



The Committee on Earth Observation Satellites (CEOS)
Joint meeting of the
**35th Plenary Working Group on Calibration and
Validation (WGCV) and the 34th Plenary
Working Group on Information Systems and
Security (WGISS)**

September 24-28, 2012

**Hosted by the
Indian Space Research Organisation (ISRO)**

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Executive Summary

The Working Group on Calibration and Validation (WGCV) for the Committee on Earth Observing Satellites (CEOS) held its 35th Plenary session jointly with the 34th Plenary of the Working Group on Information Systems and Services (WGISS) in Hyderabad, India on September 23-28, 2012. The Indian Scientific Research Organization (ISRO) hosted this session's event at the National Remote Sensing Centre (NRSC). Approximately 50 people from over 12 different countries attended that were chairs or representatives from all WGCV/WGISS subgroups, as well as calibration / validation and information systems specialists and authorities from academia, industry, and worldwide space agencies. The WGCV addresses the need to standardize ways of combining data from different sources to ensure the interoperability required for the effective use of existing and future Earth Observing (EO) systems. The WGISS promotes collaboration in the development of systems and services that manage and supply EO data to users worldwide. Joint meetings of these two working groups are held approximately every 2-3 years to foster inter-group cooperation on activities benefiting all space agencies, their members, and CEOS as a whole.

ISRO made great progress towards opening their EO catalogs to the public. Joint session discussions included developing quality indicators that would allow researchers to better understand the quality of the data and how one data set could be compared to another. This vision of intercomparable Earth Observation (EO) data and products that contain quality indicators in order to support future information products is moving forward with great promise, and face-to-face meetings are imperative to fostering such goals. WGCV Chair Gregory Stensaas (USGS/EROS) received multiple comments on the meeting such as "We've never had such a productive joint meeting."

[Key Recommendations](#) from this meeting are highlighted at the end of this document (Friday's discussion), and shared in a [presentation to the 26th CEOS Plenary](#) in the October meeting in Bangalore.

MONDAY, Inaugural Address

Location: Auditorium

Welcome and Introductions

Santhi Sree, conference organizer of National Remote Sensing Centre (NRSC)/ Indian Space Research Organisation (ISRO), gave the good-morning welcome, introduced the key people from the Committee on Earth Observation (CEOS) and ISRO, and presented each of them with bouquets of beautiful roses.

VIP Addresses

Gregory Stensaas, WGCV Chair, provided introductory remarks. Stensaas shared that he has always been intrigued and impressed by ISRO capabilities, and that there is a strong vision and WGCV and WGISS to be able to provide data, and these subgroups are excited to work through this with ISRO colleagues during the meeting. The technology capabilities are coming together at one time, in bringing data to all the constituents in CEOS, and it is exciting for all involved. The excellent space program at ISRO is going to help in moving this vision forward. Support from ISRO is very valid to all CEOS communities, and Stensaas expressed his gratitude (on behalf of all) for this support.

“Thank you to the ISRO NRSC Director, Dr. V. K. Dadhwal, for hosting our meeting, and we are very glad that we could be here. Between all your data sets available, we are excited to make those accessible to all in the CEOS arena. I would like to also recognize A.S. Kiran Kumar, the current CEOS Director, for his support.”

Satoko Miura, WGISS Chair, shared welcoming remarks. “Good morning. I also want to say thank you to the hosts and to the ISRO chair for supporting the working groups. For this meeting, I would like to have a fruitful discussion on future joint activities, and on the WGISS side, our 5-year plan. I would like to appeal to everyone for your cooperation and support in this meeting. Thank you very much!”

Dr. Rajeev Jaiswal, ISRO Scientist/Engineer and CEOS Host shared his welcoming address. “Good Morning. This is indeed my pleasure to welcome you all, especially the WGISS chair, WGCV chair, ISRO dignitaries, WGCV Vice Chair, sub chairs, secretariats, etc. This is the second time that both the cal/val and WGISS are meeting together in India. This year is very important because this is happening after the Strategic Implementation Team (SIT) and just prior to the CEOS plenary that will be hosted in India. Many of the participants may not due to VISA problems. For the WGISS, there are 17 delegates on space agency, and for Cal/Val there are 19. I hope that this meeting will improve our data system. This year ISRO is the chair for CEOS, so this meeting is especially important. Welcome to you all.”

Host Welcome and Logistics

Senthil Kumar, ISRO’s Group Director for Geophysical and Special Products (and meeting host) provided a warm welcome and logistical information regarding meeting, Wi-Fi arrangement for delegates to join through WebEx/Go-to-Meeting mode, breakout room locations, group photo, Tuesday evening’s host dinner/event, and thanked everyone for the opportunity to host this meeting.

CEOS/ISRO Host Welcome Address

AS Kiran Kumar, CEOS Chair and Director of the ISRO Space Applications Centre shared his welcoming remarks. “Good morning to all of you. Stensaas, Satoko, Jaiswal, and all others, welcome to India and

Hyderabad for this joint meeting. The contribution of ISRO's various activities are really growing. CEOS was established in 1984 to coordinate civil space-borne observations of the Earth and ISRO has been involved since the beginning. It also serves as focal point for enhancing international coordination and data exchange and to optimize societal benefit. About 30 observation space agencies are members of CEOS. There will be 100 new missions in the next 5 years, and 74 instruments in the next 15 years. This is now a multilateral program, and we are close to bringing in virtual constellations as well. Apart from this, the two working groups here this week are addressing the issue of inter-calibration and validation on a seamless platform. This is important because no matter how much data we have from the satellites, it is useless unless it gets into the hands of the user. In this, I wish success in your working groups, and bring us the information so all of us will benefit from these activities. I wish all the participants a happy stay and fruitful work here. "

MONDAY, Joint Meeting

Location: Hall 1

Introductions by WGCV/WGISS Chairs

WGCV Chair, Gregory Stensaas, and WGISS Chair, Satoko Miura each reiterated their gratitude to ISRO for hosting, and to everyone for traveling to Hyderabad in support of this productive meeting. It is appreciated by WGCV, WGISS, and CEOS.

Adoption of Agenda

In light of the time, it was agreed that the WGCV portion of the joint agenda was fine as presented and that the WGCV portion of the agenda would be updated in the WGCV as needed to incorporate any changes (e.g. presenters' name changes). Miura recommended changes for Wednesday's joint meeting and re-arrangement of such for ease in flow (two sessions were swapped). All agreed upon those proposed change for Wednesday. Additionally, it was agreed that proposed joint WGCV details would be done later Monday morning if time allowed. No other comments, all concurred, and the agenda moved forward as proposed.

Summary of SIT Meeting

Stensaas highlighted the [WGCV efforts](#) (slides 1-15) during his tenure as Vice-Chair and Chair (4 years). He shared the CEOS organizational structure and objectives for WGCV. Stensaas shared the competencies and plans to accomplish them, and what is expected out of WGCV over the next few years. Expected deliverables over the next 3 years were disclosed, as well as the need and importance for establishing better communication across CEOS. Stensaas introduced Satish Srivastava (current Vice-Chair) and Albrecht von Bargen (Vice-Chair elect) as moving into the chair roles after this WGCV Plenary. The next WGCV-36 Plenary is unofficially planned for the May timeframe in Shanghai, China.

Miura provided an overview of WGISS, its purpose, and mission. The WGISS structure including Interest Groups (IGs) and projects represents extensive effort. The 3-year outcomes for WGISS as defined by the CEOS Self Study (SS) were summarized. Progress, issues, and obstacles to overcome, and how WGISS is currently working through these were shared. See Miura's presentation here:

http://ceos.org/images/WGCV/WGCV35/Documentation/9.24_WGISS_intro.pdf

Summary of Previous Joint Meeting and Key Working Group (WG) Efforts

Stensaas shared the objectives, efforts, and actions from the previous joint meeting held in Montreal, Canada. Quality assurance is very important to CEOS and GEO, and the Quality Assurance for Earth Observation (QA4EO) priority has been provided via CEOS for the efforts underway.

Brian Killough of the National Aeronautic Space Administration (NASA) provided an [overview of SIT](#) and CEOS on behalf of Tim Stryker. Much good work is being done across the space agencies. The SIT actions for WGISS were shared (SITWS-2012-10, SITWS-2012-12, and SITWS-2012-31). CSS is the CEOS self-study. WGCV had some inherent actions to develop goals with China to support Virtual Constellations (VCs). The next SIT chair will be CSA. Killough gave the meeting highlights, which also included Essential Climate Variables (ECVs). He shared the focus on Data Democracy.

One of the things the SIT chair has asked is to focus on key priorities established, and how working groups and VCs can better support Plenary. If we are able to concisely put these together, it will benefit greatly. Carefully think about what you want from these agency leaders, for better success. Space-based observation is a large task, but the major priorities of CEOS are Constellation progress and the China-Brazil Earth Resources Satellite (CBERS) program. Killough will make a call to all Working Groups (WGs) for information to bring forth to the International Geoscience and Remote Sensing Symposium (IGARSS). Discussion ensued regarding the resource process, and the need to define how it ties to CEOS priorities, what is required, etc. This will be discussed this week in the Plenary.

Group on Earth Observation (GEO) Tasks and IN-02-C1

Satoko Miura gave an overview of the [GEO Work Plan Tasks](#), its priority actions, and WGISS related activities and accomplishments.

Greg Stensaas shared the [IN-02-01 tasks](#) (slides 16-37) including showing the [actions website](#) and discussion of the need for people to go there on a regular basis for updates and their actions. In addition, Stensaas discussed the need for CEOS Quality Indicators. The need for well-calibrated and accurate data sets and products was shared. Stensaas shared a copy of the work plan and the CEOS strategy. Stensaas introduced the QA4EO efforts and informed that the USKA will provide the secretariat support and will be the POC.

Stensaas shared the common efforts WGCV engages in with other CEOS Components. Stensaas discussed Carbon requirements need to continue moving forward in WGCV to support their needs. Stensaas shared the other International Standards Organization (ISO) tasks doing knowledge quality assurance efforts ongoing within agencies, organizations, and standards bodies, such as:

- QA definitions/standards
- Quality in metadata
- “fit for purpose” information
- Accuracy, error, uncertainty, traceability fields in GEO and CEOS data structure
- System specs and standards
- ECV cal/val and QA
- Carbon and climate requirements validation
- In situ and modeling quality, uncertainty, traceability

- Other related programs and tasks

A question was brought up regarding data democracy processes. This is still open for discussion and needs to be worked within CEOS and the quality assurance efforts related to quality information in CEOS and GEO. WGISS will be a good help in how we incorporate data and metadata across the data sets. The long-term data preservation aspect is also very important and needs to be included in this discussion.

Stensaas provided an update on the showcases for QA4EO, Forest Carbon Tracking (FCT), Atmospheric Composition (AC), and Global Elevation.

Miura shared the three top priorities for WGISS actions:

- Provide a suite of global datasets from improved/validated data sources
- Produce a global, coordinated and integrated Digital Elevation Model (DEM)
- Improve Global map and foster its use across Societal Benefit Areas (SBAs)

Stensaas explained the WGISS priorities will be helpful to WGCV.

Dr. A Senthil Kumar had a question regarding the International Standards Organization (ISO) standards and asked if this will be a basis for WGCV requirements. The group agreed that CEOS and WGCV need to work with the ISO standards, and that CEOS needed to respond to the ISO standards. We should make sure we are responding to these requests and making Recommendations from our groups.

Discussion ensued regarding the carbon requirement. The CEOS is creating the climate variables associated with all of the products and quality associated to support the Global Climate Observing System (GCOS). Therefore, WGCV needs to continue developing a strong cal/val relationship with the Working Group on Climate (WGC); especially, related to looking at carbon from an Essential Climate Variable (ECV) validation perspective. Stensaas shared the key partners working in these areas, but we need to identify how they can assist WGCV, and be having them at our working meetings.

Joint WG Interaction Requirements

Miura introduced Yonsook Enloe to present a demo of the CEOS WGISS Integrated Catalog (CWIC) accessing data tools. The CWIC tool demo and associated information can be viewed at the following links: <http://youtu.be/-hXfcNI-654> or at <http://wgiss.ceos.org/cwic>.

At this meeting, we hope to come up with a plan for making this available across the board. There is a huge value in being able to see what is available.

MONDAY morning Joint Session Wrap-Up

Self-introductions took place for this joint meeting, and more than 54 people representing approximately 18 different countries or agencies attended (see website [attendee list](#) or [Appendices](#)).

MONDAY Afternoon, WGCV 35th Plenary

Location: Hall 2

Approval of WGCV-34 Plenary Meeting Minutes

[Meeting minutes from WGCV-34 Plenary](#) in Brisbane, Australia, February 6-10, 2012 approved (no objections).

Adoption of Agenda

Jan-Peter Muller (UK) suggested incorporation of to include the discussion on ISO standards information (for an additional 15 minutes) into the presentation entitled *Task plan In02c21*, and combine it with the Terrain Mapping Sub Group (TMSG) report. All agreed. Other adjustments will be discussed for the Chinese constituents unable to attend in person as or if they can tune in via WebEx. For the GCOS actions, Dr. Slawomir Blonski will represent the National Oceanic Atmospheric Administration (NOAA) via satellite/WebEx. The Global Space-based Inter-Calibration System (GSICS) may be a combination of Blonski and Chander presenting. NOAA sends their regrets they could not attend in person. All agreed to these WGCV-35 Plenary changes and none opposed. We will move forward with the above adoptions to the [posted agenda](#).

Objectives of WGCV Meeting

WGCV Chair (Stensaas) shared the [main objectives and goals for this week's 35th Plenary](#):

- 1) Regarding the CEOS Self-Study and Work Plan, discuss the issues relevant to WGCV.
- 2) Define WGCV interactions across CEOS.
- 3) Define the status of GEO and CEOS actions.
- 4) WGCV Action Status
- 5) Define Recommendations to CEOS Plenary
- 6) New Chair and Vice Chair Elected

Voting Eligibility

Stensaas went over the WGCV Vice-Chair Voting procedures.

ACTION1: We need to define our terms of reference as to who (when dialing in via WebEx) and what constitutes adequate participation to a WGCV Plenary Meeting which determines eligibility of WGCV members for the vice chair voting.

WGCV Secretariat (Jucht) shared those eligible to vote, the process in garnering that data, and sent an e-mail for such prior to this meeting per protocols set forth in the WGCV Work Plan, section 4. Absentee votes were received from those eligible to participate.

Nominated Vice Chair

[Nominee for WGCV vice Chair](#), Albrecht von Barga shared his visions, understanding, and future goals for this possible role. "I understand the nominated not only represents the person but also the space agency." von Barga explained his agency, its goals and objectives, and its relationship to the CEOS/GEO needs. von Barga shared his background, education, professional experience, his view on CEOS and Cal/Val, and future direction.

Senthil Kumar (ISRO) had a question regarding QA4EO, fitness for purpose, and proposal for a demo like CWIC tool. von Barga responded that QA is the baseline only and should not limit us. The proposed showcases should be shown, like the CWIC tool. von Barga explained how he hopes to have CEOS

plenary provide more than verbal support by way of good focus. We need our Recommendations written well, there has to be someone supporting and leading Recommendation.

Stensaas responded to this last statement explaining the Plenary is there to review and dispatch Recommendations of WGs and VCs within CEOS. However, the Plenary's job is not to tell you how to do your Recommendation; that job needs to be developed by recommenders and presented to CEOS management (SIT, SEC, Plenary) as appropriate. We need to go through SIT for support.

Srivastava made the suggestion that when you start with a problem, you must also bring the solution.

During the break-time, votes (both absentee and in-person) were collected, and von Bargen was unanimously approved for elected as the WGCV vice Chair with 17 votes. Stensaas congratulated him and echoed that he will be a very good WGCV leader.

WGCV Chair's Report

Stensaas shared the [WGCV Chair's Report](#) and went over the SIT, and Secretariat (SEC) meetings attended. He explained Global Space-based Inter-Calibration System (GSICS), their goals/objectives and the good job they do of inter-calibration systems.

Discussion:

Bojon Bojkov, European Space Agency (ESA): The cross-pollination of principles is fine, but the executive panel of GSICS is a steering body. They do not make decisions but Recommendations. We need to take this issue at heart for WGCV and take the action of WGCV on its 9-month meeting. Are we a working group or a steering panel?

Einar Herland (NSC): If we go one step farther with regard to the World Meteorological Organization (WMO) work, how do we relate on this level and for Climate.

ACTION2: The Plenary needs to have a discussion and vote on responding to GSICS's request to us. Follow interaction and define those (per Albrecht).

Nigel Fox (UK): While we are chairs, we may not be experts in everything they do. It would be challenging for me (for example) to represent the technology expertise my group represents as a working group. I just facilitate the group. WGCV does function as a steering group for the subgroups.

Bojkov: It is hard to differentiate actions and things we need to do. We need to be making decisions and the agendas in the future should reflect more robust decisions or Recommendations.

Srivastava: We are calibrating/validating data for users, not the WGs. We need to be more selective of what, why, and how we do this.

Stensaas: We do have reports from each one of the subgroups to the Plenary. However, as the chair for the last two years, I rarely see feedback from the subgroups.

Upcoming WGCV meetings:

The next meetings for WGCV and their tentative times/dates were disclosed and subgroups were encouraged to discuss potential meeting hosts for WGCV 37 and 38. It was brought to the group's attention that we have been to India, Russia, Australia, but have not been back to North America or Europe for a while. Consider that.

Highlights over the last two years were shared. QA4EO is a large accomplishment as well as the relationship between UK leading the QA4EO for WGCV. Stensaas explained the GEO task started out as quality strategy and continued on to a quality task; now it has some IN tasks within the CEOS work plan, and we will need to work additional accomplishments with the UK. The lead for the GEO task and efforts related to QA4EO Secretariat has been WGCV as a co-chair with the Institute of Electrical and Electronics Engineers (IEEE). However, the latter has not been an active member. SIT needed a QA4EO representative from a CEOS agency, and UK was willing to take that on. Fox explained that the secretariat role is no more than website support to facilitate communication of our activities. This is not a leadership role.

ACTION3: Have discussion on QA4EO chair and co-chair role, and the management role for this task. The role for a volunteer agency should be fine for secretariat, but not for leadership role. Define WGCV's leadership role with respect to QA4EO implementation, and what the sharing process is for the co-chair.

The goals and outcomes of the CEOS Self Study (SS) were shared. The main one being how do we get better communication processes across CEOS? Stensaas shared regarding support still needed and already garnered for various QA4EO needs. We still are looking for additional support for showcases. WGCV needs commitment from CEOS agencies. This is in process today as a result of the self-study. WGCV needs to understand how to liaison better.

Some discussion ensued on collaborative writing tools such as DocuShare so everyone has ability to edit items. It was agreed to re-visit this later in this week's meeting.

WGCV has good interfaces with China and Russia. Many of the working groups and VC's WGCV can support need to find the right points of contact (POC's) and provide those to SIT.

Stensaas shared his wish list in terms of CEOS WGCV support. von Barga observed that Eumetsat should be up there. WGCV needs feedback so requests can be made to the right groups to solve WGCV needs.

It was brought to the WGCV's attention that the Chinese have restructured their organization and the WGCV should determine the appropriate agency points of contact to support across subgroups.

Stensaas shared work that is happening across the working groups and VCs, and with regard to determining points of contact for working groups and future constellations.

Quality badging was discussed. We need to stay away from words that have too broad of meaning. Stensaas would like more feedback on this for Recommendations to SIT. Stensaas encouraged people to read the QA4EO implementation plan.

Actions

[Actions](#) report and accomplishments since the last meeting were shared by the secretariat (Jucht), discussed, and further updated by the group.

Monday adjournment.

TUESDAY, WGCV 35th Plenary

Location: Hall 2

Opening remarks and welcome, review of agenda plans for Tuesday. In light of von Bargaen and Bojkov needing to leave early, they will be providing their agency (and subgroup) reports a bit out of order.

Agency Reports

The German Aerospace Center (DLR) Agency Report

Albrecht von Bargaen shared the [DLR agency report](#), their most recent missions, Digital Elevation Models (DEMs) recent improvements, as well as future plans for acquisition. von Bargaen also shared on the Scanning Imaging Absorption Spectrometer for Atmospheric Cartography (SCIAMACHY) quality working group (SQWG) on the Environmental Satellite (ENVISAT). SQWG is an international effort to improve the SCIAMACHY Level 1 to 2 products and to ensure proper balance between operational need and scientific possibilities. Discussion continued on availability and resolution specifications. This was of very much interest to the group.

ACTION4: ESA to check on thematic sampling from the Ozone Mapping and Profiler Suite (OMPS). Others to provide sites for subsets.

ACTION5: Have group discussion (Stensaas, Bojkov, Chander, von Bargaen) to getting SCIAMACHY data over CEOS recommended test sites.

The availability of hyper-spectral measurements in the future and the associated land characterization techniques to which these programs are applicable were discussed.

European Space Agency (ESA)

Bojan Bojkov gave the latest status of Earth Observing (EO) Missions, QA4EO at ESA, WGCV support and the Cal/Val interest group (CVI). Bojkov gave the time line through 2017 of all ESA EO missions. Sentinel funding was discussed. ENVISAT was amongst the missions disclosed, and the future plans for such. They would really like to work with ISRO on ocean color and altimetry. Budgets, of course, can potentially go down, and, as a result, priorities are being addressed. ESA is interacting with sister agencies to see how they can leverage one another through data sharing (just for example).

A review of QA4EO at ESA Studies covers Generic ESA missions, Long-Term Data Preservation (LTDP), Characterization of Synthetic Aperture Radar (SAR), funding the development of best practices, end-to-end characterization, and study on geometric uncertainties. Establishment of validation procedures was disclosed and recommended as the direction QA4EO should/could go. The way forward for ESA QA4EO was shared and characterization studies are needed and suggested at more than just the philosophical level. Bojan gave Recommendations to WGCV and reminded us that the cal/val portal is supported by

ESA, and he has been commissioned to support that through 2014 at least. He expressed interest to work with USGS on cross-calibration activities between the Landsat Data Continuity Mission (LDCM) and the Sentinel missions.

Cal/Val Interest (CVI) working group, its key infrastructure sustainability, existing bodies, and sister agencies they are working with to address this sustainability were shared. Partner agencies are critical. The data policy for Global Monitoring for Environment and Security (GMES) was discussed. This is the European Program for the establishment of a European capacity for Earth Observation.

Subgroup reports

Atmospheric Composition Subgroup (ACSG)

Bojkov gave the Atmospheric Composition subgroup highlights. ACSG works on topical areas and has many areas of interest. The cross sections for ozone retrieval, an ESA project, and its impact was of great interest and important to share. Support from ACWG to constellations support has changed over the recent years. Showcases cannot continue due to lack of resources at this time. Future activities of the working group and its focus areas were shared. Aerosol is part of Atmospheric Composition (AC) now and the activities formalized related to it were discussed. Air quality and its best practices, and ACSG's mission to deliver such were discussed. Legislative requirements are not necessarily represented for the satellite. Additional discussion was encouraged regarding the showcase to consider continuing showing those best practices.

Infrared and Visible Optical Sensors (IVOS) Subgroup

Nigel Fox (UK), [IVOS Subgroup](#) Chair, shared the work plan for optical sensors. IVOS interactions with WGs and constellations, the scope of such, and the needs for and by IVOS were shared. Fox disclosed the Recommendations that came of the climate activity. Post launch cal/val efforts were shown. The needs of CEOS and support from them is imperative. 6-7 supporters/partners are combining efforts and resources, to get together to develop best practices. Chinese colleagues came to the IVOS meeting and disclosed some unique applications. Fox communicated Recommendations to CEOS and potential users. Sea Surface Temperature (SST) and other groups on climate have come to IVOS, and this will be insightful as a Recommendation to disclose. It was brought to the group's attention that IVOS needs some cost-sharing mechanisms.

Land Product Validation (LPV) Subgroup

Joanne Nightingale, current chair for the [LPV subgroup](#), shared the LPV objectives and goals. She shared requirements, and definitions of future missions. Nightingale's LPV work and support has been provided through NASA, and the LPV has eight Land Product focus groups. LPV tries to engage community members. LPV has a large presence and involvement with the Global Earth Observation System of Systems (GEOSS) and GCOS. Dr. Gabriela Schaepman-Strub will be the next LPV sub group chair and the LPV sub group will need a vice chair.

Brian Killough (NASA CEOS Visualization Environment (COVE) Tool) mentioned they are working with USGS (Doug Machoney) to add some phenology overlays to COVE in the future. All the LPV sites are going into the COVE Tool.

ACTION6 and Recommendation: For LPV to cross-coordinate with the WG on Climate. They have invited LPV to come to these meetings. There is a lot of cross-coordination happening and it would be nice to see more from the WG on Climate.

Microwave Sensor Subgroup (MSSG)

Stensaas went over the slides on behalf of [MSSG](#) Chair, Xiaolong Dong. Dong was unable to attend due to last-minute visa problems. This presentation nicely outlined the MSSG mission objectives, recent requirements, challenges, the focus of its progress, and plans. The need for agency participation and support was suggested.

ACTION7: Dong to address links between IVOS and MSSG test sites. What are the current and future sites being reviewed by microwave and are they related to IVOS sites?

Terrain Mapping Subgroup

Jan-Peter Muller (JPM), [TMSG subgroup](#) chair, went over the mission and objectives of TMSG. The TMSG actively participates and coordinates with the International Society for Photogrammetry and Remote Sensing (ISPRS). JPM encouraged more agencies to support the TMSG. Muller discussed the involvement of TMSG in the QA4EO Showcase. Global 30 Arc-Second Elevation Data Set (GTOPO30) uses 1 kilometer resolution. The Digital Elevation Model (DEM) resolution requirements has only one documentation, and is an area that could use some updating on. A relative DEM can be transformed into an absolute DEM, and one can use the smaller resolution items to do so. Muller shared the data quality of Global DEM (GDEM), as well as the European Union (EU-DEM), their requirements and objectives. Muller introduced Hannes Reuter who will take over the TMSG group activities.

Actions and Task Reporting

IN-02-C2 Earth datasets

Jan-Peter Muller shared the POCs and proposed activities to make this IN-02-C2 task happen (slides for this are at the end of the [TMSG subgroup](#) presentation, page numbers 68-70). He shared Recommendations to CEOS to include bathymetry DEMs. When the TerraSAR-X add-on for Digital Elevation Measurement (TanDEM-X) mission is complete, informally by 2015, it is expected to have information publically released. People have done assessments on what is the true horizontal resolution of Advanced Space-borne Thermal Emission and Reflection Radiometer (ASTER), and found it to be around 77 meters. Various data sets and their availability were discussed.

A Recommendation was made to make DEM data available from EROS. It was so noted by responsible parties, and no official action needed to be implemented.

CEOS/GEO Task Plan

Stensaas shared the [CEOS Management Plan and work plan](#), and components related to QA4EO and WGCV. The CEOS Implementation Plan processes were explained. Stensaas presented the IN-02-C1 actions for which WGCV is responsible. Stensaas showed the Actions Website and where to go for updates.

ACTION8: Update and discuss the showcase for AC.

Recommendation: Continue to develop a showcase for elevation as delegated to WGCV in the task. Discuss and develop implementation of IN-02-C1-3 and 5 tasks with WGISS.

Stensaas covered all the IN tasks, and others went more in-depth as to their progress on those.

Task Plan IN02-C1_2

Nigel Fox shared information on the [Dome C \(Antarctica\)](#) site and the results from the campaign, which will go to the cal/val portal.

Task Plan IN-02-C1_4

Chander shared on [IN-02-C1_4 on the COVE tools CEOS sites](#). The cal/val portal is the front end of much of what we are doing. It is up to the agencies to provide the data so it can be updated (not the other way around).

Discussion on the CEOS Website ensued. Additional dialogue and information on the CEOS website regarding the events calendar took place. It is possible to ask Kerry Sawyer to post our Subgroup events, and we will find out down to what level of subgroups she is willing to post events. It would be nice to have our events on that calendar for communication purposes.

Joint Meeting Ideas

This collaborative session facilitated by Stensaas for ideas to bring forth and present at [Wednesday's Joint meeting produced the following ideas, interaction and discussion](#):

- 1) Ideas were suggested regarding quality data/metadata fields for the key sensors and products. Meta data Standards were discussed. WGCV needs a good understanding of quality data fields and atmospheric sensors.

RECOMMENDATION: Discuss tomorrow how WGCV should be including quality metadata. Generic Earth Observation Metadata Standard [GEOMS) is the actual guideline. Discussion ensued. Cover LPV and IVOS; this is something that could be a quick turn-around in success of promoting EO data.

In our quest to get more information from others, Jan-Peter Muller will put together a few slides to show this need (done).

von Bargaen: We should have a rough outline of showcases so the messages to stakeholders are consistent. Showcases should define your research.

Stensaas (to Killough): Killough, you have been involved with presentations and what has been happening with EO; is there a way we could establish a template or process to better provide information for showcase examples?

Killough: This would be well-served in an expedition or International Geoscience and Remote Sensing Symposium (IGARSS) booth. We can share prototypes there.

Stensaas: Steve from the WGCV shared up to 12 papers for a cal/val session at IGARSS. The original intention of the showcase was to show that CEOS had some very good things going on

that promoted the value of EO data and we could provide quality assessments of different things. Where do we get a template or a process? Having demos of systems is good. We still need a better way to market our information. WGISS does this. It is a continued challenge to match the technical help to the decision makers and managers.

Fox: We should be engaging with them. If you have got a case study showing how cal/val is important to parameters, the message you try to sell is the same, but needs to be interpreted. We need to better do marketing and outreach.

- 2) With regard to data access of CEOS test site information, this is the concept of using the quick tool in the Integrated Data Network (IDN) to have a description test site. This could be a great place for us to disclose our test site information.

Muller: All the information we have is either classified or under commercial restriction (a problem with DEM). Elevation information has a jewel use, but restrictions. Therefore, this may not be a candidate for WGISS to help us set up.

- 3) Metadata requirements for quality: this is a large, difficult area to work and there are many people working this. The NASA/ESDSWG federation (<https://earthdata.nasa.gov/esdswg>) has been looking at Quality Assurance (QA) indicators for about 4 years, and we should be trying to figure out how to take advantage of working enhanced Meta data.

Bojkov: Why would an ECV be different, or be documented differently? All the different levels of data processing and information have different parameters. Your identifier is the same. Why should there be a different set of metadata? This would be a better discussion with the Working Group on Climate.

Product versus ECV quality descriptions were discussed by the group.

Fox: Your requirements of what the uncertainty may be different, but the fields are the same.

Stensaas: What would be good to have is set of metadata to be recommended to be populated by CEOS.

Fox: This is why we are asking people to put information in. Some of this information you may not have. What do you put in the field of you do not have it? You then cannot validate much if you are guessing too much.

- 4) Quality Indicators: What do we have in the metadata that covers the quality indicators we need? In seeking support from CEOS, we need to define what we think those components are.

Senthil Kumar (ISRO): It is not about elements, and sub quality elements. If ISO standards are referred to, some of the data may follow the principles. We, as a technical body need to look at the definitions. ECV quality perspective on climate would be good. This process still needs a lot of definition.

- 5) Input from ECV perspective. How does QA information on ECV products get populated and stored, and what are the documentation components needed?
- 6) Identification of key quality partners: Can this be done? ISPRS is doing some good work in documenting quality and it would be nice to tie this back together. The ISO is just one small example of thing happening. All were requested to keep these in mind because Stensaas is looking for input and discussion for Wednesday's joint meeting. It was suggested by Srivastava that data observation from the Distributive Active Archive Center (DAAC) is good, but we should also have algorithms.
- 7) Updated current and newly developed showcases. This was discussed, and requested to keep in mind for upcoming dialogue and consideration.

WEDNESDAY, Joint Meeting

Location: Hall 1

Welcome

Stensaas provided the welcome and plans for day three where both WGISS and WGCV met jointly.

Host Presentations

ISRO Contributions to WGISS Activities

Nitant Dube shared the [EO Missions of ISRO](#), Data Portals, etc. ISRO contributions with regard to IDN, Technology Exploration, virtual constellations, and future proposals were shared.

All agreed it was a wonderful presentation. Many from NASA and NOAA are looking forward to a fruitful partnership with ISRO. It was stated that there are many wonderful ideas from ISRO. John Faundeen (USGS) stated that they are working with the CWIC team just this week to get the first steps begun.

Stensaas: It was interesting to see you had over 19,000 unique users coming into your portal and the number of terabytes (a day) coming through your area. These are some great contributions for long-term data preservation.

QA4EO for Indian Remote Sensing (IRS) Products

Senthil Kumar of ISRO shared [Essential principles, Quality indicators, and Traceability for QA4EO](#). User requirements for National projects and quality elements for Indian Remote Sensing (IRS) data products and products compliance reports were shared. Accuracy results, radiometric performance of the various sensors, cross calibration, and spectral variation impacts and biases, along with some preliminary results were shown. This was an excellent showing of processes of QA from pre-post launch through operational missions.

The following discussion resulted:

Srivastava: Excellent, this is the first time I am seeing QA4EO in practice (not just how, but actually doing). How is this initiated in the data products chain?

Kumar: For IRS Sensor products, we are the main focal point to distribute the products. Quality check is done on almost every scene in a selective way. From this, we do the entrance to mission team...but once chain is fully ready, it is shared and data are fully in compliance.

Fox: In utilizing QA4EO, have any of your customers noticed the benefits or acknowledged such?

Kumar: The users requirements are well within acceptance, but many of the products with regard to the National Spatial Framework, everyone is fully satisfied.

Fox: We would like some nice case-studies to show or share so we can draw from these as examples of how the benefit is being used/needed by community.

Chander: For us right now, we are going to a national land-imaging requirement, contacting partner agencies, and trying to get a good understanding of what the requirements are for the data products we have. This assists in planning future satellites. ISRO is very application driven; In the future, USGS and ISRO should collaborate as to how you have done this in the past. We would like to have a good understanding and partnership for future satellites.

Kumar: ISRO would like to start with cross-calibration.

Site characterization for Land Surface Imaging (LSI) and Lunar Calibration

B Kartikeyan shared [Site Characterization for LSI and Lunar Calibration](#). Identification and characterization of radiometric sites for medium-resolution optical sensors, tryst with artificial targets, lunar calibration (lun-cal), and inter-sensor cross calibration (X-cal) were all covered in this presentation. The following discussion resulted:

Fox: I applaud these efforts, and would very much welcome and encourage you to establish one of those sites to be a CEOS reference site. We can help you with what that is from the specifications. This is one of the new sites we would like to have for radiometric gain, and for Modulation Transfer Function (MTF), which is an aspect of IVOS. We encourage you to be part of Dennis Helder's activities, for the best practice guidance we are trying to produce.

Recommendation by Fox to have one of ISRO's test sites be a CEOS reference site and to be a part of the best practices as set forth by the IVOS/SDSU (South Dakota State University) partnership. ISRO will put in a proposal for such. IVOS and WGCV will help with cross comparisons.

Stensaas: We are trying to establish additional spatial resolution target test sites, as well as enhancing the radiometric test sites and would be happy to incorporate these into our catalog.

Fox: For both presentation and the efforts for sensor-to-sensor cross-calibration for the Database for Imaging Multi-spectral Instruments and Tools for Radiometric Intercomparison (DMITRI) tool, it would be beneficial to add to this database the ISRO satellites so you can play with the tool, and we can have another sensor. It will be available on the cal/val portal in the next two weeks, and it would be good for you to be the first to add this tool.

Ocean Buoy for Ocean Sensors

K. N. Babu shared his [Ocean Buoy for Ocean Sensors presentation](#). Cal/val sites, how/when established and augmented, and sampling types were shared. Comparison with Marine Optical Buoy (MOBY) was presented, as well as vicarious calibration, and results of the Ocean Colour Monitor on-board Oceansat-2 (OCM2) sensor.

Stensaas: We have been talking in WGCV about ocean color sensors and tying this all into the portal, and this would be excellent. We will look forward to collaborating on this in the future. The portal could be available that can be linked in to by others for ocean color sensor. This would be very useful, and another buoy would be important.

Cross-Comparison of Meteorological Sensors

Pradeep K. Thapliyal presented [Cross Comparison of Meteorological Sensors](#). He shared the objectives of inter-calibration, and proxy radiance generation for the Indian Geostationary Met Satellites/Sensors. He shared inter-calibration procedures, methods, and the sources for such. Radiance Bias correction methods were shown, as well as future plans for inter-calibration of their various sensors.

Stensaas: We really appreciate the efforts by you for the Global Space-based calibration, and we are interested in keeping this within WGCV.

Fox: I noticed that you use the view of corrective results. If we want to do calibration of our own sensor, we remove calibration correction. We have a set of profiles. Using a reference and how you are reporting those values, how you are reporting and how it is being defined is what matters.

ISRO Personnel: Albedo is from .3-4 microns and the visible band is narrow.

Discussion/explanations ensued by ISRO Personnel.

The sensors are well calibrated to the National Institute of Standards and Technology (NIST) standards.

Stensaas: I would just like to make a comment to the director and staff at ISRO that the contributions of ISRO's excellent space program are incredible in all the space efforts, and we look forward to much continued discussion and work!

COVE Tool Demonstration

Brian Killough of NASA shared the [CEOS Visualization Environment](#) (COVE) tool, based on Google Earth. COVE has many applications within CEOS to include deforestation, agriculture, and data access (to only name a few). There are many outside applications for campaigns, data studies, and acquisitions as well.

Discussion ensued:

Kumar: I have two questions. 1) This software will save a lot of time in communicating synchronization. In optical sensor calibration, regarding cloud cover, can this be applicable as well? 2) Once on the CEOS site, if the spectral info is available through a link, which would be

helpful, we have different models, and positions, but, for those who would like to try, what is a suitable model?

Killough explained cloud cover data and data links.

Chander: Killough and I will make sure the test sites are linked to the COVE.

Killough: In terms of export and a graphical export, we'd like to be able to do more than just a screen shot, and export of K and L will be coming (Killough will tell his guys to get on it).

Muller: Does the system know about when a sensor dies?

Killough: Yes. "Data outside the mission guidelines."

Stensaas: One of the things we have on the agenda is to provide comments and suggestions for enhancement to COVE. We would like to have a list of questions and Recommendations for Killough to move forward with this. Please write those down and we will take the things we get out of WGCV and provide to Killough.

WGISS Proposed Efforts and Responses to Monday's Discussion

Satoko Miura presented on the [WGISS proposed Efforts and Responses](#). Miura shared on the Showcase updates (FCT, AC, and Global Elevation). Also, ideas received from this WGCV interaction were disclosed (slide 4). Metadata and quality, Data Access to CEOS test sites, Identifying Key Partners, Showcases, and New Proposals (DEM Quality Information Services (DEMQis)) are what WGISS is proposing.

CWIC Tool

Yonsook Enloe and Martin Yapur presented the [CWIC tool](#) and its many capabilities. CWIC serves as a community catalog of products and services of CEOS member agencies. The CWIC information, resources, and support options available to new partners were shared. The following discussion ensued:

Kumar: Since the information is available from the satellite systems regarding the information criteria, what are the quality indicators you look for?

Enloe: Harmonization across programs. We are also counting on the agencies to provide this information. WGISS will soon be doing a survey to see what is available before we can move forward.

Miura: We will need to do a survey. Only after that, we will go forward.

Fox: If I understand correctly, if in principle, when you find the latitude and longitude, that is going to bring up all the data that exists through whatever time period you define; is that what happens?

Enloe: Yes, if they are registered in the IDN. Identify which datasets you want to search on.

Directions and suggestions ensued.

Enloe: We can only include in CWIC where the data is available. This is a loose coupling of the data providers. We are trying to get as many of the CEOS data as possible that are open.

Fox: Can one use COVE at the front end to link to CWIC?

Enloe explained that it can be linked to the IDN to browse, and further discussion resulted.

WEDNESDAY Afternoon, Joint Meeting

Location: Hall 1

Implementation Pilots or Showcases/Current and Future Proposed Efforts

Everyone is encouraged to look at the GEO implementation plan. (Stensaas slides). We are not a standards body, but we would like to come up with a means of reference for such.

Fox: I shy away from declaring what is suitable for an application. This should really be the user.

Stensaas: If you are trying to answer a societal benefit question, you need to know how accurate is the information and the user has to decide how accurate it needs to be. It is important to know that engagement with the end user can happen.

Srivastava: In some cases, the data provider is not the user. It is up to the user to know what they need and which data they would like to use.

The main thing is that usually people find many more uses for the data than what it was originally intended. Let us make visible what it can do, but it should not be for the provider to be defining what it is useful for. It may be that the virtual constellations have within their specifications to define requirements as to what sensor characteristics need to exist in order to deliver.

ACTION9: The appropriate people should be looking at these items as they come out. Maybe WGCV can be defining what those fields are. Recommendation or suggestion to think about a discussion in this area.

System specifications were discussed. Stensaas shared the Recommendations made to SIT. As we move into the climate data environment, the data quality has to be consistent across the chain.

Joint meeting ideas were disclosed:

- 1) Quality metadata fields for the key sensor and products. WGISS is to look at quality Meta data for WGISS 35. After the survey, we can exchange our views. Fox offered for WGCV to look at or add questions if this requires. Further discussion about this and harmonization took place. Stensaas shared that we do need to work on some common definitions. WGCV can have a strong influence to definitions.
- 2) Metadata requirements for quality (need to tap each WGCV sub group) etc. There are also numerous things going on within ISO for example. We need to look at all the different quality assurance efforts and determine how we tie them together. We need to pull together a list

(document this list, and make it available to the group). We should discuss how we can do this, and take actions.

- 3) Data access of CEOS Test Site information. John Faundeen of LSI VC has provided the Libya field. John has implemented CEOS test sites into CWIC.

ACTION10: Get more knowledge on how to get the right parameter, take information from test sites and share with the Team. From a test site perspective, WGCV has the action.

Miura made the recommendation for a definition requirements.

- 4) Quality indicators: Get WGCV SG support and provide ideas to WGISS; WGISS can help determine implementation.
- 5) Input from an ECV quality perspective.

Long-term Data Preservation (LTDP). It was suggested not to use the acronym. Recommendation for cross-coordination in the LTDP. The following people shared WGCV's input to GEO through WGISS.

Kumar: With regard to primary QA4EO post launch accuracy of products; this in particular, is something like a systematic system. Depending on algorithms that work, we need to define and work towards that.

Fox: A higher level steps in the quality chain needs to be defined.

Stensaas: In addition to metadata and the appropriate references, information to access indicators or traceability is important. This is still a piece that we need to have a better handle on.

Stensaas: With regard to LTDP, more discussion needs to happen. I recommend that LTDP define and document archival processes, make them available, and tie them to the long-term data preservation. These processes need to be connected via an IN-C Infrastructure traceable action.

Stensaas shared all the test sites as well as the Cal/Val portal. We need some thought on how things are done in the CEOS environment. Constellations can be one of the key partners. How do we take advantage of the efforts already happening without overlapping? What is a good way to make this happen and to see what the key efforts are? Stensaas suggested we attempt at coming up with an effective search process and look at all the other quality activities and document them.

Recommend: Acquire a list of organizations that are cooperative.

ACTION11: With regard to test sites, cal/val portals, constellations, etc. find out what is out there and re-define from there.

- 6) Identifying key partners and how they benefit the working group.
- 7) Update and develop new showcases.

Discussion on how to put this together so it is a CEOS /GEO demonstration, and how to make it a showcase. The focus is on the quality aspect. It was suggested to take the showcases we currently have, and decide how they are going to be moved forward.

- 8) Portal quality and commonality: Now that we have the cal/val portal, how do we make it presentable to the community?

- 9) Linking of CEOS tools and accessibility to tools
- 10) Data Accessibility and availability list per mission
- 11) CEOS- related calendar: what level of information can be on this calendar?

ACTION12: For WGCV to contact CEOS DCEO (Sawyer) to find out how to start populating things on this calendar site (done per Gregory Stensaas). Sawyer suggested that WGCV develop its own calendar.

DEMqis and Quality Albedo (QAlbedo)

Jan-Peter Muller shared show case suggestions regarding [DEMqis and Qalbedo](#). You tube videos were recommended for each of the showcases. Proposed DEMqis Web Processing Services (WPS) functions were shared. Overall aims of GlobAlbedo were shared.

Kumar: From the Moderate Resolution Imaging Spectroradiometer (MODIS), when you generate a broadband model, it is already done as a product and it is a simple function that can be put on line.

Muller: We now have version 1 and version 2, DLR DEM that can form the bases for something more interesting. Proposing the DEMqis as a showcase for someone somewhere is an example of WGISS/WGCV cooperation.

The albedo validation process is on the website, www.GlobAlbedo.org.

We want to make sure we have appropriate sponsorship, so a recommendation for that was suggested. Wyn Cudlip said he would be a POC on the WGISS side, and Jan-Peter Muller for WGCV.

It was decided to have a further discussion at WGCV meeting.

ACTION13 for WGCV to come up with a Recommendation on showcase and provide feedback to WGISS.

Recommendations to CEOS

Satoko Miura shared her slides on [Joint Recommendations to CEOS](#). WGCV teams should also suggest ideas of quality metadata fields for the key sensors and products.

ACTION14: Document all the quality related activities, send out an e-mail to WGCV and WGISS and provide QA related activities to a POC, and create a list of information. (Stensaas will do for WGCV and Miura for WGISS). Fox will provide the group with the e-mail POC for the QA4EO group. Fox and Stensaas will work on an e-mail that would work for both groups.

ACTIONS15-16:

Other actions/Recommendation per joint meeting.

1. WGCV teams should also suggest ideas of quality data/metadata fields for the key sensors and products.
 - WGISS to look at quality metadata for WGISS 35, starting from collection level (led by Tech Expo Interest Group).
 - Common definitions on quality is needed. WGCV will work on this.

- Work together based on above results and prepare example(s). Show and appeal to CEOS members!

2. Metadata requirements for quality; need to tap each WGCV working group for sensor information. Have WGISS find out what is available. Get NASA and Earth Science Information Partner (ESIP) feedback on this and others.

- WGCV & WGISS chairs will e-mail WGISS/WGCV members to document all the quality related activities.
- Fox will provide QA4EO information.

3. Data access of CEOS Test Site information starting with:

- WGCV will provide necessary information to WGISS/CWIC.
- CEOS WGISS Integrated Catalog (CWIC) will provide support for this.
- Data access to one test site will become available before the 2012 CEOS Plenary.

4. Quality indicators: get WGCV SG support and ideas, and ideas from WGISS.

- Will follow No.1

5. How does quality assurance information on ECV products get populated and stored, and what are the documentation components needed?

- WGCV will contact the Climate WG to obtain quality assurance requirements.
- WGISS/DSIG will contribute to this, especially regarding long-term data preservation.
- Input to GEO Work Plan (WP) Component IN-02-C1.

6. Identify key partners and how they assist the working group, and how they benefit from the WG.

- WGISS use wish List from VCs. WGISS, working with WGCV, to contact to each VC on their needs (detailed/specific needs).

7. Updates and develop new showcases.

- QAlbedo: new proposal from WGCV
 - WGCV will discuss existing showcases and Qalbedo tomorrow (SEP-27) and give more feed back to WGISS.

8. DEM Quality Information System (DEMqis).

- DEMqis WPS functions (newly proposed).
 - New web services could be developed by different space agencies irrespective of whether they produce or store/distribute DEMs.
- On-going WGISS-WGCV joint efforts.
 - Sponsorship needed.

9. Portal Quality and Commonality/new portals.

10. Linking of CEOS tools and accessibility of tools.

11. Data Accessibility and availability-list per mission? Data Policy-CAL/VAL-free and open

12. CEOS related calendar

- WGCV chair to contact Kerry Sawyer of CEOS to see if SG events (and other lower level events) can be reflected into the current calendar (done, 10/2/12).

CEOS Water Portal

Mr. Hude highlighted the CEOS Water Portal located here: <http://waterportal.ceos.org/>.

This was a very productive meeting.

Adjournment of the WGCV-35/WGISS-34 Joint Meeting.

THURSDAY, WGCV 35th Plenary

Location: Hall 2

Stensaas gave a meeting overview thus far, and the goals to yet accomplish.

Special Interest Presentations

COVE Overview

Brian Killough gave a [COVE overview](#), and shared the new features of COVE. We have six CEOS test sites are they are all on the cal/val portal. Killough asked for feedback form the WGCV group.

ACTION17: Killough will take an action to talk to Tom Stone, and get requirements, and report back to the group regarding lunar calibration.

ACTION18: Killough will contact ESA (Alessandro) to see what lists they have to provide.

ACTION19: For WGCV to discuss lunar calibration modeling and components and address future requirements to get that.

We do not have a very good set of geometric ground control sites and need to take the action to address this for Geometry and Image quality issue.

WGCV give Killough a list of missions for these opportunities and Killough will find the contacts. The view of WGCV is that all data should be available. COVE and CWIC tools would be powerful if we could connect quickly to those Level 1 radiances.

Land Surface Interface (LSI)

John Faundeen shared the [Land Surface Interface](#) tool (LSI), its origin and focus, along with a very useful hands-on demonstration.

ACTION20: To let the National Institute for Space Research (INPE), through Leila Fonseca, know that the information they have does not include proper (correct) names as related to header names for data collection sets. Faundeen will also take it back to his LSI group to resolve other names that need to be corrected.

LSI tool has been released for only two weeks and it is still being tweaked. It will be sent to WGCV after the Libya 4 data has been made available. This will be available on different portals by first quarter 2013 and the focus is on spatial and temporal surfing. Perhaps the water portal could also be interchangeable with this, and worthy of consideration.

ACTION 21: WGCV to provide feedback to John on WGCV test sites on CWIC by using Libya 4 as an example.

Website updates and Test site Discussion

Tim Malthus shared [the Commonwealth Science and Industrial Research Organisation \(CSIRO\) Website Updates and Test Site Discussions](#) and the need for updates on cal/val portals, general issues, etc.

ACTION 22: Processes and efforts regarding cal/val portal and test sites to be deciphered, documented, and provided in an e-mail. Additionally, a regular reminder on this action should take place at least by every WGCV (every 8 months) or less.

The cal/val portal is maintained under contract to Bojkov of ESA.

ACTION 23: All WGCV members look at portal and suggest changes/fixes to ESA. ESA has asked for this on a regular basis so we should provide our best effort.

Cal/Val Test Sites

Gyanesh Chander presented on the various [Cal/Val Sites](#), their measurement needs, their justification, and two budget approaches for supporting sites. Automated ground measurements approaches are a useful means for radiometric calibration.

ACTION24: Fox and Chander to provide documentation associated with requirements for radiometric gain sites for linkage and Recommendation to WGCV.

Agency Reports

ISRO Agency Report

Samir Pal presented the [ISRO Agency Report](#) to include the history of ISRO activities, quality, capabilities and traceability of ISRO sensors (and end-use products), launch vehicles, organization structure, and future missions.

Indian Cal/Val Activities

Dr. A Senthil Kumar presented on the [Indian Cal/Val Activities](#) as related to the National Remote Sensing Centre (NRSC). Imaging capabilities, numerous EO missions, and applications were shared. Kumar shared cross-calibration and those results, image quality parameters, plans for observatories, and ISRO's support of CEOS sites and QA4EO implementation.

ACTION25: SAR to work with ISRO to help bring access to ISRO in situ information forward and available to CEOS, and provide ISRO information of CEOS ground and ocean sites and relevant information of other comparing sensors acquired over the CEOS CV sites.

NOAA/VIIRS

Slawomir Blonski presented via WebEx on the National Oceanic Atmospheric Administration's Visible Infrared Imaging Radiometer Suite ([NOAA/VIIRS](#)). Dr. Blonski shared on the data records, the cal/val team, the knowledge base and data access, instrument components, cal-comparisons, radiometric/geometric performance, and future plans. Stensaas shared that this was good to talk about in the future as we see changes across instruments like the difference between MODIS 5 and 6.

THURSDAY Afternoon, WGCV 35th Plenary

Location: Hall 2

Agency Reports

World Soil Information

Hannes Reuter of the Netherlands presented on the International Soil Reference and Information Centre's (ISRIC's) [World Soil Information](#). ISRIC's objectives, databases, and the relative applications it can bring to WGCV and CEOS were disclosed. Mr. Reuter shared the Global Soil Information Facilities (GSIF) and their objectives. GSIF is a framework for enhancing, collating, harmonizing, and use of soil and covariate data to store and rescue legacy data, and assist production of added-value global soil information at various resolutions. 100 is the aim for soil product spatial resolution currently.

Canadian Space Agency (CSA)

Satish Srivastava presented on the [Canadian Space Agency](#) (CSA), sharing regarding the Radio Detection and Ranging (RADAR) Satellite (RADARSAT) 1 and 2 Missions (R1 and R2), status, programs, outputs, and the Science and Operational Applications Research (SOAR) program. The SOAR Program provides access to RADARSAT data for research and testing purposes. It focuses on providing opportunities to explore the enhanced capabilities of RADARSAT-2 and their potential contributions to various applications. These opportunities are realized through loans of circumscribed amounts of RADARSAT data to research projects.

The Science Satellite (SCISAT) Mission, launched in 2003, measures numerous trace gases, thin clouds and aerosols in the stratosphere, has approval to continue at least until 2015.

The RADARSAT programs, missions, and evolution were shared as well. The RADARSAT Constellation Mission (RCM) is the next in the series of RADARSAT missions, is designed to provide continuity to the R1 and R2 missions, and will provide EO application development phases. Having three satellites in orbit will provide potentially better than weekly Canadian landmass coverage. RCM will cover the Canadian departmental requirements of Maritime Surveillance, Environmental Monitoring, Disaster Management, and Northern Development.

Commonwealth Science and Industrial Research Organisation (CSIRO)

Tim Malthus presented on [CSIRO's](#) background, EO activities, calibration facility, workshops, the Terrestrial Ecosystem Research Network (TERN) validation efforts, and funding issues for such. Tim is also the National Satellite Calibration Working Group co-lead.

Geoscience Australia

Medhavy Thankappan presented on [Geoscience Australia](#), its federal fit, and the activities they are involved in supporting cal/val for EO. Many acquisition facilities, types of datasets derived from the archived data, and several forms of data correction methods were disclosed. Dr. Thankappan shared cal/val campaigns, the National Field Spectrometer Loan Service, the concept of Unlocking the Landsat Archive (ULA), their involvement in and with TERN, best practices for application/implementation, ISO standards as applied to the National Land Cover Dataset, and various products and systems related to, or of interest to, cal/val activities.

Stensaas: There are so many new things happening and new initiatives in Australia. We should be cooperating in numerous areas. Is there something we need to be looking at in terms of WGCV to take notice of the good work you are doing?

Thankappan: Anything that comes from the international community will be very helpful in leveraging the importance of this program.

ACTION26: Continue to work to establish this CEOS/WGCV/Australia (AUS) partnership. The last two briefings we saw from AUS had much in them. Everyone was encouraged to provide feedback to the chair/vice chair on potential work we can do within the subgroups.

National Institute for Space Research (INPE)

Dr. Leila Fonseca presented on [INPE](#), its hierarchical structure, multilateral agreements, the China–Brazil Earth Resources Satellite program (CBERS) payload and launch schedules, CBERS data processing and distribution, and activities related to cal/val. INPE is also looking forward to receiving help from other agencies for collaborating and help with the data.

European Commission (EC)

Dr. Jean-Luc Widlowski presented on the [European Commission's on-going cal/val activities](#). EC is involved with LPV, surface albedo, IVOS (Ocean color and Radiative Transfer (RT) models), and Land Cover. GMES aims at developing operational user services, and is based on satellite EO and in-situ data. One of its services includes Marine/Ocean data. Steps for implementing QA were shared, as well as validation efforts, and calibration models.

Discussion ensued:

This may warrant some additional looks at how we want to use this process.

National Aeronautics Space Administration (NASA)

Brian Killough presented a [NASA update](#) on behalf of Garik Gutman of NASA Headquarters. NASA's summary of accomplishments regarding cal/val activities were summarized. Proposed activities for collaboration and partnerships were shared. Budget has been poor the last few years so the Climate Absolute Radiance and Refractivity Observatory (CLARREO) will not likely be launched until after the budget increase, or after 2020. NASA has 16 missions they are flying in, so there are many opportunities. Operational costs are phenomenal.

Norwegian Space Centre (NSC)

Einar-Arne Herland presented on the [Svalbard Integrated Arctic Earth Observation System](#) (SIOS) for the Norwegian Space Centre (NSC). The project structure, research sites and institutions, instrumentation, fieldwork applications, receiving stations, and various missions and research vessels were disclosed. Cal/val activities for EO are very important for SIOS. Discussion ensued regarding the usefulness of a CEOS test site in Svalbard, and the consensus was a resounding “yes.”

Russian Federal Space Agency (ROSCOSMOS)

Denisov Pavel presented on the [Russian Federal Space Agency](#) (ROSCOSMOS).

By 2015 in Russia, there are plans to deploy four test sites designed to measure spatial-frequency, spectroradiometrics, and coordinate-measuring characteristics of visible, Infrared (IR) and radar imagery data. Mr. Pavel disclosed current and planned test sites, their equipment, and software packages for observational data processing and analysis. Key items are target and spatial resolution.

ACTION27: ROSCOSOMOS to work w/IVOS. IVOS has put out a request for such.

FRIDAY, WGCV 35th Plenary

Location: Hall 2

Welcome and Agenda overview by WGCV Chair Greg Stensaas.

Agency Reports

United Kingdom Space Agency (UKSA)

Nigel Fox presented on the [United Kingdom Space Agency \(UKSA\)](#), its current programs and involvement (QA4EO for one), and plans for the future. He shared the construct of the space innovation and growth strategy. One of the major aims of the UKSA is to invest in and support growth in the Space Industry, and efforts are focused on building a cluster of activities in Harwell Oxfordshire. There is now a new committee to advice UKSA on all EO issues, so they are getting senior government interest.

United States Geological Survey (USGS)

Gyanesh Chander presented the status of the ongoing cal/val activities within the United States Geological Survey's (USGS) [Earth Resources Observation and Science](#) (EROS) Center. Four decades of EO through the Landsat program has taken place. The Landsat Data Continuity Mission (LDCM), also known as Landsat 8 (L8) is schedule for launch in February 2013. The NASA and USGS responsibilities and relationships were explained (launch to ground systems). Chander shared the accomplishments of the Landsat program since the last meeting, and cross-calibration techniques used between Landsat sensors. The free data provided has broadened the user base.

The Global Land Survey (GLS) datasets were jointly produced by NASA and USGS to provide complete or near complete global coverage of Landsat images for all land areas. The QA/QC assessment of GLS data was summarized.

Chander shared the candidate Landsat ECVs. The Test site catalog and trending was shared. USGS has extensive internal capabilities and leads a number of national and international calibration partnership

and activities. The Landsat archive and open data policy has enabled much growth and innovation in use and applications of land remote sensing data.

Special Interest Presentations

The Global Space-based Inter-Calibration System (GSICS)

Slawomir Blonski of NOAA shared on the [GSICS updates and interactions](#), its current activities and goals, and its fit within the CEOS organization. GSICS' current focus is on the inter-calibration of operational satellites and on using key research instruments as reference instruments for the operational instruments. Amongst the GSICS goals for outcome are best practices and requirements for prelaunch characterization, and to establish requirements for cal/val with CEOS WGCV. Calibration is critical for climate change detection.

GSICS does not generally re-calibrate archives of data. To date, GSICS have concentrated on current GEO imagers and has developed procedure for product acceptance, and there is a need to ensure consistency between products.

CEOS Self Study (CSS) and Participation Update, and QA4EO Task Plan

Stensaas shared on the CEOS Self Study (SS) and gave an update on participation. He also shared the [QA4EO task plan](#).

Sea Surface Temperature Virtual Constellations

On behalf of David Llewellyn Jones, Nigel Fox presented on the [Virtual Constellations \(VCs\) for Sea Surface Temperature \(SST\)](#). He went over the issues related to WGCV. The goals of this VC are to foster the best quality sea surface temperature data and their availability for applications across all relevant spatial and temporal scales in the most effective and efficient manner through international collaboration, scientific innovation, and rigor. They also strive to advocate priority areas for funding of SST activities, and promote "the sharing of data" in support of the SST-VC aim. Affecting WGCV, there is a need for continued collection of in situ reference observations of SST, which are traceable to international standards. There is a need for continued funding and support by CEOS and others.

RECOMMEND WGCV communication with VCs and VCs to communicate with WGCV.

CEOS WG on Climate

Stensaas presented on the [CEOS WG on Climate](#), and interactions of WGSC with such. Stensaas went over the progress, issues, and obstacles. They want help on defining the matrix, and are looking for guidance.

ACTION28 WGCV to work with WG on Climate

- 1) To find out the exact components and support WG Climate is looking for from WGCV.
- 2) To discuss the maturity matrix process of QA4EO as a guideline or maybe a showcase.

Presentation of Gratitude

Srivastava presented a "[Thank You](#)" and verbal gratitude to Stensaas for his four years of service and leadership to CEOS WGCV as Vice Chair and Chair.

Closing Thank You from the ISRO Director

VK Dadhwal expressed his happiness for having us. Santhi Sree and Kumar Kumar presented host gifts to Stensaas (Chair) and Carrie (Secretariat).

Future WGCV Plenary Meetings

Srivastava shared on the [proposed date](#) offered to us by the Chinese hosts in Shanghai, and all agreed to accept the proposed date.

Subgroup Recommendations to CEOS

Stensaas shared a [compilation of Recommendation](#) by all subgroup chairs/leads and updated it in real time per working discussion.

CEOS WGCV recommends that CEOS plenary consider action:

1. a) For agency support in developing and maintaining recommended instrumentation at the recommended CEOS Cal/Val test sites for IVOS, LPV, and SAR,
 - a. (1aa) Agency support for CEOS SAR test sites in India and Australia (SAR)
 - b. (1ab) For satellite based OC measurements, agencies to commit to long term support of CEOS reference test sites for oceans; e.g., OC Buoys MOBY, BOUSSOLE, (Kavaratti - ISRO) and develop Aeronet-OC network (IVOS)
 - c. (1ac) To underpin validation of satellite based SST measurements and help mitigate data gaps for climate records, agencies to support the deployment of a set of traceably calibrated drifting buoys at a cost of ~\$300k (IVOS)
 - d. (1ad) To encourage members to identify global MTF Cal/Val test sites , and provide resource to establish CEOS standard sites and webpages (similar to the USGS Worldwide test site catalog) (IVOS)
 - e. (1ae) For members to fund the set-up of global test sites over continental shelves where “bathymetry” truth is available for (a) clearwater (e.g. Australian bight); (b) turbid water regions (e.g. English channel) for evaluation of spaceborne visible and SAR methods respectively for bathymetry retrieval (TM)
 - f. (1af) Previous CEOS-24 Action: for members to support set up and long-term maintenance cost of autonomous SI traceable instruments for the CEOS land test sites (LANDNET) (minimum of 5) and establishment of infrastructure to enable coordination and dissemination of information to satellite operators (IVOS)
1. b) to provide routine data via sensor acquisition plans over the CEOS recommended sites,
 - a. (1ba) To encourage members to provide consistent minimal acquisition metadata in the header files; e.g., view angles, time, solar angles, etc., to support comparisons needed for data quality and interoperability (IVOS)
 - b. (1bb) To encouraged members to ensure full PSF/MTF pre-flight characterization of the sensor and provide results to the user community (IVOS) and,
1. c) to provide free access to data acquired over CEOS sites to CEOS member agencies for calibration purposes, preferably via CWIC
 - a. (1ca) To encourage members to provide through WGISS WPS services (e.g. bare earth retrievals, river catchments, data fusion engines) as well as WMS of their spaceborne

DEM products including QI using the internationally agreed ICEDS color LUT for elevation and a to-be-agreed CLUT for QI (TMSG)

2. To provide
 - a. (2a) A process for supplying resources/funding/support for ground networks and field campaigns, and
 - b. (2b) Resources required to enable comparisons of radiometers used for validation of 1) SST and 2) OC to be organized in 2014 (preparations to commence in 2013) in support of VCs and climate
3. For CEOS members to
 - a. (3a) Provide point of contact for WGCV and its six subgroups,
 - b. (3b) Provide Recommendations for LPVSG vice chair and MSSG co-chair, and
 - c. (3c) Provide POCs for 2 new thematic groups with in IVOS SG (Geo-spatial quality and Geo-image quality) via WGCV and IVOS SG Chairs
4. To review and approve current WGCV 5-year plan (on WGCV web page)
5. To encourage members to provide resource to lead and encourage widespread implementation of QA4EO principles within current and future activities of CEOS members facilitated by the new UKSA QA4EO Secretariat
6. Develop WGCV and WG-C interface group to establish consistent interpretation of GCOS ECV requirements and analysis methodology for accuracy and stability monitoring, and to support validation processes of EVCs (IVOS-SG and LPV-SG)

Further WGCV actions assigned as a result:

ACTION29: Srivastava to look at SAR report and make Recommendations.

MSSG: support membership as well as agency support.

TMSG: Vice Chair Reuter will talk with Chair Muller to determine a Recommendation for TMSG.

ACSG:

ACTION30 Stensaas and Srivastava will check the slides by Bojan and share any Recommendations with the group.

DEMqis or QAlbedo:

Recommendation for agency support by Reuter and Muller. Stensaas would like response from Reuter regarding suggestions for showcases.

ACTION31: LPV, IVOS, and TMSG to work with chair and vice chair to determine the fitness of QAlbedo as a showcase or recommended effort that needs to happen within CEOS.

Adjournment of WGCV-35

Appendices

Acronyms

AC	Atmospheric Composition
ASTER	Advanced Space-borne Thermal Emission and Reflection Radiometer
AUS	Australia
cal/val	Calibration and Validation
CBERS	China-Brazil Earth Resources Satellite
CEOS	Committee on Earth Observation Satellites
CLARREO	Climate Absolute Radiance and Refractivity Observatory
CSA	Canadian Space Agency
CSIRO	Commonwealth Science and Industrial Research Organisation
CSS	CEOS Self-Study
CVI	Cal/Val Interest
CWIC	CEOS WGISS Integrated Catalog
DAAC	Distributive Active Archive Center
DEM(s)	Digital Elevation Model(s)
DEMqis	DEM Quality Information Services
DLR	German Aerospace Center
DMITRI	Database for Imaging Multi-spectral Instruments and Tools for Radiometric Intercomparison
EC	European Commission
ECVs	Essential Climate Variables
ENVISAT	Environmental Satellite
EO	Earth Observing
EROS	Earth Resources Observation and Science
ESA	European Space Agency
ESIP	Earth Science Information Partner
EU-DEM	European Union DEM
FCT	Forest Carbon Tracking
GCOS	Global Climate Observing System
GDEM	Global DEM
GE	Global Elevation
GEO	Group on Earth Observation
GEOMS	Generic Earth Observation Metadata Standard
GEOSS	Global Earth Observation System of Systems
GLS	Global Land Survey
GMES	Global Monitoring for Environment and Security
GSICS	Global Space-based Inter-Calibration System
GSIF	Global Soil Information Facilities
GTOPO30	Global 30 Arc-Second Elevation Data Set
IDN	Integrated Data Network

IEEE	Institute of Electrical and Electronics Engineers
IGARSS	International Geoscience and Remote Sensing Symposium
IGs	Interest Groups
INPE	Instituto Nacional de Pesquisas Espaciais (Brazilian Space Agency), a.k.a. National Institute for Space Research
IR	Infrared
IRS	Indian Remote Sensing
ISO	International Standards Organization
ISPRS	International Society for Photogrammetry and Remote Sensing
ISRO	Indian Space Research Organisation
IVOS	Infrared Visible Optical Sensors
L5; L7; L8	Landsat 5; Landsat 7; Landsat 8
LDCM	Landsat Data Continuity Mission
LPV	Land Product Validation
LSI	Land Surface Imaging
LSI	Land Surface Interface
LTDP	Long-Term Data Preservation
lun-cal	lunar calibration
MOBY	Marine Optical Buoy
MODIS	Moderate Resolution Imaging Spectroradiometer
MRSS	Malaysian Remote Sensing Society
MSSG	Microwave Sensor Subgroup
MTF	Modulation Transfer Function
NASA	National Aeronautics Space Administration
NIST	National Institute of Standards and Technology
NOAA	National Oceanic Atmospheric Administration
NRSC	National Remote Sensing Centre
OCM2	Ocean Colour Monitor on-board Oceansat-2
OMPS	Ozone Mapping and Profiler Suite
POC(s)	Point(s) of Contact
QA	Quality Assurance
QA4EO	Quality Assurance For Earth Observation
QAbedo	Quality Albedo
R1/R2	RADARSAT 1 or RADARSAT 2
RADAR	Radio Detection and Ranging
RADARSAT	RADAR Satellite
RCM	RADARSAT Constellation Mission
ROSCOSMOS	Russian Federal Space Agency
RT	Radiative Transfer
SCIAMACHY	Scanning Imaging Absorption Spectrometer for Atmospheric Chartography
SCISAT	Science Satellite
SDSU	South Dakota State University



Working Group on
Calibration and Validation

SG	Subgroup
SIOS	Svalbard Integrated Arctic Earth Observation System
SIT	Strategic Implementation Team
SOAR	Science and Operational Applications Research
SQWG	SCIAMACHY Quality Working Group
SS	Self-Study
SST	Sea Surface Temperature
TanDEM-X	TerraSAR-X add-on for Digital Elevation Measurement
TERN	Terrestrial Ecosystem Research Network
TMSG	Terrain Mapping Sub Group
UK	United Kingdom
UKSA	United Kingdom Space Agency
ULA	Unlocking the Landsat Archive
USGS	United States Geological Survey
VCs	Virtual Constellations
VIIRS	Visible Infrared Imaging Radiometer Suite
WGC	Working Group on Climate
WGCV	Working Group on Calibration and Validation
WGISS	Working Group on Information Systems and Security
WGs	Working Groups
WP	Work Plan
WPS	Web Processing Services
X-cal	cross-calibration



Working Group on
Information Systems & Services

Actions

WGCV35 Actions

Tracking Number	Description	Assigned to:	Due Date:	Status	Notes/ Recommendations
WGCV35-1	WGCV to define our terms of reference as to who (when dialing in via WebEx) and what constitutes adequate participation to make them eligible to vote.	WGCV	WGCV36	Open	
WGCV35-2	The Plenary needs to have a discussion and vote on responding to GSCICS's request to us. Follow interaction and define those (per von Bergen).	WGCV	WGCV36	Open	
WGCV35-3	Have discussion on QA4EO chair and co-chair role, and the management role for this task. The role for a volunteer agency should be fine for secretariat, but not for leadership role. Define WGCV's leadership role with respect to QA4EO implementation, and what the sharing process is for the co-chair.	WGCV QA4EO	WGCV36	Open	
WGCV35-4	European Space Agency (ESA) to check on thematic sampling from the Ozone Mapping and Profiler Suite (OMPS). Others to provide sites for subsets.	ESA (Bojkov)	WGCV36	Open	
WGCV35-5	Have group discussion (Stensaas, Bojkov, Chander, von Bergen) to getting SCIAMACHY data over recommended test sites.	Stensaas, Bojkov, Chander, von Bergen	WGCV36	Open	

WGCV35-6	For LPV to cross-coordinate with the WG on climate. They have invited LPV to come to these meetings. There's a lot of cross-coordination happening and it would be nice to see more from the WG on climate.	LPV (Lead Joanne Nightingale and Gabriela Schaepman-Strub)	WGCV36	Open	This is also a Recommendation. See ACTION6 of meeting minutes.
WGCV35-7	Dong to address links between IVOS and MSSG sites. What are the current and future sites being reviewed by microwave and are they related to IVOS?	MSSG-Dong	WGCV36	Open	
WGCV35-8	Update and discuss the showcase for AC.	WGCV	WGCV36	Open	Coinciding Recommendation: Whether or not we should continue to develop a showcase for elevation. JPM clarified the showcase presented in Montreal. This is one of the things in the task that WGCV was delegated to do. We also need to discuss and develop implementation of WGISS (IN-02-C1-3 and 5). See ACTION8 of meeting minutes.
WGCV35-9	The appropriate people should be looking at pilots and showcases as they come out. Maybe WGCV can be defining what those fields are.	WGCV	WGCV36	Open	Recommendation or suggestion to think about a discussion in this area. See ACTION9 of meeting minutes.
WGCV35-10	To get more knowledge on how to get the right parameter, take information from test sites and share with the Team. From a test site perspective, WGCV has the first step.	WGCV	WGCV36	Open	Miura made the Recommendation for a definition requirements. See ACTION10 of meeting minutes.

WGCV35-11	With regard to test sites, cal/val portals, constellations, etc.: Find out what is out there and re-define from there.	WGCV	WGCV36	Open	Recommendation: Acquire a list of organizations that are cooperative. See ACTION11 of meeting minutes.
WGCV35-12	WGCV to contact Kerry Sawyer to find out how to start populating things on the CEOS calendar site.	WGCV Chair	WGCV36	Done/Complete	
WGCV35-13	WGCV to come up with a Recommendation and feedback to WGISS regarding DEMqis and QAlbedo.	WGCV	WGCV36	Open	
WGCV35-14	Document all the quality related activities, send out an e-mail to WGCV and WGISS and provide QA related activities to a POC, and create a list of information. (Stensaas will do for WGCV, and Miura for WGISS). Fox will provide the group with the e-mail POC for the QA4EO group. Fox and Stensaas will work on and e-mail that would work for both groups.	Stensaas, Miura, Fox	12/12/2012	Open	
WGCV35-15	WGCV teams should also suggest ideas of quality data/metadata fields for the key sensors and products. WGCV to work on common definitions of quality. Work together with WGISS on this and present to CEOS.	WGCV/WGISS	WGCV36	Open	
WGCV35-16	WGCV and WGISS chairs to send e-mails to document all quality-related activities regarding WGCV35-15, and data access to CEOS Test sites and tools	WGCV/WGISS	WGCV36	Open	

WGCV35-17	Brian Killough will take an action to talk to Tom Stone, and get requirements, and report back to the group regarding lunar calibration.	Brian Killough, NASA	WGCV36	Open	
WGCV35-18	Brian Killough will contact ESA (Alessandro) to see what lists they have to provide.	Brian Killough, NASA	WGCV36	Open	
WGCV35-19	WGCV to discuss lunar calibration modeling and components and address future requirements to get that.	WGCV	WGCV36	Open	
WGCV35-20	To Let INPE (through Leila) know that the info they have does not include proper (correct) names as related to header names for data collection sets for the LSI tool. John will also take it back to his group, as there are other names that need to be corrected.	INPE (Leila F.), John Faundeen of WGISS	WGCV36	Open	
WGCV35-21	WGCV to provide feedback to John Faundeen on Libya 4.	WGCV	WGCV36	Open	
WGCV35-22	Processes and efforts regarding cal/val portal and test sites to be deciphered, documented, and provided in an e-mail. Additionally, a regular reminder on this action should take place at least by every WGCV (every 8 months) or less.	WGCV	WGCV36 and ongoing LOE	Open	
WGCV35-23	All WGCV members look at portal and suggest changes/fixes to ESA. ESA has asked for this on a regular basis so we should provide our best effort.	WGCV	WGCV36	Open	
WGCV35-24	Fox and Chander to provide documentation associated with requirements for radiation gain sites for linkage and Recommendation to WGCV.	Nigel Fox, Gyanesh Chander	WGCV36	Open	

WGCV35-25	SAR to work with ISRO to help bring access to ISRO in situ information forward and available to CEOS, and provide ISRO information of CEOS ground and ocean sites and relevant information of other comparing sensors acquired over the CEOS CV sites.	SAR/Manfred Zink	WGCV36	Open	
WGCV35-26	Continue to work to establish this CEOS/WGCV/AUS partnership. The last two briefings we saw from AUS had much in them. Everyone was encouraged to provide feedback to the chair/vice chair on potential work we can do within the subgroups.	WGCV and AUS partners	WGCV36	Open	
WGCV35-27	ROSCOSOMOS to work w/IVOS. IVOS has put out a request for such.	ROSCOSMOS leads	WGCV36	Open	
WGCV35-28	WGCV to work with WG on Climate 1) To find out the exact components and support WG Climate is looking for from us. 2) To discuss the maturity matrix process of QA4EO as a guideline or maybe a showcase.	WGCV	WGCV36	Open	
WGCV35-29	Srivastava to look at SAR report and make Recommendations.	Satish Srivastava	by CEOS Plenary	Closed	
WGCV35-30	Stensaas and Srivastava will check the slides by Bojan and share any Recommendations with the group.	Stensaas and Srivastava	by CEOS Plenary	Closed	
WGCV35-31	LPV, IVOS, and TMSG to work with chair and vice chair to determine the fitness of QAlbedo as a showcase or recommended effort that needs to happen within CEOS	Leads Nightingale/Schaepman-Strub, Fox, and Muller	WGCV36	Open	

Attendees

Joint meeting of CEOS Working Groups
WGCV-35 and WGISS-34
Hyderabad, India
Sept 24-28, 2012

CONFIRMED PARTICIPANTS LIST

(In red are those unable to obtain visas)

Title	First	Last	Org/Country
Mr.	K N	Babu	ISRO, India
Dr.	Slawomir	Blonski	NOAA, USA
Dr.	Bojan	Bojkov	ESA ESRIN
Mr.	Michael	Burnett	NASA, USA
Dr.	Gyanesh	Chander	SGT, USGS/EROS, USA
Dr.	Wyn	Cudlip	UKSA
Dr.	VK	Dadhwal	ISRO, India
Mr.	Paval	Denisov	ROSCOSMOS, Russia
Dr.	PG	Diwakar	ISRO, India
Dr.	Xiaolong	Dong	NSSC-CSSAR, CAS, China
Mr.	Nitant	Dube	ISRO, India
Ms.	Yonsook	Enloe	JAXA, Japan
Dr.	John	Evans	NASA, USA
Mr.	John	Faundeen	USGS/EROS, USA
Dr.	Leila	Fonseca	INPE, Brazil
Dr.	Nigel	Fox	NPL, UK
Mr.	Einar	Herland	Norwegian Space Center
Dr.	Rajeev	Jaiswal	ISRO, India
Ms.	Carrie	Jucht	SGT, USGS/EROS, USA
Mr.	B	Kartikeyan	ISRO, India
Mr.	Atsushi	Kawai	JAXA, Japan
Mr.	Brian	Killough, Jr.	NASA, USA
Mr.	Yoshiyuki	Kudo	JAXA, Japan
Dr.	Kiran	Kumar	IRSO, India
Dr.	A Senthil	Kumar	ISRO, India
Professor	Nataliia	Kussul	NASU-NSAU
Ms.	Olga	Kussul	NASU-NSAU
Professor	Guoqing	Li,	NSSC-CSSAR, CAS, China
Dr.	Heguang	Liu	NSSC-CSSAR, CAS, China
Professor	Dingsheng	Liu	NSSC-CSSAR, CAS, China
Dr.	Tim	Malthus	CSIRO, AUS
Mr.	Andrew	Mitchell	NASA, USA

Ms.	Satoko	Miura	JAXA, Japan
Ms.	Karen L	Moe	NASA, USA
Mr.	Michael	Morahan	NASA, USA
Mr.	Richard	Moreno	CNES, France
Professor	Jan-Peter	Muller	University College, London
Mr.	Kevin	Murphy	NASA, USA
Dr.	Joanne	Nightingale	NASA, USA
Mr.	Samir	Pal,	ISRO, India
Ms.	Michelle	Piepgrass	NASA, USA
Mr.	Ron W.	Pietsch	CSA, Canada
Dr.	Hannes	Reuter	The Netherlands
Professor	Andrii	Shelestov	NASU-NSAU
Mr.	Artem	Shelestov	NASU-NSAU
Mr.	A K	Shukla	ISRO, India
Dr.	Sergii	Skakun	NASU-NSAU
Ms.	Santhi	Sree	ISRO, India
Dr.	Satish	Srivastava	CSA, Canada
Mr.	Gregory	Stensaas	USGS/EROS, USA
Mr.	Medhavy	Thankappan	GEOSCIENCE, Australia
Mr.	Pradeep	Thapliyal	ISRO, India
Mr.	Costas	Theophilos	CCRS, Canada
Dr.	Albrecht	von Bargaen	DLR, Germany
Professor	Lizhe	Wang	NSSC-CSSAR, CAS, China
Dr.	Zhenzhan	Wang	NSSC-CSSAR, CAS, China
Dr.	Jean-Luc	Widlowski	European Commission/JRC
Mr.	Martin	Yapur	NOAA, USA
Mr.	Yufeng	Zhang	CAST, China

Agenda

Joint meeting of the
**Working Group on Calibration and Validation
(WGCV)-35**
and the
**Working Group on Information Systems and Services
(WGISS)-34**
September 24-28, 2012
Hyderabad, India
Hosted by the Indian Space Research Organisation (ISRO)

AGENDA

Key:

Indicates joint meeting of WGCV-35 and WGISS-34

Indicates separate WGCV-35 Plenary Session

Indicates separate WGISS-34 Plenary Session

CEOS WGCV-35/WGISS-34

WGCV-35 Pre-Meeting Planning, Sunday, September 23rd 4:00-6:00 pm

Location: Hotel Premises (designated planning personnel, subgroup chairs, etc.)

4:00 pm	WGCV Planning
5:00 pm	QA4EO Implementation Plan
6:00 pm	<i>Adjourn</i>

WGISS-34 Pre-Meeting Planning, Sunday, September 23rd 5:00-6:00 pm

Location: Hotel Premises (designated personnel)

5:00 p.m.	WGISS Planning
6:00 p.m.	<i>Adjourn</i>

Day 1: Monday, September 24, 2012

8:00 am	Busses Leave for NRSC (all other days at 8:30)
9:00 am	<i>Registration/coffee</i>

Session 1: WGCV-35/WGISS-34 Joint Inaugural Session

Location: NRSC Auditorium

9:30 am	Welcome and Introductions	WGCV and WGISS Chairs Greg Stensaas and Satoko Miura
9:40 am	Adoption of Agenda(s)	WGCV/WGISS Chairs
9:50 am	Host Welcome and Logistics Information	Rajeev Jaiswal and Senthil Kumar, ISRO
10:00 am	Host Welcome Opening Address	Kiran Kumar, CEOS Chair VK Dadhwal, Director, NRSC PG Diwakar, ISRO HQ
10:30 am	<i>Break</i>	
10:50 am	Summary of SIT Meeting and the CEOS	Brian Killough for CEOS CEO
11:20 am	Summary of Previous Joint Meeting and Key WG Efforts	WGCV/WGISS Chairs
11:50 am	IN-02-01 Overview	Satoko Miura
12:20 pm	IN-02-01 QA4EO Implementation	Greg Stensaas
12:50 pm	Joint WG Interaction Requirements/Wrap up Session 1	All
1:00 pm	<i>Lunch</i>	

Session 2: WGCV-35 Plenary

(WGCV-35 and WGISS-34 **Joint Sessions** will reconvene on Wednesday)

Location: Hall 1

2:00 pm	Adoption of Minutes from WGCV-34	WGCV Chair and WGCV Secretariat
2:10 pm	Adoption of WGCV-35 Agenda	WGCV Chair and WGCV Secretariat
2:20 pm	Discussion of WGCV-35 Meeting Objectives	Stensaas
2:50 pm	WGCV Vice Chair Nomination and Election Process	Srivastava/Jucht
3:10 pm	Presentation by WGCV Nomination	von Bargaen
3:30 pm	Election	all
3:45 pm	<i>Break</i>	
4:00 pm	Election Results/Acceptance	Srivastava/Jucht/Newly Elected
4:15 pm	WGCV Chair Report	Stensaas

4:50 pm WGCV Actions Update

Jucht

5:10 pm Actions Reports/Discussion

All

5:20 pm Wrap up Session 2

Srivastava

5:30 pm *Adjourn*

Session 2: WGISS-34 Plenary

(WGCV-35 and WGISS-34 **Joint Sessions** will reconvene on Wednesday)

Location: Hall 2

2:00 pm Chair Report

Miura

2:30 pm SEO Data Policy Study, Status Report to
WGISS

Killough

3:15 pm 5-Year Plan

Cudlip

3:45 pm *Break*

4:00 pm 5-Year Plan, Continued

Cudlip

4:15 pm Future Meetings

Moreno

4:30 pm TBD

5:15 pm Minutes and Action Items Review

Pieppgrass

5:30 pm *Adjourn*

Day 2: Tuesday, September 25, 2012

8:30 am Busses leave for NRSC

9:00 am *Registration/coffee*

Session 3: WGCV-35 Plenary

Location: Hall 1

Agency Reports

9:30 am DLR von Bargaen

9:55 am ESA Bojkov

Subgroup Reports (include slide(s) on WG and VC interaction needs and specific slide on WGISS interaction requirements)

10:10 am ACSG Bojkov

(include AC – VC update/comments)

10:30 am *Break*

10:45 am IVOS Fox

11:10 am LPV Nightingale

11:35 am MSSG Dong

12:00 am TMSG Muller

12:25 pm Wrap-Up Session 3 Stensaas

1:00 pm *Lunch*

Session 3: WGISS-34 Plenary

Location: Hall 2

9:30 am WISP Yapur

10:00 am GA.4.Disasters project Moe/Skakun
Architecture Document status
Case Study Findings
Status and expected outcomes
from GEOSS AIP-5

10:30 am *Break*

10:45 am GA.4.Disasters project (continued) Moe/Skakun
Findings from the July ESA
forum on Understanding Risk
with Earth observation
Preliminary Recommendations
to CEOS regarding architecture
findings
Next steps

12:30 pm Water Portal Project

1:00 pm *Lunch*

Kawai

Session 4: WGCV-35 Plenary

Location: Hall 1

2:00 pm	SAR	Srivastava for Zink
2:25 pm	CEOS/GEO Task Overview	Stensaas
2:30 pm	Task Plan IN-02-C1_3&5	Stensaas
2:50 pm	Task Plan IN-02-C1_2	Fox
3:10 pm	Task Plan IN-02-C1_4	Goryl
3:30 pm	<i>Break</i>	
3:45 pm	Task Plan IN-02-C2_1	Muller
4:05 pm	QA4EO Way Forward	Stensaas/Fox
4:30 pm	WGCV Task Support Needs From CEOS	Srivastava
5:00 pm	Joint Meeting Preparation	Srivastava/All
5:15 pm	Wrap up Sessions 3 & 4	Stensaas
5:30 pm	<i>Adjourn</i>	

Session 4: WGISS-34 Plenary

Location: Hall 2

2:00 pm	Data Stewardship Interest Group	Faundeen
	Archive Environmental Data	
	Logger Network Update	
	Data Browse Statement	
	Browse Guidelines Document	Kudo
	<i>ESA Long-Term Data</i>	
	<i>Preservation (LTDP) Update</i>	Moreno
	New Topic Discussion	

2:30 pm	Virtual Constellations Interest Group LSI Update Forest Carbon Tracking (FCT) Global Forest Observations Initiatives (GFOI) Space Data Coordination Group (SDCG) Joint Experiment for Crop Assessment & Monitoring (JECAM) GEO Global Agricultural Monitoring (GEOGLAM)	Faundeen
3:30 pm	<i>Break</i>	
3:45 pm	Discussion on Joint Activities with WGCV	All
5:15 pm	Minutes and Action Items Review	Piepglass
5:30 pm	<i>Adjourn</i>	

Day 3: Wednesday, September 26, 2012

8:30 am Busses Leave for NRSC

9:00 am *Registration/Coffee*

Session 5: WGCV-35/WGISS-34 Joint Session

Location: NRSC Auditorium

9:30 am	Welcome	WGCV/WGISS Chairs
9:40 am	ISRO Host Presentation (WGISS)	Nitant Dube
10:00 am	ISRO Host Presentation (WGCV)	A Senthil Kumar
	QA4EO Resourcesat Cross-Comparison	
10:15 am	ISRO Host Presentation (WGCV)	B Kartikeyan
	Site Characterization for LSI, Lunar Cal	
10:30 am	ISRO Host Presentation (WGCV)	K N Babu/A K Shukla
	Ocean Buoy for Ocean Sensors	
10:45 am	ISRO Host Presentation (WGCV)	Pradeep Thapliyal
	Cross-Comparison of Met Sensors	
11:00 am	<i>Break</i>	
11:20 am	WGISS Joint Proposed Efforts	Satoko Miura
11:55 am	WGCV Joint Proposed Efforts	Greg Stensaas
12:30 pm	CWIC Tool Demonstration	Yonsook Enloe
1:00 pm	<i>Lunch</i>	

Session 6: WGCV-35/WGISS-34 Joint Session

Location: NRSC Auditorium (and Halls 1 & 2)

2:00 pm	Discussion of Current and Future Proposed Efforts	All
3:00 pm	Break up into facilitation groups for joint efforts: Include future plans and milestones	Greg Stensaas, Satoko Miura
3:40 pm	<i>Break</i>	
4:00 pm	COVE Tool Demonstration	Brian Killough
4:40 pm	Showcases Status (AC, FCT, Elevation)	Greg Stensaas
5:00 pm	Presentation and Discussion of Joint Efforts: Include best practices and how to identify key partners	Determined at 3:00 session
5:30 pm	Wrap up Sessions 5 & 6	Satoko Miura, Greg Stensaas
5:45 pm	<i>Adjourn</i>	

Day 4: Thursday, September 27, 2012

8:30 am Busses Leave for NRSC

9:00 am *Registration/Coffee*

Session 7: WGCV-35 Plenary

Location: Hall 1

Special Topics Reports:

9:30 am	COVE Requirement for/by WGCV	Killough/All
9:45 am	Website updates and Test site Discussion	Malthus
10:05 am	Revamped IVOS Instrument Site Concept	Fox/Chander
10:25 am	LSI Implementation	Faundeen
10:45 am	<i>Break</i>	

Agency Reports:

11:00 am	NOAA, USA	Blonski
11:20 am	CSA, Canada	Srivastava
11:40 am	CSIRO, Australia	Malthus
12:00 pm	GA, Australia	Thankappan
12:20 pm	INPE, Brazil	Fonseca
12:40 pm	ISRO, India	Samir/Kumar/Karthikeyan
1:00 pm	<i>Lunch</i>	

Session 7: WGISS-34 Plenary

Location: Hall 2

9:30 am	CWIC	Enloe Yapur Enloe
9:55 am	CWIC Report Integration with GCI Reviewing hierarchical search – Directory/Inventory General Status	
10:20 am	CWIC-Start status and future work How to narrow list of datasets from IDN	Mitchell
10:45 am	<i>Break</i>	
11:00 am	LSI Portal Demo & Report	Faundeen

11:20 am	GHRST CWIC Partner
11:40 am	CCRS Portal and Data Partner Status
12:00 pm	JAXA Status & Experiences
12:10 pm	AOE Status & Experiences
12:20 pm	The New CLASS API
12:40 pm	CWIC Doc Builder Demo
1:00 pm	<i>Lunch</i>

Yapur for Casey
Theophilos
Kudo
Li
Yapur
Morahan

Session 8: WGCV-35 Plenary

Location: Hall 1

Agency Reports, continued:

2:00 pm	AOE, CAS	Li
2:20 pm	JRC, EC	Widlowski
2:40 pm	NASA, USA	Killough
3:00 pm	NSSC, China	Dong
3:20 pm.	Norwegian Space Center	Herland
3:40 pm	<i>Break</i>	
4:00 pm	ROSCOSMOS, Russia	Denisov
4:20 pm	UKSA, UK	Fox or Muller
4:40 pm	USGS, USA	Chander
5:00 pm	WUR/Netherlands	Reuter
5:20 pm	Wrap up Sessions 7 & 8	Stensaas
5:30 pm	<i>Adjourn</i>	

Session 8: WGISS-34 Plenary

Location: Hall 2

2:00 pm	Outreach/Closing Remarks	Yapur
2:10 pm	IDN	Morahan
	Metadata Web Service (MWS)	
	Keyword Management System	
	(KMS) Web Service	
	New IDN Development	
	IDN Metrics	

2:40 pm	Technology Exploration User Registration and Authentication Data Access Methodologies (i.e. OPeNDAP, WMS) Reference Architecture GRID Infrastructure Agency Topics of Interest	Mitchell
3:40 pm	<i>Break</i> <u>Agency Reports</u>	
4:00 pm	JAXA	Kawai
4:15 pm	NASA	Mitchell
4:30 pm	GSDI Liaison	Remetey
4:45 pm	5-Year Plan Discussion	Cudlip
5:15 pm	Minutes and Action Items Review	Pieppgrass
5:30 pm	<i>Adjourn</i>	

Day 5: Friday, September 28, 2012

8:30 am Busses Leave for NRSC

9:00 am *Coffee*

Session 9: WGCV-35/WGISS-34 Joint Session

Location: Auditorium

9:30 am	Discussion of Joint Task Efforts	Satoko Miura Greg Stensaas
10:00 am	WGCV/WGISS Joint Recommendations to CEOS and GEO	WGCV/WGISS Chairs/All
10:30 am	Closing of WGCV-35/WGISS-34 Joint Session	WGCV/WGISS Chairs
11:00 am	<i>Break</i>	

Session 10: WGCV-35 Plenary

Location: Hall 1

11:30 am	WGCV Work Plan	Srivastava
12:00 pm	Update WG and VC Interaction	Stensaas
12:30 pm	LSI	Faundeen
12:45 pm	AC	Bojkov/von Bargaen/Lambert
1:00 pm	<i>Lunch</i>	

Session 10: WGISS-34 Plenary

Location: Hall 2

11:15 am	WGISS Summary	Miura
12:00 pm	Action Items Status	Piepgrass
12:30 pm	Plenary direction to Subgroups, Concluding Remarks	Miura
1:00 pm	<i>Adjourn/Lunch</i>	

Session 11: WGCV-35 Plenary

Location: Hall 1

2:00 pm	Climate	Lecomte
2:15 pm	OCR	Johnson
2:30 pm	SST	Fox for Llewellyn-Jones
2:45 pm	OSVW/OST	Dong
3:00 pm	<i>Break</i>	
3:15 pm	GCOS actions & Climate Contributions	NOAA/Blonski

3:35 pm

GSICS Update and WGCV Interaction

3:55 pm

WGCV-36 (China) Logistics and Agenda

4:15 pm

Hand-over of chair and vice-chair

4:30 pm

Closing Session of WGCV-35

4:45 pm

Adjourn

NOAA/Blonski

Srivastava

Stensaas/Srivastava

Srivastava