MINUTES OF THE 26th CEOS PLENARY MEETING

25th-26th October 2012
Bangalore, India

Thursday 25th October: Work Plan Implementation Day

Welcome and Opening Session

1 Welcome and Opening Remarks

The Chair, Kiran Kumar (ISRO), opened the meeting and welcomed participants to the 26th CEOS Plenary and to India. He welcomed the ISRO Chairman, Dr. K. Radhakrishnan, to the opening session of the CEOS Plenary. Kiran Kumar invited a tour de table for participants to introduce themselves. The list of participants is provided as an Annex to the minutes.

Dr. K. Radhakrishnan added his welcome to India and noted that ISRO was very pleased to serve as CEOS Chair for 2012, and to contribute to global cooperation. He gave a short history of the Indian space programme and explained about the National Natural Resources Management System and the ISRO satellites currently operating. He outlined ISRO future programmes and plans – including for Earth Observation (EO) satellite missions.

2 Organisational and Membership Matters

Rajeev Jaiswal (ISRO) explained the role and mandate of the Earth System Science Organization (ESSO)/Ministry of Earth Science (MoES) of India. ESSO has approached CEOS with a view to becoming an Associate Member and ISRO has confirmed that they meet the necessary membership criteria.

Dr. Ravichandran (ESSO) gave a short presentation on ESSO and its activities. ESSO was formed in 2006 to bring the ocean and atmosphere departments of Government of India under one umbrella.

ESSO is active in the acquisition and processing of satellite data in India. It supports domestic users in a range of sectors including fisheries and agriculture. ESSO hopes to contribute to CEOS objectives in relation to cal-val, Virtual Constellations, and thematic areas such as climate, weather, agriculture, and water.

Stephen Briggs (ESA) noted the long heritage of India in relation to practical applications of satellite EO. He hoped ESSO could support the WGClimate and the SST-VC and he expressed support for their application to become Associate member.

With no objections expressed, the Chair welcomed ESSO as the newest Associate Member of CEOS and invited its representatives to join the remainder of the Plenary. He encouraged ESSO's active participation in relevant CEOS groups and activities.

26-1	**CEOS SEO to revise the CEOS membership list online to reflected ESSO's Associate Membership. SEO and CEO to ensure that CEOS Associate-P and Associate-C contact lists are also updated.**	**November 2012**

3 Coordination of Open Action Items from 25th Plenary

Rajeev Jaiswal (ISRO) reviewed the status of actions from the 25th CEOS Plenary, and no specific comments were raised.

No.	Action	Due Date
25-1	The CEOS web team (SEO) to update the CEOS membership and contact lists to include Global Geodetic Observing System (GGOS) as an Associate Member, and Netherlands Space Office (NSO) as a Member	**COMPLETE** **Information added to ceos.org.**
25-2	SST-VC Team to prepare a full Implementation Plan, per the Constellations Process Paper, in time for review at SIT-27	**COMPLETE** **The SST-VC has been formally established and is ramping up capacity.**
25-3	CEOS agencies should work with the CEOS International Directory Network (IDN) team to register their data collections	**CEOS-26** **To be reported under item 29 WGISS report.**
25-4	CEOS Agencies encouraged to support the long-term funding necessary for the CEOS WGISS Integrated Catalogue (CWIC) development and operations, and to work with WGISS to become a "CWIC Partner"	**CEOS-26** **To be reported under item 29 WGISS report.**
25-5	WGISS should develop CWIC guidelines for future data partners to understand requirements	**COMPLETE** **CWIC development is proceeding and has been reported at SIT-27 and the SIT Technical Workshop.**
25-6	WGISS to engage related agencies and to lead an investigation into the opportunities and obstacles for the interoperability of HMA and CWIC, providing a report and recommendations to CEOS-26	**CEOS-26** **To be reported under item 29 WGISS report.**
25-7	CEOS Chair and SIT Chair, in coordination with CEOS SEC, to ensure CEOS is kept appraised of and engaged in the post-2015 GEO planning process	**CEOS-26** **To be reported under items 10 and 11, GEO report and Post-2015 GEO WG report.**

25-8	CEOS agencies invited to nominate additional authors in support of the CEOS Carbon Strategy report – contact the Carbon Task Force co-leads	**COMPLETE** **The CTF writing teams are now fully staffed. Support to the review and release phase may be requested.**
25-9	CEOS agencies encouraged to support Carbon report co-author travel to the key meetings and to offer to host writing meetings. SIT Chair will issue a call for such support	**COMPLETE** **Progress to be reported under item 14.**
25-10	CEOS agencies to ensure expert representation at the Carbon Strategy Report review meeting in La Jolla on 29th March 2012	**COMPLETE** **A successful CTF side meeting was held the day and a half following SIT-27.**
25-11	Carbon Task Force Co-Chairs to contact CEOS agencies to establish points of contact able to supply programmatic information and clarifications in support of the Carbon Strategy Report	**COMPLETE** **To be reported under item 15.**
25-12	Stakeholder agencies to explore management and operation arrangements for the GFOI Space Data Coordination Group	**COMPLETE** **The first two SDCG meetings have been held in 2012, and the third is planned for early 2013. USGS, ESA, and NSC are co-chairing, and LSI is being consulted on potential dataset coordination.**
25-13	GFOI Space Data Coordination Group to develop the GFOI Baseline Global Space Data Acquisition Strategy for 26th CEOS Plenary, including a year-by-year plan through to 2015	**CEOS-26** **To be reported under item 16 SDCG report.**
25-14	CEOS agencies to consider providing nominations for a Vice Chair for WGISS	**COMPLETE** **Richard Moreno/CNES nominated.**
25-15	CEOS Chair to write CEOS agencies outlining the WGISS Work Plan and objectives for the coming years and inviting representation from CEOS agencies not currently active	**COMPLETE**
25-16	CEOS Agencies encouraged to consider taking on responsibility for QA4EO secretariat and website maintenance	**COMPLETE** **UKSA providing support.**
25-17	CEOS Chair to coordinate input of consolidated CEOS comments on the Climate Architecture Report	**COMPLETE** **WGClimate is managing this on going activity.**

25-18	WGClimate and SST-VC to undertake a pilot effort in 2012 to demonstrate the approach and benefits of the contribution of the CEOS Constellations to ECV coordination – and to report to CEOS-26 with a progress statement and recommendations	**CEOS-26** **To be reported in the Climate Session, items 24-28.**
25-19	WGClimate to coordinate with the ESA MIM team to determine how best to integrate the ECV survey process into the full 2012 MIM update	**COMPLETE** **The ECV Inventory was circulated with the 2012 MIM update.**
25-20	WGClimate to report on their initial progress towards the CEOS ECV inventory and assessments	**CEOS-26** **To be reported in the Climate Session, items 24-28.**
25-21	SIT Chair, in coordination with CEOS SEC, appoint an ad-hoc Task Group on Participation, to report to SIT-27	**COMPLETE** **Participation was a major topic at SIT-27, and is a topic of the CEOS Self Study Implementation Initiative (CSSII)**
25-22	CEOS Chair, in coordination with CEOS SEC, to develop discussion and recommendations for CEOS Plenary, around the Membership issues raised by the CEOS Self Study	**CEOS-26** **To be reported in the CSSII session, items 6-8.**
25-23	CEOS agencies to send written comments on the Self Study outcomes and the proposed way forward to SIT Chair	**COMPLETE** **CSS finalised in early 2012.**
25-24	CEOS Chair, in coordination with CEOS SEC, to lead development of a CEOS Work Plan for 2012	**COMPLETE** **Work plan finalised in early 2012.**
25-25	SIT Chair to lead development of the White Paper on CEOS "Essential Questions" suggested by the Self Study	**COMPLETE** **EQ's have been circulated, will be discussed at Plenary, and answers developed and presented at SIT-28.**
25-26	SIT Chair, in coordination with CEOS Chair and SEC, to initiate planning and development of the CEOS Guiding Documents (Strategic Guidance; Implementation Plan; 3-year Work Plan) suggested by the Self Study	**ON-GOING** Teams established: CEOS-26 Documents complete: CEOS-27 **To be reported in the CSSII session, items 6-8.**

25-27	CEOS Chair will convene a short CEOS Plenary session at SIT-27 in order to elect a Vice Chair for SIT	**COMPLETE** **CNES elected as SIT Vice Chair for 2014-15.**
25-28	CEOS Chair and SIT Chair, in coordination with CEOS SEC, will steward the further definition of the emerging initiatives (GEO-GLAM, Polar Ecosystems, Water, Biodiversity, expanded Disasters activities) for their further consideration at SIT-27	**SIT-27** **To be reported in the Key GEO and CEOS Initiatives Session, items 20-23.**
25-29	CEOS agencies interested in participating in further side discussions on disaster-related matters, as raised by ESA at Plenary, to contact CEOS Chair	**COMPLETE** **To be reported under item 17.**
25-30	ESA to confer with CEOS SEC on the definition of the approach and contents for the EO Handbook 2012	**COMPLETE** **Rio+20 print handbook published.**
25-31	CEOS Chair, in collaboration with CEOS SEC and INPE, to manage CEOS engagement and inputs for Rio+20	**COMPLETE** **Support for Rio+20 provided by CEOS Chair and SIT Chair, JAXA, CEOS SEO, ESA, CEO/DCEO, and others.**
25-32	ASI CEOS Chair team to conclude and issue the final version of the Lucca Statement	**COMPLETE**

4 Report from the Chair: Accomplishments and Challenges

Kiran Kumar (CEOS Chair) reviewed the CEOS outcomes for 2012:

- 22 of the 32 25th CEOS Plenary actions are complete with 10 ongoing;
- Addressing governance of CEOS through the CEOS Self Study Implementation Initiative;
- Formation of the Space Data Coordination Group (SDCG);
- Formalization of the Sea Surface Temperature VC (SST-VC);
- Contributions to the GEO Post-2015 Working Group;
- GFOI Satellite Data Acquisition Planning;
- GEOGLAM Data Requirements Development and Analysis;
- Rio+20 Outreach, EO Handbook 2012;
- *Ad hoc* group activities on Disaster risk mitigation;
- Data Democracy Promotion (WGCapD initial meeting);
- QA4EO Coordination (CEOS WG on Calibration/Validation);
- The CEOS response to the GCOS Implementation Plan 2010;

– Carbon observations (including those to support national forest inventories/assessments), GFOI Satellite Data Acquisition Planning;

– Capacity building and data democracy for e-learning and remote sensing data usage; and

– Integrated water cycle products and services and the GEO BON network.

Kiran Kumar referred to some recent studies on trends in Earth observation spending and plans. The outlooks suggest a significant dip in EO spending in coming years, with a resulting reduction in new missions. CEOS will have to adapt to a reduced budget scenario and to realities of virtual participation in meetings, for example. Kiran also underlined the on-going trend in space agencies for free and open data access.

He stated that "Coming together is a beginning; keeping together is progress; and working together is success". For the latter, the key challenge for CEOS agencies will be to focus on sustained satellite observations to meet the needs of societal services and applications. In order to sustain the delivery of these Earth observations in relation to societal benefits, CEOS must continue to attract support from its membership by continuing to deliver on its potential as a value-adding coordination organisation.

Kiran Kumar recalled the future leadership succession in CEOS and wished CSA (Chair 2013), NASA (SIT Chair 2012-13), EUMETSAT (Chair 2014), and CNES (SIT Chair 2014-15) success in addressing these challenges.

5 CEOS Executive Officer Report

Tim Stryker (CEO) reported:

– **Macro view:** Tim referred to the CEO/DCEO team's intended accomplishments for 2012, as stated at the Lucca Plenary, including: continuity of all major CEOS activities; support of an enhanced strategic focus for key CEOS leadership meetings; continued support to GEO; support for the implementation of priority CEOS self-study recommendations as well as maintaining insight to and assistance of CEOS community needs;

– **Micro view:** Tim reviewed CEO/DCEO's active support of CEOS leadership priorities through liaison, advice, and delivery of key CEOS deliverables, including: the 2012 CEOS Work Plan for 2012; their significant coordination work with external stakeholders and CEOS contacts – most notably with the GEO Secretariat; and, their regular reporting, editing, and analytical work.

– **Current and future challenges:** Tim described the accretion of duties for the CEO/DCEO since the position's establishment. He emphasized the need to carefully delineate CEOS leadership roles and responsibilities, to maximize the impact of CEOS's many volunteers. This activity should also clearly define the roles and responsibilities of the CEO and DCEO. Tim also said that he expected continued evolution of CEO/DCEO interactions with major stakeholders at GEO, the UNFCCC, and elsewhere, and that these activities remain a very important part of the CEO/DCEO position.

On the way forward, Tim expressed his hope for continued engagement of CEOS leadership at all levels, and resource support for CEOS activities, to include provision of a new DCEO. CEOS needs to maximize the value and impact of its Working Groups and VCs. It will be important to increase CEOS membership participation to maintain and enhance CEOS capacity.

Tim thanked all CEOS colleagues for their excellent working interactions and support during his term as CEO, including the SEO team, and Kerry Sawyer as DCEO. He anticipated an equally

productive term for Kerry who will now take on the CEO role. He encouraged CEOS agencies to submit their nominations for the role of DCEO.

Conrado Varotto (CONAE) acknowledged the foresight of Barbara Ryan when Chair in 2007 for proposing the role of CEOS Executive Officer (CEO). Stefano Bruzzi (ASI) thanked Tim and Kerry for their contributions and urged CEOS agencies to identify a suitable representative for the DCEO. Jean-Louis Fellous (GCOS) reaffirmed that the CEO/DCEO role is too much for one person. Both Ivan Petiteville (ESA) and Stefano hoped that the incoming CEO will benefit from additional resources that are necessary to perform the duties.

Kiran Kumar (CEOS Chair) thanked Tim and Kerry for their tremendous effort over the last two years. Mike Freilich (SIT Chair) stressed that the responsibility falls on CEOS Principals to staff the DCEO position and to offer names before leaving Bangalore.

26-2	**CEOS agencies encouraged to submit nominations for the role of Deputy CEOS Executive Officer (DCEO).**	**November 2012**

6 CEOS Self Study Implementation Initiative (CSSII) Overview

Mike Freilich (SIT Chair) introduced the session and explained the proposed process and flow. First will be the report to the 2012 CEOS Plenary followed by a discussion of Plenary decisions to map a course to the 2013 CEOS Plenary. The CEOS website (www.ceos.org) has a page dedicated to the CSS, which includes its timeline, approach, and supporting documentation.

Mike recalled the five key recommendations from the CSS:

- Strategic Objectives: *Document CEOS principles and priorities;*
- Decision-making and New Initiatives: *Develop a process for selecting new initiatives;*
- Organizational Functions: *Articulate functions needed to accomplish mission and consider modifying current structure to better suit functions;*
- Membership and Participation: *Develop process for acceptance of new members and find out why some members are not participating; and*
- Meeting Objectives: *Reduce redundancy, balance reporting with discussion/decisions.*

He recalled that the Lucca Plenary and SIT-27 had concluded that CEOS should develop three guiding documents:

- Strategic Guidance document (with 10-12 year longevity);
- CEOS Governance and Processes document(5-7 year longevity); and
- Work Plan (3-year longevity, updated annually).

CSS Implementation is being done over two years and in two phases:

- **Phase 1 *Plenary 2011 – SIT-28*:** Reports/Implementation of easy-consensus matters: Develop options for core/substantive issues; and
- **Phase 2 *Plenary 2012 – Plenary 2013*:** Develop CEOS Guiding Documents.

Progress has been substantial since SIT-27, including: a CSSII workshop at the SIT Technical Meeting in September 2012; completion of the Membership & Participation Study; identification of the CEOS Essential Questions; definition and approach for the three documents; and three topical teams to study/provide options for key elements (Major Meetings,Organizational Roles and Responsibilities, and Decision-Making Processes).

In the 2nd phase, the three key documents will be developed. The SIT Team will appoint a steering committee to oversee each document and volunteers are requested at Plenary.

Content will be developed by iteration with the full membership, including options for Plenary to decide upon that were derived from the work of the three topical teams. A professional writer has been secured by NASA to ensure consistency among the documents and support with document editing. Substantial decisions will be made by Plenary consensus – though not necessarily at the annual meeting only (there may be Plenary sessions at other meetings). An iterative process is a key to ensuring consensus.

Mike Freilich would like to consider focused discussion sessions at most planned CEOS meetings in 2013 including remote participation. Email inputs will be welcome at any time and a POC will be established for each document.

26-3	**CEOS Agencies are invited to nominate volunteers for the CSS key documents steering committees.**	**November 2012**

7 Reports from the Three CSSII Working Committees

Mike Freilich (SIT Chair) moved to quick updates on each of the three topical teams established at the SIT Technical workshop:

Meetings Team: Ivan Petiteville (ESA) reported on this topic. He explained that the CSS recommendation was to develop coordinated objectives and formats for the CEOS Plenary meeting, SIT meeting(s) and SEC telecons to encourage discussion and decision-making; and to balance reporting with strategic discussions that engage and utilize all CEOS functional groups. The objectives are to ensure clear definition of the purpose, main objectives and participating audience for each meeting on the CEOS annual calendar. Ivan reviewed the current CEOS annual calendar of major meetings including the SIT meetings and CEOS Plenary. He asked for new members to join the topical team to help bring a variety of opinions. Ivan noted that CEOS meetings have been shaped through an iterative process during almost 30 years; future recommendations are likely to be adjustments rather than revolutionary ideas. Preliminary recommendations will be made to CEOS Secretariat from January 2013.

Roles & Responsibilities: Paul Counet (EUMETSAT) recalled the objective of seeking to maximize benefit of participation for CEOS agencies by re-connecting with CEOS essential business/core activities, and aligning the CEOS mechanisms accordingly. The methodology for the topical team is to: construct the organizational *status quo* from existing documentation; identify duplications, inconsistencies and gaps; and, make proposals to address issues identified. The aim is to finalise a set of options for consideration at SIT-28.

Decision-Making Processes: Tim Stryker (CEO) recalled the CSS objective of adopting systematic and useable corporate decision-making processes for CEOS. The status report contained some early ideas for Plenary consideration. The schedule for further development was shown including presentation and discussion of recommendations at SIT-28. Initial findings from the CSS were that:

- CEOS should continue to meet existing commitments;
- CEOS's current *ad hoc* decision-making approach is no longer sufficient; and
- A clear, fair, systematic and reliable mechanism is required to assist CEOS in determining which new initiatives/projects should be undertaken (and continued).

The team has a number of initial ideas under consideration, including:

- The need for inclusive and dynamic decision-making;
- A possible review team for proposed major new initiatives;
- Strategic acceptance/rejection of requests;
- Granting different scales of CEOS support; and
- Feedback and approval mechanisms at SEC, SIT and Plenary levels.

Stefano Bruzzi (ASI) expressed the need for caution in proliferating groups to review and implement the CSSII outcomes. We should be careful in not paying more attention to the process than the substance of the decisions that need to be taken. Mike Freilich noted the concern and hoped that CEOS activities of substance have not been adversely impacted by the CSS effort over the last year.

Stephen Briggs (ESA) thanked the participants for their work to date, which appears to be headed in the right direction. He also recalled that the CEOS Working Groups (WGs) should first dedicate their resources to support the activities decided by the Plenary. Only after that, the WGs might conduct activities on topics of interest to them, should they have further resources available. Pascale Ultre-Guerard (CNES) noted the need for coordination among the three groups. Mike Freilich explained that it will happen in the production of the three key documents. Brent Smith (NOAA) suggested that the effort is essential and there will be substantial work necessary in the next twelve months. He suggested that the CEOS identity and activities need to be clarified and focused with a clear sense of purpose that all members can understand. Stephen Briggs suggested that SIT-28 will be a critical milestone for substantive discussions around the CSS matters. Mike Freilich added that there may be significant issues outstanding after SIT-28 and hoped there would be opportunities to revisit them before next year CEOS Plenary – even if through virtual meetings.

8 Discussion Time

Mike Freilich (SIT Chair) returned to the Membership and Participation (M&P) study outcomes for discussion and approval. A key recommendation is for CEOS leadership to initiate individual contact with inactive Members and Associates in order to re-engage them. There were four broad themes with corresponding recommendations in the M&P study:

- Contact management: Individuals move or retire and institutional contact is lost;
    - Recommendations: Establish secondary points of contact;work to support CEOS visibility to members at organizational levels; and make it easy and routine for members to provide contact updates;
- Alignment of CEOS with particular members' agency or organizational goals: Members may join/become active to participate in a specific, time-limited activity;
    - Recommendations: One-on-one engagement; understand as a positive organizational dynamic; and articulate the value proposition of CEOS;
- Institutional barriers and impediments: Lack of resources;
    - Recommendations: Leverage existing meetings, use telecons, and develop capacity for virtual meetings;
- "Invisible Participation": members active at particular working levels but not Plenary;
    - Recommendations: Recognize and value the contributions of these members; record participation in working level meetings; and archive attendance lists.

A policy was proposed to ensure participation by recording attendance and participation at all working level activities. The establishment of a central repository for attendance lists was proposed so that participation is more readily visible to CEOS leadership.

26-4	**SEO, with input from CEO, to establish an on-line record of attendance for all CEOS meetings.**	**December 2012**

Barbara Ryan (GEO Secretariat Director) queried the strategy around engagement of user programmes as Associates and their tendency to attend and participate these days in GEO rather than CEOS. Stephen Briggs (ESA) suggested that we might revisit the original members of the IGOS Theme Teams and ask whether they believe the user interests are being maintained through GEO or CEOS. Brent Smith (NOAA) noted that IGOS Themes were invited to integrate as Communities of Practice into GEOSS with the termination of the IGOS Partners activity in 2007. He stated that the post-2015 GEO Working Group is addressing the status of Communities of Practice and user engagement. Some of the Theme Teams were very well accommodated by the transition to GEO whilst others were less so. We should explore whether there has been a loss of capability with the establishment of GEO. Patricia Jacobberger-Jellison (NASA, virtual) noted that these issues were addressed in the CSSII M&P Study.

Ruth Boumphrey (UKSA) suggested that it is difficult for smaller agencies to keep up to date with the full range of activities in CEOS, and would welcome opportunities for occasional routine briefings in-country to encourage understanding and participation. She added that some of these agencies may be willing to host such smaller scale activities, which would have the added benefit of raising awareness and understanding of the work of CEOS among a broader audience at their agencies. Mike Freilich welcomed the suggestion and undertook to consider how to go forward with it. Tim Stryker (CEO) suggested that CEOS leadership could look to existing meeting schedules and append dedicated briefing days to serve the purpose of informing countries and their stakeholders. It was suggested that webinars would be a useful mechanism for promoting CEOS activities and securing broad engagement. Mike Freilich asked the Membership and Participation group to consider developing a suitable presentation set to promote CEOS activities. Tim noted that such a presentation set already exists and could be updated and expanded as necessary.

26-5	**CEO to lead an update and expansion of the CEOS presentation set and to provide a broad distribution of the information for CEOS Agencies and stakeholders.**	**January 2013**

Stefano Bruzzi (ASI) suggested that the forthcoming key documents can be the basis for an improved and expanded set of materials communicating CEOS objectives and activities, including a refresh of the website. Stephen Briggs noted that the CEOS SEC members have a standing role in promoting CEOS objectives within their respective regions. ESA is willing to undertake the promotional activities within Europe and Africa using the relevant materials.

Mike Freilich returned to the issues around deciding new CEOS projects and the need for a formal decision-making process to choose new projects. Stephen Briggs remarked that CEOS does not make commitments, but rather, individual agencies make commitments that lead to providing the resources. We need to understand the distinction. Alain Ratier (EUMETSAT) suggested that CEOS should only engage in projects where it can make a real difference. Also projects have a beginning and an end and CEOS needs to systematically terminate projects that are seen as complete. Mike Freilich concurred, but also noted that CEOS as an organization identifies areas of priority and this topic is covered within the CSS scope – in particular the need to be able to define a cooperative framework. Mike stressed the need to be able to decide when a

project is genuinely a CEOS endeavour and would benefit from collaboration, rather than an activity undertaken mainly by a single country or countries. In this regard, Patricia Jacobberger-Jellison (NASA, virtual) noted that the Essential Questions (EQs) were circulated about a month ago and are available on the CEOS website. Pat will circulate an email soon after Plenary on the way forward for answering the EQs.

Ivan Petiteville (ESA) noted that the failure in the execution of a project supported by only a small number of agencies might result in a negative image for CEOS as a whole. For that reason, the endorsement of new projects cannot be left to the decision of only a few CEOS Agencies participating in candidate new projects for which they are seeking a CEOS identity.

Klaus Schmidt (DLR) cautioned against using the CEOS brand to justify national funding or participation and to clearly indicate the value-added by CEOS. Conrado Varotto (CONAE) stressed the need for Principals to be able to demonstrate the value-added by CEOS when promoting projects nationally. Jean-Louis Fellous (GCOS) suggested that the CEOS Response to the GCOS IP is a fine example of the added value of CEOS as a collection of space agencies that can individually benefit and guide national activities and priorities.

Mike Freilich (SIT Chair) asked whether Plenary endorsed the substance of the Membership and Participation Report (M&P). Plenary endorsed the Report.

9 Progress on Key GEO Priorities

Barbara Ryan (GEO Secretariat Director) reported on key GEO initiatives, noting that the 2012 priorities for CEOS support were:

- Coordinated data acquisitions, data access and R&D support for GFOI, GEOGLAM/JECAM, Disasters Supersites, and biodiversity;
- The space response to the updated GCOS IP and Satellite Supplement; and
- Architecture for Climate Monitoring from Space.

She noted that:

- GFOI extends the GEO Forest Carbon Tracking Task (FCT); GFOI aims to operationally enable and support the worldwide development of national forest information systems;
- GEOGLAM is an emerging initiative focused on food security and price stability objectives;
- The GEOSS Common Infrastructure (GCI) promotes brokerage and interoperability services;
- The Water Cycle Initiative is seeking a more complete understanding and management of water resources on the continental scale; and
- The UN Convention on Biodiversity has asked for support to achieve the biodiversity 2000 targets.

The GEO Secretariat has undertaken an overview assessment of the progress of the GEO WP Tasks. This includes looking to articulate the value-added components of GEO in its post-2015 efforts, including initiatives such as GFOI and GEOGLAM, and the International Charter's recent decision to implement Universal Access. She highlighted the impact of free and open data policy of Landsat, with a daily average of 5,700 scenes delivered by internet, contrasted with a best annual average of 53 daily during the commercial era.

The GEO-IX Plenary will be held from the 22nd to 23rdof November 2012 in Foz do Iguaçu, Brazil. Documents are available on the GEO website. Barbara noted that the private sector is heavily involved in the energy Task, in the Open Geospatial Consortium process, and elsewhere. There is a document on this topic amongst the documents posted on line for the 2012 GEO Plenary.

Stephen Briggs (ESA) questioned the GEO slide on 2012 priorities for CEOS support and asked how GEO proposes to take forward their global biodiversity initiative (provisionally called the GBOI). Barbara noted that the activity is at a very early stage and next steps will be discussed with the Secretariat of the UN Convention on Biodiversity (UNCBD) and other stakeholders in the near future.

Ivan Petiteville (ESA) recalled the traffic light chart that was just created to highlight the status of the various GEO Work Plan Tasks/Components and queried why IN-01 (Earth Observing Systems) is indicated as red – suggesting there is a risk of misleading readers to feel the space component is not performing well, which is not the case as the difficulties encountered are related to the *in situ* observation systems. Barbara noted the point and suggested that it would be addressed in the text supporting the stoplight chart. Brian Killough (SEO) confirmed that the 'red rating' was predominantly due to lack of progress on *in situ* observations.

Mark Dowell (WGClimate) recalled the effective process of the GCOS IP, which provided detailed requirements to respond to. He commended such detail as necessary for the likes of the biodiversity initiative – typically GEO strategy documents do not give a strong enough basis for space agencies to respond effectively. Tim Stryker noted that he had shared background materials on the GCOS IP, its Satellite Supplement, and the CEOS Response, with Martin Wegmann (CEOS Biodiversity SBA Coordinator, DLR) and Woody Turner (NASA), for their use in advising the UN CBD on how CEOS Agencies might best address its interests.

Lawrence Friedl (NASA) asked how the GEO Secretariat intends to react to the post-2015 analysis and promoting and recognizing those initiatives that have been seen to be the most successful in achieving GEO goals. Barbara suggested that the process had not gone that far as yet.

Adam Lewis (Geoscience Australia) referred to the USGS open data policy and how Australia benefited from that policy. He suggested that GEO should be commended for their leadership on promoting open data policies.

10 CEOS Perspective on Post-2015 GEO

Brent Smith (NOAA) presented a summary of how CEOS has engaged in the activities of the GEO Post-2015 Working Group, which was established at the November 2011 GEO Plenary. He recalled that SIT-27 had established a CEOS *ad hoc* team on Post-2015 GEO and this team had worked to provide a set of CEOS recommendations that the CEOS and SIT Chairs had sent to the GEO WG Co-Chairs in late May 2012. Many of the CEOS recommendations were taken into account in the preparation of a GEO Post-2015 document that has been submitted to the upcoming GEO IX Plenary for "consultation". This document outlines the vision for GEO and GEOSS beyond 2015, discusses issues, and proposes options regarding the strategic directions, the Societal Benefit Areas, and the governance of GEO post-2015. The Working Group will use the GEO-IX response and guidance to prepare a decision document on future GEO/GEOSS for the November 2013 GEO-X and Ministerial.

Brent addressed the set of recommendations from the document, urging CEOS Agencies to review the entire document, which he and Tim Stryker had provided in connection with this CEOS Plenary agenda item, to help prepare not only the CEOS position going into the GEO Plenary but also to inform their national GEO delegations as to their preferred options.

The first recommendation in the report addressed the question of whether GEO should continue to exist Post-2015. The Working Group's recommendation is as follows: (Recommendation 1)

Recommendation 1: *The WG strongly believes that the need for GEO remains and that, while recognizing there is room for improvement, GEO is making significant progress towards meeting its Strategic Targets. Considering the urgency of the global challenges faced by humanity and the benefits of a response involving an international, collective approach to supplying Earth observations, the WG recommends that GEO, and the implementation of GEOSS, be continued.*

The Working Group then addressed a number of strategic directions for GEO, including the following options:

A: GEO will function as a ***catalyst***; identify needs for application and services: financial model would remain unchanged.

B: In addition to A, GEO will commit appropriate resources to implement/sustain a ***more robust/expanded GEOSS information system;*** a strengthened financial model needs to be elaborated.

C: In addition to B, GEO will ***incubate specific applications and services*** and arrange for these to be adopted/supported/managed by specific governments/organizations; a moderately strengthened model for GEO would need to be elaborated.

D: In addition to C, GEO will develop and deliver, on a continuing basis, a sequence of ***operational applications and services*** in support of international priorities; an entirely new financial model would be needed.

From these Strategic Direction options, the WG suggested that Option C be selected in its second overall recommendation:

Recommendation 2: *Considering the demonstrated success of the incubation model, the Post-2015 WG recommends Plenary endorse Strategic Direction Option C for the period 2015-2025.*

Brent then identified the Societal Benefit and Governance options recommended by the WG, given here as WG Recommendations 3 and 4:

Recommendation 3: *Given the historical background that gave rise to GEO and links with sustainable development issues since its inception, the Post-2015 WG recommends Plenary endorse SBA Structure Option B (Maintain the current basic SBA structure while allowing for modifications, and explore linkages to sustainable development framework themes: Sustainable Economics (economic development); Resilient Society (social development); Vibrant Planet (environmental protection)) for the period 2015-2025.*

Recommendation 4: *In the interest of preserving GEO as a flexible, agile and inclusive international partnership, the Post-2015 WG recommends Plenary endorse Governance Option B (The current GEO governance structure will be maintained; additionally, linkages with other relevant Earth-observation organizations, including the private sector, should be improved and resources to sustain key components of GEOSS should be identified) for the period 2015-2015.*

Brent noted the importance of the "status quo plus" governance option with the recognition that GEO is not the sole intergovernmental organization engaged in EO coordination with UNEP and now ICSU having identified global coordination programs. It is therefore incumbent on GEO to reach out and establish linkages with other organizations and programs, much as the current GEO Secretariat Director is now engaged in doing.

Finally, he summarized the core functions for Post-2015 GEOSS implementation as identified by the WG:

- Strengthening observation networks (space-based, airborne, and particularly *in situ*);
- Advancing interoperability and integration of Earth observations;

– Enhancing data access and sharing;
– Building capacity; and
– Encouraging research and development of integrated applications of Earth observations, and of global Earth observation datasets.

In the ensuing discussion period, Stefano Bruzzi (ASI) noted his participation in the Working Group process, noting the progress on the report but suggesting that CEOS need not accept it without criticism. There are several issues of concern to highlight. Stefano suggested that we need a strong GEO as the customer for the space segment of the GEOSS. The loss of GEO would mean a loss of focus for CEOS. Stefano suggested that a strong GEO is a GEO which delivers tangible outcomes that can be demonstrated to Ministers. Such deliverables could be GCI, or the likes of GFOI.

Wenjian Zhang (WMO) said that he is the WMO representative to the Working Group, and that WMO supports the Working Group's recommendations.

Stephen Briggs (ESA) suggested that the questions as posed in the report are rather misleading and should be considered carefully. He encouraged removal of the vague language in recommendation 3 regarding Social Benefits (also identified by Stefano). He also questioned the logic around recommendation 2 regarding Strategic Direction and the phased descriptions. He compared the three options to the current status quo to those beds that were offered to Goldilocks: one recommendation is "too hard"; another recommendation is "too soft"; and the last recommendation is "just right". He asked what is meant by 'GEO' – and assumes it refers to countries and their agencies – as is the case with GFOI developed by Australia, Norway and others. It is not clear what the role of GEO is in this geometry; it is not sufficient to be a clearinghouse for international collaborations. We have to be clear on what GEO is, and to be disciplined and clear when referring to GEO.

11 Annual Report on CEOS Implementation of the GEOSS Space Segment

Mike Freilich (SIT Chair) reported, as follows.

CEOS Work Plan and Actions

– 2012 has seen improved coordination of space agency activities related to climate; this includes delivery of an update of the CEOS Response to the GCOS IP; development of Fundamental Climate Data Records (FCDRs) and release of the ECV inventory survey; continued development cooperation with GEO, GCOS, WMO and CGMS of space-based climate system; further alignment of Virtual Constellation objectives of a space-based climate information strategy;
– Good progress towards established CEOS-GEO priorities (GFOI/FCT/SDCG, CTF, WGCapD, VCs, GEO DataCORE, Geohazards, JECAM, and QA4EO), most of which are reported out on specific agenda items;
– Continued and enhanced CEOS outreach to key stakeholders;
– MIM updates (thanks to ESA) and regular CEOS Newsletters (thanks to JAXA);
– A strong Rio+20 presence; and
– A new ECV inventory initiative of the WGClimate;

Mike Freilich noted that the CEOS-GEO actions tracker described 50 actions for 2012, of which two were closed successfully and of the remainder, about 24 are estimated to have good progress. However, since many actions lack appropriate/timely reporting from their POCs, the overall level of CEOS progress remains uncertain. He emphasized the need for regular reporting by action POCs, to allow adequate assessment of CEOS's overall progress.

26-6	**CEOS-GEO action leads encouraged to provide regular updates on task status and progress**	**Ongoing**

IN-01: Earth Observing Systems

Component 2 is the space-based observations component of the GEO 2012-2015 Work Plan. A key part of the progress made is in the rapid development of and production from the CEOS Virtual Constellations.

The presumption is that VCs have a key role supporting delivery of GEOSS space segment outcomes (consistent with the CEOS Self Study VC report recommendations). The SIT Chair has been developing a more integrated approach that is priority-driven, as well as introducing stronger feedback and support mechanisms in close consultation with the VCs and WGs co-leads. The first dedicated workshop for the VCs at SIT-27 was followed by regular SIT Chair telecons with the VC co-leads. In addition, the VCs are being provided systematic representation of their issues on SEC telecons. (The CEOS Working Group chairs currently participate in and render reports on the monthly SEC telecons).

Mike Freilich (SIT Chair) reviewed the achievements and issues for each of the VCs as follows:

– **OST**: key outcomes include development of Jason-3 with a target launch date of December 2014; the OST Science Team (OSTST) has been engaged as the new 'home' for the VC; OST asks how we transform the OSTST into a mechanism for international involvement; OST would like to encourage participation of agencies with complementary missions (such as ESA).

Ivan Petiteville (ESA) queried the reference to ESA with respect to complementary missions since ESA is already intimately involved in the OST VC. Stephen Ward (ESA) will clarify with Eric Lindstrom.

– **OSVW**: cross-calibration is a key focus and improved utilization in forecasting and warning services; the team is looking to engage the International Ocean Vector Winds Science Team (IOVWST) to leverage programmes and resources; the team wants clear direction in the context of the new guiding CEOS documents; operational requirements are as important for this VC as climate requirements; Mike Freilich congratulated ISRO on providing Oceansat-2 Scatterometer data to the global community; and
– **OCR**: the team has produced the *in situ* OCR White Paper and requests CEOS agencies to support the implementation; an ECV WG has been established within the IOCCG.

26-7	**OCR-VC leads to circulate the IN SITU OCR White Paper via the SIT Chair Team and CEOS Agencies are encouraged to engage in implementation with the VC.**	**November 2012**

– **SST**: the team is getting its activities started, including the ECV pilot; it is looking to make its data available through the IDN/CWIC; they are looking for greater participation of CEOS agencies with supporting missions;
– **LSI**: key outcomes include a mid-resolution guidelines document and support of GFOI and JECAM. Progress is being made on re-assessing LSI's scope and direction; exploring an SDCG partnership to address GFOI needs etc.; addressing CSS, portal studies and LSI Explorer;
– **PC**: Outcomes are the deployment of the GPM phase constellation satellites; ECV support (response to GCOS Action A-8); and the PC Data portal and links to the CEOS water portal.

Progress is being made on the launch of GCOM-W1, and the data availability of Megha-Tropiques-SAPHIR and MADRAS. Issues related to participation and resources were expressed; and

- **ACC**: good progress on volcanic alert system; looking to implement the Geostationary AQ Constellation paper recommendations.

Issues for discussion include:

- **Resources**: multiple VCs are evaluating the SST model of alignment with GHRSST – which may suggest the current arrangements are not sufficient for them to meet their goals?
- **Participation**: this is critical to the success of the GEOSS space segment. China, India and Russia are noted most often as having systems that would benefit the VC outcomes but are not yet participating;
- **Direction**: it was noted that some VCs are less clear on their purpose and outputs; LSI and OSVW would benefit from a master plan. New documents with input from the VCs are required to address this; and
- **Information systems**: SIT Vice Chair (CNES) has proposed a study of more consistent capabilities for the VCs.

12 GEOSS Space Segment Implementation Discussion

Tim Stryker (CEO) moderated the GEOSS Space Segment discussion session and raised a few important questions for discussion: What are the views of CEOS Agencies toward ***continuity*** of CEOS support toward global carbon cycle observations, global forest observations, geohazards Supersites, global agricultural research and monitoring, and water cycle products/services? What are the views of CEOS Agencies toward ***enhancement/initiation*** of support for broader disaster risk management and polar observations/polar ecosystem monitoring? And which CEOS members or entities should lead these efforts? He also requested discussion on the roles/responsibilities of the VCs in supporting GEO and GCOS priorities.

Mark Dowell (WGClimate) noted that CEOS has VCs covering most of the ocean observing satellites (perhaps other than sea ice). He recalled the effort of Eric Lindstrom (OST-VC) to suggest we take advantage of this cumulative effort to find added value in establishing a mechanism to address operational oceanography. Mark suggested that the Blue Planet task in GEO could be one example of a beneficiary of such an approach. It need not require organizational changes within CEOS.

Stephen Briggs (ESA) recalled the benefit we saw in GEO back in 2003 – as the advent of a body with Ministerial participation that could support the necessary resources for observing programmes. ESA saw GEO as the way to complete the circle with users through their political masters. Barbara Ryan (GEO Secretariat Director) stressed the need for CEOS agencies to play their part in reporting back through their own governments and Ministers. That level of connection between Principals and the relevant Ministers is essential.

Prakash Chauhan (OCR Co-lead, ISRO) recalled progress on the ECV and IN SITU OCR by the VC team. He suggested that the biggest obstacle is the demise of operational missions with instruments such as SeaWifs and MERIS. Data supply is a major concern and we need to find alternatives to fill the gaps. Oceansat-2 Ocean Colour Monitor data are some help but do not have the same global coverage as some other missions (full global data are acquired in 8 days for OCM-2).

Per-Erik Skrovseth (NSC) asked what the LSI is doing around the coordination of data for the likes of GFOI, stressing that significantly more progress is required around data supply. Per-Erik

recommended that the SDCG and LSI consider developing a note that highlights their respective roles. LSI has asked for direction. John Faundeen (USGS, LSI Co-Chair and SDCG Co-Chair) is doing an excellent job in SDCG and should be clear on the distinctions. PG Diwakar (ISRO, LSI Co-Chair) noted that the same point had been raised within LSI without resolution. Per-Erik suggested we may need to be bold in terminating or merging groups based on changed circumstances.

Pascale Ultre-Guerard (CNES) suggested we could focus on improved data access for assets relevant to the VCs. CNES wants to emphasise this task during their SIT Chair period. This will include participation of the VCs, WGISS and other stakeholders. CNES will work to further develop the proposal and come back to CEOS. Stephen Briggs suggested we should consider whether the users and usage is actually structured along lines in which the VCs are organised. He also indicated that it is imperative for portals to be complete and not just provide a subset of available data.

It was asked whether radiation budgets are adequately addressed in a coordinated way by CEOS. Mike Freilich (SIT Chair) replied that such measurements are typically addressed through the WMO/CGMS framework.

13 CEOS Strategy for Carbon Observations from Space

Osamu Ochiai (JAXA) reviewed the motivation behind establishing the CEOS Carbon Task Force (CTF), noting that the goal of the CTF is to coordinate space agency responses to the GEO Carbon Strategy. In April 2012, Masakatsu Nakajima replaced Takashi Moriyama as the JAXA CTF co-chair.

A CTF executive team and authors meeting was held after SIT-27 in La Jolla during which feedback was given on the CTF report draft. Feedback was generally positive with reviewers noting that there is still a lot of work to do with regards to section integration, crafting recommendations/actions and making the report structure and content consistent.

Since the 25th CEOS Plenary, a meeting of CTF report authors was held in conjunction with the AGU meeting in December 2011 in San Francisco; the CTF plan for the CEOS strategy report was presented at ACC-8 on the 19th of April 2011 in Columbia, Maryland. It was confirmed that ACC members will review the draft report when it is ready; and the writing team has been expanded to include more diverse expertise and writers have been selected to compile the integration chapter.

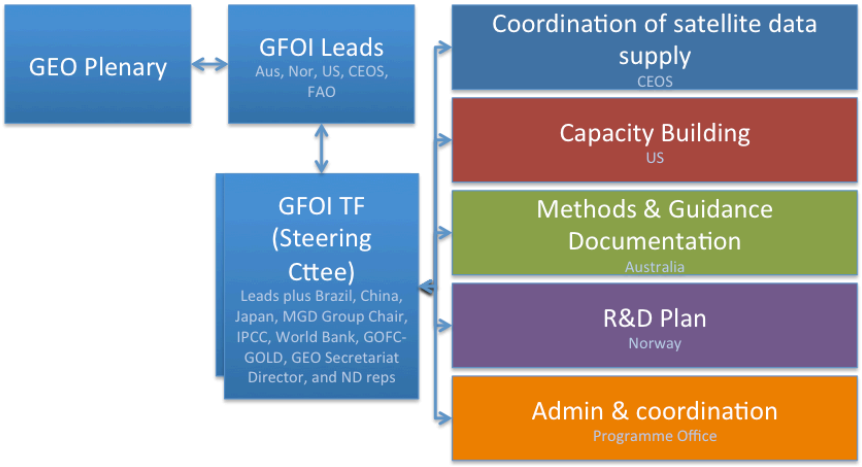
A Land chapter meeting was held at IGARSS in Munich on the 26th of July 2012. The core measurement requirements were refined and a new land section was prepared. A new integration and Ocean chapter will follow. Also, a third Atmosphere chapter draft has been delivered.

It was noted that the CTF task is difficult due to the reliance upon best efforts volunteer work and *ad hoc* meetings. In August 2012, the CTF Executive team and chapter leads noted that the work is approximately 3 months behind schedule. As reported at the SIT Technical Workshop in September 2012, the due date for the final report has been changed to the 31st of May 2013, although it is hoped that it will be ready in time for SIT-28 in March 2013.

26-8	**CEOS Carbon Task Force to deliver their report in time for review at SIT-28**	**SIT-28**

14 Forest Carbon Tracking and Global Forest Observation Initiative (GFOI)

Stephen Briggs (ESA) gave an introduction to FCT and GFOI noting that in 2008, GEO members developed FCT to support countries in the development of national forest monitoring systems. 11 National Demonstrator (ND) countries were involved with capacity building. This was followed by GFOI, which was proposed to allow for more formal and sustained arrangements and was endorsed at the 2011 GEO Plenary. GFOI consists of five major governance components.



Coordination of satellite data supply is supported by the *ad hoc* SDCG. Good progress has been made in developing a good baseline global strategy and it is anticipated that the report will be completed by SIT-28.

Capacity building is working to help nations develop the capacity to utilize EO data in their national forest monitoring systems, with capacity building workshops being held since 2010. Further workshops are planned for 2013 and 2014 in the Americas, Asia and possibly Africa.

Methods & Guidance documentation aims to guide countries in the use of remotely sensed and ground observation data to establish national forest monitoring and carbon tracking systems. It is anticipated that a first version of the documentation will be completed by February 2013 with field-testing taking place in GFOI countries from March to August 2013, with endorsement expected at GEO-X in November 2013.

The R&D plan is working to identify topics that need research in support of the GFOI objectives including: forest degradation, mapping of particular forest types (mangrove, peat forests, etc), interoperability, comparison of uncertainties associated to different forest biomass and allometrics estimation methodologies, and data model integration.

The administration and coordination of the GFOI is outlined in the 2012-13 work plan. A GFOI program office is being established in Geneva, with a vacancy notice issued for the role of coordinator.

It was noted that there is a need to move beyond acquisitions and provide sample products that demonstrate the societal benefits. Data-mobilisation and assembly for pre-operational demonstration are felt to be within the scope of CEOS. One or more GFOI leads will need to lead the data processing component.

It was noted that there is substantial donor funding in the REDD+ environment and national aid should be predicated based on supported country engagement in GFOI, for example the GFOI Methods and Guidance should be adopted by countries seeking REDD+ funding.

Stephen Ward (on behalf of Australia) added that:

- Australia is supporting Indonesia's first carbon account generation using GFOI approaches;
- Australia is still a very strong supporter through its Department of Climate;
- The institutional progress of last year directed by the Task Force is pleasing, and the planned engagement and structuring is needed to ensure foundations for future operational processes;
- Australia's new ground receiving antenna in Darwin guarantees coverage of SE Asian forests;
- Australia will host the next series of GFOI meetings in Sydney and Canberra in February, with SDCG-3 taking place from the 7th to the 9th of February;
- Australia is also funding the provision of personnel for the Programme office; and
- Australia will hold the G-20 Chairmanship in 2014, which may help provide further exposure for GFOI and GEOGLAM.

Stephen Ward noted that the GFOI brochure was recently kindly provided by ESA, and will be circulated to GFOI stakeholders.

In response to a question from ISRO, Stephen Briggs stressed that reporting on forests to UNFCCC (as part of broader carbon accounts) is done by sovereign governments – typically based on national forestry service information. It was also noted that FAO does a satellite-based global Forest Resources Assessment (FRA) every 5 years and uses satellite data for that purpose. FRA is a global (not national) level activity using sampling. GFOI will not claim to do global scale assessments although it has worldwide scope.

15 *Ad hoc* Space Data Coordination Group for GFOI (SDCG)

Stephen Ward (for Australian GFOI Co-Lead) reported, noting that the SDCG was established to implement the CEOS Strategy for Space Data Coverage and Continuity in Support of the GEO Global Forest Observations Initiative (GFOI) and Forest Carbon Tracking (FCT) Task, which was endorsed at the 2011 CEOS Plenary.

This was driven in part by the need for CEOS to support delivery of datasets to GEO pre-2015, and GFOI is seen as one of the best opportunities for the demonstration of an end-to-end service. The establishment of the SDCG shows the likes of IPCC and UNFCCC that the institutional will within CEOS agencies to support GFOI and the global baseline strategy seeks to demonstrate that satellite Earth observation supply for forest monitoring is feasible. The global baseline strategy will be a living document, adapting to changes and evolution in availability of various instruments – the baseline will include data streams that have the capacity to provide wall-to-wall national coverage free of charge for GFOI purposes. The level 2 and 3 strategies address the coordination of specific national needs, and the needs of FCT and R&D respectively in addition to the level 1 coverage.

A number of agencies are participating with core (openly available and free of cost) and contributing (have a cost element and/or are part of a Public-Private Partnership arrangement) missions including USGS, ESA, NSC, DCCEE, CNES, CONAE, CRESDA, CSA, DLR, INPE, JAXA and NASA, with pending invitations for ISRO, KARI and ASI.

Bi-annual meetings of the SDCG have been held since March 2012, with the first being hosted by CSA and the second by USGS (September). Australia will host SDCG-3 in February 2013.

The SDCG is currently focused on level 1, the establishment of a baseline, coordinated global data acquisition strategy involving core data streams. Data will be systematically acquired, wall-to-wall data of forested areas globally, and will be consistent with national reporting

commitments and requirements of national forest information systems. The SDCG has developed a set of representative information requirements for planning purposes, in consultation with the IPCC, GOFC-GOLD, and others.

A phased implementation of acquisitions is planned:

- **2012 to mid-2013** – Indonesia, Cambodia, Republic of Congo, Costa Rica, Ecuador, Panama, Vietnam.
- **Mid-2013 to 2014** – UN-REDD/World Bank FCPF countries, tropical and subtropical forest.
- **2015 onwards** – Global coverage, including temperate and boreal forest.

The recent losses of CBERS-2, ALOS, Landsat 5, and Envisat have created a shortage of available data, with gap-filling data provision by commercial missions not yet in place. However, the future is looking positive with the planned launches of CBERS-3, LDCM, Sentinels and ALOS-2.

The development of visualisation tools to communicate results and support quantitative conclusions is underway, and an example output from COVE was shown demonstrating coverage over the densely forested African Congo Basin region using a collection of instruments on multiple missions. It was noted that in 2015, full coverage is possible in less than 4 days without clouds and greater than 10 days with clouds.

Forested areas with greater than 50% cloudiness, such as the African Congo Basin region (67% cloudiness), are considered hotspots for optical imagery planning. Multiple optical missions with SAR are required to meet cloudy imaging requirements for GFOI. It was demonstrated that augmentation of business-as-usual acquisition plans is required to provide monthly imagery in all cloud conditions.

The following were presented as the next steps for SDCG:

- Continuing the development of the global baseline strategy;
- Development of reporting and visualisation tools;
- To seek Plenary approval for a further year of operation;
- To complete the Tier-1 strategy for review by SIT-28; and
- Provide initial support to GEOGLAM as tasked at SIT-27, which is indicative of the importance of SDCG to CEOS/GEO.

Adam Lewis (Geoscience Australia) noted the role of GA in supporting DCCEE in handling and processing data in support of GFOI needs.

Per-Erik Skrovseth (NSC) congratulated the SDCG and its co-leads on what they have achieved in a short time on such a complex and technical subject. He noted the next challenge to look at the national requirements and countries have specific requirements that we will need to look at. The group should run until the national requirements have been looked at and it can hopefully evolve to become an operational capability in the relevant institutions.

Mike Freilich (SIT Chair) congratulated the SDCG on bringing new capabilities to CEOS for the delivery of the GEOSS space segment and proposed that Plenary endorse the continuation of the SDCG for a further year. Plenary gave its endorsement.

Mike Freilich further suggested that the Terms of Reference of the LSI VC and the SDCG should be reconciled in the framework of the CSSII.

26-9	**SIT Chair to liaise with the SDCG and LSI leads to consider their respective roles and responsibilities, and reconcile their terms of reference, within the framework of the CSSII, and to report progress to SIT-28.**	**SIT-28**

16 Report of the CEOS *Ad hoc* Group on Disaster Risk Management and Discussion of Next Steps

Ivan Petiteville (ESA) began by presenting a background on Disaster Risk Management (DRM), noting that:

– disasters are increasing economically impacting due to higher population densities, and are politically important;

– there is growing international engagement by international organisations (e.g. The World Bank, UN agencies, EC, G8, WMO); and

– there is an opportunity (and obligation) for space agencies to contribute to DRM and we should be ready to respond to political pressure to invest more in preparedness and prevention phases.

Ivan summarized initiatives by which space agencies contribute to DRM within the GEO framework:

– GEO Disaster SBA - one of nine SBA's;

– International Charter Space and Major Disasters;

– GeoHazards Supersites and Natural Laboratories; and

– Sentinel Asia.

Ivan recalled the discussion at CEOS Plenary in November 2011 and the ESA proposition aimed to deliver greater benefits from CEOS agencies to DRM communities. He recalled that CEOS formed the *Ad hoc* Disaster Risk Management Team (with volunteers from ASI, CNES, CSA, DLR, ESA, EUMETSAT, JAXA, NASA, NOAA, USGS), with the main task of preparing a report with findings and recommendations to improve CEOS support of DRM. The top objectives are:

1. Increase and strengthen the contribution of EO satellites to the various DRM phases through a series of coordinated enlarged actions.
2. Raise the awareness of politicians, decision-makers and major stakeholders of the benefits of using satellite EO in all phases of DRM.

Five major actions are proposed by the Team's report:

1. Define a Global Satellite Observation Strategy for DRM;
2. Implement the Global Satellite Observation Strategy for DRM;
3. Set up a virtual repository for DRM-relevant data/products/information from both space agencies and DRM-users and make the repository content accessible to all DRM users;
4. Set up a DRM Data Processing Platform; and
5. Ensure the positioning of EO from Space in the 2015 post-Hyogo Framework for Action (HFA).

A further three supporting actions were also identified:

1. DRM outreach and evaluation of CEOS DRM actions;
2. EO capacity building for DRM; and
3. Develop a satellite EO DRM projects database.

The first issue of the report with finding and recommendations was distributed to CEOS agencies on September 12th 2012.CEOS Principals are requested to endorse the full report and to authorise the start of the implementation phase.A phased approach is proposed. A three-year demonstrator project will be held from 2013-15 to establish R&D activity. Open participation will be welcomed and some agencies may choose to support only a subset of the actions. Ivan requested that CEOS Principals endorse the study consensus report including the "5+3 actions".

1. Authorize the start of the implementation phase;
2. Establish a CEOS DRM Project Team in charge of implementation;
3. If necessary, extend the mandate of the current *Ad hoc* Group on DRM until the establishment of the DRM project team to ensure continuity of the activity;
4. Mandate the new DRM Team to begin coordination with the UN ISDR in the lead-up to the May 2013 post-Hyogo Framework for Action activities (Global Platform for Disaster Risk Reduction); and
5. Mandate the new DRM Team to liaise with UN ISDR, other major stakeholders and users to prepare the future Implementation Plan.

Per-Erik Skrovseth (NSC) explained some Norwegian national activities and the need for a broad range of data sources (including many beyond CEOS scope) to satisfy national DRM requirements.

Wenjian Zhang (WMO) referred to the statistical increase in natural disasters over recent decades. He suggested the need to integrate prediction and forecasting systems to ensure early warning. He further suggested the need to integrate *in situ* sensors to allow early assessment of disaster impact. He suggested that high resolution data can play a key role, combined with frequent moderate resolution data.

Sanjay Srivastava (UN ESCAP) thanked CEOS for UN ESCAP participation in the CEOS Plenary. He explained that UN ESCAP has a space applications programme which includes the participation of CEOS Agency members JAXA, ISRO, and a number of Chinese agencies. A regional five year plan will be discussed at a forthcoming meeting in Bangkok, and will include DRM applications.

Klaus Schmidt (DLR) noted the very significant scale of the proposed DRM effort and suggested that it must be a phased approach to be manageable.

Mike Freilich (SIT Chair) thanked Ivan for the clear and concise report. He expressed some concern as to how much this group builds on the SBA for Disasters and the WGISS work on the same topic. He would like to avoid any overlap of new activities with existing ones. Ivan noted that the effort would complement and build upon existing efforts in the Disasters SBA and would not overtake the activities of the Disasters SBA.

Stephen Briggs (ESA) noted that Guy Seguin has been engaged in the development of the DRM proposal and it is essential that the Disasters SBA work is fully reflected in the plans going forward. He cautioned against technical Working Groups undertaking application projects – without knowing the details of the WGISS heritage in this domain. Satoko Miura (WGISS Chair, JAXA) assumed that there need be no conflict with existing WGISS efforts.

Luc Brulé (CSA) repeated the concern around avoiding duplication with the Disasters SBA. The upcoming SBA meeting in Washington is a good opportunity to confirm these matters. There are ambitious data acquisition strategies being proposed and Luc suggested that we go step-by-step towards worldwide plans.

Klaus suggested we take stock of which Working Group activities might support the DRM activity. Mike Freilich said that the CSSII work would take a hard look at the process by which Working Group tasks are approved and propagated. Mike remains concerned still at the possible overlap of activities undertaken by both disasters groups (the SBA and the new DRM activity). He agreed that the November meeting that has been called is the perfect venue to resolve the matter.

The issue will be revisited in the later discussion session (below).

17 Implementation of CEOS Support to Geohazards Supersites and Natural Laboratories

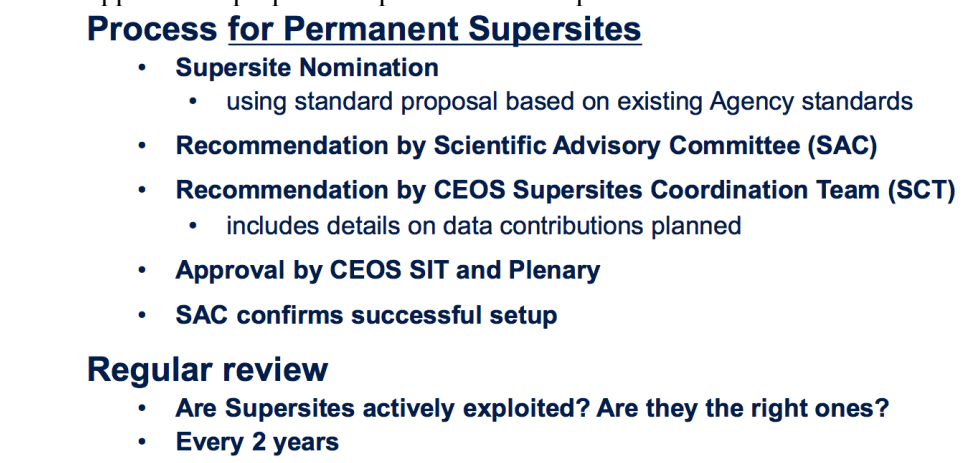
Klaus Schmidt (DLR) reported:

- The GEO Geohazards Supersites Initiative aims at enriching our knowledge about geohazards by empowering the global scientific community through collaboration of space and *in situ* data providers and cross-domain sharing of data and knowledge - primarily through providing easy and free-of-charge access to comprehensive satellite and ground-based geophysical data sets derived from different sources and different disciplines;
- GEO Geohazards Supersites is a recognised CEOS priority initiative;
- The 25th CEOS Plenary agreed to establish a CEOS Disaster SBA Team subgroup to review Supersite proposal requests and coordinate agency data provision: the group was asked to develop agreement on objectives and definition of Supersites; to establish a process to respond to Supersite proposals; and to advise CEOS on course of actions and policy;
- The main 2012 achievements/outcomes are: the proposed CEOS process for Supersite selection; agreement on Supersites-related definitions; a specific proposal for approval of the Hawaii Supersite; and
- Future activities and milestones include: settle initial Supersites Consortium structures (end 2012); agree CEOS coordination mechanism for data contributions (end 2012); prepare and evaluate Supersites proposals (initial set by end 2012/early 2013).

The first draft of the proposal was presented in May 2012, and the first issue of the report, with findings and recommendations, was distributed to CEOS agencies on 12th September; a second issue of the report is ready for distribution.

Plenary is being asked to:

1. Approve the proposed Supersite selection process.

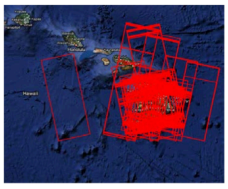


2. Approve CEOS support to Hawaii as a Permanent Supersite.

Recommendation of CEOS Supersite Coordination Team

- **CEOS should accept Hawai'i as a "Permanent Supersite"**
- **CEOS should commit* to support this Supersite with these resources:**

(ASI)	100 scenes/yr by end 2014	COSMO/Skymed
(CNES)	1 coverage @ 2.5m	SPOT-5
(CSA)	archive data	Radarsat-1 Radarsat-2
(DLR)	250 scenes by end 2014	TerraSAR-X
(ESA)	complete archive any available acquisition	ERS-1, -2, Envisat Sentinel-1, -2
(NASA)	any available acquisition	EO-1



3. Invite additional agencies interested to contribute their data to the supersite initiative to nominate a POC.

26-10	**CEOS agencies to nominate a point of contact to the CEOS Supersites Coordination Team**	**December 2012**

Plenary later discussed these three proposals and accepted them.

CEOS Agencies agreed to define a Global Satellite Observation Strategy for Disaster Risk Management (DRM), to include a detailed assessment of needs, gaps and definition of EO requirements. CEOS agencies will also seek to define a DRM Baseline Dataset, which would consist of no-cost data for selected observations, disaster themes, and geographic areas. CEOS representatives will maintain a close dialogue with GEO and UN experts to ensure appropriate recognition for the use of space-based Earth Observations within the 2015-2025 Post-Hyogo Framework for Action (HFA). CEOS DRM activities are intending to include and leverage existing disaster-related efforts supported by CEOS Agencies.

Friday 26th October: Progress Reporting & Strategic Discussion Day

18 CEOS Support to Food Security: Research and Monitoring

Pascal Kosuth (Irstea, on behalf of the GEO Secretariat) presented, explaining the background to the G-20 initiative around food price volatility and food security. He noted:

- Two initiatives were taken to increase information: AMIS (Agricultural Market Information System – led by FAO), and GEOGLAM – to improve information on supply (led by GEO);
- GEOGLAM is a coordinating programme which seeks to link and strengthen various initiatives;
- The role for CEOS was explained including data coordination and support on methods for application of data;

- The information needs for GEOGLAM have been explored provisionally with the CEOS SDCG for GFOI (consistent with the SIT-27 decision on the matter); these include crop maps, crop conditions, yield forecasts etc.;
- Top priorities include daily 300m monitoring, weekly monitoring at 10-20m;
- Early detection of anomalies for food security is an important component; a range of different information products of interest were shown;
- GEOGLAM seeks to work with CEOS SDCG for GFOI to further explore how satellite data supply can satisfy requirements; the hope is for a decision from SIT-28 on initial CEOS support to GEOGLAM. It was noted that there are common uses of EO data by GEOGLAM and GFOI as evidenced by the example presented on Rhondonia, Brazil; and
- There is strong political support for GEOGLAM, though it won't succeed without a coordinated effort on Earth observations – for which CEOS is essential. GEOGLAM can adapt to a progressive data strategy from space agencies – which is technically challenging but feasible.

Wenjian Zhang (WMO) noted the effort within the Global Framework for Climate Services (GFCS) on food security and WMO is happy to support the hydrometeorological information required by GEOGLAM.

Tim Stryker (CEO) thanked Pascal for the brief and looked forward to a decision at SIT-28 on further CEOS engagement. He queried the complementarity of the datasets for GFOI and GEOGLAM.

Espen Volden (GEO Secretariat) encouraged CEOS support for the GEOGLAM initiative. He encouraged SDCG to keep in mind evolving GEOGLAM needs and maximize potential synergies with GFOI data coordination efforts.

Jai Parihar (ISRO) explained about the GEOGLAM Asia Rice component – and stressed the importance of SAR data for their requirements, with the report being developed by a team coordinated by JAXA. He also noted that weather products are very important in GEOGLAM.

Per Erik Skrovseth (NSC) congratulated GEOGLAM on the progress of the last year. He noted the huge difference in data volumes compared to GFOI – as often as daily in some cases. Acquisition scenarios can be developed, but to what level of capacity, and for delivery to whom? Downstream user organization and services development will be an enormous management challenge. CEOS needs a clearer understanding of who the service providers are, and how they may obtain and productively use the data.

Pascal suggested that very high resolution data will be required in some cases for validation and sampling and that budget will be required for commercial data purchases. Jai noted that JECAM is the testbed for the GEOGLAM ambitions and would be a suitable first phase for data coordination efforts (equivalent to the National Demonstrators for FCT).

Tim Stryker (CEO) noted the daunting scale of the task but the importance of the achievement. Phasing the approach is obviously important. Pascal responded on the possibilities for phasing the demands on CEOS – starting with the JECAM activity. Brian Killough (SEO) noted that we have learned a lot from the JECAM process. He noted that Yves Crévier (CSA) will work with the SEO in the near future to explore the GEOGLAM requirements in more detail.

19 Integrated Water Cycle Products and Services

Osamu Ochiai (JAXA) reported that the Integrated Global Water Cycle Observations (IGWCO) report was first published by IGOS-P in 2004. The GEO Water Community of Practice has proposed to revise the IGWCO report as a GEO Water Cycle Strategy in order to:

- Update and synthesise the status of water cycle observations and information systems;
- Describe a strategy for water cycle observations to meet short and long term GEO and community goals;
- Provide CEOS, GEO and WMO with guidance for water cycle observations, information systems, interoperability and capacity building; and
- Propose initiatives to advance the concept.

The report will cover satellite data, *in situ* data, modelling capabilities and the interpretation of data to meet the needs of users. Further report details were presented:

- A team consisting of experts from IGWCO and the Water COP, space agencies, *in situ* communities, international organisations and the water cycle scientific community will write the report;
- The report will be of interest to the water cycle scientific community, CEOS, space agencies, WMO, national water agencies, the UN and GEO members, among others;
- The aim is to complete the report for the GEO Plenary and Ministerial Summit in November 2013; and
- The report will include chapters addressing the needs for water data, an overview on the status and future of water cycle observations, the status of water cycle and quality measurements, data issues, water cycle integration, capacity building and information applications, linkages, funding, the implementation plan and details of preparations of Water Cycle activities in Phase II of GEO.

A future schedule for the development of the report was given, noting that: a complete draft version of the report had been circulated to authors by 1 October; a writing workshop will be held 30 November and 1 December; 3-7 December a Science Town Hall meeting on the GEOSS Water Strategy will be held; a draft of the report will be available for GEO and CEOS member comment by May 2013; and, printed copies of the report will be available for circulation at GEO Plenary in 2013.

Osamu noted the following contributions that CEOS is making to the report:

- Writing several sections of the report, and providing chapter review;
- Charts detailing current and planned missions with different water cycle measurement capabilities; and
- The CEOS SBA Water Coordinator holds regular teleconference calls with the GEOSS Water Strategy lead to discuss progress and inputs.

The following requests were made of Plenary:

1. Provide comments on the current progress.
2. For attendees to take part in their regional water strategy meetings.
3. Volunteer qualified representatives to review the report.
4. Support implementation of the GEO Water Strategy in future as a coordinating framework.

26-11	**CEOS agencies invited to provide feedback on the GEO Water Cycle Strategy Report progress and to nominate (to Water SBA Coordinator, Osamu Ochiai) expert reviewers to engage in the review phase.**	**December 2012**

20 Polar Space Task Group Report

Steven Hosford (CNES) presented, noting that the Polar Space Task Group (PSTG) was established in 2011 under the auspices of the WMO's Executive Council Panel of Experts on Polar Observations Research and Services (EC-PORS). He noted that:

- the group's mandate is to provide coordination across space agencies to facilitate acquisition and distribution of fundamental satellite datasets, and to contribute to or support development of specific derived products in support of cryospheric scientific research and applications;
- the group comprises members nominated by Heads of Space Agencies, upon invitation by WMO Secretary General; the Secretariat is provided by WMO; and
- future steps include: to document state-of-art and cryospheric science priorities at the ESA-CliC-EGU Cryosphere Conference – ESA ESRIN, Nov 2012; establish WGs (as required) for coordinating activities (including on SAR); establish a Strategic Implementation Plan; implement through annual meetings and alignment of commitments taken through respective Agency programmes; periodic reporting to CEOS, CGMS, EC-PORS, and CM.

Stephen Briggs (ESA) asked whether this looks like a Virtual Constellation arrangement for polar applications, established outside CEOS, and he would like to understand more about its provenance and ambitions. Brent Smith (NOAA) recalled the IGOS heritage of integrated space and *in situ* observations and the interest of WMO picking up this cryosphere topic. He encouraged communication between CEOS and WMO. Stephen Briggs noted that this is a Space Task Group and not for *in situ* systems. Wenjian Zhang (WMO) welcomed the work of the PSTG.

Steven Hosford noted that the group is going step-by-step and seeking CEOS reaction, particularly gauging interest in formally establishing communication, working, and reporting channels between CEOS and the PSTG.

21 Concluding Discussion Time

Tim Stryker (CEO) proposed that CEOS continue its support of its established priorities including: global carbon cycle observations; global forest observations; Geohazard Supersites; global agricultural research and monitoring (emerging priority); and, water cycle products/services. **Plenary agreed to support current CEOS established priorities.**

Tim Stryker also formally requested that Plenary approve the continuation of the four *ad hoc* working groups: SDCG; CTG; DRM: and GEOGLAM. **Plenary approved the continuation of all four groups.**

Tim Stryker asked whether Plenary supports adoption of the **Geohazard Supersites process proposal** presented by Klaus Schmidt (DLR). **The proposal for the supersites presented by Klaus was agreed by Plenary**.

Alan Ratier (EUMETSAT) noted the need, in parallel, to have the CSSII establish the mechanisms for selection and prioritization of new initiatives, and to review the consistency of all *ad hoc* structures with the CEOS permanent mechanisms. Mike Freilich (SIT Chair) agreed.

26-12	**SIT Chair, within the framework of the CSSII, to establish mechanisms for the selection and prioritization of new initiatives, and to review the consistency of all *ad hoc* structures with the permanent CEOS mechanisms (WGs, VCs, etc).**	**CEOS 27**

Chuanrong Li (CAS) expressed his hope that CEOS could focus more on the disaster prevention phase. Ivan Petiteville (ESA) revisited his summary of the way forward on the DRM proposals. He noted that the comments from CAS are consistent with the proposals.

Mark Dowell (WGClimate) referred to the **GEO Water Cycle** report and questioned what the CEOS level of involvement should be in these GEO strategies, since they will be the basis for how we respond to the report and we must be careful not to have a cyclical engagement. He urged the CEOS not get involved in the definition of requirements. Osamu Ochiai (JAXA, Water SBA Coordinator) noted the concern and assured that the CEOS role was limited to the space data chapters.

Mark Dowell (WGClimate) noted that the **Carbon Task Force (CTF)** is a response to the GEO Carbon Strategy and the kind of engagement model that we need to avoid engagement in development of requirements we then respond to.

Stephen Briggs (ESA) repeated his concern again that the idea of a group of space agencies under WMO for the **Polar Space Task Group (PSTG)** is worth further reflection for the same reasons. Stefano Bruzzi (ASI) suggested the PSTG is an example of a non-strategic approach by space agencies to coordination of their business. There is nothing wrong in the work of the PSTG. He asked whether the group wishes to write requirements or coordinate observations. If it is observation, then this seems to be the core business of CEOS. The new guiding documents should be clear on the core business for CEOS and establish the scope of our activities.

Alain Ratier (EUMETSAT) suggested that it is not surprising that WMO was leading the polar initiative as they have a heritage in this domain. Furthermore, CGMS was also considering the potential benefits of highly elliptical orbits for polar observations. Stephen Briggs does not question the right of WMO to work on polar observations but objects to the outsourcing of thematic space data coordination beyond CEOS, which risks overall effectiveness, and the effectiveness of CEOS. He suggested that during the gestation of this through IPY and WMO, CEOS has become more coherent. We should welcome intelligent transmission of information from users to space agencies and this should be encouraged but it seems that this does not fit that model. We need to make the effort more consistent with the CEOS efforts.

Espen Volden (GEO Secretariat) noted that there currently is no Polar SBA; the Polar Regions are actually addressed within the GEO Water Task. There is a proposal for GEO to make polar activities move visible in next year's revision to the GEO Work Plan.

Paul Counet (EUMETSAT) suggested that we should look at the issue as part of the CEOS Self Study effort. Steven Hosford (CNES) welcomed the reaction to the presentation.Stephen Ward (ESA) proposed a draft action to draw the discussion to a close.

26-13	**CEOS Agencies encouraged to review the report of the Polar Space Task Group and to provide comments on the nature and structure of CEOS engagement and appropriate roles and responsibilities for the space systems coordination.**	**December 2012**

Mike Freilich (SIT Chair) remarked that space agencies can be very goal oriented but also undisciplined. CEOS Agencies tend not to look at existing structures and ask how we might modify or educate them to achieve certain objectives –as a result, we devote resources and pursue new activities all the time. CEOS needs to think hard about an organisational approach. We cannot propose unique solutions to every challenge that arises. Conrado Varotto (CONAE) agreed with Mike's comments.

Ivan revisited the **Disaster Risk Management (DRM) proposals** and noted that some agencies had provided feedback preferring a phased approach. The revised proposal focuses on two initiatives only:

- Definition of a global satellite observation strategy for DRM; and
- Ensure the positioning of EO from Space in the 2015 post-Hyogo Framework of Actions.

Ivan asked Plenary to seek consensus to endorse the study report with the amended initial plan and authorise the initial actions. The WG will develop an implementation plan for SIT-28 and a strategic observation plan for 2013 CEOS Plenary with a set of recommendations. Plenary asked the DRM team to begin coordination with the UN ISDR.CSA has volunteered to co-chair the DRM activity with ESA.

Plenary endorsed the Study Consensus Report including the action plan as amended (actions 1, 5, 6, 7 and 8) and authorized the start of the implementation phase for the activities related to the execution of the endorsed actions. Ivan thanked Principals and asked for agencies to engage in the implementation work, coordinating with him as required.

26-14	***Ad hoc* DRM Working Group to prepare an Implementation Plan that addresses the DRM Study Report actions 1, 5, 6, 7 and 8.**	**SIT-28**
26-15	***Ad hoc* DRM Working Group to prepare a Strategic Observation Plan.**	**CEOS 27**
26-16	**CEOS agencies interested to join the DRM activities are invited to contact the *Ad hoc* DRM Working Group co-leads (CSA and ESA) to nominate a representative.**	**November 2012**

22 Developments within GCOS

Jean-Louis Fellous (GCOS) reviewed the scope of GCOS, noting that GCOS encompasses the climate component of the WMO observing systems, GOOS, GTOS, WCRP and IGBP, among others. Together these form the overall global observing system for climate, and the climate-observing component of GEOSS.

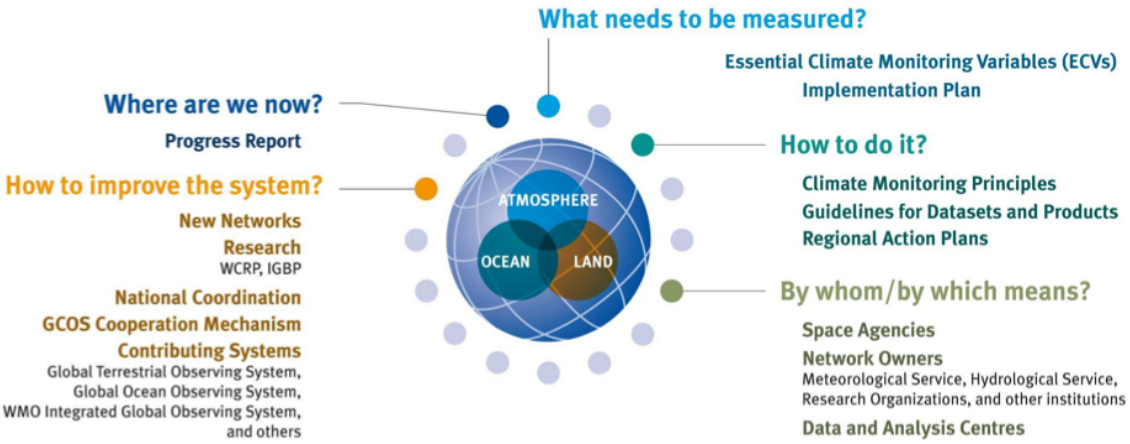
GCOS covers the observations, transmission and management of data, establishes climate data records and forms products using this data. The GCOS program also assesses and communicates overall requirements, advises on implementation and reporting as well as reviewing and promoting progress.

GCOS functions through contributions from: National Meteorological and Hydrological Services, other national institutions and regional agencies; secretariats of contributing observing systems, related technical commissions, space-agency coordinating bodies and expert groups; and GCOS bodies (WMO, steering committee, WCRP Data Advisory panel, etc.).

A status update on the observing system and the observing-system review panels of GCOS was given:

- The AOPC (Atmosphere) and TOPC (Land) panels have met in the last year while a change in GCOS governance delayed an OOPC (Ocean) panel meeting;
- It was noted that despite funding pressures there have been positive outcomes; and
- Some ongoing concerns include some *in situ* network deterioration (including atmospheric composition measurements and the maintenance of moored buoys) as well as real or potential gaps in the provision of several types of satellite data including altimetry, limb sounding, reference measurement and basic meteorological measurement from polar orbits.

The continuous improvement and assessment cycle of GCOS was demonstrated using the following figure.



Essential Climate Variables (ECVs) are physical variables (or groups of related variables) for which provision of sustained observations and/or derived datasets is feasible, and that are important for meeting UNFCCC and other climate requirements. The ECV's are summarised in the following table.

Atmospheric	**Surface:**	Air temperature, wind speed and direction, water vapour, pressure, precipitation, surface radiation budget
	Upper-air:	Temperature, wind speed and direction, water vapour, cloud properties, earth radiation budget (including solar irradiance)
	Composition:	Carbon dioxide, methane, and other long-lived greenhouse gases, ozone and aerosol, supported by their precursors
Oceanic	**Surface:**	Sea-surface temperature, sea-surface salinity, sea level, sea state, sea ice, surface current, ocean colour, carbon dioxide partial pressure, ocean acidity, phytoplankton
	Sub-surface:	Temperature, salinity, current, nutrients, carbon dioxide partial pressure, ocean acidity, oxygen, tracers
Terrestrial	River discharge, water use, groundwater, lakes, snow cover, glaciers and ice caps, ice sheets, permafrost, albedo, land cover (including vegetation type), fraction of absorbed photosynthetically active radiation (FAPAR), leaf area index (LAI), above-ground biomass, soil carbon, fire disturbance, soil moisture	

ECVs are not datasets or products, and were first identified in the second Adequacy Report, from the original GCOS concept of "Principal Observations" and recognised by UNFCCC COP in responding to the Adequacy Report and IP. They have been increasingly recognised such as in the ESA Climate Change Initiative (CCI) and the European FP7 Calls & Projects. They were revised in 2010-IP, and the list is unlikely to change until the next IP revision – though the concept has extended to include both ocean and biodiversity variables.

GCOS is involved in the partnerships and collaboration with CEOS and its Working Groups, CGMS Plenary, Climate Monitoring Architecture activity, with CEOS Agencies in the production of an ECV data inventory. GCOS and WCRP will possibly hold a second ECV data inventory workshop, following the first GCOS-WCRP-ESA workshop held in 2010 in Frascati.

GCOS celebrated its 20th anniversary at WMO on the 29th of June 2012. The future plans for GCOS and the next assessment cycle include the following (subject to the outcome of a sponsors review of the program in the next 12 months):

- Liaising with UNFCCC;
- Reviewing data needs for adaptation and service provision (2012-13), taking account of uncertainties identified by the IPCC 5th assessment process; and
- Formulation of a new implementation plan (2015-16).

23 CEOS Response to the Updated GCOS IP

Mark Dowell (WGClimate) reported on behalf of Mitch Goldberg (CEOS Climate SBA Coordinator) who has overseen all the work on the CEOS Response. Mark reported that the 2010 edition of the Implementation Plan for the Global Observing System for Climate (GCOS) in Support of the UNFCCC (IP-10) replaces a similarly titled Plan (IP-04) which was published in 2004. Its purpose is to provide an updated set of Actions required to implement and maintain a comprehensive global observing system for climate that will address the commitments of the Parties under Articles 4 and 5 of the UNFCCC and support their needs for climate observations in fulfilment of the objectives of the Convention.

This revised Plan updates the Actions in the IP-04, taking account of recent progress in science and technology, the increased focus on adaptation, enhanced efforts to optimize mitigation measures, and the need for improved prediction and projection of climate change. It focuses on the timeframe 2010-2015.The Satellite Supplement to the GCOS IP provides supplemental detail related to the generation of global climate products derived from measurements made from satellites.

The CEOS Response to the GCOS IP responds to the GCOS Actions and reinforces the needs called out by the GCOS Satellite Supplement (with more details on deliverables, coordination, activities and who will lead the effort). There are 47 Actions to respond to and the responses involve coordination with CEOS Working Groups, CEOS Virtual Constellations,external Climate related groups (e.g. SCOPE-CM, GSICS, WCRP, CGMS), and agency subject matter experts to develop plans responding to the GCOS IP-10 actions via templates. It is hoped that the new CEOS response will help agencies to plan their Climate Data programs and vice versa as well as define priorities for WGClimate.

The document was delivered to SBSTA on 27th of September. Mark asked for special thanks to the contributors and the writing team – George Ohring and Julie Price of NOAA.

Mark Dowell highlighted an excerpt from the Executive Summary:

Achieving the metrics laid out in this response represents a significant challenge to the CEOS community and will require a degree of coordination and collaboration never achieved before.

A subsequent "condensed" version (20pp) of the report, was produced by Kerry Sawyer (DCEO), and will be distributed as an official document to delegates at COP-18. The condensed version includes a link to the full report, with templates, available online through CEOS website.

Implementation will require coordination (action-tracking). Mark recommends that WGClimate take on responsibility for the action tracking and reporting. Mark has proposed changes to the revised WGClimate Terms of Reference should Plenary adopt the recommendation for the WGClimate to subsume the activities of the CEOS Climate SBA Coordinator since Mitch Goldberg has retired from the role. **See the Annex here for revised Terms of Reference.**

24 Climate Monitoring Architecture from Space and the ECV Inventory

Mark Dowell (WGClimate) referred to the WGClimate 3-year outcomes defined in the course of the recent CEOS Self Study:

1. Logical Architecture Development **(complete)**
2. Complete first ECV Inventory **(on-going)**
   - Maturity matrix
   - ECV sustained roadmaps
3. WGClimate VC Pilots **(on-going)**
4. COP-18 planning **(on-going)**
5. Support to CEOS Response to GCOS IP and Satellite Supplement **(complete)**

Mark referred to the Climate Monitoring Architecture Report, which will be published as an unbranded document, kindly printed by ESA, and available on the CEOS website after Plenary. The overall process is on schedule, with the next phase looking at gap analyses and developing implementation plans.

On the ECV Inventory, CEOS agencies should be reassured that good use will be made of the information that they are investing time to provide. The information will be used at the ECV/product level to identify gaps and shortfalls and in formulation of a coordinated action plan to address such gaps and shortfall. The Inventory can be a trigger for the medium-term activities that need to be undertaken to sustain the long-term implementation of the architecture. Mark hopes to see national, regional and thematic studies of this data to make best use of it. In Europe they hope to update their 2009 report on the capacity of Europe with regards to space based observations of climate. The work will use the ECV Inventory as an example of the application potential of the information.

The Inventory survey is a joint effort among CGMS, CEOS and WMO. The initial survey was circulated with the MIM survey in June, but with an extended deadline. The response so far amounts to 171 records submitted for 11 responsible organizations. No records have been submitted for the following ECVs: carbon dioxide, methane, and greenhouse gases; sea state; sea surface salinity; lakes; above ground biomass; and ice sheets. Some records are incomplete and WGClimate encourages organisations to continue submitting data so it may begin conducting analyses.

Mark thanked Shelly Stover (SEO) and George Dyke for all their work on the ECV Inventory in 2012.

Mark explained the concept of Maturity Metrics and the ambition of defining CEOS "endorsed" Metrics" for ECV datasets. WGClimate is establishing a task for that purpose with the hope that it will provide a tool for monitoring progress and to provide a snapshot of current capability.

26-17	**WGClimate will work with CEOS contacts to determine the most appropriate long-term contacts in support of the ECV Inventory survey and to encourage a comprehensive response to the survey**	**November 2012**

On the subject of Virtual Constellation (VC) support to ECV development, some VCs are already committing to new ECV relevant activities e.g. within OCR and SST. The OCR ECV has a number of activities in support including a new standing team on ECV Assessment.

Mark explained about the WCRP Data Advisory Council (WDAC) in which he participates as the CEOS representative. Mark learned about the GCOS/NCDC/GOSIC ECV Inventory, which will also consider *in situ* data and WGClimate will study possibilities on how to merge this with the CEOS/CGMS/WMO ECV Inventory. The WDAC proposed the formation of an internal task group composed of Mark, Adrian Simmons, Michel Rixen, Otis Brown, and Jörg Schulz to align the two Inventories.

Mark attended the Global Framework for Climate Services (GFCS) Observation and Monitoring expert group meeting in December 2011.The GFCS IP was available for open review in June-July 2012 but it was decided that the required feedback process was not amenable to CEOS submitting comments and that input should be submitted through national representatives. A number of issues were raised, including: poor representation in the document of space agency coordination mechanisms such as CEOS (but also CGMS), and the need to clarify that there is already ongoing activity to define a climate monitoring architecture for space-based observations.

Some CEOS agencies will be represented at the WMO Extraordinary Congress next week, and it is in CEOS interest to ensure that these points are reiterated, and to start to discuss on how to best interface with the GFCS process.

WGClimate-3 is being planned as a joint meeting along with the *ad hoc* Climate Monitoring Architecture group, SCOPE-CM, and WCRP-WDAC. The plan is for a "Climate from Space" week, 18th-22nd February at WMO in Geneva. One of the key topics for discussion will be a joint first analysis of the ECV Inventory. A WDAC "session" will be held within the WGClimate meeting to further discussion on CEOS-WCRP collaboration concerning Inventory and Assessments.

Mark noted that the deadline for submissions to the ECV Inventory has been extended until the end of 2012, and that support is available from the Inventory team (help-ecv-inventory@lists.ceos.org).

26-18	**CEOS Agencies to provide their agency responses to the ECV Inventorysurvey**	**December 2012**

25 Developments within WCRP

Ghassem Asrar (WCRP, virtual) presented on the World Climate Research Programme (WCRP), explaining the background of the activity. WCRP works with IGBP, DIVERSITAS, and IHDP through the Earth System Science Partnership (ESSP) on the integrated study of the Earth system, the changes that are occurring to the system and the implications of these changes for global and

regional sustainability. The observing systems of CEOS and others are critical elements of this work.

Ghassem stressed the urgent need for "actionable" climate information based on sound science, and a supporting symbiotic relationship between providers and users of climate information to ensure climate information is timely, accessible, and easy to understand. WCRP has identified six grand science challenges of interest to CEOS:

- Provision of skilful future climate information on regional scales (includes decadal and polar predictability);
- Regional Sea-Level Variability and Change;
- Cryosphere response to climate change (including ice sheets, water resources, permafrost and carbon);
- Improved understanding of the interactions of clouds, aerosols, precipitation, and radiation and their contributions to climate sensitivity;
- Past and future changes in water availability(with connections to water security and hydrological cycle); and
- Science underpinning the prediction and attribution of extreme events.

The corresponding research foci for WCRP going forward are:

- Quantify and communicate uncertainties in climate change information/knowledge;
- Develop seamless regional and intra-seasonal to inter-annual, and decadal climate prediction/projection;
- Support development of climate information for adaptation planning, mitigation policies, and for assessing risks of climate variability and change;
- Promote and enable development of timely, reliable, and easy to access climate information and knowledge; and
- Support education, training and development of next generation of climate experts and networks.

WCRP is looking for continued CEOS support in the observations supply.

26 Concluding Discussion Time

Kerry Sawyer (DCEO) invited Wenjian Zhang (WMO) to present a few slides on the Global Framework for Climate Services (GFCS). Wenjian gave some background on the genesis of the Global Framework for Climate Services (GFCS) – leading to the Extraordinary Congress of WMO on the topic next week. Initial focus areas are agriculture, water, and health and disaster risk reduction. The space architecture is a key component.

Kerry led the discussion session around a series of questions:

What are the roles of the Virtual Constellations (VCs) and WGClimate in the coordination of ECV development? Both Rich Eckman (ACC Co-Lead) and Ken Casey (SST VC Co-Lead) confirmed they are happy with the collaboration with WGClimate in support of ECV development for the Climate Architecture. Prakash Chauhan (OCR Co-Lead) queried Mark Dowell on how uncertainty estimates should be addressed. Mark replied that the IN SITU-OCR work and the standing group on ECV assessments were perfect examples of successful

collaborative efforts. Alain Ratier (EUMETSAT) stressed the necessity of links between WGClimate and the VCs and said that this discussion underscores the importance of close WGClimate-VC collaboration.

Stephen Ward (ESA) said that the VCs are now moving systematically to support the climate architecture wherever possible, and there are pilot efforts like SST to work out what the VCs can and can't do and where they should focus.

Shizuo Yamamoto (JAXA) asked if there are shifts from R&D to operations. Mike Freilich (SIT Chair) suggested that there are several examples, including the transition to operational meteorological observations that have followed the path from R&D to operations through CEOS Agencies. Yamamoto noted that there are not many transitions from R&D to operations in the field of Earth observation in Japan. He also noted that it would be necessary to address the transition process more carefully in the future - so that JAXA can continue to contribute to the development of the space segment for EO.

26-19	**The MIM Team to work with WGClimate to ensure the latest contact details for the ECV Inventory are available and shared**	**November 2012**

On the question of the merger of the Climate SBA into WGClimate, Stephen Briggs (ESA), Mike Freilich (SIT Chair), and Jean-Louis Fellous (GCOS) all spoke in favour, noting that this was also discussed at the SIT Technical Workshop, and most recently, at the October 24, 2012 CEOS Troika and Secretariat meetings in Bangalore. **The merger was agreed, and the revised WG Climate Terms of Reference were adopted by Plenary - to include the current activities of the Climate SBA coordinator.** Mark Dowell led Plenary in a round of applause for Mitch Goldberg and his team for all their work in support of CEOS climate activities.

26-20	**WGClimate to circulate their revised set of Terms of Reference to CEOS agencies, reflecting the addition of the Climate SBA coordinator duties to the WGClimate remit**	**November 2012**

Mark Dowell (WGClimate) added that WGClimate could have a 1-day meeting at the next gathering of opportunity – including attendance of SST and OCR and their science groups to discuss how WGClimate can progressassessment aspects of the ECVs. This may focus on Europeanrepresentatives to make the event cost-effective, and the meeting should focus on advancing thinking on ECV development.

GFCS: Mark queried whether GFCSwill result in additional requirements for CEOS to respond to, and emphasized that CEOS mechanisms and processes should stay agile to respond to that possibility. Jean-Louis suggested that it is unlikely that we see any new requirements from GCOS ahead of the next Implementation Plan - given the review process involved.

External linkages & governance: Mark hoped that the Climate Architecture group with CGMS and WMO would not lose momentum. He asked whether we can continue at the working level or need some form of governance. Mark noted that the current working arrangements, with shared participation in the various groups, are extremely effective, but how do we proceed in the future? Joint CEOS/CGMS oversight? Mike Freilich then noted that we have seen that shared membership does not always lead to convergence and suggested that some formalisation of the relationship would be helpful sometime soon. Stefano Bruzzi (ASI) suggested that the CGMS relationship is much broader than Climate and we need to consider the full range of common interests. Alain Ratier (EUMETSAT) acknowledged the excellent work on Climate within CEOS and the priority is to encourage its continuity. Stephen Briggs supported the EUMETSAT

comments and applauded the progress within WGClimate as indicative of the way forward for CEOS. He queried what the relationship would be between GEO and GFCS.

Kerry Sawyer noted that CGMS and CEOS have never had a formal relationship, although many members of each organization participate in each group. She asked if it would be useful to have more representation/linkages and Mike Freilich indicated that some formal level of representation at this stage would be essential. However, final decision on a formal CEOS-CGMS relationship was not resolved at the Plenary. It was noted, however, that Mark would attend the upcoming CGMS to report on the Climate Architecture from Space strategy.

Stephen Briggs raised the draft comments around the GFCS Extraordinary Congress and the need to ensure representation and get feedback from the meeting. Mark noted the lack of formal representation at the event and recommended that there must be a much broader involvement of the stakeholder community in the GFCS process. Stephen posed the question as to how we engage with GFCS and raised the example of agriculture and our GEOGLAM activities – will GFCS duplicate that? He suggestedthat the GEO and GFCS relationship needs to be clarified. GFCS seeks to cover several of the existing SBAs. Wenjian suggested that services are the focus of GFCS and Observations are the emphasis of GEO – GFCS seeks to promote the uptake of observations through the provision of services. He agreed the need to ensure there is no conflict between GEO and GFCS ambitions. CEOS priorities are well chosen and heading in the right direction. Per Erik Skrovseth (NSC) suggested the GEO-GFCS discussion is better held at GEO Plenary. Ruth Boumphrey (UKSA) stressed the importance of service provision for smaller agencies.

Mark asked whether it is acceptable for the WGClimate to continue to engage at the working level to promote the Climate Architecture as a recognised framework and to establish the necessary linkages and partnerships to ensure its implementation – and this was confirmed by plenary.

26-21	**WGClimate Chair, in cooperation with CEOS SEC, to propose a way forward for engagement in the GFCS process**	**January 2013**

27 WGISS Report and Actions

Satoko Miura (WGISS Chair, JAXA) reported:

- the schedule for the 5-year WGISS Plan update was explained and WGISS is seeking approval of its annual update;
- CNES will assume WGISS Chair for 2014 and 2015;
- WGISS held a joint meeting with WGCV hosted by ISRO, resulting in joint efforts on: quality information on metadata; data access for CEOS test sites; collaboration with the VCs' long term data preservation for ECVs; DEM quality information system;
- Other collaborations include: with WGCapD: on linking portal systems, and arrangements on joint sessions and regional workshops; with WGClimate on "CEOS Response to GCOS IP" – which needs further discussion.

Satoko recalled the 3-year outcomes for WGISS defined in the course of the CSS as: Advancing CWIC; IDN development; and support to development of CEOS Portals. Satoko noted the status of CWIC and the addition of new CWIC partners, including the SST VC, the LSI VC, CCRS, and ISRO.

Mike Freilich (CEOS SIT Chair) announced that following the United States Government (USG) meeting among USGS, NOAA, and NASA in Bangalore, the decision was madefor USG to provide long term funding for the CWIC activity for the next 5 years in order to transition CWIC from the development stage into an operational system.

WGISS is contributing to the GEO Water and Disasters Portal developments (CEOS-GEO actions WA-01-C1_1 and DI-01-C1_2 respectively).

Ivan Petiteville (ESA) raised the issue of co-existence of HMA and CWIC and hoped that all missions and products of all CEOS agencies could be visible through the respective CEOS and GEO portals, independently of the protocol used (CWIC or HMA). So it falls to CEOS and WGISS to make an effort to make sure that these same portals do not emphasise the datasets of any particular agencies. Mike Freilich (SIT Chair) supported Ivan's comments. Ivan noted the emphasis of the LSI portal presentation on CWIC and other WGISS initiatives on CWIC. Satoko confirmed that WGISS is willing to work as required to support multiple agency catalogue technologies. Pascale Ultre-Guerard (CNES) suggested that WGISS be asked to consider a more integrated approach that might accommodate more frequently alternatives to CWIC such as HMA. Stephen Briggs (ESA) suggested we focus on asking what the portal is supposed to be and we define the scope including inclusion of multiple technologies if appropriate.

Satoko noted that the necessary action remains open from last Plenary: *25-6: WGISS to engage related agencies and to lead an investigation into the opportunities and obstacles for the interoperability of HMA and CWIC, providing a report and recommendations to CEOS-26*

This will remain open for further WGISS action. Mike Freilich fully supported the need for the WGISS approach to be inclusive to accommodate and facilitate different technical standards for middleware of the full range of CEOS agencies. Klaus Schmidt (DLR) supported the statement by Mike Freilich and suggested that there be an acceleration of the action 25-6 as the closure of this action is not due to the failure of the people but the agencies that have not been present.

Ivan suggested it would be good to hear further from WGISS at a future meeting on how it plans to accomplish action 25-6.

Satoko sought approval of the Five Year Plan for WGISS and this was agreed, noting that the outcomes of the CSSII may require an update of the plan. Plenary approved the WGISS Five Year Plan.

26-22	**WGISS to engage related agencies and to lead an investigation into the opportunities and obstacles for the interoperability of HMA and CWIC, providing a report and recommendations to SIT-28**	**SIT-28**

28 WGCapD Report and Actions

Hilcéa Ferreira (WGCapD Chair, INPE) reported:

- 1st meeting of WGCapD was held in Ilhabela, Brazil, 29 February to March 02, 2012;
- WGCapD is focused on building capacity for the effective use of EO data as well as providing wider and easier access to those data;
- Updated 3-year objectives for the group are:
  - Improved access to global DEM developed on a country-by-country basis
  - Development of a remote-sensing E-learning course

    - Support to GEO 2012 – 2015 Work Plan Task ID-02 (Developing Institutional and Individual Capacity)
    - Continued support to GEONETCast, including an event at the GEO Plenary ("GEONETCast Americas User Forum")
- **DEM workshop progress:** planning regional workshops across the world utilizing the SRTM 2 data (first one in Kenya in 2013);
- **E-learning courses progress:**planning 180 hour courses that target university professors in the sciences to teach them the benefits of incorporating EO into their classes; targets are Nigeria, Kenya & South Africa;
- **GEONETCast support progress:** WGCapD will support the GEONETCast Americas Forum and the GEO Plenary side event.

Going forward, WGCapD will aim to minimize the chance of duplicating current capacity building efforts within GEO and also help to establish synergies (with the Task) and determine possible gaps.

CEOS agencies are asked to spread the word about the work of the WGCapD and to help the WG in making the connections required – with the GEONetCab Project, with the Portal for EO Resources, and with the WMO/CGMS Virtual Laboratory (VLab) for Education and Training in Satellite Meteorology.

Per-Erik Skrovseth (NSC) asked why the WGCapD activities were not better linked to CEOS priorities – such as GFOI, which might benefit from their skillset. Hilcéa noted that the activities had been driven more by the data availability than strategic priorities. Brent Smith (NOAA) noted that with respect to FCT/GFOI, that Hilcea as WGCapD Chair participated via a Skype linkage in an *ad hoc* discussion arranged with Doug Muchoney (USGS) and the CapD Vice Chair at the Reston SIT Workshop regarding SilvaCarbon/FCT capacity building activities, following earlier consultations with Jim Baker (Clinton Global Initiative). Brent noted his understanding that CapD plans to follow up on the information on developing country workshops supplied by Doug.

26-23	**Agencies interested in providing the next WGCapD Vice-Chair (from 2014, to subsequently serve as Chair from 2016) should forward nominations to WGCapD Chair**	**February 2013**

29 WGCV Report and Actions

Greg Stensaas (WGCV Chair, USGS) reported:

- Greg recalled the WGCV meeting schedule including the very successful joint meeting with WGISS in India in September; and confirmed the cooperation topics explained by Satoko;
- WGCV is working with strong WGCV supporters from China and Russia to help define key members from those countries for other VCs and WGs;
- On communications: WGCV has defined points of contact to interact with each WG and VC; WGCV has sent an email to all VCs, WGs, and Task Leads requesting Cal/Val requirements and needs;
- Greg listed the six WGCV subgroups and noted the need for leadership roles in Terrain Mapping, Microwave Sensors, and Land Product Validation and asked for CEOS Agency support in populating these roles;

- Greg reviewed WGCV action status (summarised in the table above at the start of this document);
- WGCV continues to lead the QA4EO implementation in CEOS and GEO; the QA4EO Framework and Draft CEOS Implementation Plan documents are completed and on the CEOS website for review;
- At the Joint WGCV/WGISS meeting in 2010 it was agreed to define a set of showcases to exemplify QA4EO implementation for CEOS: Forest Carbon Tracking; Climate – ozone; and Global Elevation; these are being progressed;
- The main recommendations from WGCV to Plenary are:
  - Reviewing and approving WGCV 5-year plan (on WGCV web page);
  - Providing agency support in developing and maintaining recommended instrumentation at the CEOS Cal/Val test sites, and acquiring data routinely over them;
  - Provide free access to a set data acquired over these sites to CEOS member agencies for calibration purposes, preferably via CWIC;
  - Provide resources and support for ground networks and field campaigns;
  - Agencies to provide points of contact for WGCV and its subgroups;
  - Provide support to lead and encourage widespread implementation of QA4EO principles within future (and where possible current) activities of CEOS agencies facilitated by the new UKSA QA4EO Secretariat.

Greg completes his two-year term as WGCV Chair (2010 – 2012) at this Plenary. Satish Srivastava from CSA (the former WGCV vice-chair) becomes the new Chair (2012 – 2014). Albrecht von Bargen from DLR has been elected as the new WGCV vice-chair (2012 – 2014). Albrecht will become WGCV chair in 2014. Kiran Kumar (CEOS Chair) thanked Greg for his service as WGCV Chair and welcomed Satish Srivastava as the new WGCV Chair.

Klaus Schmidt (DLR) asked how we pick out the priorities from the massive wish-list of WGCV – it doesn't facilitate action by CEOS agencies to have such an extensive list. Mark Dowell (WGClimate) appreciated the efforts of WGCV in studying how best to support WGClimate. He also welcomed the attendance of Albrecht von Bargen (DLR) from WGCV at the WGClimate meetings.

26-24	**CEOS Chair will work with WGCV Chair to advertise the need for WGCV Subgroup leadership roles to be staffed**	**December 2012**

30 CEOS Systems Engineering Office Report

Brian Killough (SEO) reviewed the 2012 Accomplishments of the CEOS Systems Engineering Office (SEO):

- Supported WGClimate with survey input and implementing the online ECV inventory (compatible with the MIM database);
- Enhanced the COVE tool in support of WGCV, JECAM and GFOI;
- Supported JECAM/GEOGLAM and FCT/GFOI initiatives by using COVE to develop initial data acquisition strategies;

- Supported the Carbon Task Force (CTF) by completing gap assessments of carbon parameters in the atmosphere, ocean and land domains;
- Supported the disasters SBA team with gap assessments for floods and specific related instrument types; and
- Hosted: CEOS-GEO Actions Meeting, SIT-27, CEOS booths at GEO-VIII and COVE booth at IGARSS.

The CEOS SEO plans and challenges for 2013 were summarised:

- Support SDCG and GFOI Data Strategy Report by developing COVE visualizations and data acquisition planning assessments;
- Complete Phase-2 Data Policy Study. Promote improved data access via online data policy information, client portals, and CWIC utilization;
- Support WGClimate ECV inventory analysis;
- Support the Disasters SBA team in the development of a white paper on Satellite Monitoring of Floods and Gap Assessments as well as supporting a new initiative for gap assessments of other disaster types;
- Enhance the COVE tool to support CEOS initiatives such as GFOI, Cal-Val Campaigns and GEOGLAM;
- Several meetings are planned: CEOS-GEO Actions Meeting (virtual meeting in February 2013), SIT-28 (March 11-15, 2013) and the SIT Technical Workshop (September 2013 date is pending;
- Host CEOS booths at GEO-IX and a COVE booth at the next IGARSS Conference in July 2013; and
- Provide continued communications support for the CEOS website, mailing lists, and education outreach.

In response to CEOS actions ID-01-C1_1 and IN-05-C1_1, the CEOS SEO conducted an assessment of data sharing policies for current CEOS missions and assessed DataCORE categorisation and CWIC utilisation. 256 mission-instrument combinations from 100 CEOS missions were reviewed with a range of data access categories. Brian would like to ensure the Missions, Instruments and Measurements (MIM) database might include data policy information and first links to data holdings.

Future steps for the study include investigating unknown data policies, publishing of the results online (2013), adding past CEOS missions as a 2013 phase-2 study, promotion of dataset registration in the IDN, increasing the number of CWIC partners, support access to HMA from CWIC through the GEO Access Broker and possibly adding data portals to the MIM database.

Brian noted that outreach is important for CEOS in order to share the benefits of coordinated efforts. However, outreach at international meetings is costly, and CEOS needs to consider how to make the greatest impact at events.

Some questions were posed to the Plenary including whether to expand meeting attendance to include the Annual American Geophysical Union (AGU) meeting, the International Astronautical Congress (IAC), and the annual meeting of the Committee on Space Research (COSPAR). Another question asked was what should be targeted at these meetings and how it should be done (booth, handouts, etc.).

Ruth Boumphrey (UKSA) offered UKSA to staff CEOS stands at major conferences in the UK as appropriate if the CEOS stand and handout materials were available for the purpose. Brian indicated that any interested individuals may contact Kim Keith to request CEOS materials.

31 CEOS MIM Database and EO Handbook

Ivan Petiteville (ESA) gave an overview of the CEOS Missions, Instruments and Measurements (MIM) database. The CEOS MIM database is the only official consolidated statement of the programmes and plans of CEOS agencies. The MIM is the data backbone of the EO Handbook and is the cornerstone for CEOS coordination on gaps and overlaps to optimise global observations. The data in the MIM is compiled using data from CEOS Agency official contacts.

In 2012, the CEOS MIM was updated for the Rio+20 EO Handbook in addition to the regular annual update. In support of WGClimate, the 2012 MIM survey was also distributed with ECV inventory materials. As well as data updates, new database measurement parameters have been added.

Collaboration with the CEOS SEO has been highly productive, resulting in the further enhancement of database contents (measurement accuracy etc.), sharing of information on VCs, ECVs and SBAs as well as coordination on future directions.

Data from the CEOS MIM was used to compile the Rio+20 EO Handbook, including data on instrument types and mission/instrument timelines. The EO Handbook provides a consolidated and up to date statement of CEOS agencies programmes and plans.

The special edition Rio+20 EO Handbook has been distributed and is an invaluable source of information, including:

- Scientific articles highlighting the important role of satellites in support to UN conventions (climate change, desertification and biodiversity);
- Timelines indicating worldwide plans for each of 30 different key Earth system measurements;
- Tables featuring information on 260 satellite missions and 395 instruments planned for the next 20 years; and
- An interactive database which supports queries of particular agency plans or measurement types (database.eohandbook.com).

Ivan shared data indicating that the online EO Handbook and MIM database had an annual user base increase of 6%, with 22,938 unique users and 155,559 page viewsin the last 12 months. The mission and instrument table and index pages are the most popular with approximately 32,000 views.

Direct support has been provided to WGClimate by distributing ECV Inventory to CEOS Agency MIM points-of-contact. There are ongoing discussions regarding the integration of the ECV Inventory information in the online MIM database. The objective of including ECV data in the MIM database is to maximise the availability and utility of information gathered. End-to-end analysis within a single information system is valuable and important.

Ivan noted that the MIM team continues to be responsive in support of this important activity that contributes to the CEOS response to the 2010 GCOS IP.

The way forward and future goals of the CEOS MIM were summarised:

- Support WGClimate and the ECV inventory survey and expand the MIM capabilities and content;
- Further expansion of work with SEO and strengthen support and interaction with the CEOS community;
- Annual updates will continue, with the next scheduled call for April-May 2013;
- Content and utilities are continuously being developed;
- Further integration and consistency with key sources will be developed; and
- Print editions of the EO Handbook are produced approximately every three years for major events to promote CEOS activities.

Mark Dowell (WGClimate) stressed the need to ensure that the ECV Inventory data is accessible for continued use and access by CGMS and WMO – even if integrated into the CEOS MIM.

32 CEOS engagement for GEO and UNFCCC meetings in late 2012

Rajeev Jaiswal (ISRO) noted that the GEO-IX Plenary Meeting will be held in Fozdo Iguaçu, Brazil, 22nd-23rd November. Kerry Sawyer (DCEO) will lead the delegation along with Brent Smith (NOAA) and Emin Bank (Tubitak). Kim Keith (SEO), along with Ms Denisse Aranda (SEO), will host a CEOS booth. The SEO has contacted GEO to indicate interest in having a CEOS booth, and CEO and SEO will coordinate outreach materials from various CEOS groups including newsletters (JAXA), one-page CEOS statement (CEO), CEOS Constellation posters, and charts on CEOS organization and key projects, etc. The EO Handbook will also be available. CEOS will be preparing a written CEOS statement and providing a verbal statement during Plenary; both statements will be coordinated with CEOS Agencies.

COP-18/SBSTA-37 will be held in Doha, Qatar on 26thNovember – 7thDecember. Accredited participants with CEOS affiliation will be: Mark Dowell (EC-JRC); Frank Martin Seifert (ESA); Jack Kaye (NASA); and, Thelma Krug (INPE). As the WGClimate Chair, it is expected that Mark will provide a report on the *CEOS Response to the GCOS IP-10*. He and Frank Martin will confer on this process.

National delegations are encouraged to provide supportive statements following the CEOS presentation, particularly with regard to continuity of space-based observations and full and open data sharing to support climate monitoring and research.

UNFCCC has approved ESA's request for a side event at COP-18 on "Monitoring and Adapting to Change in the Cryosphere.The EC-JRC is also proposed for a side session at COP-18 to have a dedicated climate session in the EU pavilion.

Mark Dowell announced that this side session on Climate at COP-18 has been accepted recently.

26-25	**CEOS agencies encouraged to liaise with their national delegations to COP-18 to secure their supportive response to the CEOS presentation - including with regard to continuity of space-based observations and full and open data sharing to support climate monitoring and research.**	**COP-18**

33 CEOS Bangalore Statement

Tim Stryker (CEO) explained the purpose of the annual CEOS Plenary Statement and referred to the draft circulated yesterday by the ISRO Chair. He noted that the texts are consistent with current CEOS priorities and activities.

Mark Dowell (WGClimate) commented on the Climate Data Records references and suggested caution on the terminology and to be more generic.

Alain Ratier (EUMETSAT) suggested a reference to advancing scientific knowledge and encouraged inclusion in the climate section.

Shizuo Yamamoto (JAXA) suggested referencing the Self Study, but it was agreed that not to do so, since this is an external document.

Stephen Briggs (ESA) suggested the reference to "disasters" should refer to "disaster risk management" to encompass all dimensions of disasters.

Tim Stryker (CEO) summarised the nature of the comments received on the draft statement, and the Statement was endorsed and will be circulated and promoted by the CEOS Chair and Secretariat.The final statement has been included as an Appendix to these minutes.

34 Calendar October 2012 – November 2013

Kerry Sawyer (DCEO) discussed CEOS representation at key stakeholder meetings:

Month	Stakeholder Meeting	CEOS Engagement
October	WMO Extraordinary Congress	WGClimate
November	CGMS-40	WGClimate, ??
	Oceans and Society: Blue Planet Symposium	WGClimate, Oceans VCs, Carbon Task Force
	GEO-IX Plenary	All CEOS, esp. CEOS Chair, CEO, SIT
December	SBSTA 37/COP 18	WGClimate, VCs
February	Climate Week	WGClimate
April	ISRSE-35	??
May	GEO Work Plan Symposium	CEO, CEOS GEO Task/Component Leads
	UNISDR 4th Session of the Global Platform for Disaster Risk Reduction	*Ad hoc* group on DRM
July	CGMS-41	??
	IEEE Geoscience and Remote Sensing Society (IGARSS)-2013	CEOS Chair – proposal for a CEOS session
October	64th International Astronautical Congress (IAC) 2013	CEOS Chair

CEOS agencies are invited to inform Kerry of further key meetings where CEOS presence would be advisable. Stephen Briggs (ESA) queried whether WGClimate would actually be represented at the WMO meeting next week for example and Kerry clarified that the table is an indication of relevant groups rather than planned representation.

35 Reports from CEOS Agencies

Kiran Kumar (CEOS Chair) referred participants to the many Agency presentations available on the website (http://ceosplenary2012.isro.gov.in/agenda.aspx). Due to time constraints, Kiran proposed that only two presentations be given verbally.

GGOS: John Labrecque (GGOS) noted that GGOS would like to ensure space agencies play a strong role in the further development of the global geodetic network, since they would benefit

significantly from it. John noted the recent letter from GGOS to CEOS Chair. Per-Erik Skrovseth (NSC) noted that the Norwegian government is upgrading its Svalbard station to include all geodetic measurement techniques, including satellite laser ranging. The network is needed for high precision satellite technology. The new station, NyAlesund, will be ready in 2018. **Per-Erik hoped that the topic be discussed at the next SIT meeting, and Plenary participants agreed to do so.**

Vietnam Academy of Science and Technology (VAST): Dr. Pham Anh Tuan (VAST) attended this year's CEOS Plenary with observer statusat the invitation of CEOS Chair/ISRO. VAST is considering applying for CEOS membership in 2013, and Dr. Tuan made a presentation introducing the VAST space programme. Dr. Tuan reported on the recent development of EO satellites in Vietnam, including an overview of Vietnam's strategy through 2020. Objectives include building up national policy and legal frameworks to support research, applications, and international cooperation in space technology.Some implementation steps have also been identified, including building a national infrastructure, implementation of a national space technology program, manufacturing both ground station and small EO satellites, and applying these technologies. 54.5 billion Yen have been invested in the development of the Vietnam Space Centre, located at Hoa Lac Hi-Tech Park. Potential projects include development of an X-band SAR satellite (JV-LOTUSat, 500kg, 5 year life, spatial resolution 1m), and a Natural Resources, Environment and Disaster monitoring satellite system (VNREDSat-1a and -1b, PAN/4-band MS).

36 CEOS Priorities and outcomes for 2013

Luc Brûlé (incoming Chair, CSA) recalled that Canada was one of the founding members of CEOS and has hosted CEOS Plenary twice. Canada is active in CEOS through participation in the Disasters SBA, the Working Groups (Chair of WGCV, member of WGISS) and satellite data provision in support of international initiatives (GFOI, GEOGLAM, disaster flood management).

CSA's approach will be consistent with the CEOS objectives and current priorities.

Luc suggested that with CEOS members involvement already stretched to capacity, it is important to focus on initiatives aligned with CEOS's exclusive mandate, i.e. developing requirements and providing multi-lateral coordination of satellite systems among CEOS members. He noted that CEOS, as an organization, is entering a transitional phase, and that the CEOS Self Study Implementation Initiative will (most probably) bring strategic alignment and structural changes to the organization. He also noted that the GEO 2012-2015 Work Plan is underway and the GEO post-2015 Work Plan is under development will have a profound impact on future CEOS activities.

Working with the CEOS community, CSA will strive at providing leadership during the transition phase. 2013 priorities will be:

- Support the CEOS Self Study Implementation Initiative;
- Support the development of the GEO post 2015 Work Plan;
- Initiate the development of 2013 CEOS Work Plan with an horizon of three years; and
- Sustained emphasis on: Impact of Climate Change on Polar Regions; Improving Disaster Risk Management through closely coordinated actions.

37 Future CEOS & SIT Chairmanships 2013-2015

Mike Freilich (SIT Chair) noted that SIT-28 would be held in the week of March 11th 2013 in Hampton, Virginia at NASA's Langley Research Center. The main meeting will be on13th and 14th of March, and Principals are strongly encouraged to attend.

Kiran Kumar (CEOS Chair) closed the meeting by expressing ISRO's gratitude for the opportunity to lead CEOS in 2012 during ISRO's 50th anniversary. He thanked NASA for its SIT Chairmanship and support during that period and for its leadership on the CEOS Self Study. He also thanked the CEO (Tim Stryker) and DCEO (Kerry Sawyer) for their support to the ISRO Chairmanship, as well as all CEOS contributors for their invaluable contributions to this voluntary partnership.

Mike Freilich (SIT Chair) thanked Kiran Kumar and the ISRO team for their outstanding leadership as CEOS Chair, and expressed appreciation for the close collaboration that has resulted in a very productive year for CEOS.

Kiran Kumar formally passed the CEOS Chairmanship to the Incoming CEOS Chair, LucBrûlé, of CSA and wished him every success in the role.

38 Adjourn

Kiran Kumar (CEOS Chair) adjourned the meeting.

List of Participants

AgroParisTech	Pascal Kosuth
ASI	Simonetta Di Ciaccio
ASI	Stefano Bruzzi
ASI	Cristina Ananasso
CAS	Chuanrong Li
CAS	Lingli Tang
CEO	Timothy Stryker (USGS)
CNES	Steven Hosford
CNES	Pascale Ultre-Guerard
CONAE	Conrado Franco Varotto
CONAE	Maria Lucia Kocar
CSA	Luc Brûlé
CSA	Satish Srivastava
CSA	Marie-Josee Bourassa (Virtual)
DCEO	Kerry Ann Sawyer (NOAA)
DLR	Klaus Schmidt
ESA	Stephen Briggs
ESA	Jean-Charles Bigot
ESA	Ivan Petiteville
ESA	Stephen Ward
ESSO/MoES	M. Rajeevan
ESSO/MoES	V.S. Prasad
ESSO/MoES	Ravichandran
EUMETSAT	Alain Ratier
EUMETSAT	Paul Counet
EUMETSAT	Robert Husband
GCOS	Jean-Louis Fellous
GEO Secretariat	Barbara Ryan
GEO Secretariat	Espen Volden
Geoscience Australia	Adam Lewis
INPE	Hilcéa Ferreira
ISRO	A.S. Kiran Kumar
ISRO	P.G. Diwakar
ISRO	Rajeev Jaiswal
ISRO	Jai Singh Parihar
ISRO	V.K. Dadhwal
ISRO	A. Senthil Kumar
ISRO	Sateesh
ISRO	Vivek Singh
ISRO	Ajai
ISRO	B.S. Gohil
ISRO	Samir Pal
ISRO	Nitant Dube
ISRO	K.R. Manjunath
ISRO	Prakash Chauhan
ISRO	S.P. Agarwal
JAXA	Shizuo Yamamoto
JAXA	Takao Akutsu
JAXA	Osamu Ochiai A
JAXA	Satoko H Miura
JAXA/JAMSS	Takashi Moriyama
JAXA/JAMSS	Masako Torii
JRC/ESA	Mark Dowell
NASA	Andrew Mitchell
NASA	Brian Killough
NASA	Christine Bognar
NASA	Francis Lindsay
NASA	John Labrecque
NASA	Justin Tillman
NASA	Kim Keith
NASA	Lawrence Friedl
NASA	Michael Freilich
NASA	Richard Eckman
NASA	Patricia A. Jacobberger-Jellison (Virtual)
NASA	Yonsook Enloe
NOAA	Brent Smith
NOAA	Jacob Sutherlun
NOAA	Ken Casey
NSC	Per-Erik Skrovseth
NSMC-CMA	Zhang Jiashen
NSMC-CMA	Fan Jinlong
NSMC-CMA	Wang Jinsong
NSMC-CMA	GuoQiang
SANSA	Jane Olwoch
SANSA	Sandile Malinga
SANSA	Nale Audrey
SANSA	Asanda Ntisana
SDCG Co-Chair for NSC	Ake Rosenqvist
U.S. Dept. of State	Fernando Echavarria
UKSA	Ruth Boumphrey
UN-ESCAP	Wang Keran
UN-ESCAP	Sanjay Srivastava
USGS	Greg Stensaas
USGS	Jean Parcher
VNSC	Pham Anh Tuan
WCRP	Ghassem Asrar (Virtual)
WMO	Wenjian Zhang

Bangalore Statement

26 October 2012

We, the assembled participants of the 26th Plenary meeting of the Committee on Earth Observation Satellites (CEOS), taking place in Bangalore, India, on 25-26 October 2012:

Building upon our collective commitments to coordinate our Earth observation satellite missions in response to needs expressed by the United Nations Commission on Sustainable Development (UNCSD), the UN Framework Convention on Climate Change (UNFCCC), the intergovernmental Group on Earth Observations (GEO) and the Group of 20 Industrialised Nations (G20);

Confirming our commitments to advance the use of space-based Earth observations to advance scientific knowledge, economic and social development, and environmental protection of all societies; and,

Recognizing the major investments made by CEOS agencies in developing the space-based components of the Global Earth Observation System of Systems, and global observing systems operated under the auspices of the United Nations;

Declare that:

CEOS Agencies will continue and enhance their cooperation to support more effective societal decision-making in the areas of climate change, forest monitoring, sustainable development, food and water security, and disaster risk management. This cooperation will be expressed through a number of global-level initiatives and projects, including:

- Development and provision of climate data records, in support of climate monitoring and research
- Coordinated observations to support the effective monitoring and management of the worlds' forested regions
- Development of a strategy for observing and assessing the global carbon cycle
- The application of space-based Earth observations to support research in agricultural productivity and an improved understanding of the global water cycle;
- Development of a more integrated approach in the application of Earth observations for the purposes of disaster risk management; and,
- Close collaboration with all countries, especially developing countries, to share new sources of EO satellite data and enhance their governments' capacity to apply these data for societal benefit.

CEOS will accomplish these activities through its Virtual Constellations of satellite missions focused on seven thematic areas: atmospheric composition, land surface imaging, ocean colour, ocean surface topography, ocean surface wind, precipitation, and sea surface temperature. Specialized Working Groups will continue to address user needs for data quality, data discovery and access, climate applications, and capacity building.

CEOS plays a vital role in ensuring coordination of Earth observations to enable decisions for securing a prosperous and sustainable future for humankind.

TERMS OF REFERENCE (REVISED 26th October 2012)
CEOS WORKING GROUP ON CLIMATE (WGClimate)

The CEOS Working Group on Climate will:

- Define and implement a consistent Climate Monitoring Architecture for space-based observations and ensure the complementarity of CEOS efforts with those of partner coordinating bodies (e.g. CGMS)
- Review and assess, on behalf of CEOS, the generation of Fundamental Climate Data Records (FCDRs) and derived Essential Climate Variable (ECV) climate products supported by Member space agencies, complementary with existing entities and roles,
- Assess the compliance of satellite missions and products with the GCOS Climate Monitoring Principles and with the "Guideline for the Generation of Datasets and Products meeting GCOS Requirements" (GCOS-143),
- Identify multi-agency implementation teams for each product and review their actions, and ensure that a coherent implementation plan exists for each and every product taking full account of other pertinent international initiatives such as SCOPE-CM and science programmes,
- Make recommendations to the above teams and receive recommendations from them, for transmission to CEOS Agency Principals,
- Ensure coherence of climate product generation supported by space agencies, including other relevant international activities, in particular SCOPE-CM, and
- Undertake any other relevant activities as instructed by CEOS Chair.

In addition, it will:

- Ensure a plan is put in place for the development of a CEOS response, which has broad consultation across the community, and provides the basis for future planning and priority setting by space agencies in response to climate information needs, including:
  - The update of the CEOS Response to GCOS requirements, and
  - The update of reports to SBSTA/UNFCCC on CEOS climate actions, as requested;
- Support the work of GCOS in defining and delivering the Essential Climate Variables required by the UNFCCC;
- Provide guidance to CEOS regarding climate-related Tasks in the GEO Work Plan, and produce relevant reports on behalf of CEOS Plenary.
- Support and advise on the overall relation of CEOS to the UNFCCC and its subsidiary bodies, and to the IPCC

In carrying out the tasks above, it will:

- Undertake an analysis, of the extent to which the current status of production of satellite climate records meets the GCOS requirements, including an analysis of the consistency of definitions of ECVs

- Work with the CEOS Virtual Constellations to ensure a coherent and consistent approach to the provision of climate records across their various topical areas
- Promote openness, traceability and access to climate data, codes and products
- Facilitate the inter-comparison of model outputs with data by identifying a subset of parameters key to the IPCC needs and encourage providers to deliver the necessary data in the required form.
- Interact with Science programs such as WCRP and IGBP to assist them in enabling their analysis, assessment and feedback to space agencies on the production of climate records
- Build on the work of the CEOS WGCV, GSICS, and the QA4EO initiative to support the calibration and validation underpinning the production of climate data records
- Coordinate with existing *in situ* networks to integrate complementary measurements and observations
- Track the progress of the detailed Actions Plans developed by CEOS in the *CEOS Response to the GCOS IP* for all of the ECVs involving space-based observations.

The Group shall operate under the procedures for the conduct of established CEOS Working Groups.