34th Plenary Meeting of the Committee on Earth Observation Satellites (CEOS) Working Group on Calibration and Validation (WGCV)

February 6-10, 2012

Hosted by the

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in collaboration with the
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I: Monday 6 February 2012

Pre-meeting Planning and Discussions

(WGCV chair, vice-chair, subgroup chairs, subgroup vice-chairs, & secretariat)

Present:
Tim Stryker, U. S. Geological Survey (USGS)/CEOS Chief Executive Officer (CEO)
Gyanesh Chander, SGT, USGS Earth Resources Observation and Science (EROS) Center
Satish Srivastava, Canadian Space Agency (CSA)
Joanne Nightingale, NASA Goddard Space Flight Center (GSFC)
Nigel Fox, UK National Physical Laboratory (NPL)
Carrie Jucht, SGT, Contractor to USGS/EROS
Xiaolong Dong, National Space Centre, Chinese Academy of Science (CAS)
Gregory Stensaas, WGCV Chair, USGS/EROS
Jean-Christopher Lambert, Belgium BELSPO-BIRA-IASB

Organizational structural breakdown, and plans for the week:
Stensaas shared the pre-planning slides for WGCV, presented the organizational chart showing CEOS infrastructure and breakdown. He informed to the group that NASA is now the CEOS Strategic Implementation Team (SIT) chair with a vacant position for vice SIT Chair. A new Virtual Constellation (VC) group entitle Sea Surface Temperature (SST) has been formed. The Working Group on Data and Democracy (WGDD) will focus on training, research and education, and having the data more readily available. Stensaas, stressed that one of the goals out of this WGCV34 meeting is to get more Australians involved in CEOS and GEO tasks. He also pointed out that the next WGCV meeting (Plenary 35) is in Hyderabad, India at the National Remote Sensing Center (NRSC), and will be held jointly with the CEOS Working Group on Information Systems and Services (WGISS).

Stensaas briefed everyone on the SIT 26 meeting that was held in Frascati, Italy, May 24-25, 2011, and introduced the Lucca statement from the CEOS Plenary meeting. At SIT 27. Scheduled to be held at the Scripps Institution of Oceanography, University of California, San Diego, in La Jolla, California from March 26-28, 2011, WGCV is due to present on the cost and resources of instrumentation test sites. They are looking for this kind of information for the rest of the test sites as well. Further discussion continued on how to accomplish this and/or have a plan on how to get this information to present by March 2012.

Stryker shared that the self-study initial report was released as just a first step, out of which 14 recommendations came. The self-study team will prioritize these. One of the priorities is the organization and interrelations between the constellations and what they are trying to accomplish. Discussion ensued regarding how to get these things accomplished and have the resources for such.

The group discussed that CEOS is an informal coordination group. There is no physical entity that is (or holds) the secretariat duties. It was also stated that with busy schedules and limited resources to accomplish the current actions, the members cannot host the much needed CEOS campaigns without financial funding behind it. It was suggested to look at other governments that are getting things done without treaties.

The group emphasised that WGCV needs to provided ideas and recommendations for SIT 27. There is a new Group on Earth Observations (GEO) work plan for 2102-2015 and the WGCV related tasks are

rolled into a new infrastructure task. In addition, there is a new CEOS work plan and WGCV actions in support of this plan should be documented in the plan. Essential Climate Variables (ECV) is of importance to more than just one group from many different perspectives.

Stensaas mentioned that one of the goals for this meeting is to remap our actions for the CEOS actions meeting next week. Stryker, CEOS CEO, spoke of the new GEO work plan and CEOS work plan, and how they relate to WGCV, and he discussed that at the actions meeting next week WGCV information will have to be updated. Stryker hopes to have a good discussion this week and hence the reason for the data call that went out.

Key elements and goals for Tuesday's meeting:

- The five-year work plan: The plan should be an instrument for CEOS to look at.
- A letter went out to each CEOS major principle and their technical POCs doing cal/val for WGCV. CEOS SEC will try to work this issue.
- Discuss the key areas and relevance for WGCV and sub-groups
- Review the International Organization for Standardization (ISO) -19159 and -19157 standards
- Update the previous GEO Work Plan DA tasks and map them into the new GEO Work Plan.

Srivastava, CSA, stated that long-term integration is a big push and important. What we as WGCV can support is what we mean by quality flags and how those things get tied into the metadata. Identifying all the elements of the secondary data, and long-term preservation, what things people need in the future to use, and the daily and explicitly, etc. were discussed as important. This is a common framework and small 2-year study. The accuracy and precision of today's sensors may be inadequate for addressing climate (for example) questions. Strategy is testing a philosophy about doing the analysis. A framework to encourage every bit of data for every sensor should be stored. It was mentioned that calibration of the sensor changes and it is important to document what was the calibration of that sensor at that point in time.

Constellations Support and Coordination:
Stryker shared alignment of WGCV to constellations and WG. Stensaas stated that the group should document and note our relationships so other groups can see how this works. WG on Climate (WGClimate) support should continue. The architecture for space-based climate monitoring and those relationships was shared. Pascal Lecomte, ESA has been asked to be the WG on Climate representative and work with WGCV. WGCV should make sure it has a representative at the upcoming meeting. Nightingale, NASA has agreed to attend and represent WGCV.

CEOS Showcases:
The CEOS Showcase Status' were shared and discussed, and the QA4EO workshop covered these and provided an update to them as well. This group needs to decide where it is going with these, and provide a recommendation for how to finalize and present them to CEOS and GEO. The future showcase examples will be documented as Quality Implementation Pilots (QIPs).

We are still looking for QA4EO support for the webpages and the secretariat. It is up to date currently, but will need some revisions and updates in the near future. A message was sent to the UK Space Agency (UKSA) representative with hopes that the UKSA will consider supporting this work.

ISO:
A letter has been sent to ISO, WGCV will be an official ISO member, and is the official POC for cal/val. Discussion ensued. The group responsible is the Technical Committee 211 (TC 211) for Geographic Information Standards (GIS) within ISO. WGCV needs to be aware that the people doing this have a geometric background in lieu of understanding the digital numbers. WGCV tried to incorporate a lot of information into the documents, but it was agreed they still need more work. We should have an ISO representative at WGCV meetings.

Vice Chair:
Our team will discuss the WGCV vice-chair later in the meeting, but we do not have an official nomination. The SIT Chair and CEOS chair from India are going to assist with promoting the importance of having that recommendation. Associated vice chair nomination processes and rules will be discussed at tomorrow's meeting.

GEO Work Plan Data Management (DA) Tasks:
Everyone must think about what is needed to resolve the GEO DA tasks and how they should be remapped. In addition, changes and comments to the CEOS work plan, and comments are encouraged. Stensaas shared the key items needed for planning and Strategic planning. Everyone was encouraged to be thinking these through to put forth suggestions and solutions.

CEOS Quality Assurance Framework for Earth Observation (QA4EO) planning

Afternoon participants in addition to the morning participants:
Tim Malthus, Australia/CSIRO
Einar-Arne Herland, Norwegian Space Center
Albrecht von Bargen, German Aerospace Center
Jan-Peter Muller, UK/University College London

Stensaas explained the QA4EO background, actions and timelines. WGCV is the co-lead of the task with Institute of Electrical and Electronics Engineers (IEEE) to implement the quality assurance structure for CEOS with GEO, and make it available in the 2012-2015 time frame. The development of a QA4EO plan was suggested at the October 2011 GEO Workshop, which should be presented to the GEO plenary. It is to be drafted by June, and finalized by September. WGCV did get a recommendation from GEO to do this at the previous workshop, but we have not established an approved process to do so. How can WGCV establish CEOS and GEO working groups and get things moving in the near-term? It was also recommended that there needs to be more QA4EO examples across the Societal Benefit Areas (SBA) and they need to be defined and called QA4EO Implementation Pilots (QIPs). WGCV needs to establish some of these tasks in the near future. CEOS needs a strong plan to do this implementation. Discussion ensued regarding QIPs versus Showcases terminology.

Stensaas presented more topics to discuss in this pre-meeting regarding QA4EO.

- QA4EO Workshop Objectives
    - Leaders and Champions for QA4EO
- Subgroup recommended papers, speakers, and thoughts
- Future QA4EO concept in GEO versus CEOS
- QA4EO Secretariat (still needed)
- How to engage groups regularly and establish regular work processes

Nigel Fox of UK NPL explained that with regard to using the label of the badge, QA4EO needs to be implemented for consistency and harmonization's sake. Official approval from GEO is still necessary. A strategic team and their components were shared. This group needs to discuss the co-chair from IEEE or someone else to help bring these things forward. The task lead is supposed to be driving the process. A new ESA POC is in place and may be a starting point of who to contact in lieu of Rob Koopman.

The proposed QA4EO Board for CEOS was discussed and it was recommended that the team have monthly or bi-monthly meetings/telecons. Stensaas shared the QA4EO tasks that need to be re-mapped, and how they are all related to QA4EO. The DA DA-09-01a_12 DOME-C task was discussed to create a new task that includes DOME-C and other test sites. If every six months we are to report on these tasks, this group could close them yearly, and then reopen under a new year's number. Alternatively, subtasks within these with a longer commitment were discussed. For members of GEO and CEOS, it is better to have tasks than not, and make them more specific to show the relationship to the work that we are doing.

WGCV needs to come up with some tasks this week that reflect where we want to go with our QA strategy. Tomorrow, our group will go through all the tasks and actions. Stensaas was keen on finding new tasks that WGCV should implement, and our group should think through the process from a WGCV perspective so it can move forward. In relationship to the GEOSS QA task, CEOS WGCV will continue to recommend and support cal/val test sites and associated processes:

- From an IVOS subgroup perspective, a majority of the sites are documented but need instrumentation support.
- The SAR subgroup has provided two test sites and two SAR transponders sites have been provided as well (four sites in total).

The follow-on to this task is (as said before) a more general header with infrastructure and subgroups identifying the characteristics or instrumentation of those sites, and actions needed to flow that process through to make them long-term sites. Changing in funding by individual countries complicates this process. Each subgroup will be different.

Stensaas needs to be able to bring forward QA4EO actions. What if there is something the subgroup(s) need to work on? Make a process available (for example), write the task in a simple task structure now, and we can always add task components later. It is better received by the community if you put them in the work plan up front. Feedback will be important from everyone regarding the atmospheric composition tasks, and there are many issues on the table for QA4EO as well. WGCV has a perfect opportunity to move these things forward with our new work plan. The CEOS management and current infrastructure is in agreement with helping us move these things forward. The self-study also proved we need to be more interactive with groups. Please consider these things for the next several days of meetings.

QA4EO session closed, and end of pre-planning meeting

Australian Delegation and CEOS Delegation

(Notes for the following round-table discussion are provided by Tim Malthus, CSIRO).

Australian Cal-Val round table discussion - Monday 3-5pm

Meeting at 3:00pm, Board Room, Custom House, Brisbane
Chaired by Anthony Rea, Bureau of Meteorology

12 people present [Anthony Rea, Stuart Phinn, Tim Malthus, Gregory Stensaas (WGCV Chair), Tim Stryker (CEOS Executive Officer), Albrecht von Bargen, Nigel Fox, Jean-Christopher Lambert, Joanne Nightingale, Gyanesh Chander, Satish Srivastava, Xiaolong Dong]

Rea provided an introduction of the Australian and Bureau of Meteorology (BOM) context. Strategic infrastructure plan - idea behind it outlined. Covering ground stations, etc., but more importantly cal-val activities. Seeking opinions what an Australian investment in cal-val would look like. This needs better coordination, reducing duplication, and clarity on what needs to be supported by the Australian Government.

Stensaas highlighted the need for further cal-val test sites for cross calibration of sensors and for establishing accuracies of products (e.g. Landsat, Sentinel, and similar missions producing similar products).

Fox said there is a catalogue of potential calibration test sites. There are currently eight instrumented test sites, and six stable desert test sites (reasonably invariable in time) that have been identified. Ideally, 10 instrumented sites covering the globe would be desirable. Dome C is the only southern hemisphere test site, but due to its latitude, it is not always accessible and can be only imaged three months a year. Research is only just beginning on the measurement of these sites in an autonomous way. The plan is for a networked subset of sites to use as the reference plane for normalization, validation, and bias correction. There are certainly parts of the Australian desert, sufficiently accessible and stable that could be used. It would be both timely and opportune if Australia could contribute to this, for calibration of optical sensors, but also for Land Surface Temperature (LST) i.e. covering a range of activities (wavelength ranges). This would certainly get Australia a very high profile and further possibilities to do research. The country certainly has the expertise that is able to contribute in this area. Plus it can learn from best practices established via CEOS. The benefit would be both ways. It would not fundamentally require enormous costs; maintenance of autonomous instrumentation is not an enormous cost but would be a big contributor to the international community.

Phinn: outlined the relevant emerging infrastructure networks, TERN and IMOS. TERN AusCover is developing cal-val approaches to make data available in Australia and internationally, looking at what state governments are doing (e.g. Queensland (QLD)). TERN is about coordinating the low-level output that has gone on previously and has for the first time linked the states with federal agencies to share information and data. The 2008-09 decadal plan for EO in Australia included a recommendation for cal-val and to link it up internationally. CEOS makes the link to pull it together.

Fox: the key for CEOS is the need one or two further sites, but do not want a lot. If a lot then there is the risk they will not be maintained (from previous experience). Find a good site that will be instrumented and will be maintained. He would rather that it is one site that is optimum in terms of accessibility, but do not go for too many - otherwise it will not happen.

Q. Can we have one site that meets a number of uses?

Fox: Vegetated sites will not be useful for a radiometric gain calibration. But could have one bright site for LST and optical (i.e. as emitter and a reflector). Could also have some atmospheric characterisation. There may be sense to have other atmospheric composition measurements on the same site (i.e. more than just aerosols). This would not be that costly conceptually; the effort is to get there in the first place. The ability to maintain it long-term is important.

Phinn: long-term path is the 'critical sell'. Highlights supersites in TERN AusCover. Building continuity across missions. Sites for stability monitoring are mostly desert-based. Other candidate sites in Australia are being used but have not been promoted sufficiently. The TERN AusCover User Reference Group is setting up of formal links to feed into this. Gave more of TERN background and highlighted the need for more communication and linkage.

Fox/Stensaas: highlights CEOS coordination difficulties - struggles with being able to get the data and have it available to others to use on a regular basis. A lot of times data collection efforts/data not easily pushed to others who need it (sometimes due to data restrictions, etc.). [Highlights some lack of coordination here, internationally]. There is also a similar potential risk to Australia here, but also an example of where Australia could show the world, which could be used to shame others into producing that data for the community. CEOS is looking for a common operational infrastructure, but that is in development. Australia could do a lot here to lead that process. The actual amounts of data are not huge (only need relatively small amounts but of high quality). Similarly, those collecting the imagery over those sites should also be contributing their data.

Stensaas: CEOS has not got to the point where each data provider pushes data from the cal-val sites up for access by all. An Australian example would be a prime example to show how it could work. His suggestion is to identify sites that do not set up a conflict of interest as part of the site selection process. For example, military sites sometimes limit both physical access and data access.

Stryker: Australia has been a leader in global change and in United Nations collaborative initiative on Reducing Emissions from Deforestation and forest Degradation (UN REDD) initiatives, and in turning observations into information, e.g. for climate variables. Cal-val plays a key role. CEOS is developing the protocols to help design, implement and maintain the infrastructure to both calibrate and validate the climate variables.

Challenges are with working with multiple groups, agencies, industrial partners, but involved around sharing. Highlights example of 2-way flow. DigitalGlobe WV2 and value of additional bands. Gaps in Australia in imaging radar - need to strengthen investment in this area, particularly for northern Australia. Instrumented sites of value also for vegetated sites.

Rea: There is a need to consider the future use/value of the cal/val data that might be collected in the process. Also consideration of the need for thermal data, in the Australian context. What are the real science requirements for the different wavelengths of data? Should vegetated sites also be instrumented for both thermal and radar, as well as LPV?

Nightingale: Validation for different instruments is probably quite useful and is lacking. E.g. for carbon tracking there is a need for data that helps understand both biomass and structure of the vegetation [and thus multiwavelength approaches needed].

Long-term continuity is the real challenge, i.e. in understanding both spatial and temporal variability. There are no sites that address this. The biggest challenge is the long-term, which is difficult to implement in research institutions, but is an attitude of space agencies. It needs a similar approach from an operational agency to implement it. It is a challenge of getting this point home to policy makers. The MODIS validation program was highlighted as a good example, but subsequent missions are leveraging off MODIS validation data sets and not contributing to the continuation of new validation measurements.

Rea: Atmospheric composition - what measurements should be made?

Answer: trace gases, CO2, AERONET, aerosols, flux site networks. Climate reference network, surface radiance network. Reference climate stations (Canada). ARN sites (NASA funded). Value from a CEOS perspective. Used for albedo validation. Incorporation into vegetation test sites would be of value. NEON - 20 bioregions being monitored, cal-val test sites being set up for this.

Lambert: Ozone monitoring network in Australia is a highly valuable one. It is worth maintaining. [Is being used for developing] methods and tools to make the link between instrument measurements and satellites. Mentions Fourier Transform Infrared spectroscopy/spectrometry (FTIR) instrument pool at University of Wollongong - highlights that there is nothing else existing at these latitudes. Spoke of NIWA in NZ struggling to maintain their measurements and looking to reduce operations. It is thus worth considering NZ collaboration in any expanded cal-val plan.

Discussions on oceans, altimetry, ocean optical properties (and SST?). Very valid requirements. Was recognized that Australia was active in SST (Ian Barton). Ocean surface topography, ocean surface vector.

Stensaas: GEO work plan and CEOS work plans highlight key priorities for the next three years. QA4EO documentation highlights establishing reference test sites and products and desired end-points.

Meeting closed at 4:15. Rea thanked CEOS delegates for their valuable contributions to the discussion.

End of Australian cal/val round-table discussion

II: Tuesday 7 February 2012

Introduction & adoption of agenda (Stensaas)

Stensaas started the WGCV meeting and the agenda was adopted via Roberts Rules of order.

Everyone introduced himself or herself. See list of attendees. Stensaas, WGCV Chair, presented the host, Alex Held, CSIRO, with a gift [paperweight with a Landsat scene] from USGS and CEOS. Everyone was asked to please sign the "Thank You Card" for Marie-Claire Greening, expressing our gratitude for all her work as the past Secretariat!

CSIRO host welcome and logistics (Held)

The welcome was provided by Alex Held, AUS/CSIRO, who introduced all the Australian representatives. He thanked Rowena for all her organizational efforts in getting this venue together. Stuart Phinn from the University of Queensland also provided a welcome.

CEOS CEO (Stryker)

Tim Stryker, USGS, presented key visions of CEOS. CEOS is primarily a voluntary activity with many members worldwide. He explained primary objectives of CEOS, the subgroups, and the organizational structure. The CEOS work plan was mentioned as crucial to desired outcomes. Key stakeholders are the GEO, Communities of Practice (COP), United Nations Framework Convention on Climate Change (UNFCCC), Subsidiary Body for Scientific and Technological Advice (SBSTA), and G8/20 (see Acronyms Appendix). The new GEO points of contact who are replacing Rob Koopman were named as Espen Volden and Humbulani Mudau. The GEO work plan is in fact adopted by the 2011 plenary; however, there is room to add more to this within the task components. The WGCV needs to close out some tasks as well. The high-level work plan is written, but some details need to be written for the action tracking. The action meeting will take place next week as well.

The main objectives of support by WGCV to CEOS are:

- Coordination of instrument calibration/data validation
- Alignment with top priorities of GEO and CEOS
    - Connections with/Support to GEO and CEOS Work Plans
    - QA4EO
    - Virtual Constellation implementation
        - Enhanced WG/VC coordination (CEOS Self-Study/SIT-27)
    - GEOSS Common Infrastructure (WGISS interfaces)
    - FCDR development
    - Support to major CEOS-coordinated data initiatives (GFOI, JECAM, Geohazard Supersites), [GEO-GLAM, Water Cycle, CTF outputs]
- 2011 CEOS Implementation Plan Close-out and Actions Disposition

Chair's Report (Stensaas)

Stensaas, USGS/EROS, shared the Chair's report and the self-study result. Conclusions of the self-study included better communication, so all are encouraged to bring forward their areas of concern or ideas. From the WGCV perspective, please share these issues with the chair and vice chair.

Also from the WGCV perspective, we need to figure out how this group is going to better interact with one another (per the organization chart). Stensaas shared the subgroups of WGCV and their chairs, and thanked them for their work. WGCV needs to continue to encourage the relationships with all those involved from other countries. Nominations for vice-chair were discussed, along with the logistics to make this happen, and the directives from the work plan on how to establish that. Please provide any nominations as soon as possible. History and accomplishments since May 2011 were explained.

Having appropriate POCs for WGCV members by all other CEOS groups is crucial. Stensaas explained GEO Task DA-09-01a and potential remapping of these efforts. GEO tasks related to QA4EO were explained. There was a successful QA4EO workshop in October, and the minutes and details are available. The CEOS showcases were started in Montréal. Stensaas shared that the Subgroup recommendations that were started previously are moving forward. It is also crucial to receive support from SEC/SIT.

2012-2015 CEOS and GEO Work Plans (Stensaas)

Stensaas discussed the CEOS/GEO work plans more in-depth. Regarding draft version V.0.1 for CEOS, provide your comments by the end of this week. A couple key points are the expected outcomes, many of which are highly tied to refinement and architecture, and the task related to the observation initiative (QA4EO included).

Stensaas explained the resources and responsibilities of the different activities and who the main contributors are. The table on page 11 CEOS work plan is very useful. Please provide comments or input to Stryker. The CEOS Self-Study final report was shared. It was revealed that the communication process has been made difficult due to growth of many subgroups since the 2004 period. **Jucht** will post this self-study report as well as the annex as soon as possible. Key recommendations are encouraged to review.

The GEO Work plan was shared. Please do a scan of the table of contents and pull up key areas that are important to us. This document is highlighted to identify CEOS leadership roles, and it is in the process of dialogue, in terms of support from various areas. In addition, other areas of additional contribution need to be provided. This group will be closing out our analysing the actions from 2011, and adoption of areas of contribution where CEOS agencies would like to get involved. GEO has tracking of various tasks. The online system will be updated next week. If you are the action POC, you have privileges to edit on line.

Action items (Jucht)

Actions were updated on the PPT per live discussion. Please link to the website to see those updates.

- Action Items 508KB
  - WGCV CEOS_SIT_SEC Actions 171KB
  - WGCV GEO Actions 281KB
  - WGCV Past Plenary Actions 242KB
  - WGCV Present 34th Plenary Actions 210KB

WGCV's 5-year plan, mission statement, group objectives and membership (Stensaas)

It was requested that everyone should study the work plan and provide feedback as soon as possible. Discussion regarding membership ensued. It was suggested to change the verbiage from "membership" to "participants. "

Action (WGCV34-7): **WGCV** to define appropriate way of identifying member vs. participants, and incorporate that definition into the work plan.

No objections to the work plan were disclosed, other than by Nigel. It seems there is some communication missing as to what we do or where we put information on the cal/val portal.

Action (WGCV34-8): **WGCV** to include a communications section in the WP as to what we do and how the team is going to present this to SIT.

Interactions with Constellations and other CEOS Working Groups (Stensaas)

Working discussion among participants present. Stensaas explained the organization and the various constellation groups. Stensaas can continue to be the POC on behalf of WGCV to other constellations. For the Ocean Color Radiometry, Carol Johnson, NIST is the POC, and the ACWG has a good representation on the atmospheric side. Other POCs need to be better defined.
Action (WGCV34-9): **Dong** (China) took an action to find a POC for the MSSG to ensure we have permanent linkage. Please include OSVW and OST Constellations.

POCs and associate chairs and subgroups should be identified. The recommendation came forth to make the subgroup chairs the POCs. It was recommended that the WGCV chair and vice chair are responsible for communication on behalf of group to/from all working groups. There is a key POC for WGISS; it is up to JAXA to define this communication within the CEOS as well as GEO infrastructure. **Everyone**, send an e-mail in to Stensaas, Carrie and Satish so we can create a matrix to be presented back to the self-study group. There are many components that WGCV is participating in, and this group should try to capture those. WGCV is just trying to encourage a good work plan that CEOS and other constellations look at. Based on our expertise, how does WGCV tie in the work we are doing to the importance of all? There is a need to continually educate the CEOS as to what you can do for them. Our group needs to be our own communicators and promoters. Discussion ensued.

The goal is to promote our efforts, and identify POCs. WGCV needs to show management this as well. Discussion on defining this continued. POCs between all the groups will help support us, and making the 5-year plan available to all groups will assist as well.

Action (WGCV34-12): **WGCV subgroup chairs** to ask the virtual constellations to specify WGCV work requirements to constellation. Due March 20th, 2012.

Action (WGCV34-14): **WGCV subgroup chairs** to specify the highlights and issues related to working groups and constellations to WGCV POC and present at next WGCV Plenary 35.

Interactions with GSICS (Chander)

Gyanesh Chander, US, SGT/USGS/EROS, presented on the Global Space-based Inter-Calibration System (GSICS), which was put in place to ensure and provide accurate and consistent calibration between various instruments. Many agencies are part of this group. The scope, very large in nature, is to create an on-orbit calibration. There are two working groups, GRWG, GDWG (research and data). A summary of the different methods was shared, as well as the updated plan. The GSCIS website is very comprehensive summarizing the procedures and results. QA4EO is a large component and interaction between the

groups is imperative. The need for one clear document between the two groups showcasing best practices was emphasized.

The strength of WGCV is beneficial to GSICS and shared experiences are helpful. Free access in sensor information is imperative. Chander shared their special issue of the IEEE Transactions on Geoscience and Remote Sensing (TGRS) publication and highlighted the importance of inter-calibration between instruments.

Subgroup reports #1

Infrared & Visible Optical Sensors (IVOS) subgroup report (Fox)
Nigel Fox, UK/NPL, shared the IVOS mission, terms of reference, and its progress and follow-through thus far. The next IVOS meeting will be in May at the USGS EROS Center in Sioux Falls, SD. The vision is for Operational calibration service through the CEOS standard. IVOS should start to collect and make sure to circumvent the inter-comparisons between communities. The team needs to do some work of comparing different ways these methodologies and approaches might be implemented, and how they work compared against each other. This cross-comparison approach will assist in standardizing methodologies, and assist in understanding the need for comparison. Method 4 (of 5) was emphasised as relevant to concentrate on given limited personnel to do them all. IVOS is working on limiting the range of what it needs to do in order to make it plausible. Keeping a limited range of sub-elements and making sure of consistency is imperative. Much work on characterizing the reference standard IVOS test sites took place. Good results were received from the test sites (e.g. Tuz Golu). Different reflectance targets (e.g. artificial vs. natural) were compared. Similar consistencies were found regardless of target types.

Next, finalize analysis. Strategy is being implemented for long-term maintenance for climate recording. Nigel presented the best practices for Atmospheric Correction and the approach they are following. More agencies needed to participate. Also, the need for agencies to identify their points of contact so IVOS can communicate directly with the person responsible for the sensor for proper delivery to that community. Another technical workshop is planned for Spring 2013 with a focus on pre-launch and on-board calibration. The Tuz Golu project on atmospheric correction has provided superb best practices to emulate and pave our way forward to:

- Continue to move forward on previously discussed approaches
    - Radiative transfer code intercomparison
    - Comments on recommended input parameters
    - Comments on protocols for sensitivity analyses
    - Compile results of past work
    - Comments on recommended measurement approaches for vicarious calibration
- Update progress at next IVOS meeting

Microwave subgroup report (Dong)
Xiaolong Dong presented on the Microwave Sensors Subgroup (MSSG) and their mission and objectives. This is for high quality calibration and validation of microwave sensors for RS purposes. International cooperation, standardization of terminology, and forums for discussion are their objectives. He shared the characteristics of microwave sensors, and their recent requirements and challenges. Precision, accuracy, and stability are all taken into account. Climate applications of ocean wind vector was shared. Future direction and needs are community involvement. A platform for exchange and sharing of prelaunch

calibration standards/schemes between agencies is imperative. Pre-launch, in-orbit, and post-launch needs were identified, as well as priorities for passive and active sensors. MSSG focuses on requirements for climate and global change, cross-calibration/comparison requirements, and long-term stability/traceability requirement. Recent progress includes communication regarding scatterometer data quality control, reference target survey and data collection, in-orbit cal/cross cal MW radiometers, and radiometric standards of microwaves. Proposal and recommendations from the workshop include:

- Development of standard for passive microwave calibrator is necessary
- Prelaunch test and calibration requirements should be identified
- A database should be setup with participation of agencies with capability as cross-calibration and validation is necessary
- The community should identify some certain cold references, and warm references, and collect data, including data from satellite payloads and in-situ measurements
- Setup a working mechanism to coordinate the agencies with capability to participate
- Community should provide in-situ measurement data and participate in development of models

Climate and global change applications of data from microwave sensors impose calibration/validation requirements of microwave sensors with higher sensitivity, precision and stability, and cross-calibration requirements of microwave sensors flown on different spacecrafts and developed by different agencies. WGCV and MSSG can provide CAL/VAL support to CEOS virtual constellations and data application groups/communities by coordination of reference sites for both passive and active microwave sensors, and standardization of quality. Standardization of procedures, processes, production, identification, etc. are priorities. Participations of concerned agencies and organizations are crucial for assurance of data. Communication and cooperation with other interested groups and CEOS constellations are important. WGCV MSSG can provide a platform for this inter-group coordination.

Land Product Validation subgroup report (Nightingale)

Joanne Nightingale, US/NASA/GSFC, shared regarding the climate variable groups, the Land Product Validation (LPV) structure, focus groups, their roles in GEOSS, and objectives goals for all. The CEOS webpage is the main tool of communication. Their involvement with GEO is significant. Twelve of the 138 action items are directly related to land validation. Land Cover, Fire, Biophysical, Surface Radiation, Land Surface Temperature, Soil Moisture, Land surface Temperature and Emissivity, Land Surface Phenology and Snow/Ice are the main focus groups. LPV's role is to engage the community, organize topical workshops, expand collaborations globally, develop land product validation protocols, lead product inter-comparison activities, and define product error definitions for the climate modelling community.

As the team moves forward, it is necessary to continue promoting land validation in the GEOSS setting and work with all the other groups. It is recommended to continue developing protocols and working with cross-cultural groups. Contributing to the QA4EO protocols for data quality, and continuing to validate field sites and existing networks for international expansion is an on-going goal.

Country & agency reports #1

IASB/BIRA (Lambert)
Jean-Christopher Lambert, Belgian Institute for Space Aeronomy (IASB-BIRA), presented on IASB-BIRA and their mission/operations. Jean-Christopher shared the Belgian extensive international involvement. Highlights of their community practices include:

- Cross-cutting harmonisation of data quality management and system engineering across GMES Atmospheric Service projects
- Sustained effort to coordinate and carry the voice of the Atmospheric Composition (AC) community in the development of INSPIRE Implementing Rules
    - Interaction with INSPIRE Team at JRC and IR (Implementing Rules) drafting teams
    - Coordination of the response of atmospheric and GAS community to consultation and testing of INSPIRE Annexe III IRs on Data Specifications
    - Further coordination for ongoing IR developments (e.g. Metadata)
    - Detailed technical reports as part of GAS projects deliverables
- GEO QA4EO workshop at RAL-Space, October 2011, in which IASB-BIRA contributed to Atmosphere and Climate Change session:
    - "QA4EO and the remote sensing of atmospheric composition" by J.C. Lambert
    - "Quality and the GMES Atmospheric Service" by A. De Rudder

Again, communication and being the voice of the Atmospheric Composition and Change in the development of INSPIRE in imperative.

AOE/CAS (Ma)
Ling-Ling MA, Academy of Opto-Electronics (AOE), and the Chinese Academy of Sciences (CAS), shared a general view of flight campaigns, inflight calibration and performance assessment, and the work being done in the their lab lately. To provide a background, calibration and performance assessment of payload is key to remote sensing data quality and quantitative remote sensing application accuracy. Compared to payload development, calibration and performance assessment fall behind in China due to many reasons. The fast development of UAV technique provides opportunity since it possesses many advantages such as being safe, flexible, and repeatable. During 2009-2011, our project named "UAV-based Remote Sensing Payload Pre-launch Calibration and Validation System" has been carried out in order to establish practical workflow for calibration and validation of optical and SAR payload.

There are two Optical sensors to be assessed, which are developed by CAS. Flight experiment have been carried out to validate these sensors on three different occasions. With regard to inflight calibration and performance assessment, the four radiometric targets with very good homogeneous and Lambert characteristics have very stable spectral reflectance. Our team also carried out radiometric calibration. Spectral calibration accuracy is very important for the hyper-spectral sensor. The regular method for inflight Spectral calibration is by using atmospheric absorption line. It is necessary to assess the spectral shift at each detector unit.

Inflight calibration and performance assessment work for optical remote sensing sensors has been completed, and our team would like to accumulate experience for carrying out future cal/val work of Chinese remote sensing payloads. Cal/val work will continue on focus test sites and include measuring

and testing techniques, standard targets, supporting systems, measuring and testing quality standard, and application examples.

End of day one

III: Wednesday 8 February 2012

Country & agency reports #2

NOAA (Blonski)
Slawomir Blonski shared the continuity of the National Oceanic and Atmospheric Administration (NOAA) Polar Orbiting and Partnerships (NPP). The opening of the Visible Infrared Imager Radiometer Suite (VIIRS) nadir door on Nov. 21, 2011 ushered in a new generation of operational satellite imaging capability. This provides global observation of land, ocean, and atmosphere with high temporal resolution. He shared the Novel VIIRS spatial sampling characteristics. There is now new progress in Simultaneous Nadir Overpass (SNO) prediction and routine use for NPP. He also shared the NPP VIIRS channel sensitivity monitoring in the Antarctica. The Day Night Band (DNB) outperforms the Operational Line-scan System (OLS) on the Defence Meteorological Satellite Program (DMSP), and represents a new capability with NOAA's operational environmental satellites.

He shared an overview of the data products from VIIRS, and where and how to access this data. Prelaunch test data analysis and verification objectives and goals were shared, as well as the accomplishments of the Geostationary Operational Environmental Satellite – R Series (GOES-R) Calibration Working Group (CWG), which encompassed radiometric, spectral, and spatial technical oversight. The NPP has provided great success with regard to calibration and validation, both pre and post launch for NPP and GOES-R. NOAA scientists are leading post-launch Sensor Data Records (SDR) cal/val for all major NPP instruments. For up-to-date information, visit http://ncc.nesdis.noaa.gov.

Subgroup reports #2

Synthetic Aperture Radar (SAR) subgroup report (Zink)
Manfred Zink of the German Aerospace Center is the new chair for the SAR subgroup as of November. The SAR subgroup is comprised of more than 250 entries, from 30 countries, and 5-6 different agencies. He shared the mission and objectives of this WGCV SAR Subgroup. It is a great forum for international technical exchange, providing high quality SAR data from airborne and spaceborne systems through precision calibration in radiometry, phase and geometry, and validation of higher-level products. He shared the challenges of calibrating future SAR systems, and the strategies for overcoming those challenges. Their plans of action, in addition to hosting annual meetings, are to incorporate sophisticated calibration concepts and techniques, and identify and characterize cal/val reference sites.

The 19th CEOS SAR Cal/Val Workshop was held in Fairbanks, Alaska. Out of this came some recommendations to foresee a better fuel budget for deorbiting, more information on sensor calibration sites collected, and sharing of that information is important. Completeness of information is important (rather than harmonization of formats). A master structure (general guidelines should be published, and made available on the web. Annotation of absolute ranging measurements (atmospheric and ionospheric delay) shall be done. Geometric and radiometric terrain corrected products shall include annotation on how they were generated and which DEM was used. Publicising community software tools and reference data is imperative for testing purposes and to motivate software vendors.

Atmospheric Composition subgroup report (Lambert)
Jean-Christopher Lambert sent his condolences from Dr. Bojan R. Bojkov for not being able to be there. Jean-Christopher shared the Subgroup status, the support they provide to ACC, future coordination

(meeting) plans, harmonization and intercalibration with numerous sensors, ground-based networks, and their view on future Earth Explorers. Future validation needs were shared including analysis of needs, growing applications, new instrument concepts, better exploitation of data, etc. Challenges for Networks with regard to future of satellites such as continuity, new species and characteristics, peculiarities, etc. were shared. The status of networks and the expanding collaborations was disclosed.

He shared his DA-09-01a-15 action regarding QA4EO Showcase:

- Initially, showcase suggested on AQ
- Replaced by showcase on ozone to show the vital role of validation in the successful development and QA of a data product facing new challenges
- AQ (and other) status might be shown after, with appropriate disclaimers
- Successful Atmosphere and Climate Change session at GEO QA4EO Workshop (RAL, 10/2011), illustrations on ozone column and profile with perspectives on Montreal Protocol / AQ / ECV / FCDR

Update to WGCV 30-4 on Metadata-GEOMS:

- Generic Earth Observation Metadata Standard
- Optimised, homogenised version of AVDC/NDACC and NILU's HDF formats
- Finalized in March 2011 (Retscher et al.)
- Operational at AVDC and NDACC
- EVDC at NILU still uses previous metadata format HDF 4.1.3, migration to GEOMS upcoming
- Translation tools expected

CEOS 24-13/WGCV 31-3/WGCV 32-1Cal/Val Test Sites Dossier:

- Definition of "best test site" depends on:
    - The molecule, its variability and its range, its vertical profile
    - The intended use
    - The orbit of the satellite and the observation technique
    - Peculiarities of the retrieval
- Hazardous scientifically, delicate diplomatically, and damageable operationally, to provide a list of "minimum set of mandatory sites (applicable across all relevant sensor / thematic domains)"
- Strategy established:
    - NDACC and EARLINET sites (good range of geophysical states, species etc., commitment of PIs to perform QA activities for their own data)
    - Stations used in CSA/ESA/EUMETSAT/JAXA/NASA/NIES projects
    - AERONET and GAW stations having demonstrated interest in QA and validation
    - Other criteria TBD within ACSG
    - New: Evaluation of long-term reliability of ozone stations in SPARC SI2N

WGCV 32-2 Generic Comparison procedures to aid inter-comparison between products:

- Peer-reviewed papers available for every species
- Validation Requirement documents
- Formal Validation Protocols, from generic to specialized

- Product Validation Plans
- GECA

Terrain Mapping subgroup report (Muller)
Jan-Peter Muller, UK/UCL, shared on the CEOS WGCV Terrain Mapping Subgroup, their mission and objectives. They have one variable they deal with, but several systems. He shared recent results. The need for GEO Bathymetry was disclosed. Assessments on the accuracy were disclosed. The technical documentation is available on the web at http://pubs.usgs.gov/of/2011/1073.

Then he shared the GEO task DA-09-03d, Global DEM:

- Objectives are to:
  - Facilitate interoperability among Digital Elevation Model (DEM) data sets with the goal of producing a global, coordinated and integrated 30m DEM of the Earth's land surface and continental shelves
  - This DEM database should be embedded into a consistent, high accuracy, and long term stable geodetic reference frame for Earth observation.
- Planned activities include:
  - Successive open calls for validation of Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER) Global Digital Elevation Map (GDEM) quality (12/08, 9/11) and presentation of results through online proceedings of workshops, subsequent peer review journals.
  - Open display of ASTER GDEM quality through the CEOS-WGISS DEMqis (10/10).
  - Open display of errors and artifacts through a "Known Product Issues" web service (10/10).
  - Promotion of continental shelf bathymetry acquisition using high resolution TerraSAR-X
- 40 members involved in Task (UK, US, AU, DE, FR, IT, ES, JP, CN, KR, WMO, OGC)
- Contributes towards 6 of the 9 SBAs with Disaster monitoring most important
- Close-out activities planned:
  - Following discussions with ASTER PI, Mike Abrams, there is a plan to call for papers for a publication in 2012 similar to the one on Shuttle Radar Topography Mission (SRTM) in PERS (3/06)
  - A selected set of papers will be included in the ISPRS Congress to be held in Melbourne
  - Further investigations into the best possible method for bathymetric mapping continue to need to be made. Looking for a space agency to volunteer to support this (German Aerospace Center?)
  - Plan to update and open up DEMqis website as part of the QA4EO showcase along with tools for extracting data subsets and graphical plotting

The ASTER GEM Version 2 Improvements were then shared, and the protocol for Global DEM Validation including comparison accuracy, account for varying land cover, terrain conditions (etc.).

Special interest presentations/discussions #1

Cal/Val activities in the Svalbard Integrated Arctic Earth Observing System (SIOS) (Herland)
Einar-Arne shared where the SIOS area is located, what they want to achieve, and the relevance to CEOS and WGCV. He shared the extensive infrastructure in place at SIOS. Svalbard has the highest available data bandwidth in the High Arctic. The governance model, as well as the SIOS Knowledge centre and its components were shared. The SIOS preparatory project (PP) structure, its goals and coordination sources was disclosed. SIOS science has 11 key topics:

- Vertical coupling in the arctic atmosphere and coupling to space
- The Arctic lower atmosphere – boundary layer system: dynamical and
- radiation feedback processes
- Oceanic and sea ice
- Marine transport of energy, nutrients and pollution (horizontally, vertically and
- through the food chain)
- Glacier and ice cap mass balance and dynamics
- Greenhouse gas processes and feedbacks in the Arctic climate system
- Arctic permafrost, periglacial geomorphological processes including
- geohazards related to periglacial landscape development
- Isostasy and changes in Solid Earth's local and regional stress field
- Direct human impact on the Arctic System
- Inter-compartmental transition processes related to pollutants and impact of
- climate change
- Arctic ecosystem resilience to climate variability and change

The remote sensing strategy has several key objectives including:

- Developing a RS strategy covering satellite as well as near-surface activities
- The RS strategy will feed into all other platforms and the Knowledge Centre, and be made available through SIOS
- The strategy will enable SIOS and Svalbard to gain a leading role in providing quality controlled RS data for polar research
- SIOS will be ideally suited to validate and promote use of satellite and other RS products over land, sea, atmosphere (etc.) for monitoring the Arctic

The Airborne SAR/Interferometric Radar System (ASIRAS) pre-validation experiment, its aims and details were shared. Cooperation topics such as which cal/val needs can be fulfilled and which are most valuable; what is already available, what do we need to see implemented, and who are the space agency contacts? The Low Earth Orbiting (LEO) system is located close to SIOS, and could contribute to the needs over polar areas. It was suggested that this be a CEOS instrumentation site. This would be good for SVOS and other projects.

Country & agency reports #3

Roscosmos (Emelyanov)
Kirill Emelyanov of Roscosmos shared remotely (via WebEx) regarding Russian test sites, future test sites, and DOME C steps in progress. Regarding the photogrammetric test site in Moscow, deployment

of the radial test pattern and the execution of measurements on it are carried out jointly with Moscow State University of Geodesy and Cartography (MIIGAiK). The nearest future atmospheric test site is based on Kislovodsk High-Mountain Scientific Station of the Oboukhov Institute of Atmospheric Physics, Russian Academy of Sciences (Station 282 of WOUDC).

Our current Earth Observing (EO) mission is the Visible and Near Infra-Red (VNIR) Microwave sensor aboard the Meteor-M1. Future EO missions include VNIR Hyperspectral (Rsurs-P), VR (Kanopus-V), and VNIR Microwave (Meteor-M2). For more information, please visit www.federalspace.ru.

GEO task DA-09-01a action items/discussion

Task DA-09-01 & Action DA-09-01a_13: GEOSS Quality Assurance Strategy and QA4EO (Stensaas)
The Quality Assurance Framework for Earth Observation (QA4EO) will be implemented for GEOSS. QA4EO was initially conceptualized for the space community and this will now be expanded to ensure QA4EO's application to all EO disciplines within all SBA communities. The broadening of the scope for QA4EO necessitates a more generic approach and a wider remit to its applicability.

A wider focusing task team with new leadership and representation from all SBA communities is to be identified. This team will work towards an appropriate implementation and action plan to achieve a solid QA4EO approach for all members of GEOSS. The dedication of necessary resources (secretariat and facilitation support, website maintenance, etc.) is also part of this process.

Responsible: Gregory Stensaas (USGS) & Satish Srivastava (CSA)

Due: by SIT 27
Update #1: QA4EO, a major initiative of CEOS WGCV, was presented and endorsed at the 23rd CEOS Plenary and at GEO VI. The QA4EO team has been working with CGMS/GSICS and other partners to update QA4EO principles and guidelines and QA4EO was presented to both CEOS and CGMS plenaries in 2009. Version 4 of the QA4EO principles and guidelines were published in March 2010. For more information visit http://qa4eo.org/.

The goal of QA4EO is to understand how all data sets can work together, and how CEOS members can provide interoperability and use multiple data sets to develop integrated science products. The quality assurance indicators are to be used across various/multiple levels of products.
Update #2: The QA4EO team are seeking to establish a high-level coordination body within CEOS. The team will continue to promote QA4EO within CEOS and to assist in the development of domain-specific procedures within the WGCV subgroup communities. Work on the establishment of a GEO QA4EO board, responsible for QA4EO implementation across GEOSS, is also underway. It is envisaged that this board will comprise members from all the GEO Societal Benefit Areas (SBAs), with support from CEOS and others.

A QA4EO implementation workshop was held 18-20 October 2011 at RAL, UK. At that workshop a roadmap working towards QA4EO implementation across EO communities for GEOSS was discussed and established.
Update #3:

- This task will be closed and re-mapped to IN-02, C1
- QA4EO Secretariat and Web support still needed (Potential UKSA support available – discuss with SIT)
- Draft QA4EO Implementation Plan being written
- WGCV-34 Implementation discussion and way forward for QA4EO
- Present implementation information to GEO Action planning meeting and SIT-27

Action DA-09-01a_12: DOME-C Multi-sensor Experiment (Fox/Srivastava)
Use Dome-C as prototype and developing continued and on-going methodology to tie into the Cal/Val portal enhancement as a reference for Landnet sites.

- March 2011: Use Dome-C as prototype and developing continued and on-going methodology to tie into the cal/val portal enhancement as a reference for Landnet sites.
- March 2011: Evaluate prospect of BRDF at the Italian base in Antarctica as a test.
- March 2012: Establish detailed surface BRDF data of DOME-C to provide improved corrections for satellite view and illumination geometries.

Responsible: Nigel Fox (NPL) & Satish Srivastava (CSA)

Due: 31-Mar-12

Update #1: The Phase 2 study of the Dome C project has been completed. A journal paper has been submitted to the Canadian Journal of Remote Sensing (CJRS). The study shows that most of the 7 radiometers agreed well within 2% at the Dome C, although some instruments still have large biases. It is very promising that the Dome C site can be used as a community reference standard site for all space agencies.

Results of the DOME C comparisons (and others) were discussed as part of a CEOS IVOS workshop held in ISPRA Oct 2010. This workshop sought to develop a strategy for on-going and regular use of such a site as part of a global calibration system for CEOS.

2/10/12 (per Satish) The WGCV's SAR subgroup is investigating the potential use of the Dome C for the radiometric calibration of SAR. RADARSAT-2 SAR data at C-band is being routinely acquired and analyzed for radiometric characterization of the site. Compared to Amazon, backscatter level is low but consistency of measurements appears commensurate with (if not better than) Amazon data for incidence angle> 30.

Update #2: A unified single methodology that removes geometric and atmospheric biases was used to cross-compare several satellites with different bandwidths, overpass times, resolution, etc. over Dome C. Preliminary sensitivity analysis has concluded that it is essential to correct for Bidirectional Reflectance Distribution Function (BRDF) and for ozone absorption on a fine time and spectral scale. Further analyses have shown that it is reasonable to use a single temperature profile in atmospheric correction.

A series of QA4EO procedures for cross-comparison have been suggested. It had been found that most datasets provided during the campaign were too small for an adequate comparison and that over 5 datasets should be requested for each sensor, confined to the December to January window to minimize low solar elevation. It was also recommended that the Dome-C station be included in agencies' acquisition

planning to provide a means of locating a fixed target for site selection and surface variability testing.

An intercomparison campaign is planned over Dome C from December 2011 to January 2012.

2/10/12 (per Nigel Fox)

- An experiment to determine the localised small scale surface measurement of BRF of Snow near to DOME-c has been carried out in Dec 11/Jan 12 using the same goniometer as used at Tuz Golu (GRASS from NPL) led by the Italian Antarctic research group and Royal Holloway coll London, following on from a pilot exercise carried out at the Terranova base in 2010/11 which included the addition of JRC.
- To take full advantage of this CEOS agencies were made away and encouraged to collect imagery for comparison and cross-calibration as an enhanced continuance of the now on-going use of this landnet site for performance checking and international bias harmonisation as a prototype of a component of an "operational" GEO/CEOSS interoperability (bias removal) system. The results of the surface BRF together with locally measured atmospheric conditions (ozone, aerosols) will be provided to the community via the cal/val portal
- The action is now closed and will continue as part of a new task to establish operational architecture of a CEOS/GEO bias removal service.

Action DA-09-01a_14: Cal/Val test site dossier development over the WGCV subgroup domains (Stensaas/Goryl/Burini)
Develop a Cal/Val test site dossier over the WGCV subgroup domains to assist implementation of QA4EO for GEOSS

- Dec 2011: A list of CEOS-endorsed reference sites to be published by each WGCV subgroup domain
- Mar 2012: Create an automated intercalibration process for the test sites on the Cal/Val Portal

Responsible: Gregory Stensaas (USGS) & Phillippe Goryl (ESA), Satish Srivastava (CSA)

Due: 31-Mar-12

The WGCV and its subgroups are working on the definition of a list of CEOS endorsed reference sites. Once defined, the list will be presented to CEOS plenary and CEOS Member Agencies will be requested to collect and provide information of each site relevant to their sensor domain in order to facilitate interoperability, underpin internationally harmonized calibration/validation and embrace QA4EO within GEOSS. The list will also include recommended resource requirements for active agency support of site instrumentation and maintenance.

2/10/12 (per Nigel Fox): core (primary sub-set of) Sites have been identified by all sub-groups where appropriate, although this will continue to be improved for specific sensor characteristics e.g. (some smaller sites for high res optical sensors radiometric gain for IVOS). The sub-groups have initiated activities to establish a baseline scope and cost of ensuring that this type of infrastructure can be maintained into the future to meet the long term needs of the community particularly climate in a non-mission specific manner. This key task will be remapped into the new GEO program and detailed criteria on requirements for new key sites, (particularly in the southern hemisphere from countries such as Australia) that can be offered to complete the baseline needs will be made clear.

Action DA-09-01a_15: Pilot project to exemplify QA4EO implementation in Cal/Val activities (Goryl/Fox)
ESA is working with NPL on the preliminary implementation of QA4EO within its missions and in developing a strategy for future missions. The implications for QA4EO implementation will be assessed using the Sentinel missions as a case study. This case study should help others wishing to implement QA4EO with their missions. Reports from this study will form the basis for the deliverables for this task action.

Responsible: Phillipe Goryl and Nigel Fox
Due: 31-Dec-11
ESA is working with NPL on the preliminary implementation of QA4EO within its missions and in developing a strategy for future missions. The implications for QA4EO implementation will be assessed using the Sentinel missions as a case study. This case study should help others wishing to implement QA4EO with their missions. Reports from this study will form the basis for the deliverables for this task action.

ESA has also started a survey for assessing QA4EO consistency that will review the Cal/Val facilities (e.g., Boussole) and will review the Cal/Val protocols, guidelines, best practice, and current documentation for the Sentinels. QA4EO within the Long Term Data Preservation (LTDP) program is also being considered.

2/10/12 (per Nigel Fox): As above with the addition, this task will be broadened in the new geo plan to include contributions from other agencies on their activities to implement QA4EO.

Action DA-09-01a_16: Cal/Val Portal and post-launch test sites to assist implementation of QA4EO for GEOSS (Chander/Goryl/Burini)
Enhance the cal/val portal to support campaigns and WGCV test sites by:

- Building a prototype database for Landnet use (an equivalent of Mermaid for Land).
- Initiating an activity to automate a process for intercalibration of medium resolution sensor.

Note. These two activities include a link between the Landnet (instrumented for high-resolution sensors) and the Invariant not instrumented sites (for the medium resolution sensors).

Responsible: Gyanesh Chander (USGS) & Philippe Goryl (ESA)

Due: March 2012

Update #1: The online catalog is located at http://calval.cr.usgs.gov/sites_catalog_map.php and provides easy public access for the global community.

Land sites for radiometric gain and stability are well established and agencies have been requested to regularly observe them. Similarly, sites for Ocean color and Water temp (IR) have been endorsed. QA4EO Procedures have been established to aid their characterisation, description, and CEOS registration.

Work is now in progress to expand the catalogue to sites for other applications and other sensor domains and also to allow storage of associated satellite imagery. Agencies are requested to regularly observe these sites and to provide data to the database.

Update #2: CNES are working towards making available easy access to the SADE database of pseudo-invariant sites for cal/val purposes for CEOS members

ESA has been working on a new-look updated Cal/Val portal with increased functionality, including wikki based input and edit capability. The 8 instrumented Landnet sites are included in the portal (http://calvalportal.ceos.org/cvp/web/guest/ceos-landnet-sites). The Cal/Val portal supported the 2010 Tuz Golu and Ocean Color campaigns, and the Miami 2009 campaign.

Action DA-09-01a_17: QA4EO support services and tools (Stensaas)
Investigate options for QA4EO support services and tools, including support for the development of peer-reviewed lower-level guidelines through templates, structures and/or tools.

Responsible: Gregory Stensaas (USGS)

Due: 30-Mar-12
Update #1: The need for support services and tools was discussed at the QA4EO implementation workshop, held from 18-20 October 2011 at RAL, UK. The CEOS WGCV and its subgroups will also consider requirements and options within its meetings. The deliverables will be the minuted discussions and actions resulting from these two meetings.

Update #2:

- Work QA4EO Implementation definitions and implementations processes (WGISS/SEO)
- Continue working CEOS list of Cal/Val sites
- Continue to enhance processes of using Cal/Val test sites
- Description of instrumentation requirements for the sites
- Establish new process for CEOS Field Campaigns
- How do we project the quality and fitness of purpose into CEOS datasets (what process and tools are available or should be developed):
- Provide recommendations for tools to implement QA4EO in CEOS datasets; being reviewed by WGCV subgroups; needs WGISS input also
- Other tools/services proposals are needed by WGCV and WGISS under IN-02, C1
- CEOS Visualization Environment (COVE) Tool interactions and Updates (per Brian Killough)
    - The COVE tool will support QA4EO implementation primarily through its support of Cal-Val campaigns. The COVE team will ensure that all relevant mission-instrument combinations are part of the COVE database and that all Cal-Val test sites are available as KML file overlays for visualization of groundtrack coverage and calculation of coincidences. In addition, as a result of discussions at WGCV-34, the COVE team will investigate the inclusion of cloud data, detailed viewing geometry data, data ordering links, and overlays for ground stations, global DEM and GlobCover.

QA4EO

QA4EO Workshop Report (Stensaas)
Stensaas provided a quick synopsis of the QA4EO, its principles, background, and the update to the DA task. This will more than likely be re-mapped to the WGCV GEO Task. A GEO adhoc working group needs to be created.

The executive summary shows that it is important to have harmonised Quality information, CEOS data with traceable, uncertainty tied to quality indicators, better implementation process and examples, and a plan written to include workshop recommendation. A GEO meeting will be put into place to help define the implementation of a quality process. QA4EO is proposing a team for CEOS, and for GEO. Stensaas shared the actions and timelines that came out of the October workshop. QA4EO needs a working focus at all levels.

The planning meeting topics were shared, and it has been presented to GEOS for approval. The implementation time and how to incorporate timelines were shared. The GEO Secretariat experts have been tasked to contribute one dataset and associated authority per SBA to QA4EO implementation. Separate implementation at CEOS and GEO levels of QA4EO was suggested. CEOS implements the space segment QA4EO processes and supports the GEO QA4EO space segment components for the whole of GEOSS. WGCV acts as the POC for the CEOS QA4EO efforts. SIT/SEC has the action for QA4EO Web and Secretariat support. Overlaps in efforts/goals between QA4EO, QUAlity aware VIsualisation for the Global Earth Observation system of systems (GEOViQua) and the Information Quality - Federation of Earth Science Information Partners (ESIP IQ) cluster should be combined. What can WGCV do to move this train in CEOS and GEO? A finished copy of the minutes will be available on the website. Issues requiring QA4EO involvement were shared. Atmosphere and Climate Change is of interest to this group as well as biodiversity (see Minutes of QA4EO Workshop).

CEOS QA4EO Implementation Plan (Stensaas)
Stensaas shared the QA4EO implementation plan of strategy and work plan, and provided a background. The implementation will be broken out into various tasks. A strategy on how to move forward and implement guidelines is needed, and CEOS and GEO will look to WGCV to do that. Everyone, please study the Management and Authorising structure of GEO/QA4EO Matrix (Table) and shares any ideas for membership. It was suggested to define "entities" in a more generic way in order to promote better participation as an approach for the future. Discussion ensued with respect to biodiversity and its fit into CEOS vs. GEO as well as defining our support in terms of our tasks.

QA4EO roadmap, strategy, showcase planning and general discussion (Stensaas)

- QA4EO Team
    - Time spent on the implementation strategy and who is the authority to place as the CEOS Plenary, but their responsibilities were refined to say, "Requirements specifications and overall authority for developing a quality framework for implementation (as appropriate) guide by the CEOS members."
    - CEOS WGCV role/responsibility shared
    - QA4EO "Executive" management board needed defining. For now, the POCs are the chairs from all the working groups and subgroups putting efforts into the QA4EO component.
        - It was agreed that a GEO member should have representation. Also, appropriate cal/val membership was suggested
        - WGCVBDD chair or delegate was suggested
        - A GEO Advisory was suggested
        - WMO GSICS representation suggested
- QA4EO Tasks/Structure
    - Earth Data Sets Task Sheet was shared
    - GEO 2012-2015 WP Task list Matrix was shared

        - Make comments to, or put into task.
    - GEO Work Plan should have comments made to it also.
        - Concentrate on priority actions, especially as related to Cal/Val and WGISS.
- Defining the key QA4EO tasks and WGCV/subgroup tasks for the CEOS action planning tool
- Showcases
    - FCT
    - Atmospheric Composition
    - DEM
        - In terms of the QA4EO showcase for DEM, it has already been constructed in Montreal.

Subgroup processes discussion (Stensaas)

Stensaas facilitated discussion on the following:

- Relationships between working groups/subgroups and other constellations (spreadsheet, wg_vc interaction.xls). The POCs were updated and Stensaas has sent the file to all WGCV members.
- Subgroup input and key bullets related to working with Working Groups and constellations discussed and updated.

Country & agency reports #4

CSA (Srivastava)

Satish Srivastava shared the RADARSAT Program Missions (from 1-2), features, objectives, applications, and status. RADARSAT 1 has had 15 years of successful maintenance of the SAR radiometric accuracy. RADARSAT 2 is in its 5th year of operation. Satish shared the various beam products and image quality assurance. He highlighted the Science and Operations Applications Research (SOAR) program, which offers access to RDARSAT-2 data for research, testing, and enhanced capabilities, and is of interest to more than just Canada.

Satish showed the distribution sites for the Dome-C study, as well as the International Charter for "Space and Major Disasters. " The RADARSAT Constellation Mission (RCM) Key Mission Drivers are:

- Continuity of C-Band SAR for Operational Users
- Improved revisit over wide areas
- Responsive Ground Segment (tasking and latency)
- Smaller, more cost efficient satellite development
- Improved reliability (i.e. redundancy and scalability)
- Evolution to wider Operational use
- Government-owned and operated

RCM is three satellites with the capabilities of six, provides daily coverage and access (near real-time), and will gradually replace aging satellites. The many uses, applications, system descriptions and specifications were shared. International collaborations are imperative for broadest use, harmonization, commonality, etc. Satish also shared updates on various Scientific Satellite Missions (SCISAT) and programs.

End of day two

V: Thursday 9 February 2012

Special interest presentations/discussions #2

CEOS SEO Report on the COVE Tool for WGCV (Killough)
Via WebEx, Brian Killough gave a wonderful presentation and video of the COVE tool and its potential for all audience types. It is an efficient tool for visualization and to produce tabular output of acquisitions or coincidences (on the globe or output as excel). There are currently 65 missions, and 10 future missions. Disaster response is just one application of use, and consistency in cal/val for international campaigns saves the need for individual satellite forecasts and allows for better focus on research.

CEOS is using COVE to support many GEO projects. As a result, CEOS has begun a new Satellite Data Coordination Group (SDCG), and interest in COVE has grown internationally. New ideas for cloud data are being implemented, and the future is promising in terms of growth and expansion of this concept to many user communities.

COVE Video

Country & agency reports #4

USGS (Chander)
Chander gave an overview of the United States Geological Survey's (USGS) Earth Resources Observation and Science (EROS) Center. The Landsat history from 1-7 was shared. Chander shared regarding Landsat 5's current Traveling Wave Tube Amplifier (TWTA) failures, and the creative ways the Flight Operations Team (FOT) has been able to sustain data gathering. 2008 began web-enabled (free) data for users, and, as a result, the primary users of Landsat 7 (L7) data are quite extensive across many audiences. Chander relayed the calibration update, and primary distribution and applications of use for both L7 and L5, as well as the Global Land Survey (GLS) program and its distribution.

Partnerships are imperative to continued success. The Landsat Data Continuity Mission (LDCM) is a fine example of a successful partnership. NASA is responsible for the space and launch segments, and USGS is responsible for ground systems. LDCM has two sensors, the Operational Land Imager (OLI) and the Thermal Infrared Sensor (TIRS). Chander shared on their progress, and gave a spacecraft overview.

The Worldwide Test Sites for Sensor Characterization Catalog was shared, as well as the Pseudo-Invariant CEOS Reference Standard Test Sites for Calibration Stability Monitoring. The Remote Sensing Team (RST) at USGS/EROS is involved in multiple projects. Chander updated us on his involvement in the WGCV DA tasks.

In summary, the Landsat archive and open data policy has enabled growth and innovation in use and applications of land remote sensing data. The LDCM is scheduled to launch in January of 2013 carrying the OLI and TIRS sensors. Space Policy continues to place important emphasis on global land remote sensing data, and our new EROS Director, Frank Kelly, is the USGS Space Policy Advisor…a nice fit. Our goal is therefore to establish an operational Landsat program.

CNES (Henry)
Patrice Henry of the National Center for Space Studies (CNES) shared the Pleiades System, its main mission features and objectives, and system products derived from this. The Pleiades satellites are a newer concept compared to SPOT, and are designed for high agility, and high image quality.

The in-flight commissioning status, access to resources, and the civil channel operation were shared. With regard to calibration and validation, Patrice shared Modulation Transfer Frequency (MTF) characterization, geometric calibration, radiometric relative calibration, and SNR estimation methods. DOME C is one of their many calibration test sites. Patrice had several coinciding animations to share that are now located on the WGCV34 site.

Special interest presentations/discussions #3

TanDEM-X (Zink)
Manfred Zink presented TerraSAR-X-Add-on for Digital Elevation Measurements (TanDEM), its acquisition, and generation of global and local DEMs. Modes of acquisition are pursuit monostatic, bistatic, and alternating bistatic. Standards and Comparisons of DEM Resolutions (e.g. SRTM to TanDEM-X) were shown. The data acquisition plan from 2010 – 2014 was disclosed as well as the interferometric performance status for TanDEM-X.

Predicted and estimated relative height error over range information was shared. The steps of Interferometric processing are 1) precise determination of baseline, 2) radargrammetry (used to resolve ambiguity band) 3) Precise phase calibration, 4) final DEM adjustment, 5) mosaicking.

Animation of TDX-Splitscreen_schematisch_HD1-02 7.4MB

Country & agency reports #5

MIRS/CAS (Dong)
Xiaolong Dong shared regarding China's EO Satellite Missions since WGCV-33, progress and initial results of the HY-2 Satellite and of MiRS (Microwave Remote Sensing). International cooperations for the future were emphasised, mainly in the fields of applications of EO satellites for environmental and disaster monitoring, and global climate change/marine monitoring and forecasting.

From the Space Activities White Paper for China:

- China will improve its present meteorological, oceanic, and resource satellite series and its small satellites constellation for environmental and disaster monitoring and forecasting.
- It aims at developing and launching new-generation GEO meteorological satellites, stereo mapping satellites, radar satellites for environment and disaster monitoring, electromagnetic monitoring test satellites, and other new-type Earth observation satellites.
- It will work to make breakthroughs in key technologies for interferometric synthetic-aperture radar and gravitational field measurement satellites.
- It will initiate a high-resolution Earth observation system as an important scientific and technological project and establish on the whole a stable all-weather, 24-hour, multi-spectral, various-resolution Earth observation system.

Mr. Dong shared the new EO Satellite missions they are working with such as ZY-3, FY-2F, HY-2A, and their progress and initial results, as well as an overview on the Geostationary Interferometric Microwave Sounder (GIMS).

ESA (Burini)
Alessandro Burini shared The European Space Agency (ESA) EO missions such as ENVISAT, SMOS, Cryosat, and the Sentinels series. International collaborations (such as with NASA, NOAA, CNES, USGS) were emphasized.

The CEOS inter-calibration projects for ESA 09-12 objectives and tasks were shared. Alessandro shared the Generic Environment for Cal/Val Analysis (GECA), along with its objectives. Vicarious Calibration Systems for Optical Sensors (DIMITRI) is amongst their cal/val projects and activities. The CEOS Cal/Val Portal is the ESA response to CEOS needs of having a virtual POC for the cal/val community. Functionalities of the On Line Validation Exercise (OLIVE) was shared. ESA is doing much in terms of various communities' awareness of cal/val by hosting many workshops in the near future.

DLR (von Bargen)
Albrecht von Bargen of the German Aerospace Center (DLR) shared the many EO Missions with German Contributions. Hyperspectral activities with regard to quality assurance on all levels for DLR were shared. SCIAMACHY results and achievements regarding ENVISAT by its quality-working group were shared. It has a new end-to-end calibration model, uses on-ground characterization and in-flight calibration data, minimizes impact of scan angle dependent degradation, and planned implementation is for 2012. Albrecht shared the status of DLR's involvement with TerraSAR-X and TanDEM-X to include the following:

- Performance and calibration of the individual satellites within specification or better – "perfect twins"
- Stable operations in close formation
- TSX & TDX and the combined TerraSAR-X/TanDEM-X Ground Segment are performing remarkably well
- First global coverage completed
- Calibration of the bistatic interferometer successfully finished – operational processing since Aug-2011
- New TerraSAR-X modes and products are under investigation: TOPSAR, Wide ScanSAR, (etc.)

NPL (Fox)
Nigel shared the roles and vision of EO for the National Physical Laboratory (NPL). Due to budget constraints, their focus has been narrowed to three key strategic areas that are all very relevant to WGCV and its contributions:

- Environment, Earth Observation, Climate, Low carbon economy is identified as a priority
- Climate, GEO, GMES are all driving the need for improved QA and robust traceability: QA4EO, CEOS, WMO…
- "services" climate and other start to require "data quality" for commercialisation/discrimination

Nigel shared NPL's current EO specific activities, and emphasised its support if international partners, agencies, committees, and activities. Quality Assurance (hence QA4EO) is of great priority, as well as

academic development and partnerships through well-chosen mentorship programs, enabling the continuation of quality future calibration and validation.
Nigel explained the Cryogenic Solar Absolute Radiometer (CSAR) and Centre for Carbon Measurement (CCM) programs, as well as other collaborations and memorandums of understanding with many international agencies. NPL has the lead on WP1 pre-flight laboratory calibration, as well as the task for microwave sensors.

Metrology for Earth Observation and Climate (MetEOC) provides an opportunity for European National Metrology Institutes (NMIs) to jointly establish a world leading capability for EO traceability to meet the exacting needs of climate. This project will up-skill European workforce in terms of uncertainty analysis, and facilitate development of key generic infrastructure and delivery of services in a trans-national manner. It will perform collaborative research in readiness for future EO needs. The focuses for EO stakeholders for long-term metrology needs are services, advice, international standardisation (etc.), and it is timely in terms of current international activities.

Host Presentations

Australian national cal/val activities: Overview - CSIRO (Malthus)
Tim Malthus gave an overview of the Australian national cal/val activities, data collection and distribution. Australia has a satellite calibration working group covering many activities and including many partnerships. The focus of the working group is to provide the following:

- Improvements in the accuracy in at-sensor radiance, reflectance, brightness temperature, backscatter intensity
- Improved accuracies of atmospheric correction and geometric position/correction
- Quantification of uncertainties in, and more accurate algorithms for derived products

On ground activities and infrastructure, and stated future interests and needs were discussed. The focus is broad; cross calibration is essential, as well as awareness raising.

Tim introduced the rest of the Australian representative presenters.

TERN AusCover cal/val program - UQ (Johansen)
Dr. Kasper Johansen shared regarding the Terrestrial Ecosystem Research Network (TERN), AusCover, partners within AusCover, current activities, and future plans. AusCover is a nationally consistent approach to deliver and calibrate past, current and future satellite image based datasets, and the production of ecosystem science data products designed for Australian conditions.

IMOS bio-optical cal/val activities - CSIRO (Schroeder)
Dr. Thomas Schroeder, of the Commonwealth Scientific Industrial Research Organisation (CSIRO) shared the Integrated Marine Observing System (IMOS) cal/val activities within the satellite remote sensing facility. Amongst their many activities and interests is the need for ocean color cal/val in Australian waters. Dr. Schroeder explained their many facilities (9 National Reference Stations), various sensor/instrumentation usage, and sampling methodologies.

Validation of sea surface and ice sheet heights from satellite altimetry for climate studies - ANU (Tregoning)
Paul Tregoning shared an overview of the satellite altimetry data for many sensors that the Integrated Marine Observation Systems (IMOS) deals with. They have uses of Landsat for foliage protective cover (FPC). The have ground calibration targets form multiple monitoring needs. The Australian IMOS ocean altimeter validation facility is making an important contribution to the international NASA / CNES / EUMETSAT / NOAA mission science team. Australian participation in mission science teams is critical. Although Australia may not contribute funding directly, its geography and expertise dictates an important role. The same holds true for ice altimetry – some of the most dynamic regions in East Antarctica are in easy reach of Australian logistics.

Activities in Support of EO cal/val - Geoscience Australia (Thankappan)
Medhavy Thankappan reported on Geoscience Australia (GA), the National Earth Observation group. He shared regarding Satellite image correction standards with regard to the Unlocking the Landsat Archive (ULA), International Forest Carbon Initiative (IFCI), the Terrestrial Ecosystem Research Network (TERN), and the Integrated Marine Observing System (IMOS). GA provides support for national & international field campaigns, National Field Spectroradiometer Loan Service, and the Australian Geophysical Observing System (AGOS) for the Global Navigation Satellite System (GNSS) network, which is quite extensive.

Sand, sea & sky; Cal/val of the state of Western Australia – Curtin University (McAtee)
Brendon McAtee presented on In-Situ Marine Optics for the sea-going hyperspectral radiometer, DALEC. Field site Characterisation was disclosed using Nadir and other views, as well as different spectral bands. Brendon showed land product cal/val over various sites. AOD Measurement and Validation, continental aerosol and BRDF change anomaly, smoke detection, and other activities underpinned by instrument calibration were shared.

Soil moisture from SMOS and SMAP: Cal-val activities downunder - Monash University (Walker)
Professor Jeffrey Walker shared regarding soil moisture missions of the L-band. He presented campaign strategies, ground validation, the SMAPEx concept (study and focus areas, ground sampling for Soil Moisture Active Passive), PLIS data, PLMR data, and the concept for AACES. Analysis at monitoring stations for level 2 (L2) SMOS was shown. Future plans are to compare L2 SMOS data with PLMR derived SM, compare L2 downscaled SMOS data with PLMR derived SM, and compare L2 SMOS data with and assimilate into LSM.

Bureau of Meteorology (Ian Grant)
Ian Grant gave an overview of the Bureau, their calibration needs, data for validation, satellite validation activities, and the numerical weather prediction. Their bureau relies on satellite operators, Global Space-based Inter-Calibration systems (GSICS), the science community, and others. Their calibration needs require many sensors aboard many types of satellites. Ian explained the surface radiation network, how they benchmark satellite solar data, algorithm/validation work for Sea Surface Temperature (SST), and the Numerical Weather Prediction (NWP) assimilation.

End of day three

V: Friday 10 February 2012

Five-Year Work Plan Discussion

Stensaas shared his proposed changes to the 5-year work plan, now called version 5.0. Discussion on terminology and its interpretation arose. There is a formal process for subgroup chair nominees; discussion ensued. Stensaas will fix version five as per suggestions discussed. Given those actions, the nomination to accept those changes was received by Chander, seconded by Joanne, all were in favour (none opposed), and the WGCV WP Version 5 was accepted as official.

GEO Work Plan Actions as related to WGCV

GEO 2012-2015 WP Task List Matrix was discussed. Stensaas encouraged subgroups and WGCV to go through this and list key efforts related to WGCV, and let CEOS management know of our interest to be involved.
Stensaas shared the specific components already identified in the GEO Work Plan that are WGCV related.

- QA4EO
    - Stensaas shared that a new addition to the "key activities" will be added and he will compose per today's discussion suggestions.
    - "Key outputs" text will also be revised per discussion suggestions.

wgcv-34_GEO Tasks_IN02-c1 was shared. This shows where the DA tasks can be re-mapped into IN-02.
Discussion as to verbiage suggestions Stensaas needs to bring forth in the actions meeting took place. QA4EO with regard to GEO and QA4EO with regard to CEOS components were discussed.

Interaction between working groups and constellations

Stensaas shared the matrix of identified people/POCs for various groups. Additions and changes discussed. Interactions with Constellations and other CEOS Working Groups (wg_vc interactions.xls). If people have comments on this matrix, please provide that information ASAP. **Stensaas** will provide a finalized version for review.

WGCV34 Actions

WGCV34-1 through WGCV34-18 (days 1-4) discussed, fixed, and agreed upon. Actions WGCV34-19 through WGCV34-22 (Day 5) agreed upon. See appendix.

Concluding business/discussion, including recommendations to CEOS plenary (Stensaas)

Discussion regarding subgroup recommendations to CEOS ensued and each respective subgroup chair updated their information accordingly. **Stensaas** will incorporate all subgroup recommendations into his package to bring forth at the next meeting, prior to the plenary.

WGCV-35 and future WGCV meetings (Stensaas)

WGCV 35 Plenary is planned for September 24-28, 2012, in Hyderabad, India. This will be held jointly with the WGISS 34. WGCV 36 is tentatively proposed to be in Shanghai, China (officially yet TBD).

End of day four and adjournment of the WGCV 34th Plenary

Appendices

Acronyms

AACES: Australian Airborne Cal/Val Experiment for SMOS
ACSG : Atmospheric Composition Subgroup
AERONET: AErosol RObotic NETwork
AGOS: Australian Geophysical Observing System
AOD: Aerosol Optical Depth
AVDC: Aura Validation Data Center
BOM: Bureau of Meteorology
BRDF: Bidirectional Reflectance Distribution Function
CAS: Chinese Academy of Sciences
CEOS: Committee on Earth Observing Satellites
CGMS: Coordination Group for Meteorological Satellites
COP: Communities of Practice
COVE: CEOS Visualization Environment
CSA: Canadian Space Agency
CTF: Carbon Task Force
DA: Data
DALEC: Dynamic Above-water radiance (L) and irradiance (E) Collector
DEM: Digital Elevation Model
DIISR: Department of Innovation, Industry, Science and Research
DOME C: a French-Italian scientific station located on the East Antarctic ice sheet
EARLINET: European Aerosol Research Lidar Network
ECV: Essential Climate Variables
EROS: Earth Resources Observation and Science [Center]
ESIP IQ: Information Quality - Federation of Earth Science Information Partners
EUMETSAT: European Organisation for the Exploitation of Meteorological Satellites
EVDC: Envisat Validation Data Center
FCDR: Fundamental Climate Data Records
FTIR: Fourier Transform Infrared spectroscopy (spectrometry)
G20: Informal group consisting of 19 nations and the European Union
G8: France, Germany, Italy, Japan, UK, US, Canada, Russia
GAW: Global Atmosphere Watch
GECA: Generic Environment for Calibration/Validation Analysis
GEO: Group on Earth Observation
GEO-GLAM: GEO Global Agricultural Monitoring initiative
GEOMS: Generic Earth Observation Metadata Standard
GEOSS: Global Earth Observation System of Systems
GEOViQua: QUAlity aware VIsualisation for the Global Earth Observation system of systems
GFOI: Global Forest Observation Initiative
GMES: Global Monitoring for Environment and Security
GNSS: the Global Navigation Satellite System
GSICS: Global Space-based Inter-Calibration systems
HDF: Hierarchical Data Format
IEEE: Institute of Electrical and Electronics Engineers

IFCI: International Forest Carbon Initiative
IMOS: Integrated Marine Observing System
INSPIRE: Infrastructure for Spatial Information in the European Community
ISO: International Organization for Standardization
IVOS: Infrared and Visible Optical Sensors
JAXA: Japan Aerospace Exploration Agency
JECAM: Joint Experiment for Crop Assessment and Monitoring
JRC: Joint Research Center
LPV: Land Product Validation [subgroup]
LSM: Land Surface Model
LST: Land Surface Temperature
MSSG: Microwave Sensors Subgroup
NASA: National Aeronautics and Space Administration
NDACC: Network for the Detection of Atmospheric Composition Change
NDSC: Network for the Detection of Stratospheric Change
NEON: National Ecological Observatory Network
NIES: National Indian Education Study
NILU: Norwegian Institute for Air Research
NIWA: National Institute of Water and Atmospheric Research
NWP: Numerical Weather Prediction
OST: Ocean Surface Topography
OSVW: Ocean Surface Vector Wind
PLIS: Polarimetric L-band Imaging Scatterometer
PLMR: Polarimetric L-band Multibeam Radiometer
POC: Point(s) of Contact
QA4EO: Quality Assurance for Earth Observation
SBSTA: Subsidiary Body for Scientific and Technological Advice
SEC: Secretariat
SGT: Stinger Ghaffarian Technologies
SIT: Strategic Implementation Team
SM: Soil Moisture
SMAP: Soil Moisture Active Passive
SMOS: Soil Moisture and Ocean Salinity
SPARC: Stratospheric Processes and their Role in Climate
SST: Sea Surface Temperature
TERN: Terrestrial Ecosystem Research Network
TGRS: Transactions on Geoscience and Remote Sensing
UAV: Unmanned Aerial Vehicle
UK: United Kingdom
ULA: Unlocking the Landsat Archive
UN REDD: United Nations collaborative initiative on Reducing Emissions from Deforestation and forest Degradation
UNFCCC: United Nations Framework Convention on Climate Change
USGS: United States Geological Survey
UV VIS: Ultraviolet/Visible
WGCBDD: Working Group on Capacity Building and Data Democary
WGISS: Working Group on Information Systems and Services

WMO: World Meteorological Organization
WV: WorldView

Actions

Tracking #	Description	Assigned To	Due Date	Update/Status
WGCV30-5	Stensaas to work (with WGISS) to draft a short summary on the exact nature and background to the request made in action WGCV30-4 for presentation to the subgroup members to assist their response.	Stensaas	Joint WGCV/WGISS meeting 35, September 2012	-Stensaas to work with WGISS at their plenary meeting at USGS in June 2011. -Create some tasks that tie into WGISS due next week. OPEN
WGCV30-7	Compile a statement of WGCV capability and abilities that the constellation communities may use to identify areas where the WGCV could effectively contribute. This should include POCs for each capability or at least each instrument covered by the subgroup.	Stensaas / Subgroup Chairs / WGCV Secretariat	WGCV-34	This largely covered by the work plan – each Subgroup should address this within their section of the plan. Activities to identify PoCs to each constellation from WGCV are continuing. Due date changed from WGCV-33 to WGCV-34 OPEN
WGCV31-3	Define a preliminary set of CEOS Cal/Val sites that would represent the minimum set of mandatory sites (applicable across all relevant sensor / thematic domains) that should be maintained for the long-term future.	WGCV subgroups	changed from CEOS-24 to 30 June 2011	Closed by subgroups, create new action for Microwave subgroup. CLOSED
WGCV32-1	Microwave and Atmospheric Composition subgroups to identify their key reference sites and send them to Cal/Val portal for inclusion there in the CEOS reference site list	Dong/Bojkov	WGCV-34	OPEN

WGCV32-2	All subgroups to look at generic procedures to aid intercomparison between products	Subgroup Chairs	WGCV-34	Add that we should prepare a list of potential generic procedures required in the future and present this at WGCV-34. Due date changed from WGCV-33 to WGCV-34 More clarification needed -Agreed to close, consider revisiting in future. CLOSED
WGCV33-1	Identify and establish cross-representation, where needed, across the CEOS Working Groups (WGISS, WGClimate and WGEdu)	Stensaas/WGCV Secretariat	WGCV-34	Report during WGCV-34 CLOSED
WGCV33-2	Review and comment on the "CEOS LSI Constellation Mid-resolution Optical Guidelines"	WGCV members	WGCV-34	Comments received from WGCV and submitted to editors. Discuss and close at WGCV-34 Fox/Stensaas look at verbiage of document and suggest better. Fox: It is suggested that the title should be: CEOS …mid-resolution optical guideline on sensor specifications. CLOSED
WGCV33-3	Review and comment on the proposed ISO-19159 (Geographic information - Calibration and validation of remote sensing imagery sensors and data) and ISO-19157 (Geographic information - Data quality).	WGCV members	WGCV-34	Comments received from WGCV and submitted to editors. Discuss and Close at WGCV-34 Create new action on how this ties into CEOS CLOSED

WGCV33-4	Raise the need for better processes at CEOS level to engage commercial satellite providers	Stensaas/WGCV Secretariat	SIT-27	Reported at CEOS-25; discuss at WGCV-34; report information at SIT-27. Subgroups encouraged to provide WGCV chair with commercial providers and make recommendation to CEOS Chairs. OPEN
WGCV33-5	Include a section within the WGCV 5-year workplan on "Best Practices" (within the QA4EO section as a separate bullet), highlighting the value of pre-flight information and of the details of the algorithms and models that are being used.	WGCV Subgroup chairs / WGCV Sec	CEOS-25	Work plan sections amended and received a final reviewed by subgroup chairs before being submitted to CEOS plenary as v4.0 of the WGCV 5-year work plan covering 2011 - 2016 OPEN
WGCV33-6	Establish routine QA4EO telecons between the WGCV chair / vice-chair and the WGCV subgroup chairs to discuss the way forwards for QA4EO and also to build a cohesive story for the QA4EO showcases. Also, dedicate regular time slots to discuss QA4EO at WGCV plenary and other associated meetings (e.g. QA4EO workshops).	WGCV Sec / IVOS subgroup chair	WGCV-34	Status: Regular telecons not established as yet. Following on from QA4EO workshop in October 2011, a new GEO QA4EO task force is to be established. Awaiting the initiation of this task force to take QA4EO forwards according to the roadmap discussed and established at the workshop. A dedicated slot at WGCV-34 has been set up for one whole afternoon to continue discussions within WGCV. OPEN

WGCV33-7	Propose a "CEOS QA4EO implementation board" to take QA4EO forwards within CEOS.	Stensaas/WGCV Sec	CEOS 25 SIT-27	At QA4EO workshop in October 2011 it was agreed to establish a dedicated GEO QA4EO task force. Currently awaiting implementation of this task force. -GEO QQA4EO Team -CEOS QA4EO implementation plan and discussion to happen at WGCV-34 -Present plan to SIT-27 OPEN
WGCV33-8	Investigate options for setting up a push service from the USGS portal to the cal/val portal.	Chander/Burini	WGCV-34	Done, Completed CLOSED
WGCV33-9	Set up a telecon between the QA4EO showcase team members to define the next steps for the QA4EO showcases	Stensaas	June 20, 2011Due date changed to May 1, 2012	The showcases were discussed to some extent at the QA4EO workshop in October 2011. However, the next stages for the QA4EO showcases are yet to be specifically defined. The main barrier to progress is funding. -Work to establish showcase leads and teams as recommended during QA4EO workshop. -Help define QIPs; present at CEOS and GEO plenary meeting-Change due date to May 1st time frameOPEN

WGCV33-10	Comments made by the WGCV on the GCOS satellite supplement and associated templates have not been considered by GCOS. WGCV Chair to work on resolving communication issues between CEOS and GCOS. Also work on establishing a clear and defined mechanism for comment and review, by all CEOS members, of associated documentation / actions.	Stensaas	SIT-26	The main PoC on GCOS for CEOS is Mitch Goldberg (GSICS) -Items provided to GCOS via Mitch CLOSED
WGCV33-11	WGCV Subgroups to review current action GCOS action list and provide feedback through the WGCV Sec.	WGCV Subgroup chairs / WGCV Sec	30-Jun-11	Comments fed back to GCOS from WGCV CLOSED
WGCV33-12	Make sure all interested parties are informed and given the opportunity to participate in the Dec 2011 / Jan 2012 DOME C campaign.	WGCV Sec / IVOS subgroup chair	Sep-11	Information and mail shots published to enlist participants to the DOME C campaign CLOSED
WGCV33-13	WGCV subgroups to provide comments and information back to Brian Killough (SEO) on COVE tool ideas and requirements.	WGCV Subgroup Chairs	WGCV-34	Done via IVOS, ask the subgroup chairs. CLOSED
WGCV34-1	With regard to resource communication, we are still struggling to get support from CEOS Principals. WGCV communication process needs to be discussed and documented to allow for better CEOS management support.	WGCV chair/vice/subgroup chairs to provide discussion.	CEOS WGCV Plenary 35	Present at next Plenary OPEN34

WGCV34-2	Stensaas to send an e-mail to Mike F. regarding Albrecht, as nominee for vice chair, and to forward the "call for nominations."	Stensaas	Canceled, not due date	Albrecht suggest waiting for 2 weeks before taking action with SIT. The call for nominations has been sent. No further action required at this time. CANCELED
WGCV34-3	Discuss QIP vs. showcases terminology and official term changes. Future QA4EO implementation efforts will be called QIPs. Current showcases will remain as "showcases" until completion.	None	None	Action Closed
WGCV34-4	As part of the GEO QA4EO implementation plan, GEO POCs and expected leads for the tasks must be defined. WGCV Chair will incorporate POCs and task leads into the GEO/QA4EO implementation plan and provide to WGCV for review.	WGCV chair/vice/subgroup chairs to provide discussion.	SIT 27	OPEN
WGCV34-5	Feedback from WGCV and subgroups for all tasks so they can more easily be moved forward. WGCV and Subgroups to provide input to the GEO work plan tasks to WGCV Chair prior to the CEOS Actions meeting. WGCV Chair will send the GEO and CEOS work plan to members for review.	WGCV Chair and Subgroups	2/17/2012	OPEN

WGCV34-6	IVOS and LPV Subgroups to discuss – Australian cal/val sites with Alex Held.	Tim Malthus and Medhavy Thankappan to be interface on behalf of Australian constituents.	1-Aug-12	OPEN
WGCV34-7	Define appropriate way of identifying member/participants and incorporate into the work plan.	WGCV	2/10/2012	CLOSED
WGCV34-8	Include a communications section in the Work Plan as to what we do and how we are going to present to SIT.	WGCV Chair	2/10/2012	COMPLETED
WGCV34-9	MWSG (Dong) to find POCs for interaction with OSVW and OST Constellations.	Dong	Mar-12	OPEN
WGCV34-10	Action for Stensaas to suggest/bring forward more clearly explained verbiage with regard to DA-09-01a_12. Nigel put in formal text form for incorporation into actions, and it is re-mapped to CEOS/GEO.	Stensaas	Immediately	Done, Completed as part of the work plan discussion CLOSED
WGCV34-11	Need action to solve POC for Precipitation constellations.	Microwave Subgroup	July, 2012	OPEN
WGCV34-12	Subgroup Chairs to provide interaction bullets for communication with constellations and other working groups.	Subgroup Chairs	20-Mar-11	OPEN
WGCV34-13	Carrie and Stensaas to create a list of POCs.	WGCV Chair and Secretariat	2/10/2012	DONE CLOSED
WGCV34-14	Specify the highlights and issues related to working groups and constellations to WGCV POC and	Subgroup Chairs	WGCV-35	OPEN

	present at next WGCV Plenary 35.			
WGCV34-15	Provide potential recommendations on Microwave to CEOS	MSSG	April, 2012	OPEN
WGCV34-16	Stensaas to send out "call for comments" with regard to TaskSheet "Earth Data Sets."	Stensaas	2/21/2012	OPEN
WGCV34-17	Matrix and GEO Work Plan (with CEOS highlights) to be sent to group for comment.	Stensaas	ASAP	Done, completed via e-mail CLOSED
WGCV34-18	Stensaas to send out file titled wg_v. c. interactions.xls	Stensaas	2/10/2012	Done CLOSED
WGCV34-19	Create better communication and links at the CEOS level for minutes and actions	Secretariat	LOE	Ongoing
WGCV34-20	Fix errors on WP as emailed by subgroup chairs, send to all WGCV, revisions agreed upon as Version 5.	Stensaas	Feb-12	OPEN
WGCV34-21	Update the CEOS actions to the GEO Work Plan structure and send information back to work members.	Stensaas	12-Feb	OPEN
WGCV34-22	All presentations uploaded to webpage by end of February 2012, and make CEOS and WGCV aware	Secretariat	2/29/11	All presentations uploaded 2/29/12 mass e-mail forthcoming 3/12 OPEN

Working Group on
Calibration and Validation

Agenda

34th CEOS WGCV Plenary

6 – 10 February 2012

hosted by

CSIRO (Commonwealth Scientific and Industrial Research Organisation)

in collaboration with the

DIISR Space Policy Unit, TERN, GA & BoM

in

The Customs House, Brisbane, Australia

Agenda
Version 1.3

Monday 6 February 2012

10:00 Pre-meeting planning discussions (WGCV chair, vice-chair, subgroup chairs, subgroup vice-chairs & secretariat)

12:00 – 13:00 Lunch

13:00 CEOS QA4EO planning (any interested parties)

15:00 Close

15:00 Round-table, hosted by Australian Government

Tuesday 7 February 2012

08:30 Registration & Coffee

09:00 Introduction & adoption of agenda (Stensaas)
09:10 CSIRO host welcome and logistics (Held)
09:30 CEOS CEO (Stryker)
10:00 Chair's report (Stensaas)
10:30 2012-2015 CEOS and GEO Work Plans (Stensaas)

10:45 – 11:15 Coffee

11:15 Action items (Jucht)
11:45 WGCV's 5-year plan, mission statement, group objectives and membership (Stensaas)
12:30 Interactions with Constellations and other CEOS working groups (Stensaas)
12:50 Interactions with GSICS (Chander) and GCOS (Goldberg/Blonski)

13:10 – 14:10 Lunch

Subgroup reports #1
14:10 Infrared & Visible Optical Sensors subgroup report (Fox)
14:40 Microwave subgroup report (Dong)
15:10 Land Product Validation subgroup report (Nightingale)

15:40 – 16:10 Coffee

Country & agency reports #1
16:10 IASB/BIRA (Lambert)
16:30 AOE/CAS (Ma)
16:50 NOAA (Blonski)
17:10 Roscosmos (Emelyanov)

17:10 Close

Wednesday 8 February 2012

08:30 Coffee

Subgroup reports #2
09:00 SAR subgroup report (Zink)
09:30 Atmospheric Chemistry subgroup report (Lambert)
10:00 Terrain Mapping subgroup report (Muller)

10:30 – 11:00 Coffee

11:00 Subgroup processes discussion (Stensaas)

Special interest presentations / discussions #1
12:00 Cal/Val activities in the Svalbard Integrated Arctic Earth Observing System (Herland)

12:30 – 13:30 Lunch

GEO task DA-09-01a & action items
13:30 Task DA-09-01 & Action DA-09-01a_13: GEOSS Quality Assurance Strategy and QA4EO (Stensaas)
13:40 Action DA-09-01a_12: DOME-C Multi-sensor Experiment (Fox/Srivastava)
14:00 Action DA-09-01a_14: Cal/Val test site dossier development over the WGCV subgroup domains (Stensaas/Goryl/Burini)
14:15 Action DA-09-01a_15: Pilot project to exemplify QA4EO implementation in Cal/Val activities (Goryl/Fox)
14:30 Action DA-09-01a_16: Cal/Val Portal and post-launch test sites to assist implementation of QA4EO for GEOSS (Chander/Goryl/Burini)
14:45 Action DA-09-01a_17: QA4EO support services and tools (Stensaas)

15:00 – 15:30 Coffee

QA4EO
15:30 QA4EO workshop report (Stensaas)
16:00 CEOS QA4EO Implementation Plan (Stensaas)
16:30 QA4EO roadmap, strategy, showcase planning and general discussion (Stensaas)

17:00 Close

Thursday 9 February 2012

08:30 Coffee

Special interest presentations / discussions #2
09:00 CEOS SEO Report on the COVE Tool for WGCV (Killough – remote presentation)

Country & agency reports #3
09:30 IRSA/CAS (Wu)
09:50 USGS (Stensaas)
10:10 CNES (Henry)

10:30 – 11:00 Coffee

Special interest presentations / discussions #3
11:00 TanDEM-X (Zink)

Country & agency reports #4
11:20 MIRS/CAS (Dong / Liu)
11:40 ESA (Burini)
12:00 CSA (Srivastava)
12:20 DLR (von Bargen)
12:40 NPL (Fox)

13:00 – 14:00 lunch

Host Presentations
14:00 Australian national cal/val activities: Overview - CSIRO (Malthus)
14:15 TERN AusCover cal/val program - UQ (Johansen)
14:40 IMOS bio-optical cal/val activities - CSIRO (Schroeder/Dekker)
15:05 Validation of sea surface and ice sheet heights from satellite altimetry for climate studies - ANU (Tregoning)
15:30 Activities in Support of EO cal/val - Geoscience Australia (Thankappan)

15:45 to 16:00 Coffee

16:00 Sand, sea & sky; Cal/val of the state of Western Australia – Curtin University (McAtee)
16:15 Soil moisture from SMOS and SMAP: Cal-val activities downunder - Monash University (Walker)
16:40 Bureau of Meteorology - (Marshall)

17:10 Close

Friday 10 February 2012

08:30 Coffee

09:00 WGCV future tasks discussion, including subgroup & committee requirements (Stensaas)
10:00 Vice-chair nominations and candidate presentations (Stensaas)

10:30 – 11:00 Coffee

11:00 Concluding business / discussion, including recommendations to CEOS plenary (Stensaas)
11:45 Action items from this meeting (Jucht)
12:15 Dates and place for WGCV-35 and future WGCV meetings (Stensaas)

12:30 – 13:30 lunch

Attendees
WGCV 34th Plenary in Brisbane, Australia, February 6-10, 2012

Name	Country	Organization
Blonski, Slawomir	USA	University of Maryland, NOAA
Burini, Alessandro	Italy	European Space Agency
Chander, Gyanesh	USA	SGT, US Geological Survey
Chisholm, Laurie	AUS	University of Wollongong
Decker, Arnold	Aus	CSIRO
Dong, Xiaolong	China	National Space Centre, CAS
Fox, Nigel	UK	National Physical Laboratory
Held, Alex	Aus	CSIRO
Henry, Patrice	France	French Space Agency
Herland, Einar-Arne	Norway	Norwegian Space Centre
Johansen, Kasper	Aus	University of QLD
Jones, Simon	Aus	RMIT
Jucht, Carrie	USA	SGT, Contractor to the USGS/EROS
Lambert, Jean-Christopher	France	BELSPO-BIRA-IASB
Lingling, Ma	China	AOE, CAS
Liu, Heguang	China	National Space Centre, CAS
Lowell, Kim	Aus	Coorporative Research for Spatial Information
Malthus, Tim	Aus	CSIRO
McAtee, Brendon	AUS	Curtin University
Muller, Jan-Peter	UK	University College London
Nightingale, Joanne	USA	NASA
Patrice, Henry	France	French Space Agency
Phinn, Stuart	Aus	University of QLD
Schroeder, Thomas	Aus	CSIRO
Smith, Rowena	Aus	CSIRO
Soto-Berelov, Mariela	Aus	RMIT
Srivastava, Satish	Canada	Canadian Space Agency
Stensaas, Gregory	USA	USGS/EROS
Stryker, Timothy	USA	CEOS
Thankappan, Medhavy	Aus	GeoSciences Australia
Tregoning, Paul	Aus	
von Bargen, Albrecht	Germany	German Aerospace Centre
Walker, Jeffrey	Aus	Monash University
Woodgate, William	Aus	CRC - SI
Wu, Bingfang	China	Chinese Academy of Sciences
Zhang, Dehai	China	National Space Centre, CAS
Zink, Manfred	Germany	German Aerospace Centre