einar-Arne Herland*	UN	*Werner Balogh*
NSMC-CMA	*Caiying Wei*	UNISDR	*Yuki Matsuoka*
NSMC-CMA	*Jiashen Zhang*	USGS	*Frank Kelly*
NSMC-CMA	*Jinlong Fan*	USGS	*Jennifer Lacey*
NSMC-CMA	*Nianqing Liu*	USGS	*Thomas Cecere*
NSO	*Joost Carpay*	USGS	*Thomas Holm*
CNES	*Jean-Louis Fellous*	WHO	*Ramesha Krishnamurthy*
RESTEC	*Koji Akiyama*		

(GTM) indicates remote participation via GoToMeeting.

Appendix B. Record of Actions and Decisions from the 29th CEOS Plenary

No.	Action	Due Date
29-1	*WGClimate Chair to collaborate with GCOS Secretariat on an integrated work plan and schedule for the updated GCOS IP and its Satellite Supplement and CEOS Response.*	**December 2016**
29-2	*WGClimate Chair to liaise with GCOS Secretariat to form a task team defining the ECV Land Surface Temperature and organise a workshop on ECV albedo, LAI and FAPAR, and possibly soil moisture.*	**Q2 2016**
29-3	*JAXA, supported by CEOS SEC, to identify candidates for leadership of the extended Water Strategy Implementation Study Team. In the interim JAXA will initiate work of the WSIST on the Water Constellation Feasibility Study endorsed by Plenary.*	**December 2016**
29-4	*CEOS Agencies will brief their national GEO delegations on the CEOS positions on the future CEOS-GEO relationship agreed by the 29th CEOS Plenary Meeting. Specifically, in relation to CEOS's desire to participate in future GEO governance, CEOS Agencies will advocate within respective national GEO delegations support for the agreed 29th CEOS Plenary Resolutions. CEOS Agencies will advise the CEOS Secretariat upon completion of this action.*	**9 Nov 2015**
29-5	*The CEOS Delegation to GEO-XII Plenary will promote the CEOS positions on the future CEOS-GEO relationship agreed by the 29th CEOS Plenary through all available channels at GEO-XII Plenary and the Mexico City Ministerial Summit. The Delegation will ensure printed copies of the CEOS Written Statement and Kyoto Statement will be distributed to all Delegations.*	**14 Nov 2015**
29-6	*The head of the CEOS Delegation will advise CEOS Principals of the outcomes from the GEO-XII Plenary and the Mexico City Ministerial Summit and the implications for CEOS, paying particular attention to the positions on the future CEOS-GEO relationship agreed by the 29th CEOS Plenary.*	**SEC-208**
29-7	*CEOS Agencies to consider nominations to serve as SIT Vice-Chair and subsequently SIT Chair.*	**ASAP**

No.	Decision/Outcome
Decision 1	**AEM, AGEOS, ANGKASA, and BOM are accepted as Associates of CEOS.**
Decision 2	**The *'Statement from CEOS Regarding Progress Report by the Committee on Earth Observation Satellites (CEOS) and the Coordination Group for Meteorological Satellites (CGMS) on an integrated response to UNFCCC needs for global satellite observations'* is endorsed for delivery at SBSTA-43.**
Decision 3	**Plenary endorsed the new TORs and Implementation Plan for the Land Surface Imaging Virtual Constellation.**
Decision 4	**Plenary endorsed the creation of a new WGDisasters Multi-hazard Pilot on Landslides, the updated Recovery Observatory Triggering Procedure, and a two-year extension of both the Hawaii and Iceland WGDisasters Permanent Supersites.**

Decision 5	Plenary endorsed the SDCG/GFOI 2014 Global Baseline Data Acquisition Strategy Implementation Report.
Decision 6	Plenary endorsed the *CEOS Strategic Response to GEOGLAM Requirements* and the *Scope of Work* document for the CEOS Ad Hoc Working Group on GEOGLAM.
Decision 7	Plenary welcomed the appointment of the new Working Group Chairs: Pascal Lecomte (WGClimate), Andy Mitchell (WGISS), Jane Olwoch (WGCapD), Stéphane Chalifoux (WGDisasters); and endorsed the nominations for Vice Chairs: Jörg Schulz (WGClimate), Mirko Albani (WGISS), Senthil Kumar (WGCapD), Simona Zoffoli (WGDisasters).
Decision 8	Plenary endorsed the CEOS Response to the GEOSS Water Strategy Recommendations.
Decision 9	Plenary endorsed a one-year extension of the WSIST to conduct the Water Constellation Feasibility Study.
Decision 10	Plenary endorsed the new social media strategy for CEOS.
Decision 11	Plenary agreed CEOS's position on the next decade of GEO and the future CEOS-GEO relationship, in the context of the forthcoming commencement of the second decade of GEO.
Decision 12	Plenary endorsed CEOS contribution for the proposed GEO Transitional Work Programme 2016 and agreed not to propose any additional contributions.
Decision 13	Plenary agreed that CEOS Agencies and the CEOS Delegation to the GEO-XII Plenary and Mexico City Ministerial Summit should take action to pursue the agreed position.
Decision 14	Plenary endorsed the CEOS Kyoto Statement.
Decision 15	Plenary confirmed Prof. Masanobu Shimada as the new CEOS Lead for GFOI.
Decision 16	Plenary confirmed the continuation of the following ad-hoc teams: Space Data Coordination Group (SDCG) for the Global Forest Observations Initiative (GFOI); CEOS Ad Hoc Working Group on GEOGLAM; and the Water Strategy Implementation Study Team (WSIST).
Decision 17	Plenary endorsed the establishment of two ad-hoc teams proposed by the incoming CEOS Chair CSIRO in relation to: Future Data Access & Analysis Architectures and Non-meteorological Applications for Next Generation Geostationary Satellites.

Appendix C. Kyoto Statement, 6th November 2015

The Kyoto Statement

We, the assembled participants of the 29th Plenary meeting of the Committee on Earth Observation Satellites (CEOS), taking place in Kyoto, Japan, on 5 and 6 November, 2015:

Building upon our collective commitments to coordinate our Earth observation satellite missions in response to needs expressed by the United Nations (UN) Framework Convention on Climate Change (UNFCCC), the UN International Strategy for Disaster Reduction (UNISDR), the UN 2030 Agenda for Sustainable Development, the intergovernmental Group on Earth Observations (GEO), the Global Climate Observing System (GCOS), the World Meteorological Organization (WMO), the Food and Agriculture Organization (FAO) of the UN, and other external stakeholders;

Confirming our primary Mission to ensure international coordination of civil space-based Earth observation programs and promote exchange of data to optimize societal benefit and inform decision making in support of a prosperous and sustainable future for humankind;

Recognizing that the successful development of the space segment of the Global Earth Observation System of Systems, and of global observing systems and programmes operated under the auspices of U.N agencies, is the result of significant and sustained investments made by CEOS Agencies; and

Recognizing significant progress worldwide in the use and application of the data supplied by CEOS Agency satellites and subsequent diverse societal benefits as highlighted by the CEOS Data Applications report released at this Plenary meeting;

Declare that we have agreed to continue to enhance our international cooperation and partnerships in support of CEOS objectives and have affirmed our intent to:

- ensure that the climate observation requirements identified by the Global Climate Observing System (GCOS) in response to the needs of the UNFCCC – including implications of any agreements emerging from the COP21 meeting — are addressed through space agency planning processes, with CEOS reporting on progress to UNFCCC, as requested.;
- ensure, in the context of the Sendai Framework for Disaster Risk Reduction 2015-2030, adopted in March 2015, that CEOS Agency data are made available in support of disaster risk reduction activities and promote continued engagement with relevant UN agencies and authorities to ensure the full societal benefit potential of the data is realized in all phases of disaster risk management;
- continue to enhance the provision of space-based Earth observations for GEO in the framework of the new GEO 10-year strategic plan while also stepping up to participate in GEO governance arrangements to reflect widespread CEOS contributions to GEO success, including GFOI, GEOGLAM, AfriGEOSS, Blue Planet, and the GEO Carbon and Water Strategies; and
- proactively engage in global discussions on the critical challenges that face our modern society, such as achievement of the Global Goals for Sustainable Development unanimously adopted by the United Nations General Assembly, and ensure continuity in and delivery of Earth observations from space play their part in global, regional, and local solutions.

CEOS will accomplish these activities through contributions from its Virtual Constellations, Working Groups, and Ad-Hoc Teams, as well as the program coordination mandate of its Strategic Implementation Team. CEOS will continue to address user needs for data quality, data discovery and access, and capacity building.

Appendix D. Previous CEOS Plenary Action Status

Plenary	Location / Host	Actions
CEOS-26	Bengaluru / ISRO	All actions closed by CEOS-28.
CEOS-27	Montréal / CSA	All actions closed by CEOS-28.
CEOS-28	Tromsø / EUMETSAT	10 actions opened.

No.	Action	Due Date	Status
28-1	*CEOS SIT Chair to discuss with the GEO Secretariat the need to ensure that the very successful CEOS contributions to GEO Task IN-01 are accurately reflected in the GEOSS evaluation process that GEO communicates to ministers and national policy-makers at its Plenary.*	**GEO-XI**	**CLOSED** Discussions concluded and CEOS contributions recognised. Follow-up has occurred to ensure CEOS contributions will be recognised under the new GEO Strategic Plan 2016 – 2025.
28-2	*CEO, in consultation with the CEOS Chair and CEOS Agencies, to develop written and verbal interventions for the GEO-XI Plenary that will:* *i. Emphasise the overarching role of CEOS in coordinating international cooperation on space-based Earth observing systems for GEO;* *ii. Reaffirm the very successful CEOS contributions to GEO to date, based on the sustained investments of CEOS Agencies;* *iii. Emphasise the need for a formalised level of CEOS participation in the GEO Governance framework that reflects its unique role and the scale of its contributions; and,* *iv. Underscore the CEOS position that any revised SBA structure accurately reflects the full range of global community needs, and provide a vehicle for the structured and coherent collection of GEOSS requirements.*	**GEO-XI**	**CLOSED** Statements and interventions drafted, agreed and delivered. Statement published on GEO website.
28-3	*CEOS Chair to send a letter to CEOS Agencies inviting nominations for participation in the LSI VC, and including a description of the preparatory activities to reconstitute the LSI VC (see Plenary Action 28-04), with a due date for receipt of nominations of 15th November 2015.*	**5th November 2015**	**CLOSED** Discussed at SIT-30 and SIT Technical Workshop. LSI-VC Terms of Reference, Implementation Plan and membership listed for decision at CEOS-29.
28-4	*The LSI-VC, led by Tom Cecere (USGS), to prepare a draft Implementation Plan, based on the "Space Segment Coordination" option and including a proposed update to the LSI-VC ToRs, for review prior to, and discussion at, SIT-30.*	**SIT-30**	
28-5	*CEOS Chair to send a letter to CEOS Agencies seeking nominations for the upcoming vacant position of Co-Chair of the SDCG for GFOI.*	**15th November 2014**	**CLOSED** Approaches made. No candidate has emerged. Issue listed for discussion under CEOS-29 agenda item 19.

28-6	*SIT Chair in conjunction with the relevant WGs and VCs, to determine by SIT-30 whether appropriate implementation arrangements are in place for all actions associated with the CEOS Strategy for Carbon Observations from Space.*	**SIT-30**	**CLOSED** Discussion at SIT Technical Workshop confirmed action ownership with planning underway. Further detail under CEOS-29 agenda item 26.
28-7	*CEOS Chair to inform the GEO IGWCO Chair that: i) CEOS considers that the GEO Water Strategy is a relevant guidance document for CEOS activities, ii) based on the first expression of interest of CEOS Agencies, CEOS is establishing a Water Strategy Implementation Study Team to define its potential contribution to the implementation of the Strategy.*	**15th November 2014**	**CLOSED** Completed. The WSIST has been in regular communication with IGWCO; topic listed under CEOS-29 agenda item 27.
28-8	*CEOS Chair, with the support of the CEO, to develop Terms of Reference for a Water Strategy Implementation Study Team and, once available, write to CEOS Agencies to solicit nominations for participation in this Study Team.*	**2nd December 2014**	
28-9	*CEOS Chair to deliver the draft structure of the planned CEOS Data Applications Report to CEOS Agencies.*	**5th November 2014**	**CLOSED** The report has been produced and published with input from across the CEOS community. Further discussion under CEOS-29 agenda item 24.
28-10	*CEOS Agencies to deliver abstracts for contributions to the planned CEOS Data Applications Report to the CEOS Chair, together with nominations for participation in the editorial team.*	**30th November 2014**	

Appendix E. CEOS Statement to SBSTA-43

Statement from CEOS Regarding Progress Report by the Committee on Earth Observation Satellites (CEOS) and the Coordination Group for Meteorological Satellites (CGMS) on an integrated response to UNFCCC needs for global satellite observations

Conference of the Parties (COP21)/SBSTA-43
30 November - 11 December 2015, Paris, France

Australia is pleased to update the 43rd session of the Subsidiary Body for Scientific and Technological Advice (SBSTA) on a coordinated response to the United Nations Framework Convention on Climate Change (UNFCCC) needs for satellite observations prepared by the Committee on Earth Observation Satellites (CEOS) and the Coordination Group for Meteorological Satellites (CGMS) Working Group on Climate. CEOS has had the honor to provide input to the UNFCCC on several previous occasions.

At the 20th session of the Conference of the Parties (COP) to the UNFCCC in 2014, the 41st session of SBSTA invited CEOS and CGMS to provide, for SBSTA-43 and the COP-21 in November–December 2015, an updated report on progress made by Space Agencies in providing satellite observations relevant to the convention needs as set out in the Global Climate Observing System (GCOS) Implementation Plan.

Since the last report presented to SBSTA-41 CEOS and CGMS have made the following relevant progress:

Sensing – Data from an Essential Climate Variable (ECV) inventory have been analysed to provide information complementary to existing CEOS databases.

Climate Record Creation and Preservation – A quantitative assessment of compliance of the GCOS Essential Climate Variables using GCOS guidelines for dataset preparation has been made. This analysis will help quantify the level of maturity of datasets, ensure openness and transparency, and help users judge the utility of the dataset for their application.

Application – CEOS and CGMS have provided GCOS with a final report on Space Agency actions carried out in the 2011–2015 period in response to the GCOS 2010 Implementation Plan and 2011 Satellite Supplement. This input has been used in the GCOS 2015 status report that will be presented to SBSTA-43.

Decision Support – CEOS and CGMS joined the World Meteorological Organization and European Union Joint Research Center on a new report on case studies for climate services.

Since the last report CEOS has also made progress on implementation of its CEOS Strategy for Carbon Observations from Space, in response to the Group on Earth Observations Carbon Strategy. CEOS is also responding to the Global Earth Observation System of Systems (GEOSS) Water Strategy Report by preparing a CEOS Strategy for Water Observations from Space, which was recently endorsed by Space Agencies at the CEOS Plenary in November.

Appendix F. CEOS Position On Future CEOS-GEO Relationship

29th Committee on Earth Observation Satellites (CEOS) Plenary
5-6 November 2015, Kyoto, Japan

At its 29th Plenary meeting, Chaired by JAXA in Kyoto, Japan on the 5th and 6th of November, 2015, CEOS endorsed its position on the next decade of GEO and the future of the CEOS-GEO relationship.

The 29th CEOS Plenary emphasized that CEOS values the unique convening power of GEO among Members, Participating Organizations and Observers.

In order to extract maximum value from space observations contributed by CEOS Agencies, the 29th CEOS Plenary recommended that GEO focus its efforts in the next decade to:

- systematically define and prioritize requirements for each Societal Benefit Area;
- improve integration of space and *in situ* data, noting the need for ongoing development of the space segment of the GEOSS;
- mobilize resources from development banks, international finance institutions and philanthropic organizations in support of GEO objectives;
- deliver impact into major global and regional agendas; and
- develop stronger and more explicit links with United Nations institutions.

The 29th CEOS Plenary expressed its support for a foundational 'space task' in the 2016 and future GEO Work Programmes, noting the long-term efforts of CEOS Agencies through the CEOS Virtual Constellations and Working Groups to implement the space segment of the GEOSS.

The 29th CEOS Plenary emphasized the unique value of Participating Organizations in the governance and leadership of GEO, through their participation in the proposed GEO Programme Board and the GEO Executive Committee. The 29th CEOS Plenary therefore recommended that the revised GEO Rules of Procedure ensure that:

- Programme Board composition reflect the full breadth of competence and responsibilities of GEO contributors and stakeholders.
- Representation at both ExCom and Programme Board should recognise and reflect the distinct roles of each body.
- POs are able to adopt suitable internal processes to ensure appropriate and flexible representation at each body.

In recognition of the sustained scale and scope of CEOS Agency resources and contributions to GEO, the 29th CEOS Plenary resolved that CEOS shall propose to:

- Serve among the Participating Organizations at the GEO Programme Board; and
- Subsequently, participate as an Observer to the GEO Executive Committee.

Appendix G. CEOS Statement to GEO Mexico City Ministerial Summit

CEOS Formal Statement to the
GEO Mexico City Ministerial Summit
by Dr. Alex Held, 2015 CEOS Chair Representative
Commonwealth Scientific and Industrial Research Organisation (CSIRO)

Chair, Distinguished Guests, on behalf of the Committee on Earth Observation Satellites (CEOS), it is an honour for me to give this statement, coming as it does at the closing of one decade of the important CEOS-GEO relationship, and the dawning of an exciting new one.

Earth observations from space provide the only comprehensive, global, long-term understanding of the Earth system and how it changes that we have. Satellite data significantly augments the accuracy and quality of information derived from other sources of Earth Observation data, leading to improved scientific understanding, better informed decision-making, costs savings and greater societal benefits, and for that reason it is a foundation for all GEO activity.

Through the major sustained investments made by its 55 Agencies that include the largest space agencies in the world and major stakeholder users of satellite data, CEOS coordinates the availability of satellite data to GEO. As of November 2015, CEOS Agencies have over 130 Earth observation satellites in orbit, and CEOS was by far the largest provider of data to GEO.

The coordination role that CEOS plays benefits GEO in many ways: it makes satellite observation of the Earth more cost effective for individual governments; enables more comprehensive observation of the Earth system; enables more data to be made available for more users, a significant portion of it at no cost; and ensures important data gaps are closed. By working together through CEOS, we are able to bring the potential benefits of satellite data to all nations, space-faring or not.

GEO's ability to convene and connect all players, across the complete value chain is its core strength. It is the means by which the comprehensive satellite data we provide is translated into products that deliver impact in the hands of those tackling big issues like sustainable development, disaster risk reduction and climate change.

CEOS fully supports the GEO Strategic Plan 2016-2025. In our view, this plan lays a very strong foundation and promises a bright future for the next decade of GEO.

We welcome the important commitments in the proposed Ministerial Declaration. Specifically, we note our strong support for the emphasis placed on: the convening power of GEO; the need to increase data sharing; and the importance of engaging proactively and strategically with United Nations institutions and programmes, development banks and philanthropic organizations.

CEOS is committed to contributing to the future success of GEO.

Appendix H. CEOS Statement to GEO-XII Plenary

CEOS Formal Statement to the
Twelfth Plenary Session of the Group on Earth Observations (GEO-XII)
by Dr. Alex Held, 2015 CEOS Chair Representative
Commonwealth Scientific and Industrial Research Organisation (CSIRO)

Chair, Distinguished Guests, on behalf of the Committee on Earth Observation Satellites (CEOS), it is my pleasure to provide you with the formal statement of CEOS engagement and contributions to GEO. It is an honour for me to give this statement, coming as it does at the closing of one decade of the important CEOS-GEO relationship, and the dawning of an exciting new one.

CEOS, through the major sustained investments made by its fifty-nine Member and Associate Agencies, continues to develop the space segment of the GEOSS and coordinates the availability of space-based Earth observations to GEO.

As of November 2015, CEOS Agencies had over 130 Earth observation satellites in orbit. Through CEOS, these Agencies work together to ensure sustained international coordination of these assets and the data they produce with the aim of delivering as much societal benefit as possible.

Through these activities, CEOS provides significant support to GEO at all levels. CEOS implements the space segment of the GEOSS and is the most prolific data provider. CEOS has been a major player in successful 'Flagship' initiatives like Blue Planet, GFOI and GEOGLAM. In 2015, CEOS led and contributed to almost 50% of the Tasks and Components of the 2012-2015 GEO Work Plan. Our contribution to new 2016 Work Programme is also going to be significant with direct participation in 60% of the candidate initiatives likely to form the first tranche of flagships, 30% of other candidate initiatives, and community activities across diverse topics.

As much as we often like to talk about the significant contribution we make to GEO activity, we also want to clearly express our appreciation of GEO.

CEOS relies on close partnerships with international user bodies, service providers, government and international agencies, and others, to ensure its efforts are linked with important international agendas and critical user needs. We therefore support strongly and value the convening power of GEO, providing an opportunity for efficient and effective interactions between data providers, such as space agencies, and decision makers in a single forum.

It is with pleasure that I can state that at the 29th CEOS Plenary held last week in Kyoto, the space agencies and associate members assembled expressed their strong support for the text of the *GEO Strategic Plan 2016-2025* submitted for consideration at this meeting.

CEOS Plenary highlighted two other areas in the new Strategic Plan.

Firstly, CEOS Plenary noted the emphasis now placed on the important and unique role that GEO plays in connecting and convening players along the Earth observation value chain. CEOS will be looking to GEO to significantly increase efforts in this area, and sees the coming months as key in more clearly defining and communicating the value proposition GEO offers these groups in order to foster a greater interest in partnerships.

Secondly, CEOS Plenary warmly welcomed the major emphasis GEO will place on the definition of authoritative and clearly prioritized user requirements. This will greatly support CEOS's efforts to work systematically to implement a space segment that provides sustained and comprehensive observations of all aspects of the Earth system.

CEOS Plenary further expressed CEOS's commitment to build on its significant existing contribution to the work of GEO at a practical level, and CEOS's desire to expand it over time. CEOS will take leadership on the dedicated foundational 'space task' that features in the new GEO Work Programme, and will continue to contribute on activities to promote integration of space and *in situ* data. CEOS will also play a key role in the new GEO-DARMA disaster risk reduction initiative, which responds to the Sendai Framework for Disaster Risk Reduction 2015-2030; work with GEO to support implementation of monitoring frameworks for the Global Goals for Sustainable Development; and implement our strategic response to the GEO Water Strategy unanimously endorsed last week.

CEOS Plenary also affirmed CEOS's desire to embrace new opportunities to contribute to the leadership and governance of GEO. CEOS Plenary noted that the continued success of GEO in the 2016-2025 period is best served by maintaining the close coordination between CEOS and GEO demonstrated since 2005, and expressed the strong view this is best achieved through representation of CEOS on the GEO Programme Board and as an observer on the GEO Executive Committee. CEOS Plenary agreed that CEOS should formally seek to be an Observer on the Executive Committee when the time arises.

CEOS Agencies strongly believe that the next decade of GEO will build upon the accomplishments of the last decade; and that the *GEO Strategic Plan 2016-2025* lays a strong foundation for future success. We encourage all existing, and potential, GEO participants and partners to work together to implement that Strategic Plan and make that success a reality.

We, as CEOS, as the 'space arm' of GEO, will do our part. Thank you.