

MINUTES OF THE 19th CEOS PLENARY MEETING

15th-16th November 2005
London



1. Welcome and introduction

The Chairman, Colin Hicks, opened the meeting and welcomed participants to the 19th CEOS Plenary.

2. Review of agenda

The proposed agenda for the meeting was adopted.

3. Membership issues

GISTDA (Thailand)

Colin Hicks (Chair) noted the application of the Geo-informatics and Space Technology Development Agency (GISTDA) of Thailand to become a full Member of CEOS (GISTDA is currently an Associate).

Darasri Dowreang (GISTDA) gave a short presentation summarising the status of the THEOS satellite programme of Thailand and GISTDA's history in operating a ground segment for regional applications including disaster monitoring. GISTDA is a Member of GEO and of the UN Committee on Peaceful Uses of Outer Space. GISTDA undertakes to be a proactive and enthusiastic contributor to the CEOS community if elected as a Member.

Colin Hicks (Chair) recalled that the CEOS Terms of Reference specified criteria for agencies eligible for CEOS Membership:

Governmental organizations that are international or national in nature and are responsible for a civil spaceborne Earth observation program currently operating, or at least in Phase B or equivalent of system development, will be eligible for membership in CEOS. Members must have a continuing activity in spaceborne Earth observation, intended to operate and provide non-discriminatory and full access to data that will be made available to the international community. The addition of Members will be with the consensus of current Members of CEOS. Request for membership should be addressed to the Chairperson of the next scheduled CEOS Plenary session. The Members at that meeting will consider such requests.

Colin Hicks suggested that - based on the information presented by GISTDA - the agency fulfils the requirements for membership as defined in the CEOS Terms of Reference and should be accepted as a CEOS Member. Yasushi Horikawa (JAXA) seconded this proposal – noting that JAXA welcomes an addition to the Asian membership of CEOS. Colin Hicks noted the endorsement of the meeting for GISTDA’s application and welcomed GISTDA and Darasri Dowreang and Pakorn Apaphant to participate in the remainder of the 19th Plenary meeting as the newest Member of CEOS.

Colin Hicks noted that the CEOS Task Force (CTF) report – to be discussed later in the meeting – contained two key recommendations related to CEOS Membership:

Rec. No. 2: At 19th CEOS Plenary, the incoming Chair should be tasked to add a cover letter to the statement identified in Rec. No.1, to send to those agencies who have not been actively involved in CEOS activities in recent years, encouraging them to re-join the effort and indicating resolve within CEOS for a new way of doing business.

Rec. No. 3: The incoming Chair should be tasked with producing a brief assessment for 20th CEOS Plenary on the possibilities for new CEOS Members and Associates, including from developing countries.

He recalled that the CTF report suggested that CEOS be both affirmed and expanded as the space agency forum for Earth observation coordination.

4. Record of 18th Plenary

Stephen Ward (BNSC) noted that the final version of the 18th Plenary minutes had been distributed by NRSCC, incorporating all comments received. He summarised the status of the 18th Plenary actions, most of which had either been completed or were specifically being addressed in connection with 19th Plenary agenda items.

18-1	CEOS Chair to convey the CEOS input for GEO-5 to the GEO Secretariat	Complete
18-2	SIT Chairman to report to IGOS-P-11bis on the CEOS submission to GEO-5 and to encourage a submission from IGOS Partners to GEO-5	Complete
18-3	CEOS Chair to represent CEOS at GEO-5 and at the 3rd EO Summit and to confirm CEOS is willing to be a founding participant of GEOSS	Complete CEOS is a Participating Organisation in the GEO framework
18-4	SIT Chair to lead the work of the Task Force agreed at the 18th Plenary on relations with GEO and possible CEOS reforms. SIT Chair to liaise with the CEOS Chair, and to ensure presentation of the task	Complete CEOS Task Force Report Package is in the Plenary documents.

	force report and recommendations to a mid-year meeting of Principals and subsequently to the 19th Plenary	
18-5	CEOS Chair to convene a special mid-year meeting of CEOS Principals in 2005 – with the purpose of reviewing progress and way forward with regards to the findings and recommendations of the CEOS Task Force	Complete Mid-year meeting was held in Geneva on 24 th May
18-6	CEOS Members and Associates to ensure attendance of their Principals in the mid-year meeting planned for 2005	Complete 12 Member and 9 Associate agencies were represented at the meeting
18-7	All CEOS Members and Associates and Subsidiary Groups encouraged to be pro-active in the consultation process required in connection with the CEOS Task Force	Complete
18-8	CEOS Chair to continue to focus on satellite utilisation – seeking updates on relevant progress by Members, Associates, and Subsidiary Groups during 2005 (including encouraging action on Wuhai Workshop recommendations)	Ongoing WGISS will report on this issue. Proposed to be carried forward in the CEOS Implementation Plan
18-9	CEOS Agencies, WGEdu, and WSSD Follow-up Programme Modules are encouraged to involve the CEOS African Advisory Group in their implementation activities	Ongoing AAG represented at Plenary by the Vice-Chair Souleye Wade, Senegal
18-10	CEOS Members and Associates encouraged to support, as much as possible, open source software throughout their organization to foster the exchange and understanding of projects of value to all CEOS parties	Complete
18-11	CEOS Members and Associates invited to send nominations for WGISS Vice-Chair (to the current WGISS Chair – John Faundeen, USGS)	Complete Ivan Petiteville (ESA) and Ken McDonald (NASA) will serve respectively as WGISS Chair and Vice-Chair from Nov 2005. WGISS report will provide more details.
18-12	WGCV Chair and CEOS Chair to co-operate in pursuing follow-up to WGCV recommendations to 18th CEOS Plenary	Complete Status to be reported to Plenary
18-13	CEOS Members and Associates invited to send nominations for WGEdu participants (to Sergio Camacho)	Complete Needs reinforcement by 19 th Plenary
18-14	CEOS Members and Associates are encouraged to help populate the WGEdu Portal by transmitting relevant capacity building and links to on-line data holdings to the WGEdu Chair	Complete Needs reinforcement by 19 th Plenary
18-15	Korehiro Maeda (JAXA), in co-operation with the CEOS Chair, and with the support of CEOS Secretariat and other CEOS members, to develop the draft CEOS resolution on frequency protection, and distribute the draft for review and comment to CEOS agencies (final approval rests with CEOS Chair)	Superseded SFCG item on 19 th Plenary agenda
18-16	CEOS Chair, in co-operation with SFCG representatives, to invite all CEOS agencies to: be represented at the spring 2005 workshop on frequency and performance requirements for passive remote sensing; and to provide sensor performance and interference requirements (including new frequencies) to CEOS Secretariat	Complete

18-17	Chu Ishida (JAXA) to poll CEOS agencies on planned participation in COP-10 with a view to arranging co-operative efforts on behalf of CEOS	Complete
18-18	CEOS agencies to review the final version of the GCOS Implementation Plan and to send CEOS Chair comments appropriate to be made on behalf of CEOS	Complete Extensive dialogue between GCOS and SIT on CEOS Response to the GCOS IP and input to COP-11
18-19	CEOS Chair to undertake a full update of the CEOS Five Year Plan – for presentation to the 19th CEOS Plenary	Open CEOS Task Force recommended that the 5-Year Plan be updated in 2006 by the incoming Chair

5. Chair's report

Colin Hicks (Chair) gave a presentation reviewing the key initiatives and milestones which comprised the 2005 CEOS calendar:

- the further development of GEO;
- the active contribution of CEOS agency staff in the development of the GEO Work Packets and in the initial GEO Secretariat established in Geneva;
- the enormous effort expended within the CEOS Task Force (CTF) – led by JAXA – in trying to plot a way forward for the space agencies, through CEOS, in a new era for Earth observations; this included a highly successful mid-year meeting of CEOS Principals at which the draft CTF report was presented and discussed;
- the crucial role of the CEOS Secretariat in achieving the goals of CEOS and the need for CEOS to emphasise the concept of the Troika as a way of sharing the load of CEOS Chairmanship in future years;
- the ongoing efforts of the CEOS WGs and their participation in the work of the CEOS Task Force to define the way forward for CEOS;
- the continued evolution of the IGOS Partnership and its Themes reflecting the emergence of GEO and its 9 Societal Benefit Areas (SBAs);
- African country participation: BNSC is delighted to welcome more countries to join the membership and has involved a number of observers in this year's Plenary;
- CEOS 5-Year Plan: BNSC decided to wait until the deliberations of the CEOS Task Force were complete and the way forward for CEOS agreed at 19th Plenary before updating the CEOS 5 Year Plan; BNSC and CONAE will cooperate on this task in 2006.

Colin Hicks noted the broad representation of various countries and regional bodies in the London CEOS Plenary and hoped that the space agencies would recognise that the future success of their co-ordination efforts lies in their own hands – and that they should have faith in CEOS as their chosen forum for this purpose.

6. SIT Chair's report

Yasushi Horikawa (JAXA/SIT Chair) gave a presentation summarising the activities and achievements of the Strategic Implementation Team (SIT) since the last CEOS Plenary:

- two SIT meetings have been held since last Plenary: SIT-16 on 23rd May in Geneva and SIT-17 on 14th November in London;
- at request of CEOS Chair, SIT Chair provided CEOS comments to GEO SEC on version 1 of their 2006 Work Plan; the main comments were: the current draft of the 2006 Work Plan allocates far too many tasks to GEO SEC; the resources requested by GEO SEC will simply not allow it to undertake the tasks currently allocated to it (assessment of CEOS agencies, but the issue of resources should be discussed by GEO); some work plans need to be undertaken beyond 2006 - those work plans should comprise a set of tasks to be completed with defined milestones to be achieved;
- a preliminary response from CEOS to the GCOS IP has been developed by a small SIT task team – led by Stephen Briggs (ESA); this response was submitted to COP-11 through CONAE/Argentina; CEOS promises to update to detailed response by COP-12; CEOS Task Force proposes that this work serve as the Climate Chapter of the proposed CEOS Implementation Plan for Space-Based Observations of the GEOS;
- SIT Chair arranged a response to the letter from WCRP concerning the climate research community's views and concerns with regard to progress in remote sensing from space: this response focused on: an explanation of the 'CEOS Response to the GCOS IP'; a request to WCRP to indicate requirements not covered by GCOS IP; a request to WCRP to support GCOS in defining priorities and to support analysis of benefits of new observations.

SIT Chair noted the importance of the proposed CEOS Implementation Plan and the necessity for CEOS to develop an EFFECTIVE PROCESS for linking agency EO plans and budgets (commitments) to the requirements – the role for SIT in future. JAXA has been delighted to lead CEOS SIT these last 2 years and has tried to boost progress on IGOS Themes. 2006 is the start of a new and crucial phase for CEOS and space agencies must recognise that CEOS is the place where they will co-ordinate EO programmes and dedicate resources accordingly. The CEOS Implementation Plan offers a strong focus for CEOS SIT efforts.

Incoming SIT Chair, Volker Liebig (ESA) explained that he plans to build on the foundations established by JAXA over the last 2 years and on the excellent work of the CEOS Task Force – focusing on the development of the CEOS Implementation Plan and in particular the Climate Chapter in 2006. Colin Hicks (Chair) noted the importance of identifying individuals to contribute to the SIT work in 2006 given the heavy workload.

7. Future CEOS and SIT Chairs

Colin Hicks (Chair) summarised the status of current planning for Chairmanship of CEOS, SIT, and IGOS-P, as follows:

	2005	2006	2007	2008	2009
CEOS Chair	BNSC (Europe)	CONAE (Americas)	USGS (Americas)	Europe/ Africa? OFFER FROM CSIR (S Africa)	Asia/ Oceania?
SIT Chair	JAXA (Asia)	ESA (Europe)	ESA (Europe)	NOAA (Americas)	NOAA (Americas)
IGOS-P Co-Chairs	BNSC/ UNEP & WMO	CONAE/ WMO & ?	USGS/ ?	?	?

USGS kindly volunteered to bring forward Chair period due to lack of volunteer from Asia/Oceania for 2007

CEOS Chair: Barbara Ryan (USGS) confirmed that USGS is looking forward to Chairing CEOS from 2007. USGS acknowledges the role of the Troika and will work actively in 2006 alongside CONAE and BNSC. USGS would like to emphasise two themes for its Chairmanship:

- study of the engagement of the private sector in the CEOS Implementation Plan;
- study of the role of moderate resolution Earth observations – including Landsat data continuity.

Mothibi Ramusi (CSIR) confirmed that South Africa has sent a letter to CEOS SEC offering to serve as CEOS Chair from November 2007 – succeeding USGS. He noted that South Africa is an active participant in the international space community including as a Co-Chair in GEO. The Government of South Africa sees CEOS as an important future contributor to GEO. South Africa is developing its own space policy and also launching its own space agency soon. Development of a national satellite programme will qualify this agency as a CEOS Member in due course.

Colin Hicks (Chair) confirmed that CEOS Plenary welcomes and accepts the offers of USGS and CSIR to serve as future Chairs, and noted that a CEOS Chair volunteer from Asia/Oceania is required for the period from November 2008.

Action	19-1	CEOS Chair to convey the acceptance and appreciation of CEOS in letters to USGS and CSIR in response to their offers to serve as CEOS Chair agency in future years	December 2005
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SIT Chair: Colin Hicks (Chair) commended to Plenary the offers of ESA (naming Volker Liebig) and of NOAA (naming Greg Withee) to serve as SIT Chair and SIT Vice-Chair with effect from 19th Plenary – and was pleased to note Plenary endorsement of these offers.

8. GEO

Colin Hicks (Chair) invited the GEO Secretariat Director, José Achache, to brief the CEOS Plenary on the latest developments in GEO, its 2006 Work Plan, and the prospects for the cooperation with CEOS and the space agencies. The key points made by the Director were as follows:

- Members and Participating Organisations in GEO are in complete agreement on the objectives of GEO; there is however debate on how GEO should work towards these objectives; the GEO rules and the 2006 Work Plan will be discussed at GEO Plenary in December;
- the Work Plan is the consolidation of the work of several months by the Work Plan Team; initial comments suggest that the Work Plan draft is too ambitious; other criticisms address: who does what and the role for the GEO Secretariat; GEO SEC is there to coordinate and not implement; activities will be implemented by Members and Participating Organisations; GEO SEC will coordinate, monitor and report on these activities; José Achache suggested that GEO must bring added value to the system and not just record what is going on - GEO must deliver or perish; GEO SEC will not itself conduct many of the tasks – contrary to the perception of the current plan draft;
- delegation by GEO SEC must be accompanied by transmission of a sense of commitment by the bodies accepting tasks to deliver results; although GEO is a voluntary framework we must establish a sense of responsibility for delivering those tasks accepted by a Member or Participating Organisation; this commitment has to be achieved or the 10 Year Implementation Plan will not be fulfilled;
- in the draft plan the GEO SEC is identified as the default body where no responsible organisation has yet been agreed – it does not suggest GEO SEC is the implementing body; delegation to Members and POs remains to be achieved;
- the new version will indicate the actors responsible for the various tasks; the task sheets will be much more explicit and will clearly state what the deliverables are and their deadlines as the basis for commitments;
- the role for CEOS: GEO SEC is cautious about diluting impact of commitments by passing actions to a committee; if CEOS is to take responsibility then it has to be in a position to commit to delivering this task; José's experience of CEOS suggests that the Committee has difficulty in arranging commitments by its member space agencies – he hopes that the GEO process will provide a political level support to help encourage such commitments;
- GEO needs clear priorities if it is to talk sensibly to Member finance ministries; this is the key challenge for the entire community - not just in the space domain – and will require some cooperation across different domains; for example, trading off the need for observations of precipitation versus observations of land surface; to date the community has been weak in prioritising in this way;
- CEOS needs to initiate a process to address all 9 societal benefit areas;
- José has been working for last the 5 years in the space agency community and hopes that CEOS will support GEO with suitably focused efforts in the coming years.

In response to a question from Conrado Varrotto (CONAE) as to how exactly CEOS should deliver on any given task from the GEO Work Plan (eg on Landsat Data

continuity), José Achache observed that the agencies required are present here in CEOS Plenary and it is for them to decide how best to decide continuity by pooling resources and generate an appropriate technical solution. Space agencies and CEOS should consider how to bring the plans to GEO Plenary to ask Ministers to support.

Roy Gibson (EUMETSAT) asked GEO SEC Director to confirm whether the next version of the Work Plan will clearly indicate those tasks for which CEOS is the relevant actor – with more detail on the required execution route for the tasks (to be developing in coming months). He also queried whether GEO SEC envisages a period of negotiation after GEO-II in which the GEO SEC will negotiate with SIT Chair on those delegated tasks and reach an agreement on the exact process and timetable. José Achache confirmed that this is precisely the process GEO SEC has in mind.

Daniel Vidal-Madjar (CNES) expressed support for the proposed approach between GEO and CEOS, noting that CEOS must consider how to establish a process to achieve real coordination on missions; for example, by defining a ‘minimum requirements’ specification whereby an agency programme might contribute to a certain constellation or GEO target. Such a process is vital to CEOS future success in coordinating implementation of Member programmes.

Ron Birk (NASA) suggested that the GEO Plenary can help provide space agencies with the justification for implementation actions.

9. Report of the CEOS Task Force

Yasushi Horikawa (JAXA) gave a presentation summarising the activities and achievements of the CEOS Task Force (CTF) since the last CEOS Plenary:

- the CTF was established by the 18th CEOS Plenary, and was Chaired by SIT Chair, supported by current/past/future CEOS Chairs and the permanent members of the CEOS Secretariat (as framed by action 18-4: *SIT Chair to lead the work of the Task Force agreed at the 18th Plenary on relations with GEO and possible CEOS reforms. SIT Chair to liaise with the CEOS Chair, and to ensure presentation of the task force report and recommendations to a mid-year meeting of Principals and subsequently to the 19th Plenary*);
- the mandate of the CTF was to address: *‘recommendations on mechanisms and organisational structures for effective and active coordination role in GEOSS space component; review CEOS Five Year Plan and identify actions for CEOS subordinate bodies; review permanent membership arrangements and terms of reference for CEOS bodies; develop a communication strategy with GEO; other GEO related matters’*;
- the CTF was extremely active throughout 2005 – holding numerous teleconferences and meetings, including the mid-year meeting of CEOS Principals on 24th May in Geneva;
- following the guidance and feedback from the Principals meeting, a revised draft of the CTF report was issued for review on 29th July – accompanied by a draft list of actions intended to propose a way forward on each of the 21 recommendations to Plenary;
- the comments received from CEOS agencies by 15th September, all enthusiastically supported the CTF report; a final version of the report was circulated on the 7th

October – along with the actions list, and revised Terms of Reference for CEOS, SIT and the Working Groups.

CEOS Plenary is requested to: endorse the CTF report and the 21 recommendations therein; accept the draft actions proposed to implement these recommendations; and approve the revisions to both the CEOS and SIT terms of reference. Feedback in the last few days by the WG Chairs has indicated that further harmonization of the WG terms of reference will be required – although Plenary is asked to approve the general principles of the current drafts, with SIT Chair volunteering to work the finalisation of the terms of reference with the WG Chairs.

There was an extended discussion on the various recommendations and terms of reference, the highlights of which are recorded below.

Terms of Reference

Virendra Jha (CSA): the terms of reference of the Working Groups have just been tweaked rather than overhauled; a higher level review of the whole WG structure and roles is required by CEOS and this should be addressed by SIT Chair in 2006. CSA expressed gratitude to JAXA and the CEOS Task Force for their enormous effort in 2006.

The CSA comment on the need for a broad review of the CEOS Working Groups was supported by a number of agencies. Per Erik Skrovseth (NSC) noted that Plenary has in the past not guided the activities of the Working Groups particularly well and that CEOS must engage the resources and activities of the Working Groups much better in future.

Daniel Vidal-Madjar (CNES): the primary function of the Working Groups in future should be to undertake tasks for SIT in support of the CEOS Implementation Plan.

Ron Birk (NASA): the revised terms of reference for SIT, in their reference to the new planning process for the CEOS Implementation Plan should refer to space system *capabilities* as well as to the requirements for them.

Per Erik Skrovseth (NSC): the terms of reference for CEOS have evolved over a period of 20 years and refer to some very old organisations from which CEOS evolved. The terms of reference should be revisited in 2006 to generate a fresh and forward-looking version.

Stephen Briggs (ESA): seconded the NSC proposal, suggesting that the advent of GEO represented the most significant event in the history of CEOS efforts and that it offers an opportunity for a change of philosophy – and a completely new modus operandi to an agenda driven in great part by GEO requirements. There are other aspects of work that agencies cooperate on not driven by GEO and the CEOS Working Groups will continue to report on these to Plenary - but for GEO-related tasks it's the task of SIT, with the support of the Working Groups. If this does not work then we should retire CEOS and recognise that the world has changed. CEOS is just an expression of intent of the space agencies.

Brent Smith (NOAA): noted that the CTF has helped us address a major refocusing of CEOS and perhaps the revised terms of reference don't yet reflect that effort. CEOS may need to reconsider more radical changes to the terms of reference to reflect adoption of the CTF report.

Per Tegner (SNSB): encouraged SIT Chair to ensure that only agencies making commitments attend the relevant SIT meetings – so that they can truly be working meetings.

CTF Recommendations and Actions

The CTF recommendations and actions (in green) as presented by the CTF Chair to Plenary are listed below (and incorporate the immediate revisions that were agreed in discussion). A more formal expression of the agreed actions from the CTF report is also presented as an appendix to this document.

	I: Affirmation and expansion of CEOS as the space agency forum
1	At 19th CEOS Plenary, CEOS Members and Associates should agree a statement of support for CEOS, supplemented by an outline of the next steps for CEOS in relation to GEO. This statement will suggest that CEOS be recognised as a primary source of space-borne Earth observations for GEO, and should be circulated widely including to GEO SEC, GEO Director, and national/ regional points of contact to GEO.
	A draft statement is attached for discussion and approval at 19th Plenary.
2	At 19th CEOS Plenary, the Incoming Chair should be tasked to add a cover letter to the statement identified in Rec. No.1, to send to those agencies who have not been actively involved in CEOS activities in recent years, encouraging them to re-join the effort and indicating resolve within CEOS for a new way of doing business.
	CEOS Chair to draft and send after 19th Plenary.
3	The Incoming Chair should be tasked with producing a brief assessment for 20th CEOS Plenary on the possibilities for new CEOS Members and Associates, including from developing countries.
	CEOS Chair at 19th Plenary to encourage existing Members and Associates to look for new entrants. CEOS Chair, with assistance of CEOS Secretariat, to pursue promising leads during the year and prepare a report for the 20th Plenary.
4	CEOS SEC should be tasked with producing, in consultation with GEO SEC, a brief discussion paper for 20th CEOS Plenary on ways to involve - and develop a relationship with - the commercial sector for implementation of the space segment of GEOSS.
	CEOS chair after 19th Plenary to allocate responsibility within the CEOS Secretariat to contact the GEO Secretariat on this subject and to produce a draft paper for discussion in the Secretariat and subsequent presentation to 20th Plenary.
5	No change in the current membership rules should be made until the relationship with GEO of CEOS, and indeed IGOS Partnership, has become clearer. Focussing on the core business of coordination of the satellite missions may require reconsideration of the current membership rules for CEOS. Duplication of meetings has been an issue for both CEOS and IGOS Partnership, and some streamlining might later be possible. The Task Force suggests that the current membership arrangements should not be changed until the GEO process and calendar are clearer and stable.
	CEOS Chair to decide whether developments with GEO and/or IGOS-P during 2005 warrant this subject being raised again at the 20th Plenary.
	II: Developing a CEOS Implementation Plan for Space-based Observations for GEOSS
6	To be able to monitor and demonstrate real progress, CEOS should, at a pace which the progress in GEO allows, develop a <i>CEOS Implementation Plan for Space-based Observations for GEOSS</i> . Execution of this plan and its various components should drive

	<p>the annual activities and meetings of CEOS and its reporting to GEO and other relevant bodies. The CEOS Task Force suggests that the SIT efforts on the Climate SBA/GCOS IP could be adopted as a working model for the new 'CEOS process' by which GEOSS requirements are addressed and an implementation plan developed. This would allow CEOS to make progress on a priority area whilst allowing GEO time to consolidate its overall approach.</p>
	<p>CEOS Chair & SIT Chair should ensure that a coordinated response to GCOS IP is fed into CCP 11. SIT Chair should supervise the production of a draft CEOS Implementation Plan for submission to 20th Plenary, creating a task force for this purpose if necessary. The plan should inter alia reflect the recommendations of the CEOS Data Utilisation Task Force. SIT Chair should draw the attention of the GEO Secretariat to the recommendations of the CEOS Data Utilisation Task Force.</p>
7	<p>CEOS should continue to participate fully and openly with its Partners in IGOS, especially in regard to its contributions to GEO and to the GEOSS 10 Year Implementation Plan.</p>
	<p>CEOS Chair, as Co-Chair of IGOS-P should make it clear at the next Partners' meeting that CEOS does not envisage any immediate change in the functioning of the Partnership.</p>
8	<p>CEOS must ensure an effective interface with GEO at a number of different levels:</p> <ul style="list-style-type: none"> - by appropriate representation at GEO Plenary (see Rec. No. 9 below); - by responding to requests from the GEO Executive Committee; - by ensuring appropriate representation on the subsidiary bodies created by GEO; and, most importantly, - through regular contact with the GEO Secretariat Director and his staff. <p>These contacts will be ensured not only by the CEOS Chair, but also by the Chairman of SIT, the Secretariat and CEOS Working Groups, as explained in the recommendations below.</p>
	<p>Whilst delegating day to day contact with GEO to the Chair of SIT and to the Chairs of the CEOS Working Groups, the CEOS Chair will ensure that there is an effective interface between CEOS and GEO.</p>
	<p>III: Executing the Plan: a Job for SIT</p>
9	<p>The SIT Chair should be the principal CEOS interface with GEO. There should be no formalisation of membership of SIT, but those who attend meetings will be expected to be able to accept commitments on behalf of their agency. The SIT Terms of Reference should be amended to authorise SIT to address issues related to planning and implementing CEOS's contribution to the space-based segment of GEOSS.</p>
	<p>19th Plenary is asked to approve the attached modified terms of reference for SIT, consistent with SIT being the principal interface between CEOS and GEO</p>
10	<p>SIT meetings should be planned and scoped to optimise progress on the main business of implementation of CEOS's contribution to the GEOSS space component. This might require SIT to address:</p> <ul style="list-style-type: none"> - co-ordination of planning for a selected focus topic: such as the GCOS IP; - coordination of a system study by CEOS agencies for specific joint missions as required by the GEOSS 10 Year Implementation Plan; - coordination in definition and generation of high level products by CEOS agencies in response to GEOSS SBAs; - continued dialogue with relevant user bodies; - an update on overall progress of the <i>CEOS Implementation Plan for Space-based Observations for GEOSS</i>.
	<p>SIT Chair should ensure that SIT meetings are arranged such as to ensure progress on GEOSS space segment business.</p>

11	SIT Chair should make, maintain and report (to CEOS Plenary annually for endorsement by CEOS Principals) a list of CEOS agency commitments for the GEOSS 10 Year Implementation Plan. The list should be attached to the <i>CEOS Implementation Plan</i> .
	SIT Chair will present to CEOS plenary annually progress on the CEOS Implementation Plan actions by space agencies in support of the GEOSS 10 Year Implementation Plan.
	IV: A new focus for the CEOS Working Groups
12	In addition to their formal reporting to the CEOS Plenary, Working Groups should report progress to SIT (which takes the lead on execution of the CEOS Implementation Plan) on those implementation plan targets which they have been tasked to support, and should plan their activities and time their meetings accordingly. The Working Groups will require clear direction, and this should be provided by the SIT Chair who should have a clear understanding of the capabilities and potential of the Working Groups.
	SIT Chair should ensure that the WG Chairs are clear about the direction for the WG programme and the specific tasks which have been allocated to them (specifically CEOS Implementation Plan targets). SIT Chair to regularly consult with WG Chairs to be able to fully utilise the expertise that exists within the CEOS WGs. Working Groups Chairs should be actively engaged in development of the relevant parts of the CEOS Implementation Plan to ensure that the allocated tasks are within their capacity Working Group Chairs will plan their activities and meetings to best meet the needs of the CEOS Implementation plan targets allocated to them, and should report progress regularly to Chair of SIT.
13	The role of the WGEdu is somewhat different, in that there will likely be (still not fully clear) a GEO sub-group, assisted by the GEO Secretariat, that will be looking at education, training and capacity building. WGEdu should align its activities so as to be supportive of the guidelines laid down in the GEOSS Implementation Plan Reference Document and to ensure complementarity (and not duplication) with other GEO-related initiatives
	CEOS SEC to communicate with GEO SEC to establish the linkages between CEOS capacity building efforts and GEO capacity building efforts and to agree, in consultation with WGEdu, suitable roles, responsibilities, and priorities for each body.
14	The reports of the Working Groups to Plenary should be reconfigured to address both: - the Working Group contribution to the <i>CEOS Implementation Plan</i> (which should be coordinated with the SIT Chair as part of his overall Implementation Plan update); - the research and development updates (eg relating to improved or new observing capabilities), which CEOS Principals have recognised as an important part of the CEOS mandate beyond the GEO focus.
	Working Group reports to Plenary should cover both CEOS Implementation plan activities including research and development updates.
15	Principals should review their organisation's membership to CEOS Working Groups, particularly in the light of their contribution to GEO, and ensure that they obtain adequate internal support.
	SIT Chair will write to CEOS Principals to encourage them to review their agency's membership to CEOS Working Groups in order to provide them with the necessary expertise and resources to accomplish their work.
	V: The new CEOS calendar

16	Securing senior level attendance at each CEOS Plenary from as many space agencies as possible should be a responsibility and priority of the CEOS Chair each year. The agenda of the Plenary should be framed to encourage participation of Principals, with an emphasis on discussion and decisions on the important GEO-related challenges facing space agencies - including the core business of coordinating members' missions.
	The current CEOS Chair, supported by Troika members (to ensure global coverage) should personally encourage the maximum senior level attendance at Plenaries, and ensure that the agenda has the substance necessary to warrant their attendance.
17	To encourage a wider range of agencies (including smaller agencies) to consider hosting future Plenary meetings, they should be reaffirmed as senior-level working meetings – without the need for significant expense on associated hospitality. It should also be recognised and accepted that the new CEOS calendar will require significant inter-sessional progress and that Chair agencies will be required to pro-actively manage the process for a full year, and not focus solely on the Plenary meeting.
	Principals are invited to note that hosting the plenary is open to all, and that the event may be low cost and must be business-oriented. Agencies which have chair responsibilities should note that this will require significant inter-sessional activity and not simply work connected with the plenary.
18	CEOS Chair and SIT Chair may decide to vary the timing and frequency of meetings of Principals and SIT participants if business warrants it. A minimum of three months notice should normally be given for convening such meetings.
	CEOS and SIT Chairs should consult regularly about the timing of CEOS meetings, with a view to maximizing the coordination with GEO and its activities.
	VI: Improving on 'best efforts': the need for resources
19	CEOS should apply further measures in combination to ensure adequate resources are available for it to meet its objectives and to spread the workload: <ul style="list-style-type: none"> - reinforce the team supporting the CEOS Chair (including providing a dedicated staff member as a full-time leader of the CEOS secretariat) - reinforce the team supporting the SIT Chair (including providing a dedicated staff member to coordinate CEOS agency's existing and future Earth observation missions) - formalise the Troika concept, and reinforce CEOS SEC by having representatives from all 3 Troika agencies (past, present, future CEOS Chair agencies) share more of the SEC responsibilities (as opposed to just the present Chair); - apply significant resources of the CEOS Working Groups more effectively to the core business; - actively encourage a wide range of space agencies (including smaller agencies) to consider serving as CEOS Chair – perhaps under the guidance of more experienced and larger partner agencies, or in co-operation with other agencies (as a joint Chairmanship).
	Each incoming CEOS and SIT Chair should be invited to confirm that adequate staffing will be provided to enable the job to be undertaken effectively.
	Each incoming CEOS Chair should be reminded of the need to institute the Troika system, in order to maximise continuity and to ensure adequate resourcing of the CEOS Secretariat.
20	A brief resource plan for the next 2 years should be presented to each CEOS Plenary (by the CEOS and SIT Chair agencies for the period) – to ensure that adequate staff are in place to address the objectives of the CEOS Implementation Plan and other CEOS ambitions. This will help ensure that incoming and future CEOS and SIT Chairs fully understand the scale of the commitment involved, have staff in place to meet the anticipated demands, and that responsibilities can be assigned and understood as early as possible. Such practical measures are important for CEOS to be able to better assess its capacity to deliver in response to GEO requests.

	CEOS Chair should arrange for a resource plan for next 2 years to be presented to 20 th Plenary, and every plenary thereafter. CEOS Task Force has developed a brief template for consideration by the Incoming Chair.
21	The recommendations contained in this report, if approved by the 19th Plenary, should at once be incorporated into an update of the CEOS 5-Year Plan by the incoming CEOS Chair and SIT Chair, for approval by circulation in the first half of 2006 or at a mid-term Principals' meeting if it is decided to hold one in 2006. The overall CEOS Terms of Reference should also be amended to reflect these recommendations. The Terms of Reference for SIT and for each of the CEOS Working Groups should also be amended.
	CEOS Chair should arrange for work on the revision of the CEOS Five Year Plan to be resumed in the light of developments with GEO, with an advanced draft ready for discussion at 20th Plenary.

The highlights of the discussion on these recommendations and actions were as follows:

Recommendation 6: Stephen Briggs (ESA) noted that the current effort on climate observations with GCOS is seen as a good model as to how space agencies might work with GEO in the other SBAs. GCOS is extracting the priority requirements for space observations from its Implementation Plan and CEOS SIT has set up a small team to develop a paper for COP-11 – which provides a very brief initial analysis and promises a full report to COP-12 in Nov/Dec 2006. CONAE will provide a verbal statement to COP-11. There will be a further iteration on the requirements at a GCOS workshop in Geneva on 9-11 January. SIT will develop a response – starting from the SIT-18 meeting in March 2006. A second task for SIT in 2006 will be to develop the broader elements of the CEOS Implementation Plan. **Space agencies need to recognise that it is they who must volunteer to be responsible for the individual actions – albeit under the CEOS umbrella.** As incoming SIT Chair, ESA hopes to produce a full report to 20th Plenary on the Climate Chapter of the Implementation Plan and a solid modus operandi for other Chapters and the overall framework.

Colin Hicks (Chair) advised that SIT must ensure a continued close dialogue with GEO to ensure that the CEOS work satisfies GEO needs and noted that the CEOS work on Climate will report through UNFCCC as an action on 'Parties which support space agencies'.

Recommendation 11: In response to a suggestion from Stephen Briggs (ESA), it was agreed that the action for recommendation 11 (which originally proposed that SIT Chair list the commitments from space agencies to the CEOS Implementation Plan annually) should instead refer to progress on CEOS Implementation Plan actions. José Achache commented that if CEOS is to take an active role in the GEOSS Implementation, it must deliver on commitments.

Recommendation 12: Sergio Camacho (WGEdu Chair) hoped that CEOS and SIT Chair would keep WG Chairs promptly informed of the relevant community calendar so that they might arrange representation at the required meetings. Per Erik Skrovseth (NSC) encouraged a full review of CEOS WG structure in early 2006 as part of the consideration of terms of reference. Colin Hicks noted that the CTF Report requires SIT Chair to ensure that the WG Chairs are clear about the direction for the WG programme and the specific tasks which have been allocated to them (specifically CEOS Implementation Plan targets).

John Faundeen (WGISS Chair) suggested that, at least in 2006, SIT Chair arrange representation to the planned WG meetings. This representation workload could be shared by SIT, SEC, and Troika agencies. Volker Liebig (incoming SIT Chair, ESA) recalled that the mid-year meeting of Principals was pleased to record the emphasis of CEOS on the new Implementation Plan but wanted CEOS WGs to retain their efforts on other ongoing tasks in support of various science programmes etc. This needs to be recalled in the review of WG structure and activities.

Recommendations 17 & 19: Per Erik Skrovseth (NSC) noted the need for continuity provided by the CEOS Troika but commented that smaller agencies (such as NSC) cannot afford the resources associated with such a commitment. Colin Hicks (Chair) recalled that the CTF had recognised this obstacle and had suggested that smaller agencies could consider teaming with a larger partner to Chair/host Plenary. Such models could and should be explored in future.

Gilles Sommeria (WCRP) asked how CEOS planned to respond to requirements for representation in the various subsidiary bodies of GEO. Colin Hicks (Chair) noted that the GEO committees would likely be finalised at GEO-II and CEOS would respond once the arrangements have been set.

EUMETSAT PAPER

David Williams (EUMETSAT) referred to the paper circulated by EUMETSAT with the Plenary documents on 'future meeting structures and the role of CEOS'. He noted that the CEOS Task Force deliberations had highlighted concern over the number of EO co-ordination bodies and their many meetings, and the need to rationalise these to ensure efficiency and focus of effort. EUMETSAT feels that space agencies will in future need to consider how they might represent themselves to maximise return on effort. David concluded by noting that some of the issues had started to be addressed by SIT-17 and 19th Plenary and that EUMETSAT is content to see how events unfold during 2006 before proposing further specific action by CEOS.

CONCLUSIONS AND WAY FORWARD

Colin Hicks (Chair) summarised the conclusions and actions from the discussion on the CEOS Task Force Report as follows:

- 19th CEOS Plenary endorses the report of the CEOS Task Force, including the 21 recommendations – with a few minor modifications, reflected in the above table;
- 19th CEOS Plenary endorses the revised terms of reference for both CEOS and SIT proposed by the CEOS Task Force - included here as an appendix; but recognises that further amendments may be required in 2006 and the topic will be discussed at 20th Plenary;
- 19th CEOS Plenary endorses the general principles of the revised Working Group terms of reference proposed by the CEOS Task Force, but tasks SIT Chair to undertake a comprehensive review in 2006 of the CEOS Working Group structure and activities - including further revisions to terms of reference as appropriate.

Action	19-2	CEOS Chair, supported by SIT Chair and CEOS SEC, to develop an agenda item for 20th CEOS Plenary on possible further amendments to the Terms of Reference of both CEOS and SIT	20th CEOS Plenary (with any new drafts circulated well in advance)
Action	19-3	SIT Chair to work with CEOS WG Chairs to review final details of the amended Terms of Reference of the Working Groups – the general principles of which have been endorsed by 19th CEOS Plenary. This review should be in the context of an evaluation of the continued applicability of the CEOS WG Structure in light of the interface with GEO.	20th CEOS Plenary
Action	19-4	SIT Chair to take account of the CEOS WG Recommendations to 19th CEOS Plenary when reviewing WG structure, terms of reference, and tasking in support of the CEOS Implementation Plan. WG capacity to undertake the required CEOS Implementation Plan tasks should also be considered.	20th CEOS Plenary
Action	19-5	CEOS Chair to oversee execution of the various actions agreed by 19th CEOS Plenary to implement the recommendations of the CEOS Task Force (detailed in an annex to this document)	20th CEOS Plenary

10. CEOS Position for GEO-II

Colin Hicks (Chair) confirmed that we already have a statement from CEOS (in appendix here) to GEO which will be sent ahead of GEO-II and that CEOS has provided comments to GEO SEC on Version 1 of the 2006 Work Plan. SIT Chair will review Version 2 when it is made available on 25th November to confirm whether CEOS comments have been suitably reflected. José Achache noted that, although comments on Version 2 will be collected by GEO SEC, they will not be reflected in time for a new version by GEO-II. SIT Chair will provide CEOS comments ahead of GEO-II and in person in the meeting.

It was agreed that CEOS representation to the various subsidiary groups of GEO should be finalised as and when the GEO structure is agreed – likely soon after GEO-II. CEOS should be ready to be reactive to the calls for representation. The following actions were agreed:

Action	19-6	CEOS Principals to send comments on V2.0 of the GEO 2006 Work Plan to SIT Chair – who will prepare a consolidated CEOS position on the Plan for GEO-II	5th December 2005
Action	19-7	CEOS SEC to finalise proposed CEOS representation to the various GEO Committees which are envisaged	December 2006

11. Brief update on CEOP

Toshio Koike (JAXA / Univ. Tokyo) gave a brief update on the outputs of CEOP – the Coordinated Enhanced Observing Period – a project of the IGOS Water Cycle Theme and an element of WCRP, initiated by GEWEX. He noted that CEOP had made a lot of progress in recent years based on strong support from CEOS space agencies and is a prime example of how CEOS can support the implementation tasks required by GEO.

The CEOP schedule included 4 Earth observation coordination periods, the last of which concluded at the end of 2004. CEOP aims to provide 3 unique capabilities:

- **convergence of observations:** a prototype of the Global Water Cycle Observation System of Systems;
- **interoperability arrangements:** well organised collecting, processing, storing, and disseminating of shared data, metadata and products;
- **data management:** distributed and centralized data integration functions – to help users apply the 300 Terrabytes of data.

The work of WGISS was crucial to the implementation of CEOP. The WGISS Test Facility provided the data integration and mining engine expertise required.

CEOP is being used to study the Asian monsoon – which impacts 60% of the world's population. It is hoped that CEOP results will lead to improved predictability on a seasonal and inter-annual scale. Soil moisture (Tibet) and flood prediction (Japan) applications were also explained.

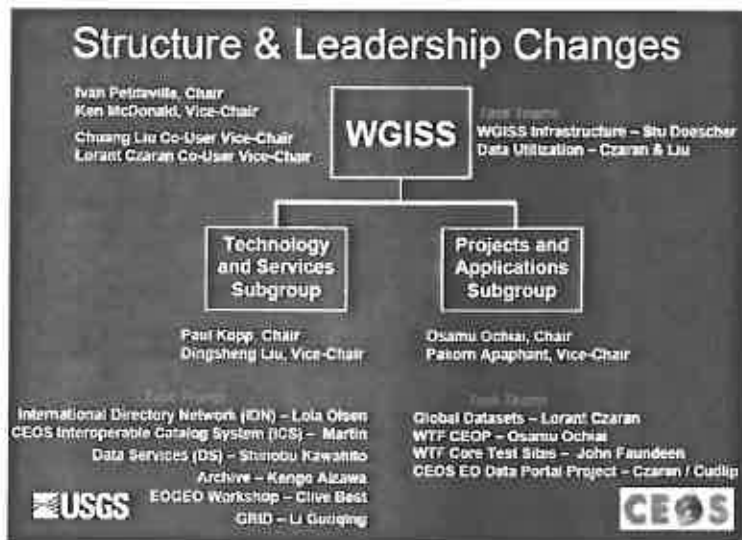
CEOP can be recognised as a successful prototype of the kind of implementation tasks which CEOS can contribute to GEO. Phase 2 of CEOP implementation will start in 2007. Toshio Koike hoped that CEOS space agencies would continue to provide support.

Several agencies commented on the impressive nature of the CEOP results and commended Prof Koike on the excellent work. Barbara Ryan (USGS) noted that USGS is keen to explore connection of such space-derived information with in-situ measurements – such as from hydrographs.

12. WGISS report & actions

John Faundeen (USGS/ WGISS Chair) presented the WGISS Report to the Plenary, including the following highlights:

- the WGISS structure (effective from 19th Plenary and including the new leadership) is shown below;
- WGISS meetings since 18th Plenary: WGISS-19, Cordoba, Argentina (March 2005) organized with WGCV and hosted by CONAE; WGISS-20, Kyiv, Ukraine (September 2005) hosted by NSAU;
- future meeting plans: WGISS-21, Budapest, Hungary (8-12 May 2006) - EOGEO & HUNAGI hosted; WGISS-22, Annapolis, USA (September 2006) - NASA hosted;



- Activities within the Technology & Services Sub-Group have included:
 - International Directory Network Task Team: expansion to include data models; now at 16,000 Metadata Records; these include descriptions of commercial & non-commercial Earth science tools, resources, and services;
 - Interoperable Catalog System Task Team: ESA has Developed an XML to CIP Gateway;
 - EOGEO Workshop Task Team: held a ‘Developer Oriented Workshop’ to highlight tools and services in June 2005 in Minneapolis, USA (<http://www.eogeo.org/Workshops/EOGEO2005>);
- Activities within the Projects and Applications Sub-Group have included:
 - The EO Data Portal Project to coordinate global & local dataset access; an Integrated CEOS European Data Server (ICEDS) has been developed as a demonstration client; African user involvement has been explored; SRTM data has been incorporated.
 - The WGISS Test Facility Core Test Sites initiative – developed at request of WGCV is ongoing;
 - WGISS also has a Test Facility team supporting the CEOP initiative;
- Outreach activities have included: ISPRS Spatial Data Infrastructure Workshop; Workshop on Strategies for Permanent Access to Scientific Information in South Africa: Focus on Health and Environmental Information for Sustainable Development; EOGEO 2005; GeoTowns; SRTM Data Validation & Applications Workshop; ASPRS / PECORA-16 Conference; transfer of the WGISS Developing Countries CD-ROM to WGEdu; International Human Dimensions Programme on Global Environmental Change Conference; AGU Conference;
- WGISS has been actively working to implement the recommendations of the CEOS Data Utilization Task Team;

- WGISS has also been extremely active in support of the CEOS position with GEO and hopes to play an important role in future within the CEOS Implementation Plan;

WGISS Recommendations to 19th Plenary

- **Note WGISS Task Team Leader Changes;**
- **Approve of WGISS Continuing Strategy to Address the Plenary Data Utilization Action;**
- **Note WGISS Chair Transitions to Ivan Petiteville from ESA;**
- **Note WGISS Vice-Chair Transitions to Ken McDonald from NASA;**
- **Support WGISS Recommendation for GEOSS to use the IDN for its Directory/Discovery System.**

The main points of the discussion following the WGISS Chair presentation were as follows:

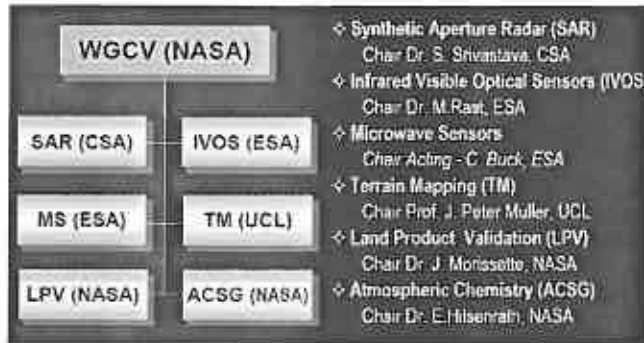
- Gilles Sommeria (WCRP) noted that the WGISS support to CEOP is a good model for CEOS implementation support to such projects, and hoped that CEOP-II can be supported in the same way;
- Roy Gibson (EUMETSAT) noted that it is very impressive to see the effort going into WGISS, and that many of their tasks are extremely relevant to GEOSS; he suggested that in 2006 there should be a considerable revision in the way the work is undertaken to map GEO requirements to the WG capabilities; Plenary will want to see next year how we have harnessed WG resources onto the GEO Implementation Plan; he also suggested that in the past we have not taken enough direct interest in the Working Groups, and we can ensure maximum support for them in future by actively helping them deliver on the GEO implementation plan;
- John Townshend (GTOS) expressed appreciation for the serious effort applied by WGISS in addressing 17th Plenary 'Data Utilization' actions;
- Don Hinsman (WMO) agreed with Roy's comments regarding the potential contribution of WGISS to GEO – and in particular to the Architecture and Data efforts; he urged caution about recommending use of the IDN and suggested that the WGISS recommendation be for GEOSS to 'consider use of the IDN';
- Stephen Briggs (ESA) expressed regret at the past lack of guidance for the Working Groups by CEOS Plenary and noted that they have done a good job without much direction; in future the Working Groups should exist in support of tasks directed at the CEOS Implementation Plan – largely driven by SIT. Chu Ishida (JAXA) supported the ESA comments and hoped that WGISS could apply their Test Facility efforts in support of GEOSS objectives – with annual updates through SIT to Plenary on progress. He also suggested that progress on WGISS tasks could be reported on a single page - against their long term targets. Ron Birk (NASA) noted that he would be willing to assist SIT interface to the CEOS Working Groups during 2006;
- Barbara Ryan (USGS) noted the many years experience in WGISS and hoped that this could be successfully applied to GEO to avoid the new initiative 'reinventing the wheel' on architecture and data issues;

- Colin Hicks thanked John Faundeen for his hard work as WGISS Chair and welcomed Ivan Petiteville (ESA) and Ken MacDonald (NASA) as the incoming Chair and Vice-Chair.

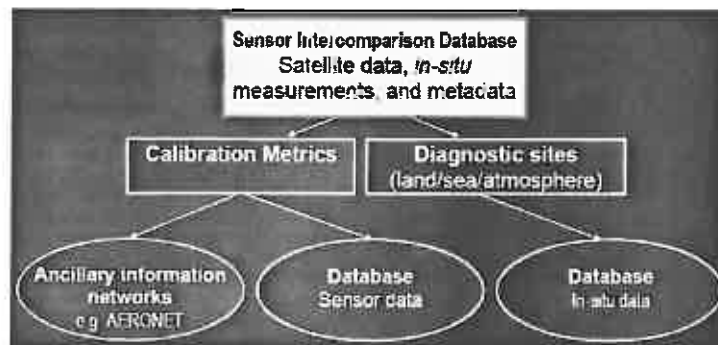
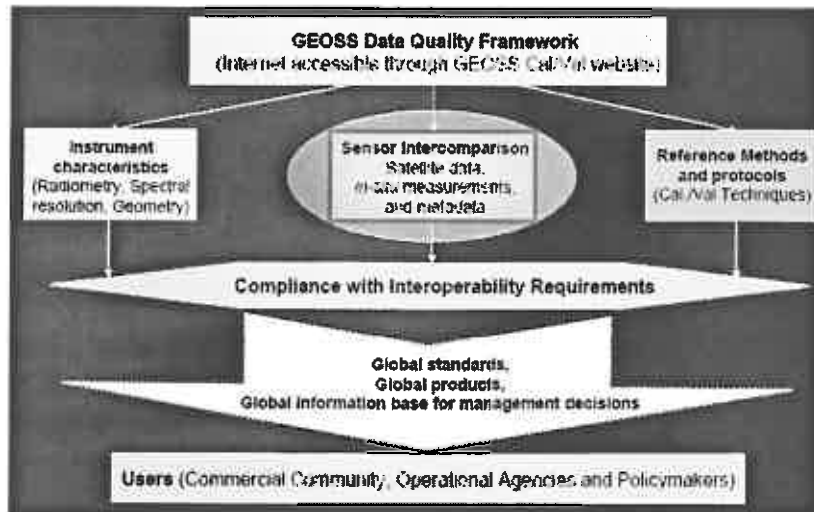
13. WGCV report

Steve Ungar (NASA/ WGCV Chair) presented the WGCV Report to the Plenary, including the following highlights:

- the latest WGCV structure is shown below:



- WGCV sees interoperability as crucial to the success of GEOSS, and believes that CEOS WGCV has a key role to play in establishing this;
- WGCV analysis of the GEOSS 10-Year Implementation Plan anticipates that WGCV activities can contribute effectively to the following GEOSS components: observation component; data processing and archiving component; data and products interoperability, exchange and dissemination;
- WGCV suggest that an over-simplistic view of the GEO system of systems will result in the need to deal with potentially disparate information; the role of WGCV and similar groups in a true system of systems - where the operating space must cut across individual systems – will be to provide *integrated* data for decision models;
- WGCV proposes to establish Calibration and Validation guidelines, to ensure interoperability of GEOSS member satellite data sources, based on the current space agencies collaboration agreements, common formats and standards; WGCV proposes that all GEOSS partners participate in the establishment of the following common practices:
 - Document the methodologies used to derive and further process satellite measurements;
 - Create and maintain, in conjunction with WGISS, an internet-accessible information database containing, on an instrument or satellite basis, links to all instrument characteristics needed for insuring interoperability;
 - Provide/publish Cal/Val reference methods in a readily accessible form.
- These activities will ensure that the various data are integrable;
- The WGCV vision for a GEOSS Data Quality framework is as follows:



- the approach outlined in the WGCV White Paper entitled “Data Quality Guidelines for Satellite Sensor Observations Relevant to GEOSS: Calibration and Validation Issues” has been crafted to ensure the quality assessment of space-borne instrument data in the context of a service driven global operational Earth observation remote sensing system. This approach exploits ongoing work and available expertise among the CEOS Working Group members, and provides a mechanism for further development over the 10-year timescale of the GEOSS Implementation Plan.

The main points of the discussion following the WGCV Chair presentation were as follows:

- Daniel Vidal-Madjar (CNES) noted that ‘upstream’ intercomparison efforts were necessary by CEOS, eg in defining a specification of intercomparability so that future missions aimed at a given measurement class could be designed to be compliant; Steve Ungar (WGCV Chair) replied that WGCV has an intercomparison satellite in mind – specifically designed to calibrate sensors on other missions;
- Gilles Sommeria (WCRP) said that WCRP is always pushing the issue of data quality for research purposes and hoped that CEOS can make a good contribution to GEO on the issue of satellite inter-comparisons.

Colin Hicks (Chair) thanked WGCV for their work in 2005, and encouraged them to continue to support CEOS efforts in 2006, through the SIT Chair's direction on the CEOS Implementation Plan.

Steve Ungar (WGCV Chair) pointed out that a number of technical recommendations from WGCV to CEOS agencies were included in the handout materials. These are reproduced here as Appendix 4.

14. WGEdu report

Sergio Camacho (UNOOSA / WGEdu Chair) presented the WGEdu Report to Plenary, including the following highlights:

- the CEOS WGEdu Education Portal (<http://wgedu.ceos.org>): The "Education Portal" aims to be a "One stop" entry point to resources that support capacity building in EO techniques, and applications, linking EO education, training and data sources with educators, trainers and other interested users; The Education Portal is hosted by Peking University, China and its data content is coordinated and maintained by EUMETSAT and Peking University; WGEdu invites CEOS Members and Associates to provide the information needed to include in the Portal's database the meta data regarding educational resources of their institutions;
- WGEdu support to GEO: For two years, WGEdu has participated in every phase of the preparation of capacity building goals of the (GEO) process, including providing inputs to drafts of the GEOSS 10-Year Implementation Plan and of the 2-year, 6-year, and 10-year targets; implementation plan; WGEdu nominated Renee Leduc-Clarke (NOAA) to the GEO ad hoc Capacity Building and Outreach Working Group;
- The WGEdu Terms of Reference have been revised in 2005 as part of the CEOS Task Force process;
- There has been active co-operation between WGEdu and the CEOS WSSD Follow-up Programme in 2005 – including joint meetings, and joint communications (eg to the mid-year Principals meeting regarding readiness to contribute to implementation of the GEOSS targets); WGEdu and the WSSD Team plan to concentrate on a few targets for delivery in 2006 and beyond;
- WGEdu Chair proposes to Plenary that Yolanda Berenguer (UNESCO) and current Co- Chair, be appointed as new WGEdu Chair and that Renee Leduc-Clarke (NOAA) be appointed as Co-chair; it is also proposed that Maurizio Fea (ESA) be renewed as Co-chair;
- WGEdu has been involving the informal African Advisory Group (AAG) in many of its activities.

Souléye Wade of Senegal, Vice-Chair of the AAG was invited to address Plenary on their efforts with the WGEdu, as follows:

- The African Advisory Group to the WSSD Follow-up Team was created at the CEOS/WSSD Module 1 Workshop on Education, Training and Capacity Building held in Stellenbosch, 2-3 October 2003 (Cape Town, South Africa);
- in 2005, the institutions represented in the AAG organised and/or participated in a number of activities related to capacity building in collaboration with CEOS Members & Associates represented in the WGEdu, including: a 1-month training

course on the use of EO data for Environmental Assessment maps (RCMRD, Kenya); a 3-day workshop and 2-week training course on the use of EO data in disaster assessment and monitoring (Kampala, Uganda);

Sergio Camacho presented the major issues and conclusions from WGEdu to Plenary:

- “Hands-on” capacity building is the best way to learn user needs; there is already an important nucleus of “aware” counterparts that can implement the GEOSS SBAs – but they need support;
- if capacity building is important, make it a priority and allocate resources; particularly human resources for the WGEdu;
- populate the CEOS Education Portal and advertise its existence;
- the WGEdu, through its member institutions, should organize workshops and training courses, preferably in developing countries;
- support pilot projects that introduce the use of EO data to provide or enhance social benefits;
- support existing centres and universities in developing countries that are building capacity;
- enhance the relationship with the AAG and replicate the experience in other regions.

The main points of the discussion following the WGEdu Chair presentation were as follows:

- Mengxue Li (NRSCC) expressed the support of China for the WGEdu efforts;
- Brent Smith (NOAA) commended the WGEdu efforts and report, and expressed support for the involvement of Renee Leduc Clarke as incoming Co-Chair; he noted that CEOS previously had a strong focus on WSSD follow-up tasks and hopes that this effort can move forward in the context of GEO as appropriate, eg in support of tasks like GEOCAST which plan for transmission of data to remote areas; NOAA hopes for active involvement of all CEOS agencies in the WGEdu efforts;
- Gilles Sommeria (WCRP) noted that WCRP is partnered in START with UN IHDP to undertake regional capacity building on global change issues; some workshops are planned and coordination with CEOS WGEdu could be considered;
- John Townshend (GTOS) observed that much may be asked of the Working Groups in 2006 in support of the CEOS Implementation Plan and he encouraged CEOS to take account of their capacity to deliver when reviewing WG structure and tasking – to ensure that commitments can be delivered to GEO by CEOS.

Colin Hicks (Chair) congratulated WGEdu and the AAG on their efforts during the last year and confirmed that Plenary has noted the major issues and conclusions presented – which should be reflected in the review of CEOS Working Groups planned for 2006. He thanked Sergio Camacho for his service as Chair of the Working Group.

15. WSSD Follow-up Team report and actions

Gordon Bridge (EUMETSAT) summarised the efforts of the WSSD Follow-Up Team in 2005, as follows:

- the 54-page WSSD Plan of Implementation, adopted by Heads of State, contains 12 specific references to the need for global/satellite/Earth observation; it is assumed that commitments by CEOS Members & Associates to WSSD Implementation are made through their national authorities, either individually or collectively; WSSD follow-up, in effect, has information and coordination roles, with the aim of minimizing duplication of effort, and facilitating outreach;
- the CEOS effort has been through 5 'modules', with an emphasis on capacity building in Africa: 1) Education, Training and Capacity Building; 2) Water Resource Management; 3) Disaster Management and Conflicts; 4) Climate Change; 5) Global Mapping, Land-use Monitoring and Geographic Information Systems;
- Module 1, Education Training & Capacity Building: a key result has been the establishment of the African Advisory Group (AAG) which provides feedback (concerns, advice, recommendations) on the beneficial use of EO data in Africa (eg to WGEdu, Africa User forum (EUMETSAT), TIGER (ESA)); the WGEdu Portal is another key result;
- Module 2, Water Resource Management: the key activity is ESA's TIGER project; ESA has started several water related EO projects with free use of ENVISAT and ERS data-sets by African researchers; The Canadian Space Agency has made substantial investment in seven research and development contracts, as part of Canada's contribution to water management in Africa. Canada is one of many global partners in the TIGER initiative to integrate space-based Earth observation satellites, in particular, Radarsat data, and services for water management in Africa: http://www.esa.int/esaEO/SEMUV0A90E_index_2.html ;
- Module 3, Disaster Management and Conflicts key activities: several UN Workshops address this subject; a UNESCO initiative for a Japan-sponsored "centre of excellence" addresses water-related disasters; NASA has projects to promote the use of data from their research satellites for flood monitoring and control; new tsunami warning services are being supported by several CGMS satellite operators; EU PUMA project to improve severe weather warning, water management and food security in Africa, with AMESD as follow-on project in 2006.
- Module 4, Climate Change: the next CSD meeting in New York in 2006 will address Climate and Energy; this will be an excellent opportunity to demonstrate the benefits of EO data for climate and related issues;
- Module 5, Global mapping, GIS and Land Cover: the main activity is by USGS on provision of GIS software packages and tools, and capacity building activities at regional remote sensing centres in Africa, using data sets from (eg) Landsat, MODIS, ASTER SRTM; future emphasis will entail creating greater awareness of the availability of Landsat and similar data, building capacity building skills (train the trainers), and software and hardware to make better use of these datasets and improve bandwidth needed to access and distribute these data;
- Each Module has identified common themes: a clear need for training and capacity building and enhanced global outreach; the need to raise awareness of EO benefits (including at the highest levels) in order to achieve the level of credibility needed to ensure appropriate allocation of resources, leading to sustainability;
- Close coordination and action is envisaged within the scope of the ten year implementation plan of GEOSS, where the importance of education, training and capacity building is highlighted as a key target area; WSSD Team Leader and Chair

of WGEdu have jointly identified to CEOS Chairs where *real* contributions can be made to (in the first instance) the two-year targets of the longer term GEOSS implementation plan; ongoing WSSD follow on module activities will then be mapped in more detail to the multi-year targets, largely in coordination with WGEdu.

Thomas Rosswall (ICSU) raised the importance of linking scientific research with EO monitoring and onwards to assessments and government policy. He suggested that CSD-14 (1st – 12th May 2006, New York) is an excellent opportunity to promote the role of Earth observations. Don Hinsman (WMO) noted that a possible side event at CSD-14 for IGOS-P will be discussed by IGOS Partners in the P-12bis meeting and that it would be helpful to know if CEOS is willing to embark in this event with IGOS - on the issue of observations for climate.

Robert Missotten (UNESCO) reported that the General Assembly of the United Nations plans to announce 2008 as the 'International Year of Planet Earth' – intended to be a vigorous international program, the principal goal of which is to demonstrate the enormous potential of the Earth sciences to lay the foundations of a safer, healthier and wealthier society. UNESCO, ICSU and others will be involved.

Renee Leduc Clarke (NOAA) recalled that one of the main 2 year targets for the GEOSS Implementation Plan is a comprehensive gaps analysis on capacity building activities. The WGEdu Portal may be able to assist the early stages of this effort.

Stephen Briggs (ESA) supported the proposal for a CEOS side event at CSD-14. He noted that ESA has successfully arranged a number of such events in recent times – including at RAMSAR and the Convention on Biodiversity.

Colin Hicks (Chair) confirmed the following action from 19th Plenary:

Action	19-8	CEOS Chair and SIT Chair to express willingness of CEOS at IGOS-P-12bis to participate in a joint CEOS/IGOS-P side-event at CSD in 2006	IGOS-P-12bis
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16. CEOS-related radio-frequency issues

Edoardo Marelli (SFCG/ESA) reported as follows:

- there is strong pressure on all frequency bands by an ever growing number of new commercial users - not limited to the lower frequencies (<20 GHz), but progressively affecting also the higher ones;
- there is increasing influence by these commercial users on national and international regulatory authorities. The economical interest of commercial applications tends to override the protection of public-interest applications (like the EO ones);
- currently, the situation is manageable for the EO satellite data transmission bands and metajds; but is critical for the active microwave sensors bands (SAR, altimeters, scatterometers); and very critical for the passive microwave sensors bands (radiometers, sounders);
- specific challenges include:

- no regulations exist on emissions outside the allocated bands - which impacts on passive sensors bands – and there is resistance to introduce limits (WRC-07 Agenda Item 1.20);
- there are no real emission limitations in some bands shared by terrestrial transmitters and passive sensors (eg 10.6 GHz and 36 GHz (WRC-07 Agenda Item 1.2). (AMSR-E RFI measures);
- there is no proper regulatory status for active sensors in some bands – means limited protection;
- new technologies are increasing the ‘noise-floor’ (eg Ultra-Wide Band systems);
- new technologies can be difficult to regulate - eg Software Defined Radios;
- some existing regulatory protections are being disregarded under the slogan “eliminate regulatory barriers” (eg automotive radars at 24 GHz);
- SFCG ask that CEOS agencies support the lobbying process, by:
 - increasing awareness of EO user interest groups of the threats;
 - lobbying the national regulatory authorities and connecting them with SFCG;
 - generating a CEOS Resolution that embeds the SFCG Resolution on “WRC-07 Objectives”.
- a key argument within national and international regulatory bodies is the ‘value’ of spectrum – contrasting spectrum users requests versus the economical and social impact of the services provided; a document explaining the economic/social/scientific value of EO data services would be extremely useful for the SFCG members to supplement their technical case (as well as for the CEOS members in their lobbying for spectrum); such a document should feature quantitative information on the impact of EO service losses, in particular in terms of economic impact;
- SFCG would like CEOS to provide a document that identifies the frequency needs/priorities for Earth observation on the basis of the expected future microwave instruments requirements.

A number of CEOS agencies expressed support for the SFCG proposals and hoped that CEOS could implement them as required throughout 2006. Colin Hicks noted that some caution is needed to ensure that the proposed resolution is acceptable to all CEOS agencies – since each operates under a different environment for regulatory issues nationally or regionally.

Colin Hicks (Chair) confirmed that BNSC, as part of its contribution to the Troika in 2006, would be pleased to take the lead with SFCG on the requested short strategic assessment of the impact of spectrum loss on Earth observation - to be provided to 20th Plenary. The study will be in 2 parts: the frequency requirements for Earth observation programmes during 2005-2025; and the most likely threats to Earth observation programmes through spectrum loss - and the implications for loss of climate and other datasets.

Roy Gibson (EUMETSAT) welcomed the support from BNSC and suggested that the frequency protection issue needs careful attention by CEOS – now and for the foreseeable future. The frequency protection issue is also one of the tasks of the GEO WP, and this could – via SFCG – be one of the candidates for CEOS participation in GEO. Indeed GEO could be an effective route for presenting appeals for frequency protection. Don Hinsman (WMO) noted that at present the GEO WP task is allocated to

GEO SEC, which is not qualified to represent GEO in ITU – whereas SFCG has both the qualifications and the heritage to do so.

Ron Birk (NASA) noted that he would supply some information to SFCG on past approaches to frequency protection that have proven successful in appealing to ITU. Edoardo Marelli (SFCG/ESA) added that he will meet with the EU at the start of December in support of their decision-making processes regarding science usage of various frequency bands. He hopes that CEOS might help in the immediate future with some idea of observing priorities and the underlying applications and their benefits. Colin Hicks (Chair) undertook to forward some reference material that might help.

The following actions were agreed to capture the way forward:

Action	19-9	CEOS Chair to draft a CEOS resolution that embeds the SFCG Resolution on WRC-07 objectives, and all CEOS agencies encouraged to employ the resolution in their lobbying activities with their respective national/regional authorities	January 2006
Action	19-10	BNSC, supported by CEOS SEC, to cooperate with SFCG to deliver a short strategic assessment of the impact of spectrum loss on satellite Earth observation and the priorities for frequency protection to be undertaken for 20 th CEOS Plenary. BNSC and SFCG encouraged to seek feedback from all CEOS agencies in undertaking the assessment in 2006.	20 th CEOS Plenary
Action	19-11	SIT Chair to consider how the proposed CEOS/SFCG assessment might be applied in support of the related frequency protection task in the GEO 2006 Work Plan and ensure appropriate linkages are made	December 2006

More info on SFCG is available at: www.sfcgonline.org

17. CEOS Publications

CEOS Newsletter: Kazuko Misawa (JAXA) reported that the CEOS Newsletter has been produced MEXT/JAXA as a contribution to the CEOS Secretariat since 1993. Two editions were produced during 2005 and a further edition is planned for early 2006.

CEOS Brochure: Kazuko Misawa (JAXA) reported that the 4th Edition of the CEOS Brochure was produced by MEXT/JAXA in November 2004 to commemorate the 20th Anniversary of CEOS.

IGOS Brochure: Kazuko Misawa (JAXA) reported that the latest version of the IGOS Brochure had just been completed by MEXT/JAXA and that 5000 copies were currently being distributed to IGOS Partners and CEOS agencies – as well as being made available at CEOS Plenary and GEO-II.

CEOS WWW page: <http://www.ceos.org> content is maintained by NASA and uploaded/hosted by JAXA as a collaboration; updates should be sent to DeVon.Carroll@nasa.gov and to CEOS-jpn@jaxa.jp ;

CEOS Annual Report: DeVon Carroll (NASA) confirmed that NASA had distributed the 2004 CEOS Annual Report and would be circulating the next edition (2005) early next year.

Earth Observation Handbook: Huw Hopkins (ESA) reported on the latest edition of the CEOS Earth Observation Handbook. The first edition was published by BNSC in 1992 for UNCED. Subsequent editions have been published by ESA, typically in support of a major conference to promote satellite Earth observations - eg WSSD (2002) and GEO-I (2005). The data pages of the Handbook are built from the CEOS/WMO Database of Satellite Systems and Requirements and ESA wishes to acknowledge the invaluable support of WMO (Don Hinsman and Yoshiro Tanaka) in producing the latest version.

The 2005 EO Handbook is available in print (212 pages), on CD-ROM, and on-line, at www.eohandbook.com. The new version includes case studies relevant to each of the SBAs of the GEOSS and has proven to be an extremely popular community resource – with both print and CD-ROM editions in demand and the on-line edition having 12,000 pages accessed by 5,000 visitors each month. Regional stocks are held by CEOS SEC agencies and a reserve is held by ESA HQ. ESA thanks all CEOS Members for providing updates on their missions, instruments and capabilities. Huw Hopkins acknowledged the role of Josef Aschbacher of ESA in managing the activity.

One Planet Many People: Norberto Fernandez (UNEP) advised Plenary of the availability of this UNEP atlas compiled in association with NASA and USGS. The atlas is available to buy or to download from the WWW.

18. Future Chairs and CEOS Calendar

Colin Hicks (Chair) noted that a volunteer agency (or agencies) is required to Chair CEOS for the Nov 2008 – Nov 2009 Period, ideally from Asia or Oceania. Conrado Varotto (CONAE) confirmed that the 20th CEOS Plenary would be held in Argentina – probably in the Buenos Aires area – in the week of 13th November 2006 (to be confirmed). Barbara Ryan (USGS) confirmed that the 21st Plenary would be held in the USA (venue TBC) in the week of 12th November 2007. Don Hinsman (WMO) reported that IGOS-P-13 is likely to be held at WMO in Geneva in the week of 22nd May 2006.

SIT Work Plan 2006

Volker Liebig (SIT Chair/ESA) summarised the results of the discussions amongst CEOS agencies of the last few days concerning the key dates and tasks for 2006, as follows:

- SIT will address 3 main Task streams in 2006:
 - Short-term (weeks to months): Task A - CEOS Response to GEO 2006 Work Plan;
 - Mid-term (months to year): Task B - Development of a comprehensive report to COP-12 – ie the CEOS Response to the GCOS Implementation Plan;
 - Long-term (one to several years): Task C – Overall CEOS Implementation Plan and framework for GEOSS.

- **Task A:** The draft GEO 2006 Work Plan, to be agreed upon at GEO-II in Geneva on December 14-15, includes a number of action items that are incumbent to CEOS member agencies. SIT action plan is:
 - initial identification, in coordination with the GEO Secretariat;
 - first assessment of GEO 2006 Work Plan actions items;
 - invitation to CEOS agencies to assess their ability to respond specifically to those actions, individually or collectively, by mid-February 2006;
 - SIT-18 Meeting (mid-March in ESRIN): CEOS agencies commitments to be confirmed and consolidated, and then communicated to GEO.
- **Task B:** A draft table of contents for the report to COP-12 has been outlined in conjunction with GCOS and an iterative process has been sketched for interaction with GCOS:
 - a joint meeting is planned on 9-10 January in Geneva to get to a common understanding of GCOS requirements and their implications;
 - SIT-18 meeting will review progress on Tasks A and B and provide guidelines for further work of the expert group;
- **Task C:** In parallel with Tasks A and B, it is proposed to develop a strategic approach to implementation of a space component delivering the space-based observations needed by GEOSS across the whole range of SBAs;. SIT will work at determining the approach to implementation and seek commitments from CEOS agencies. A preliminary assessment of this approach will take place at SIT-18 meeting in March and SIT-19 meeting in September.

The preliminary 2006 timetable was summarised as follows:

• 9-11 January	GCOS Meeting in Geneva to discuss requirements + Expert group (Tasks A and B)
• January-February	Expert group work on (1) immediate response – Task A (2) adequacy of current and planned systems for GCOS – Task B (3) long-term response to GEOSS – Task C
• March 20-21	SIT-18 at ESRIN – Review CEOS agencies commitments (Task A); Preliminary review of interim team reports (Tasks B and C)
• End-March	SIT to provide CEOS response to GEO 2006 Work Plan – Task A
• May-August	Expert team continue analysis and prepare paper for COP-12 (Task B)
• Early September	Final Expert group meeting
• September (week 38)	SIT-19 at Scripps, La Jolla – Review and approve work to date (Tasks B and C)
• November	SIT Report to 20 th CEOS Plenary
• December	CEOS response to GCOS-IP at COP-12

The following action was agreed:

Action	19-12	SIT Chair to circulate the proposed calendar for 2006 to all CEOS agencies after consultation with CEOS SEC	November 2006
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19. Updates on significant events

CEOS agencies are encouraged to send written reports in advance of the annual Plenary on significant events of the year. Those agencies/countries which supplied materials for the 19th Plenary were as follows: DLR, Russia, JAXA, NOAA, CSA, NASA, KARI. A number of agencies also gave brief reports in the meeting as follows:

DLR: Klaus Schmidt reported that DLR's SCIAMACHY sensor is still functioning well. In mid-2006, DLR will launch Terrasar-X, an X-band SAR mission. And in 2007 they will launch the RapidEye constellation – which might serve a function in providing Landsat data continuity. DLR is currently studying the selection of a future mission – from either a Hyperspectral payload mission – or a tandem X-band mission to work with Terrasar.

Roshydromet: Alexander Uspensky reported that the Russian Federal Space agency recently defined a 10 year federal space programme, including Earth observation mission programmes through to 2016. The objective is to develop and maintain a constellation of 3 polar and 2 geosynchronous satellites.

JAXA: Tad Inada reported that MTSAT-1R was launched successfully in January 2005. JAXA is now preparing to launch ALOS in early 2006. Japan's Space Activities Commission has defined a national EO strategy to contribute to GEO; and JAXA has defined a long term vision for its activities for review by national stakeholders. This includes the concept of an information gathering and warning system for disaster and crisis management. JAXA has been proactive in the CEOS and GEO communities throughout 2005 and hosted a number of key meetings. JAXA plans to continue to be active in CEOS and GEO in the coming years.

CSA: Virendra Jha noted the recent 10th anniversary of Radarsat launch - and that the mission continues to operate nominally, 5 years beyond its design life (and hopefully until launch of Radarsat-2). The vision for Radarsat-C is for a smallsat SAR constellation. CSA has defined a new mission, called Chinook, to fly the SWIFT instrument on a Canadian small satellite bus. CSA is studying a hyperspectral mission and hopes to have the first operational hyperspectral spaceborne payload. Canada is actively involved in ESA's TIGER project and participates in 7 projects in Africa using radar data for water management.

NASA: Ron Birk noted that NASA has 16 EO spacecraft on orbit – having just retired UARS and ERBS. Most of these are operating past design life. Those within design life operations are AQUA, AURA and SORCE. CLOUDSAT and CALIPSO should be launched soon. NASA and USGS are co-operating to produce a mid-decadal global Landsat dataset.

KARI: Cho Young Han referred participants to the written report from KARI, and pointed out that Korea has 2 major EO satellite programmes – one geostationary (COMS – for launch in late 2008) and one polar orbiting (KOMPSAT-2 – launch TBA).

ESA: Huw Hopkins referred participants to the written report from ESA. He noted that ESA has a Ministerial conference coming up in early December and the bulk of current ESA work is directed at a submission to that conference. The 3rd phase of ESA's Earth Explorer programme is being submitted, as is the space component of GMES; and ESA hopes that member states will fund both.

The loss of Cryosat at launch was a huge disappointment to the science community and ESA hopes that a Cryosat-2 can be funded and launched. WCRP and WMO both expressed regret at the loss of Cryosat and hoped that Cryosat-2 could be funded.

20. Review of action items

The draft action items were reviewed briefly, and it was agreed that, the outgoing Chair (BNSC) would circulate the draft action items list for review by all participants in the near future.

21. Chair handover

Colin Hicks (BNSC) made a closing statement, noting that BNSC had been delighted to have served the CEOS community during 2005 – a year in which the community has demonstrated its resolve to ensure a results-focused process and to tackle whatever changes are necessary to produce these results. He noted that the CEOS Troika now comprises BNSC, CONAE, and USGS and hoped that NRSCC/MOST (now leaving the Troika as the Chair for 2004) would continue to support CEOS.

Conrado Varotto (CONAE) gratefully accepted the Chairmanship for CEOS and expressed thanks to both BNSC (as CEOS Chair) and JAXA (as SIT Chair and CTF Chair) for their enormous efforts in 2005 in refocusing CEOS activities through the Task Force. CONAE will do their best to serve the community in 2006.

22. Adjourn

Conrado Varotto (Chair) confirmed the 19th CEOS Plenary adjourned.

***Statement from 19th CEOS Plenary on Affirmation and expansion
of CEOS as the space agency forum***

The 19th CEOS Plenary, held in London on 15-16 November, 2005, approved a report from a CEOS Task Force created to make recommendations on possible changes to CEOS structure and operating procedures, with a view to optimising the ability of CEOS to act as a primary source of space-borne observations for the 10-Year Implementation Plan.

CEOS Members and Associates re-affirmed CEOS support for GEO, and expressed a willingness to interface with GEO at a number of different levels:

- CEOS, as a Participating Organisation of GEO, will continue to provide senior representation to GEO plenaries;*
- CEOS will provide appropriately qualified representation to GEO working groups and other subsidiary bodies;*
- CEOS will establish close working relations with the GEO Secretariat and its Director, and will be responsive to requests for contributions which fall within the remit of CEOS.*

CEOS has appointed the Chair of its Strategic Implementation Team (SIT) to be the principal point of contact with GEO and in particular with the Secretariat Director. This is not intended to exclude direct contact with individual space agencies, but is merely to ensure that CEOS as a whole is aware of the contributions being made by its Members and Associates, and is thereby able to manage inevitably limited resources to best advantage.

In the same vein, the activities of the CEOS Working Groups are being refocused to ensure maximum support for GEOSS within the various areas of their competence. Of particular importance is the CEOS Plenary decision to reinforce resources available for work between plenaries. Whilst remaining a "best efforts" organisation, CEOS realises that contributions to the implementation of the GEOSS 10-Year Plan cannot depend solely on decisions at the annual meetings of the parent body.

CEOS is pleased to have been associated with the successful creation of GEO, and looks forward to a mutually advantageous collaboration over the coming years.

Draft revisions to CEOS and SIT Terms of Reference

**(adopted as working revisions by 19th Plenary
but pending clarification at 20th Plenary)**

CEOS TERMS OF REFERENCE

PREAMBLE

Remote sensing from space has evolved from an early period of limited satellite programs to a point where distinctions among existing missions result from the technology employed, rather than from the disciplines served in system operations. In the future, a number of international and national spaceborne Earth observation systems will operate simultaneously and support both interdisciplinary and international activities.

The organization of international cooperation in spaceborne Earth observation systems also is evolving, from mission-specific reviews to the interdisciplinary coordination of multimission programs. Beginning with the first Multilateral Meeting on Remote Sensing held in Ottawa on May 8–9, 1980, which was attended by agency representatives from Canada, the European Space Agency (ESA), France, India, Japan, and the U.S., current and potential operators of Earth observation systems have met several times to discuss the means by which mutually beneficial cooperation and coordination could be achieved in both the near and longer term. As a result of these gatherings, the recent past has seen the creation of the Coordination on Land observation Satellites (CLOS) by agency representatives from France, Japan, and the U.S. in Paris on November 13–14, 1980; the initiation of CORSS in Paris on May 10–11, 1982, through the efforts of agency representatives from ESA and Japan; and the second Multilateral Meeting on Remote Sensing held in Paris on May 12–13, 1982, attended by agency representatives from France, Canada, ESA, India, Japan, and the U.S.

This framework of initial discussion and cooperation has enhanced the utility of spaceborne Earth observation data to users worldwide, has encouraged the coordination of program plans among spaceborne Earth observation system operators, and had fostered international receptivity to and acceptance of spaceborne Earth observation system activities and applications.

Consequently, the assembled representatives of international and national spaceborne Earth observation systems affirmed the following:

AWARE of the overlap of spaceborne Earth observation mission objectives and of the interdisciplinary applications of remotely sensed data;

RECOGNIZING the advantages of ongoing communication and cooperation among spaceborne Earth observation system operators; and

DESIRING to promote the international growth and potential benefits of spaceborne observation of the Earth, CEOS Members have affirmed the value of the activities described above and have agreed to coordinate informally their current and planned systems for Earth observation from space through the organization of a Committee on Earth observation Satellites (CEOS).

Cooperation in the development and management of remote sensing and associated data management programs can be of benefit to operators of spaceborne Earth observation systems and to users of Earth observation data. Redundancy among systems and the utility of data can be optimized through the appropriate coordination of complementary and compatible space and ground segments, data management practices and products, and Earth observation systems research and development.

CEOS will not supersede current or potential agreements by Members. Participation in the activities of CEOS will not be construed as being binding upon spaceborne Earth observation system operators, or as restricting their right to develop and manage Earth observation systems according to their needs.

OBJECTIVES

CEOS has three primary objectives:

1. To optimize the benefits of spaceborne Earth observation through cooperation of its Members in mission planning and in the development of compatible data products, formats, services, applications and policies;
2. To aid both its Members and the international user community by inter alia, serving as the focal point for international coordination of space-related Earth observation activities, including the Group on Earth Observations and entities related to global change;
3. To exchange policy and technical information to encourage complementarity and compatibility among spaceborne Earth observation systems currently in service or development, and the data received from them; issues of common interest across the spectrum of Earth observation satellite missions will be addressed.

Individual Members of CEOS will use their best efforts to implement CEOS recommendations in their respective Earth observation programs.

PARTICIPANTS

Members

Governmental organizations that are international or national in nature and are responsible for a civil spaceborne Earth observation program currently operating, or at least in Phase B or equivalent of system development, will be eligible for membership in CEOS. Members must have a continuing activity in spaceborne Earth observation, intended to operate and provide nondiscriminatory and full access to data that will be made available to the international community. The addition of Members will be with the consensus of current Members of CEOS. Request for membership should be addressed to the Chairperson of the next scheduled CEOS Plenary session. The Members at that meeting will consider such requests.

Associates

The following may be invited to participate through the status of Associate:

1. Governmental organizations that are international or national in nature and currently have a civil space-segment activity in Phase A/pre-Phase A or equivalent of system development, or a significant ground-segment activity that supports CEOS objectives;
2. Other existing satellite coordination groups and scientific or governmental bodies that are international in nature and currently have a significant programmatic activity that supports CEOS objectives.

Addition of Associates will be by consensus of existing Members. Associates may participate fully in CEOS Plenary and working group discussions, and have their views included in reports; however, approval by Associates will not be required to establish consensus. The autonomy of both the associated organizations and the respective national and international Earth observation programs will remain intact. Membership in CEOS does not automatically assume membership in the respective associated organizations.

Members and Associates will be collectively referred to as "Agencies".

CHANGE OF STATUS

It is the responsibility of each Member and Associate to inform the CEOS Chairperson of a change in its status with regard to CEOS participant eligibility as outlined in the Terms of Reference. In the event that an organization's status changes, CEOS Members will review the change and change in status will be by consensus of the CEOS Members.

COOPERATIVE ACTIVITIES

CEOS Members will exchange technical information on and pursue the potential for coordination of space and ground segments. Such coordination could include discussions on current and future mission parameters, sensor capabilities and intercalibration, and data and telemetry downlink characteristics. In addition, Earth observation systems coordination within CEOS could address issues of ground station technical compatibility for backup satellite tracking, command and control, and sensor and telemetry data reception.

CEOS Members will investigate the means for increasing data utility and cost-effectiveness, for both operators and users. CEOS activity could include the coordination of data acquisition, sampling, and preprocessing methodologies; the standardization of data formats where appropriate; the increase in compatibility of data archives; and the enhancement of user access to CEOS Member data bases, information products, and services. CEOS Members will seek to ensure that the user community is made aware of the satellite programs of Members and will encourage discussions between the users and relevant satellite system operators, as necessary.

CEOS Members will present their plans for emerging satellite remote-sensing technologies and programs, and they will discuss appropriate approaches for the coordination of future systems. CEOS Members will address current developments and future direction/opportunities in Earth observation from space, including free-flying spacecraft, mission-specific instruments flown on space transportation systems, and the placement of instruments on space platforms.

ORGANIZATION AND PROCEDURES

CEOS will convene ~~at least~~ once every year in Plenary session. CEOS meetings will be organized and chaired by the designated host organization. Two CEOS agencies may be designated to share the duties and responsibilities of taking the CEOS Chair. Each Member and Associate will designate a ~~Principal and a~~ point-of-contact for coordination between meetings. ~~Each agency~~ should inform the CEOS Chairperson of ~~Principal and~~ point-of-contact changes.

CEOS may establish, as mutually agreed and on an ad hoc basis, special temporary Working Groups to investigate specific areas of interest, cooperation and coordination and to report at subsequent Plenary meetings. Continuation of each ad hoc Working Group requires confirmation at each Plenary session. Conclusions resulting from CEOS Plenary sessions, or the findings and recommendations of ad hoc Working Groups, will be acted upon at the discretion of each CEOS ~~Agency Member~~.

CEOS also may establish, as mutually agreed upon, standing working groups where an ad hoc status is deemed insufficient. More permanent status may be required to ensure long-term continuity of work in certain areas where the magnitude and complexity of the task is not suitable to short-term solutions. These standing working groups shall continue without requiring specific confirmation by the Plenary. The Chairpersons of such groups shall report at each CEOS Plenary session on accomplishments and future plans. If the consensus of the Plenary is that such a group is no longer required, the Plenary may discontinue the group. In the absence of such a decision, however, the standing Working Group shall continue.

Representatives from all CEOS ~~Agencies~~ are invited to participate in all Working Groups ~~and to nominate a~~ point-of-contact, ~~failing which the Working Groups will keep the formal CEOS point-of-contact informed..~~

A standing Secretariat will be maintained by ESA/EDMETSAT, NASA/NOAA and MEXT/JAXA and chaired by the incoming host organization in support of the CEOS Plenary. Each year's incoming Plenary host agency will lead the activities of the Secretariat for that year. In addition, to ensure the expeditious conduct of business, the past and the forthcoming CEOS chair will be included in the CEOS Secretariat. The Secretariat will prepare and distribute the minutes for the Plenary meetings, serve as a point-of-contact for external organizations interacting with CEOS, maintain and update the CEOS Dossier on space and ground segment activities, produce other periodic publications, ensure communications among members between meetings, report at each Plenary session on its activities and the status of action items from previous Plenary meetings, and perform other tasks as assigned by the CEOS Plenary. The chairpersons of the CEOS working groups will be invited to all meetings of the CEOS Secretariat, where they should report on the status of plenary action items under their responsibility, and they will be copied on all relevant correspondence. The Plenary guides the work of the Secretariat, with CEOS Member points-of-contact serving as a steering committee in between Plenary sessions.

At each ~~Plenary~~ meeting of CEOS, the time, place, and host for at least the next two meetings will be established. The incoming CEOS host will assume chairperson responsibilities at the conclusion of the Plenary meeting. Allocation of Plenary actions will be coordinated between the incoming and outgoing chairpersons.

A list of Members and Associates and the dates they were accepted will be updated as appropriate, included as Appendix A to the Terms of Reference, and distributed with the minutes after each meeting.

CEOS will replace the Multilateral Meeting on Remote Sensing, CLOS, and CORSS. During the development of and action on CEOS activities, the Members of CEOS will follow the example of the successful international technical and programmatic cooperation achieved by the Coordination on Geostationary Meteorological Satellites. CEOS Members also will consider the issues, concepts, and conclusions arrived at in previous gatherings of the Multilateral Meeting on Remote Sensing, CLOS and CORSS, and will address current and future activities of spaceborne Earth-observing systems.

CEOS will consider and may make recommendations and agree on actions to promote appropriate coordination across satellite coordination groups, and national and international satellite programs. Furthermore, CEOS encourages its Members to maintain communication as appropriate with other groups and organizations involved in spaceborne Earth observation activities and applications, particularly with GEO, through the relevant channels within their respective governments.

ADOPTION AND AMENDMENT

These Terms of Reference were adopted at the September 24–25, 1984, meeting of CEOS and were amended by consensus at the second meeting of CEOS, held at the European Space Research Institute (ESRIN) in Frascati, Italy, November 10–12, 1986. Additional amendments were made at the third meeting of CEOS in Ottawa, Canada, April 4–5, 1989; the fourth meeting in São José dos Campos, Brazil, November 13–14, 1990; the sixth meeting in London, United Kingdom, December 9–11, 1992; the seventh meeting in Tsukuba, Japan, November 16–18, 1993; on October 10, 1996, before the tenth meeting in Canberra, Australia; at the twelfth meeting in Bangalore, India, November 10–12, 1998; and at the fourteenth meeting in Rio de Janeiro, Brazil, November 8–10, 2000; and at the nineteenth meeting in London, November 15-16, 2005. They may be further amended by consensus of the Members.;

Adopted 9/25/1984 Washington, DC, USA	Amended 11/18/1993 Tsukuba, Japan
Amended 11/11/1986 Frascati, Italy	Amended 10/10/1996 Canberra, Australia
Amended 4/5/1989 Ottawa, Canada	Amended 11/12/1998 Bangalore, India
Amended 11/14/1990 São José dos Campos, Brazil	Amended 11/09/2000 Rio de Janeiro, Brazil
Reconfirmed 12/10/1991 Washington, DC, USA	Amended 15/11/2005 London, United Kingdom
Amended 12/11/1992 London, United Kingdom	

SIT TERMS OF REFERENCE

CEOS SIT will:

- (a) Play a central role in coordination of existing and future missions of CEOS agencies, particularly to support GEO in its realisation of the space segment of GEOSS;
- (b) At a pace which the progress in GEO allows and requires, develop and execute the *CEOS Implementation Plan for Space-based Observations for GEOSS*;
- (c) With the *CEOS Implementation Plan* as the focus, develop a planning process which takes account of international users and their requirements from the outset of satellite projects. This process should be based on the capabilities of space systems to address the objectives and the requirements arising from the IGOS Themes and the GEOSS Societal Benefit Areas (SBAs). Execution of this plan and its various components should drive the annual activities and meetings of CEOS and its reporting to GEO and other relevant bodies;
- (d) Be the principal CEOS interface with GEO and the IGOS Partnership and act as a focal point for all GEO and IGOS-P related matters of interest to CEOS. SIT Chairman will keep the CEOS Chairman regularly informed and briefed, particularly in connection with GEO and IGOS-P meetings, where the CEOS Chairman and the Chairman of SIT will be the formal CEOS representatives;
- (e) Monitor and direct the contribution of the CEOS Working Groups in support of the *CEOS Implementation Plan*, the GEOSS and IGOS;
- (f) Seek and monitor implementation of commitments from CEOS agencies in support of the *CEOS Implementation Plan*, in response to the needs of the GEOSS SBAs and IGOS Themes;
- (g) Ensure appropriate 'space component' representation in any implementation initiatives undertaken in support of the various GEOSS SBAs and IGOS Themes – including the IGOS Theme teams. Representatives will report regularly to the Chairman of the SIT, and will look to him for support in carrying out CEOS commitments;
- (h) Report to CEOS Plenary on GEO and IGOS-P matters requiring discussion or decision by CEOS Plenary, and arrange for appropriate action to be taken;
- (i) Develop, maintain and report (to CEOS Plenary annually for endorsement) progress on each of the CEOS Implementation Plan actions/commitments in support of the GEOSS 10 Year Implementation Plan;
- (j) Work to achieve greater synergy between the research satellite and operational satellite communities in building upon proven research instrumentation to develop future generation operational monitoring capabilities;
- (k) Take on such other task as Chairman of CEOS and Chairman of SIT consider appropriate.

Participation in SIT meetings is open to any CEOS agency willing and ready to contribute to one or more of the activities being discussed by SIT (eg IGOS Themes). The Chairman may, at his discretion, arrange some sessions exclusively for those agencies discussing co ordination of implementation plans. The Chairman may also invite observers as appropriate to any meeting.

Representatives to SIT should be mandated by the agency they represent to make commitments at or shortly after meetings, in order to facilitate the implementation process.

The SIT Chairman will be elected by the CEOS Plenary for a two-year term. The SIT Chairman will be a senior space agency official, from a different agency than the CEOS Chairman. A SIT Vice-Chairman should also be elected, ideally for a term concurrent with the SIT Chairman, and shall succeed the Chair after the two-year term. The Vice-Chairman role is intended to provide active support to the SIT Chairman. Both the SIT Chairman and Vice-Chairman will be members of the CEOS Secretariat. SIT will be supported by the CEOS Secretariat.

The Chairman will arrange meetings of SIT as needed to strategically address space agency commitments to the *CEOS Implementation Plan* – as dictated by progress on the underlying SBAs or IGOS Themes - and

to address implementation of such commitments. The Chairman will convene each meeting at a time and place which will facilitate the participation of as many interested and active representatives as possible. In each case the Chairman will provide an agenda in good time prior to the meeting, so that representatives may elect to limit their participation to meetings where they have a direct interest. In addition, the Chairman will, as needed, pursue inter-sessional contacts with SIT Member Principals and work together with the CEOS Chairman and CEOS Secretariat to keep all CEOS agencies informed of GEO and IGOS-P activities and issues during the period between CEOS Plenaries.

The Chairman will ensure that Plenary is adequately consulted and informed, but will avoid repetition of lengthy presentations already made in SIT and/or IGOS-P.

Actions arising from the report of the CEOS Task Force

CTF-1	CEOS Chair to add a cover letter to the statement of support from space agencies for CEOS endorsed by 19 th Plenary and to send the statement to those agencies who have not been actively involved in CEOS activities in recent years, encouraging them to re-join the effort and indicating resolve within CEOS for a new way of doing business.	December 2005
CTF-2	CEOS Chair, with assistance of CEOS Secretariat, to contact all CEOS agencies CEOS Chair at 19 th Plenary to identify possible new entrants to CEOS, to pursue promising leads during the year, and to prepare a report for 20 th Plenary.	20 th CEOS Plenary
CTF-3	CEOS Chair to allocate responsibility within the CEOS Secretariat to produce, in consultation with GEO SEC, a brief discussion paper for 20 th CEOS Plenary on ways to involve - and develop a relationship with - the commercial sector for implementation of the space segment of GEOSS.	20 th CEOS Plenary
CTF-4	SIT Chair should supervise the production of a draft <i>CEOS Implementation Plan</i> for submission to 20 th Plenary. 3 elements are envisaged for the Plenary submission: Task A (short term): a response to the GEO 2006 Work Plan Task B (medium term): a response to the GCOS IP for COP-12 (The Climate Chapter of the CEOS Plan) Task C (long term): an implementation framework for the CEOS inputs to GEOSS	February 2006
CTF-5	SIT Chair to draw attention of the GEO Secretariat to the recommendations of the CEOS Data Utilisation Task Force.	20 th CEOS Plenary
CTF-6	CEOS Chair, as Co-Chair of IGOS-P should make it clear at the next Partners' meeting that the changes initiated by CEOS in response to the CTF report will not impact CEOS commitment to the IGOS Partnership	IGOS-P-12bis
CTF-7	Whilst delegating day to day contact with GEO to the Chair of SIT (supported by the Chairs of the CEOS Working Groups), the CEOS Chair will ensure that there is an effective interface between CEOS and GEO.	Ongoing
CTF-8	SIT Chair to ensure that the WG Chairs are clear about the direction for the WG programme and the specific tasks which have been allocated to them (specifically CEOS Implementation Plan targets). SIT Chair to regularly consult with WG Chairs to be able to fully utilise the expertise that exists within the CEOS WGs.	Ongoing

CTF-9	In the context of the review of CEOS Working Groups planned for 2006, CEOS SEC to communicate with GEO SEC to to establish the linkages between CEOS capacity building efforts and GEO capacity building efforts and to agree, in consultation with WGEdu, suitable roles, responsibilities, and priorities for each body.	20 th CEOS Plenary
CTF-10	Working Groups Chairs should be actively engaged in development of the relevant parts of the CEOS Implementation Plan. Working Group Chairs to plan their activities and meetings to best meet the needs of the CEOS implementation plan targets allocated to them, and should report progress regularly to Chair of SIT.	Ongoing
CTF-11	Working Group reports to Plenary should focus on CEOS implementation plan activities but include R&D activities as appropriate.	Ongoing
CTF-12	Once the conclusions of the review of CEOS Working Groups are clear, SIT Chair to write to CEOS Principals to encourage them to review their agency's membership to CEOS Working Groups in order to provide them with the necessary expertise and resources to accomplish their work.	May 2006
CTF-13	CEOS Chair, supported by Troika members, to encourage the maximum senior level attendance at the 20 th CEOS Plenary and to ensure a suitably attractive agenda.	20 th CEOS Plenary
CTF-14	CEOS Chair to update the draft CEOS resource plan for presentation to 20 th Plenary	20 th CEOS Plenary

Technical Recommendations from WGCV to 19th CEOS Plenary

1	Request all CEOS members that produce land cover maps to use CEOS Land Validation Core Sites and either use the FAO/UNEP Land Cover Classification System (LCCS) or relate their legends to the FAO/UNEP LCCS.
2	Request that CEOS participating space agencies provide any and all internal quality metrics (e.g. Terrain Height Error Data) or external validation information via a web-link on each product page. In addition, the CEOS participating space agencies should provide a moderated "Known Issues" page in a similar fashion to the one produced by MODIS at http://landweb.nascom.nasa.gov/cgi-bin/QA_WWW/newPage.cgi?fileName=terra_issues
3	Request that subsidiary products (such as orthorectified SAR amplitude mosaics and water body masks for SRTM) produced by CEOS participating space agencies be made available as OGC-compliant data layers (WMS/WCS/WFS formats) for use in understanding and interpreting the data and for quality control of orthorectification and geocoding of any spaceborne dataset.
4	Encourage CEOS agencies to use an international site within the Amazon Rainforest with coordinates of (UL: -5.03, -65.67; LR -9.12, -69.64 deg) as one of the radiometric calibration standards. In addition, encourage CEOS agencies to support efforts by the WGCV SAR subgroup to establish and maintain a common man made calibration site for use by different SAR missions.
5	<p>WGCV recommends that CEOS agencies ensure that all satellite pre-flight calibration activities should include not only an "end to end" system calibration but also of all appropriate sub-system components, and that these should all be made demonstrably traceable to SI units.</p> <p>CEOS agencies should be encouraged to use SI traceable "benchmark" radiometric reference targets viewable by space based EO sensors to unequivocally quantify and remove biases between optical sensors. Such targets would probably include the Moon, Sun and a number of ground sites e.g. Deserts used by existing missions.</p>
6	WGCV recommends all member space agencies consider using validated space-based DEMs for georadiometric processing of EO data products. WGCV further recommends that quantitative evaluation of spaceborne DEM products be performed and published as part of any future web infrastructure for validation.

Open Actions from Previous Plenaries

18-8	<p>CEOS Chair to continue to focus on satellite utilisation – seeking updates on relevant progress by Members, Associates, and Subsidiary Groups during 2005 (including encouraging action on Wuhan Workshop recommendations)</p>	<p>Ongoing WGISS will report on this issue. Proposed to be carried forward in the CEOS Implementation Plan</p>
18-9	<p>CEOS Agencies, WGEdu, and WSSD Follow-up Programme Modules are encouraged to involve the CEOS African Advisory Group in their implementation activities</p>	<p>Ongoing AAG represented at Plenary by the Vice-Chair Souleye Wade, Senegal</p>
18-19	<p>CEOS Chair to undertake a full update of the CEOS Five Year Plan – for presentation to the 19th CEOS Plenary</p>	<p>Open CEOS Task Force recommended that the 5-Year Plan be updated in 2006 by the incoming Chair</p>

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