



**Minutes of the**

**30<sup>th</sup> Plenary Meeting of the**

**Committee on Earth Observation Satellites**

**(CEOS)**

**Working Group on Calibration and Validation**

**(WGCV)**

**26 – 29 May 2009**

**Hosted by the**

**Brazilian National Space Agency (INPE)**

**In**

**Ilhabela, Sao Paulo, Brazil**

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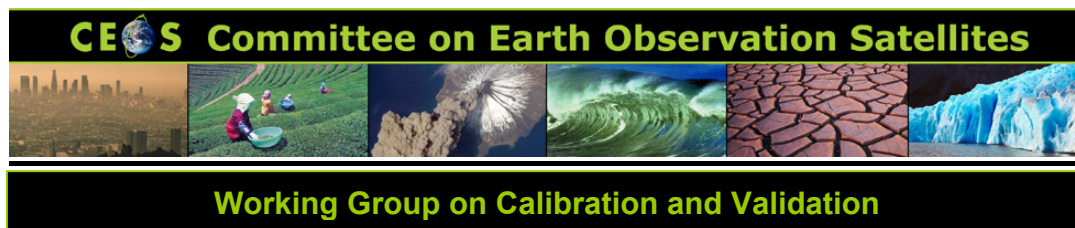
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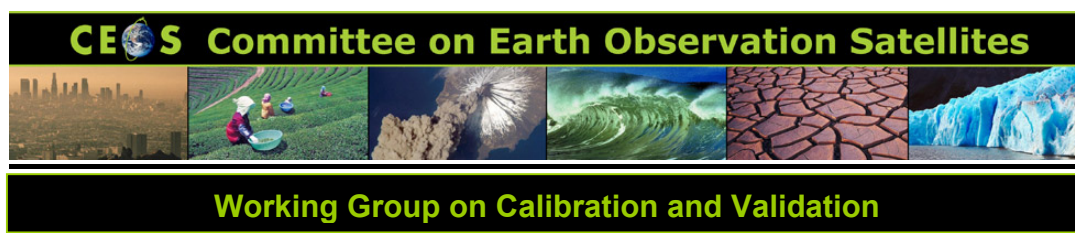


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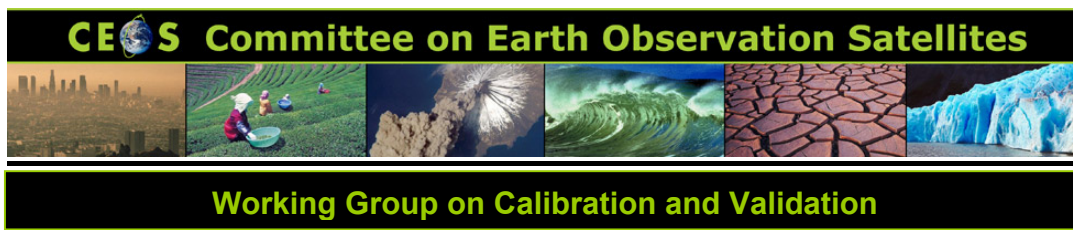


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## ACRONYMS

AATSR	Advanced Along-Track Scanning Radiometer
ACSG	Atmospheric Composition Subgroup
AERONET	Aerosol Robotic Network
ALOS	Advanced Land Observing Satellite
AVHRR	Advanced Very High Resolution Radiometer
BelSPO/IASB-BIRA	Belgian Science Policy / Belgian Institute for Space Aeronomy
BNSC	British National Space Agency
BOUSSOLE	Buoy for the Acquisition of Long-term Optical Time Series
BRDF	Bidirectional Reflectance Distribution Function
Cal/Val	Calibration and Validation
CAS	Chinese Academy of Sciences
CBERS	China-Brazil Earth Resources Satellite
CEOS	Committee on Earth Observation Satellites
CLARREO	Climate Absolute Radiance and Refractivity Observatory
CNES	Centre National d'Etudes Spatiales
COVE	CEOS Spacecraft Coverage Analysis Visualisation Tool
CRESDA	Center for Resources Satellite Data and Applications
CSA	Canadian Space Agency
CSSAR	Center for Space Science and Applied Research
DEM	Digital Elevation Model
DLR	German Aerospace Center
DMCii	Disaster Management Constellation International Imaging
EO	Earth Observation
ERS	Earth Resources Satellite
ESA	European Space Agency
EUMETSAT	European Organisation for the Exploitation of Meteorological Satellites
fAPAR	Fraction of Absorbed Photosynthetically Active Radiation
GDEM	Global Digital Elevation Model
GEO	Group on Earth Observations
GEOSS	Global Earth Observing System of Systems
GOME	Global Ozone Monitoring Experiment
GSICS	Global Space-Based Inter-Calibration System

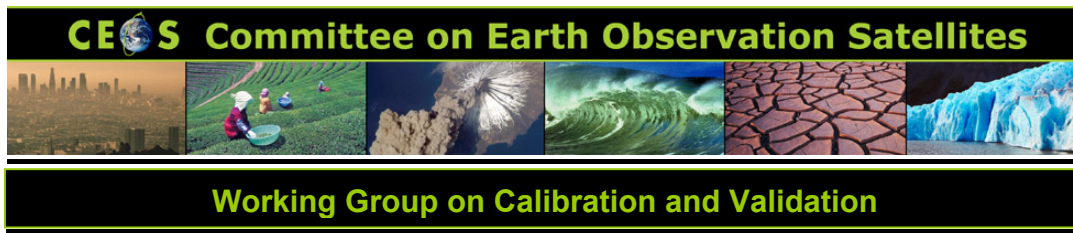


IEEE	Institute of Electrical and Electronics Engineers
INPE	Instituto Nacional de Pesquisas Espaciais
INRA	French National Institute for Agricultural Research
ISO	International Organization for Standardization
ITAR	International Traffic in Arms Regulations
IVOS	Infrared and Visible Optical Sensors Subgroup
JAXA	Japan Aerospace Exploration Agency
JRC	Joint Research Council
LPV	Land Product Validation Subgroup
LSI	Land Surface Imaging constellation
MERIS	Medium Resolution Imaging Spectrometer
METOP	Meteorological Operational satellite programme
MOBY	Marine Optical Buoy
MODIS	Moderate Resolution Imaging Spectroradiometer
NASA	National Aeronautics and Space Administration
NIST	National Institute of Standards and Technology
NOAA	National Oceanic and Atmospheric Administration
NPL	National Physical Laboratory
OCR	Ocean Colour Radiometry constellation
OGC	Open Geospatial Consortium
POLSAR	Polarimetry Synthetic Aperture Radar
QA4EO	Quality Assurance Framework for Earth Observation
QI	Quality Indicator
RAL	Rutherford Appleton Laboratory
RAMI	Radiation transfer Model Intercomparison
SAR	Synthetic Aperture Radar
SEC	Secretariat (CEOS)
SEO	Systems Engineering Office (CEOS)
SIT	Strategic Implementation Team (CEOS)
SMOS	Soil Moisture and Ocean Salinity
SOAP	Simple Object Access Protocol
SST	Sea Surface Temperature
TRUTHS	Traceable Radiometry Underpinning Terrestrial- and Helio- Studies
TMSG	Terrain Mapping Subgroup
UCL	University College London
USGS	United States Geological Survey
VIIRS	Visible/Infrared Imager Radiometer Suite



VIRS	Visible and Infrared Scanner
VNIIOFI	All-Russian Research Institute for Optical and Physical Measurements
WGCV	Working Group on Calibration and Validation
WGISS	Working Group on Information Systems and Services
WMO	World Metrological Organization





## 1 WELCOME & INTRODUCTION

Lecomte (ESA; WGCV chair) thanked INPE for inviting the WGCV to Brazil and for hosting its 30<sup>th</sup> plenary meeting. The agenda for the meeting was adopted and a *tour de table* undertaken to introduce those present.

### 1.1 Welcome & Background to INPE's Activities (Viane, Head of Earth Observation Coordination, INPE)

Viane (INPE) welcomed the participants of the meeting to Brazil and to Ilhabela and he expressed the hope that they would enjoy their stay on the island. He provided information and background to INPE's activities and explained that INPE was a relatively "young" agency and so had a lot to benefit from being involved within CEOS. The WGCV had historically been a very active group and INPE had great expectations in being involved. Viane talked about INPE's activities and showed the INPE webpage (<http://www.inpe.br/>), asking the participants to refer to this site for more details. After the USA and Canada, Brazil was the first nation in the world to host a Landsat ground receiving station, and monitoring at the Amazon ground station had continued for the past twenty years without interruption. World weather forecasts and global climate change forecasts are undertaken in Brazil and space-based astrophysics work has continued for nearly fifty years. Space engineering is also of academic interest at INPE.

CBERS is almost twenty-one years old and the vision is for at least another twelve years of lifetime out of the series. Brazilian collaboration with China has been important. CBERS-1, 2 and 2b involved efforts that amounted to a 70% share by China and a 30% share by Brazil. For CBERS-3 and 4, the share of effort will be more like a 50:50 split. Now collaboration with the UK for new builds is taking on an importance with the inception of Amazonia, which hosts a camera with a wide swath. The Rutherford Appleton Laboratory (RAL) in the UK has developed a camera with a 120km swath at nadir.

INPE's 2020 plan was presented with the concept of "free Earth Observation data for all" at its core. There are already plans to deliver CBERS data to Africa free of charge. INPE views EO data as a resource that is for the "public good" and so should be free to all. INPE are currently reprocessing the last 30 years of their Landsat back-catalogue – some 35,000 Landsat images – and these will be distributed free of charge on completion.

Gutman asked about Viane's experiences in increasing the swath, e.g. the BDRF responses, etc. Viane reported that there had been differences in BDRF in the first scenes and, from a technical point of view, INPE were happy to be working with the WGCV to share this detail. For CBERS-2, INPE had developed a correction equation



based on high order polynomials. Using this correction has improved the quality of the scene, but in terms of absolute calibration there is still much to learn and so further improvements are anticipated. Llewellyn-Jones about feedback with the user community, for example, those interested in illegal logging. Vianei explained that a user survey had been undertaken and that had revealed that 50% of the users were commercial small company users and the other half were governmental organisations (federal, state, etc.) who are interested at a policy level in understanding what is going on in their environment. Brazil has a government programme for monitoring and INPE received finance from the government. Chander asked about the test sites and he pointed out that that there were quite a few stable sites in Brazil but none in China. He reported that it had been easy to get CBERS data from Brazil but not China. Vianei explained that the community is becoming more flexible about sharing data, particularly over the test sites. He suggested that CEOS and the WGCV select international calibration sites, which might also include Chinese sites in the future, and to make more effort to bring China and the international community into this effort. Lecomte explained that the WGCV had already been working hard on the sites issue and very good collaboration in the future is anticipated, including collaboration with INPE. Muller asked about microwave sensors and their use in Brazil in the future. Vianei explained that INPE had been working with DLR to build a satellite. INPE had also been talking with their Chinese partners to build a SAR together as this would be invaluable in deforestation studies. Stensaas reiterated that INPE's open data policy and the surveys into user requirements and policy were very impressive. The USGS was moving that way also after seeing how beneficial this approach had been. Stensaas thanked INPE for their collaborative work with the USGS and as a gesture of his appreciation he presented Vianei with 4 special issue Landsat coins.

## 1.2 WGCV Chair's Report (Lecomte)

Lecomte (ESA) provided the Chair's report. He explained that higher and higher precision is now demanded from the user community, mainly due to the global climatic vision now being placed on datasets. Lecomte outlined the organisation structure of CEOS and explained where the WGCV fitted into the picture. He explained that the CEOS chair was a one-year posted elected every November. A troika, consisting of the past, present and future chairs, backed the current chair throughout their tenure. The CEOS Secretariat (SEC) was the active body that ensured implementation of the CEOS objectives. Lecomte explained that the mechanism to provide reports or request assistance in activities was initially through the WGCV Secretariat. Lecomte, as WGCV chair, would then report to the SEC where assistance would be formally requested, typically through the CEOS Strategic Implementation Team (SIT). Anything not on the table at the SIT meeting (the next one was due to be held in September 2009) would not be tabled at the CEOS plenary (held every November). Monthly SEC teleconferences were held and, if any of the WGCV community had something to put forward, it should





be done in time for that. The WGCV members were asked to be as active as possible in feeding back to the chair to allow actions to move forward.

Ungar explained that GEO action DA-06-02 was still alive and needed to be reported on. Ungar & Lecomte agreed to discuss this offline and clarify any remaining issues. Llewellyn-Jones asked about the membership of CEOS and if this information was accessible. Lecomte explained that there was a full listing on the CEOS website (<http://ceos.org/>). Llewellyn-Jones went on to ask about how the list of constellations had been endorsed and why there was no Sea Surface Temperature (SST) constellation. Lecomte explained that it was a CEOS decision to endorse or not endorse and, if there was no SST constellation, it was probably merely due to the fact that no one had yet suggested one. Apaphant talked about the CEOS deliverables plan and asked the WGCV to contribute to it by 31 May 2009.

### 1.3 Actions from WGCV-29 (Greening)

Greening listed the action items from WGCV-29 and reported on progress.

Action	Description	Status
<b>WGCV29-1a: Dome C, Phase 2 Instrument Inter- comparison</b>	IVOS (Nigel Fox) place on the Cal/Val portal protocols for instrument inter-comparison, notify participating agencies.	Complete
<b>WGCV29-1b</b>	Participating CEOS agencies collect satellite data over Dome C in the December 2008 - January 2009 timeframe. IVOS (Nigel Fox) to coordinate	Complete
<b>WGCV29-2: Miami Instrument Inter- comparison</b>	IVOS (Nigel Fox) provide to CEOS/SIT (Brent Smith): Cover letter of relevant to CEOS, Unsolicited Proposal, Itemized budget and Budget Justification. They are to be forwarded to NASA (Chris Blackerby), NOAA (Mary Kicza, Brent Smith) and USGS to request support.	Complete
<b>WGCV29-3</b>	Peter Muller, sent Global DEM guidelines to Ivan Petiteville (CEOS/SIT), and to WGCV/Sec. to post on the WGCV web site	Complete
<b>WGCV29-4</b>	WGCV Chairs present QA4EO at CEOS plenary.	Complete
<b>WGCV29-5</b>	WGCV Chairs explore / establish with CEOS an international capability for funding international cal/val campaigns. This is to facilitate the Miami and future cal/val campaigns.	Complete



Action	Description	Status
WGCV29-6	CRESDA (Xiaolong Dong) potentially providing sample high spectral resolution data HJ-1 A, over select sites: Dome C, Dunhuang and Libyan desert.	Open – Dong to maintain discussions on HY-1 A data availability once the calibration activities have been completed.
WGCV29-7	CNES (Patrice Henry) provide a report on BRDF for Dome C and Desert sites to WGCV.	Complete
WGCV29-8	WGCV members – agencies contribute to the cal/val portal information regarding the test sites characterization. List of sites to be made available on cal/val portal.	Complete
WGCV29-9	WGCV, WGISS and LSI – put together a study to achieve: coordinated quality index for land cover products.	Open – Baret to be asked for an update

## 2 SUBGROUP REPORTS

### 2.1 Atmospheric Composition Subgroup Report (Lambert)

Lambert provided the report from the Atmospheric Composition subgroup (ACSG). Muller asked about the type of **Hierarchical Data Format (HDF)** the atmospheric composition community used. Lambert explained that NDACC and ESA used HDF 4, EUMETSAT used HDF 5, and some atmospheric composition sensors, such as GOME 2, were provided in both HDF formats and also in regular binary format. That covered most of the atmospheric community. Lecomte added that the ACSG had recognised the need to have cross-cutting activities amongst the subgroups, e.g. algorithms, Quality Assurance, etc.

### 2.2 Infrared and Visible Optical Sensors Subgroup Report (Fox)

Fox presented a report from the Infrared and Visible Optical Sensors (IVOS) subgroup. He explained that LandNet required ten instrumented sites to be effective, but at the moment there were only eight. Five “stability” monitoring test sites and one extra-terrestrial site had been endorsed. Llewellyn-Jones asked about the intercomparison



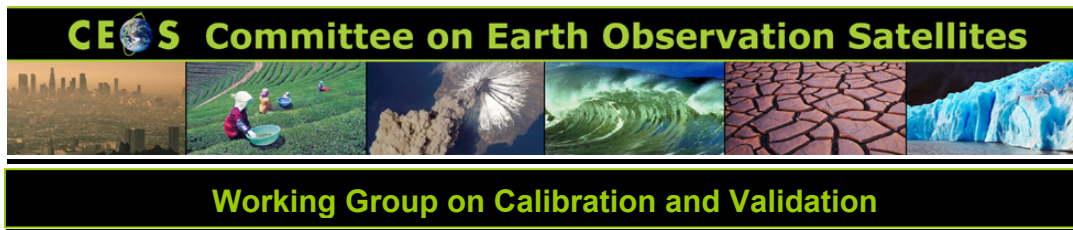
experiments. He asked if the IVOS subgroup had been the only one, so far, to have organised intercomparison field campaigns. Fox explained that IVOS had been the only ones to do so whilst adhering to QA4EO-endorsed procedures, but in the past the others had undertaken intercomparisons, but they were probably not fully QA4EO compliant. Llewellyn-Jones asked Fox if the group had thought about setting out the procedures for intercomparisons. Fox explained there they had indeed set up a guideline on how to run an intercomparison – QA4EO-QAEO-GEN-DQK-004 (<http://qa4eo.org/>). Attendees to the intercomparison were asked to read the guideline and to agree to adhere to it. Srivastava added that the SAR community were proactive and already had produced a reference standard on SAR calibration five years ago. This was produced before QA4EO was written, although it would still be close to being QA4EO compliant. Lecomte asked how important the more costly mechanisms (e.g. MOBY) were for monitoring. Fox explained that it was essential to maintain buoys of this nature. The expense involved would mean that they would be limited in their distribution and number. Lecomte added that it would be important to tell the people who fund such sites / buoys that they are crucial and should be maintained for the long term. Cao asked if CEOS might be able to make a distinction when expensive sites / instruments were concerned and work collectively to support sites of this type. A framework would need to be defined to support these activities within CEOS. Fox added that, if standard reference sites were required for all sensors in all domains, it would be important to try and limit the sites to the minimum needed to support the community. At a political level CEOS should emphasise that these are community reference standards and that they need to be maintained in some way (e.g., via a pooled resource). By providing a small subset of key sites that were the minimum number that did the task, it would be possible to start the process. Lecomte added that it would be important for Chander to cover all the domains within the test site study.

### **2.3 Land Product Validation Subgroup Report (Baret)**

Frédéric Baret (INRA; LPV Chair) was not able to attend the meeting. He provided a set of slides on recent LPV activities, but no formal presentation was given at the meeting.

### **2.4 Microwave Sensors Subgroup Report (Buck / Dong)**

Buck and Dong provided the report from the Microwave subgroup. Cao asked about the status of SMOS. Buck replied that it is ready to go and that the latest launch date was October 2009. Llewellyn-Jones commented on the huge remit of the subgroup. Microwave radiometry of the sea was used to derive temperature and there seemed to be an increased interest in this. However, problems in proper end-to-end microwave radiometry remained and Llewellyn-Jones asked how the subgroup was addressing this. Buck explained that this had been discussed within their subgroup meetings. Dong further expanded to say that an ocean site was currently being set up to try to calibrate for



temperature. The plan was to have a set of instruments in place to provide calibration and validation verification, although the actual site location had not yet been defined. Lecomte expressed his concern at the concept of dividing the microwave subgroup into smaller working groups. However, it was widely agreed that it was important not to end up with a system that was too complex.

## 2.5 Synthetic Aperture Radar Subgroup Report (Srivastava)

Srivastava presented the report from the SAR subgroup. The next SAR workshop would be held from 17-18 Nov 2009 in Pasadena, California, USA. Lecomte remarked that both the SAR and microwave presentations made reference to calibration sites and that these were not included on the list of test sites being compiled by Chander. It was important to have a list of all these sites and the application they were applicable to. Stensaas agreed that each subgroup should provide their recommendations for test sites and the associated information that needed to be provided alongside. The subgroups were also asked to decide how this information should be held and linked (*Action WGCV30-1*). Dutra identified that, at the last POLSAR meeting, it had been decided to have supersites. There is an ESA / JAXA joint project for supersites and it should be ensured that the WGCV synchronised with them. Srivastava identified that that agencies generally support sites as long as the mission is alive; after a mission fails then the sites would probably not be maintained. Lecomte agreed that this was generally the case and stressed the importance for the WGCV to defend the concept of long term calibration activities beyond the lifetime of any one mission. This would be across the board for all sensors and applications. In order to maintain activities it would be important to push the concept of Cal/Val sites and have standardised calibration techniques that were independent of missions. This concept was more important than the idea of supersites. A recommendation to say this should be sent to the CEOS chair, who should then be encouraged to pursue and promote the cause. Stensaas further stressed the need for Cal/Val sites and of stressing to management their continued importance after the failure of a mission. Lecomte added that CEOS should be involved in recognising this importance. Apaphant suggested that it would be useful to send the CEOS chair a letter that listed all the sites. The CEOS chair could then send that letter to all the members. Lecomte explained that this was indeed the intention, but first the content of the letter was needed and that was what the group was working towards. Fox asked if the WGCV was really the group that should be defining the mission requirements. Srivastava suggested that it was not actually a mission requirement, rather an evolution of the requirement that information on the orbit for all systems was needed. Stensaas clarified that, as the subgroup had found that it needed enhanced recommendations in their domain's requirement, so this then was a valid recommendation to CEOS. Lecomte again identified the need to address the transverse activities within the WGCV without creating a system of sub-working groups that was over complex.



## **2.6 Terrain Mapping Subgroup Report (Muller)**

Muller provided the report from the Terrain Mapping subgroup. He explained that he would like support and assistance for the GEO-ISPRS-IEEE workshop in making sure the ASTER DEM was made available. The focus for land was the release of the full ASTER DEM dataset, preferable on open ftp. For this, the requirement was support from CEOS member agencies who had already agreed, at plenary, to contribute their data. Muller asked what steps the space agencies were taking to make sure that they contributed their data to the global DEM as promised. Lecomte explained that the problem of access to ASTER data had been regularly raised and he as WGCV chair had been working with CEOS to push the issue (*Action WGCV30-2*). Vianei asked if Muller was aware of how the Tandem X campaign data were to be distributed. Muller explained that his understanding was that there would be a science call for Tandem X evaluation. Interested parties would then be able to get hold of the data very early on. At a larger scale level, everything would happen through Inforterra / GADH and be evaluated on a licence by licence basis in the commercial sector. Von Bargaen added that the Tandem X portal would be opened at the end of May 2009.

## **3 COUNTY / AGENCY REPORTS (PART 1)**

### **3.1 INPE (d'Alge)**

d'Alge provided the agency report for INPE.

### **3.2 BelSPO/IASB-BIRA (Lambert)**

Lambert provided the agency report for BelSPO/IASB-BIRA.

### **3.3 CSA (Srivastava)**

Srivastava provided the agency report for CSA.

### **3.4 DLR (von Bargaen)**

Von Bargaen provided the agency report for DLR. He reported on the opening of a Tandem X announcement of opportunity at the end of May 2009. Ungar asked about the availability of the data to the rest of the community and the ability to influence acquisitions. Von Bargaen agreed to discuss this offline with Ungar.





## **4 GEO TASK ACTIONS**

### **4.1 Action DA-09-01a\_5 – Benchmark Mission Coordination (Fox)**

Fox reported on GEO action DA-09-01a\_5. Stensaas remarked that it had seemed that the discussion on waiting for resource been going on for the last two years. He asked if there was anything that could be done to help from a CEOS perspective. Fox responded that there was nothing that would help regarding the specific problem in obtaining support from BNSC. It would be possible that ESA would pick the task up, but he explained that the discussion was outside the remit of this meeting. Lecomte explained that the WGCV had brought this issue to the SIT many times and that was willing to take it on. ESA would not pick it up as the pre-phase A was almost finished. Essentially 100K was missing to finish pre-phase-A. Llewellyn-Jones suggested that this type of transfer standard concept for calibration in space was already embedded into missions. He thus wondered if there was somehow a better way of trying to get national funding. Fox explained that, in principle that was what was being proposed. In actuality, any mission that has the ability to do very high accuracy radiometry has, by default, the capability of a high accuracy calibration study. In many ways the study defined the core requirement for the calibration concept in order for it to more easily fit into other missions. Ungar explained that CLARREO was trying to do exactly this and Kurt Thome (NASA) wanted to collaborate with Fox on TRUTHS. Even though it was not a dedicated traceability calibration satellite, the plan would be to incorporate it into the CLARREO mission.

### **4.2 Action DA-09-01a\_6 – Ground-based Cal/Val Campaign (Fox)**

Fox reported on GEO task DA-09-01a\_6. Ungar suggested that, where many ground measurements were made over a particular site, there would be the requirement to recruit a site manager to maintain the sites. By taking one set of measurements the nature of the sampling site may change and the site's integrity should be maintained. Fox assured that he was certainly seeking to manage these issues. Partly the reason for doing the pilot comparison would be to iron out any of these types of issues.

### **4.3 Action DA-09-01a\_7 – DOME C Experiment (Cao)**

Cao provided the report on GEO task DA-09-01a\_7. Chander remarked that for BRDF one needs 4 angles, but some of the sensors working for this comparison did not have this type of information included within the metadata. Cao explained that some of the datasets did not provide this information and so it would be modelled; there was no





standard procedure of how to deal with this. He suggested that CEOS should try to have a consistent tool where a person could input the sensor parameters and get out the sensor description, time of scene, geometry of scene, etc. Some sensors do have this, but it should be available for all. Mackin asked how the solar zenith angle was acquired. Using one model could give a very different answer than employing another. Chander added that everyone uses different methods to attain a result and it is important to ensure that whatever mechanism is employed, that it is done so in a consistent way. Fox explained that, for the comparison, this was the very reason that a common procedure and methodology was defined. There may be biases but at least they will be common biases between scientists

#### **4.4 Action DA-09-01a\_8 – Cal/Val & Post-launch Test Sites (Chander)**

Chander provided the report on GEO task DA-09-01a\_8. Over the next few months it would be important to work with each of the subgroups on the site questionnaires for each topic domain. Lambert explained that, when looking at site selection for atmospheric composition, the dependent would be the mission, its objective, long term data records, etc. This would involve looking at the map and taking into account the experience the community had in atmospheric validation. Concerning the estimation of errors, it would be necessary to take into account the smoothing and variability of the atmospheric structure, thereby making it impossible to establish a clear list of reference sites. Lambert suggested that the best solution would be to propose networks as reference sites and to identify the objective list for the missions. It would also be possible to establish the reference criteria, e.g. a need for the inclusion of polar sites. Apaphant asked if the data formats for each site were the same. Chander explained that the format for the test sites was already defined and this information was available from the questionnaire.

#### **4.5 Action DA-09-01a\_9 – Radiometric Standards & DA-09-01a\_11 – Reference Test Site Data Collaboration & Comparison (Fox)**

Fox provided the report for GEO task DA-09-01a\_9 and 11. He explained that there would be a request to the CEOS agencies, test site owners and subgroup chairs to provide data for the intercomparison experiment. Lecomte added that this approach could be adopted for other intercomparison experiments that had already been undertaken. In this case a new task could be defined to enable data to be accessed. Defining a new task would make it more visible at a higher level.

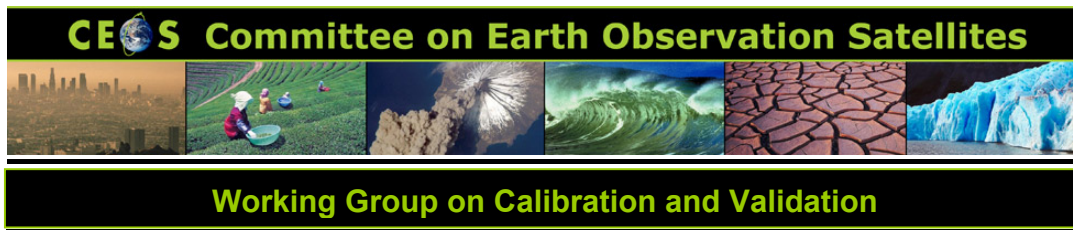


#### **4.6 Action DA-09-01b\_1 – Land Product Harmonisation (Lecomte)**

Lecomte provided the report from GEO task DA-09-01b\_1 on behalf of the task lead, Frédéric Baret. Widlowski asked why MERIS FAPAR was not used. It was agreed to pose this question to Baret, who was absent from the meeting (*Action WGCV30-3*). Muller suggested that it would be useful to ask WGISS to look into the SOAP service that was being developed for the MODIS team, which allowed for the extraction of a very long time series over a particular site. It would be good to have something like that going within ESA. Lecomte explained that there were technical issues in providing this type of information for ESA data as there was not full and complete access to all of the products.

#### **4.7 Action DA-09-01b\_2 – Data, Metadata & Product Harmonisation & Interactions between WGCV & WGISS (Apaphant)**

Apaphant provided a report on GEO task DA-09-01b\_2 and on the interactions between the WGCV and WGISS. Concerning data formats, Srivastava reported that around fifteen years ago the SAR subgroup had defined a format for SAR data and this had been put to CEOS. Because of evolving technologies, over the subsequent years relevant agencies have come with new and improved formats. Now it would be impossible to specify a single SAR format. Stensaas explained that this was exactly the kind of information that was being requested. From a data format perspective, it was important for the subgroup domains to provide information on how best to operate and what made sense. Another format that needed to be addressed was that for metadata and there was at that time very few or no standard formats / processes across the subgroups (*Action WGCV30-4*). Ungar added that metadata for satellites had to include the facility to ingest that metadata. He suggested that WGISS expand their work to include ancillary and Cal/Val data. Apaphant agreed to pass on Ungar's comment to Ken Macdonald (the task action lead). Stensaas suggested that examples of metadata content and components should be provided to WGISS. This may then stimulate a follow-on task to further enhance the goal. Srivastava suggested the drafting of a standard slide set that could be taken to each subgroup to more clearly understand the nature and content of the action being raised (*Action WGCV30-5*). Apaphant went on to discuss QA4EO implementation and he asked if the work in task DA-09-01b\_2 that included work towards QA4EO was sufficient or if something more was required. Stensaas and Lecomte agreed to discuss this in more detail with Apaphant offline. Apaphant asked if any collaboration with WGISS was needed for task DA-09-01a\_11. Fox responded that there was a need for WGISS involvement to produce a prototype of a link to a Cal/Val network. Chander suggested that once all the information on the test sites had been gathered there would be an infrastructure problem and so the assistance of WGISS at this stage would be important. Lecomte agreed and added that there would be more issues that would need to



be tackled, e.g. the need for a data dictionary, the issue of data harmonisation, etc. One leader should be appointed to take this forward and WGISS, alongside strong communication links with WGCV, would be in a better position to lead this action. A few weeks ago Stensaas had been nominated to take this forward for the WGCV. However, the action was currently so vast that it may need to be split in the future into “bite-sized” tasks.

#### **4.8 Action DA-09-01a\_10 – QA4EO (Lecomte)**

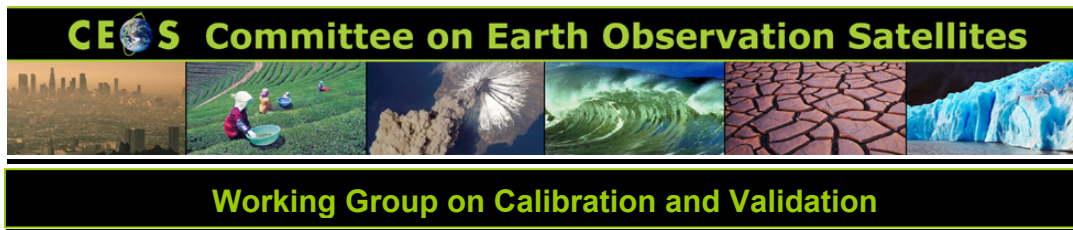
Lecomte provided the report on QA4EO (GEO task DA-09-01a\_10). Muller asked about the complexity of the document naming / numbering system. Lecomte explained that a documentary system was required and the idea behind the chosen system indicated that:

1. It was a QA4EO document,
2. Who had endorsed the document,
3. In which topic / type area it fell, and
4. An indication of the document type, e.g. calibration or procedure.

The current documentary system could be changed, but a robust and clear system would still be required. Each organisation could use its own documentary procedure, but there does need to be one for the internal QA4EO registration process. Stensaas explained that the current one provided the option to use a database search engine to find documents that one was interested in and it was therefore “fit for purpose” for QA4EO document registration. Fox expanded on this to say that the scenario was that QA4EO was for GEOSS and so there had to be a sufficient set of indicators within the documentary system to cope with this large community. A question was raised about the restricted access areas within the Cal/Val portal. Chander explained that most of the portal was open and accessible, aside from ALOS mission data. Searches in available datasets could be made by anyone, but to download data required a username and password. Some software was also restricted. Anyone within the WGCV community could apply for a username and there was little restriction within this community. A username and password could be obtained through Philippe Goryl (ESA; [Philippe.Goryl@esa.int](mailto:Philippe.Goryl@esa.int)). Stensaas identified that this was a prime example of where WGISS could help, i.e. in access control lists and also in assigning QIs to the data. Widlowski asked about the user feedback for the Cal/Val portal as he had used it without success. Fox explained that the portal in its current form was under evolution and was undergoing a major rewrite and restructure. Lecomte added that the portal was soon to be moved to another maintenance company and would be improved.

##### **4.8.1 GSICS Quality Assurance Processes (Cao)**

Cao provided a report on GSICS activities. Srivastava asked how GSICS activities were different to QA4EO. Cao explained that there were lots in common between the groups. However, the meteorological agencies were not participating in CEOS and the GSICS



community comprised of a lot of operational data. They work under the umbrella of the WMO and had expressed an interest in collaboration. Technically speaking, the issues being addressed are interchangeable and collaboration is easy, but at the political level things are different. Muller asked about the issue of ITAR in the context of VIIRS. Cao responded that this was a very touchy subject in the USA for development systems, although not much of an issue for operational satellites. Muller replied that, if it was indeed true that operational systems would not fall under the ITAR system, then there would be no problem. However, if it was funded in a different way it would not go away and may become a big issue. Stensaas thanked GSICS for reviewing QA4EO and for making the process better for GSICS and for GEO. Stensaas suggested the need to discuss these issues further with GSICS at their meeting next week. Many things would fold into QA4EO and it would be important to work out how the WGCV and GSICS were to work together.

#### ***4.8.2 DMCii's Cal/Val Programme & Preliminary Experiences towards QA4EO Implementation (Mackin)***

Mackin provided insight into DMCii's Cal/Val programme and some preliminary experiences towards QA4EO implementation. He agreed to circulate a document to explain how DMCii were implementing QA4EO. Stensaas applauded the work Mackin and DMCii were doing. He asked how many systems, in either development or operation mode, had processes in place where the product level uncertainties were being traced in products. Mackin responded that he thought that most people would have this information although it was not common to see those data being combined with the uncertainties. However, in order to move forward towards proper intercomparisons, this would need to be done and, at that stage, the user would see that in doing so their applications would not be affected. Muller identified a useful recent development of an imaging Lidar ([imaginglidar.net](http://imaginglidar.net)).

#### ***4.8.3 NASA's Cal/Val Programmes & QA4EO Implementation (Ungar)***

Ungar provided some background to NASA's Cal/Val programmes & QA4EO Implementation.

### **4.9 Action DA-09-03d\_3 & 4 – Global DEM (Muller)**

Muller provided a report on GEO actions DA-09-03d\_3 and 4. Muller requested that the agency / country reports at the next WGCV meeting should include details on progress towards the goal of making DEM data available for the GEO Global DEM (*Action*





*WGCV30-11*). He explained that ALOS data was available free from ESA for Africa and Europe. Other areas were available for purchase through JAXA. Those data made available for the test sites (currently only for two sites) will be made available to the community.

#### **4.10 Proposed Involvement of WGCV in New GEO Task Activities (Stensaas)**

Discussions on the proposed involvement of the WGCV in other GEO tasks were led by Stensaas.

Task AR-09-01c on the GEOSS Best Practices Registry is led by the University of Tokyo and IEEE. It had been proposed that the WGCV worked with WGISS and the DA-09-01b task. Ungar reported that this was a technical task based on OGC (Open Geospatial Consortium). The WGCV should at the very least be conscious of this task, but he did not see a role for the WGCV in the development of the registry. Fox asked about the referencing system and expressed concern about making sure that whatever system was adopted for storing, indexing and cataloguing could link to QA4EO and the QA4EO website. Ungar explained that the aim was to have everything that was GEO and GEOSS in that registry. It was agreed that the WGCV and QA4EO should discuss how the registry worked with the task leads and identify how the catalogue works (*Action WGCV30-6*). It was also agreed to discuss how to establish links between documents that were not in QA4EO. It would be important to encourage linkage between QA4EO and documents that were best practices and were Cal/Val related to avoid multiple systems of QA.

Task DA-09-03a addressed Global Land Cover and it was agreed that the WGCV should continue working with the LSI community in combining land cover datasets and in making sure that appropriate WGCV processes for Cal/Val were used. It would also be important to make sure that QA4EO processes could and were being utilised in the datasets employed.

Task DA-06-01 focused on the GEOSS Data Sharing Principles. It would be important to make sure the guidelines being proposed for QA4EO were consistent with the GEO data policy. Strong ties should be encouraged to ensure that the WGCV and the task leads worked together to maintain consistency, or else to create one single document out of the two. Ungar explained that the GEOSS Data Sharing Principles had been discussed at some length at the Earth summit two years ago. It was unlikely that it would be replaced and it was vital that QA4EO remained consistent with it. Stensaas added that the GEOSS Data Sharing Principles were basically a policy about open data sharing. There were some caveats about restricted data, such as Cal/Val data, before release to the next level



of user. It would be very important for the WGCV and QA4EO to contribute to the group through WGISS and the task leads.

Task EC-09-01a addressed Ecosystem Classification and Mapping. No proposed involvement in this task was anticipated.

Task EC-09-01c looked into Regional Networks for Ecosystems. Ungar suggested that it would be important to make sure that the WGCV understood how the network was set up and how the group could contribute to it. Aside from this, no other involvement was foreseen.

Task ST-09-02 promoted Awareness and Benefits of GEO in the Science and Technology Community. Stensaas suggested that the WGCV could provide support where necessary to make sure the task was following the appropriate processes. There was a rationale for the WGCV to be involved and a POC should be appointed to understand the task and to provide feedback to the WGCV and the associated subgroups. Lecomte responded that the difficulty at the moment was that support could not easily and effectively be given if there were no specific actions. The task was too high level, but, if there was a specific task that was linked to Cal/Val it could be supported by the WGCV. However, the way the task action was currently placed on the table was too wide, remote and open to provide general support. The WGCV would be happy to support specific requests, but cannot help in the lead as it currently stands.

Involvement or otherwise in GEO task US-09-03c on Bio-geophysical, Soil & Land Surface Data Leave was left open to further discussion in the future but no specific involvement was thought necessary at the present.

Task US-09-05d on Global Phenology Data was again left open for further discussion, particularly with the LPV subgroup, but no specific role of the WGCV was foreseen.

Stensaas chaired a session on the GEO / CEOS Constellations. Muller asked about the future of the Land Surface Imaging (LSI) constellation, with particular reference to the global DEM. He asked if the LSI was a collection exercise or if it was also a distribution exercise. He had not seen any evidence of working on an OGC map service to make OGC map data available to the community. Stensaas explained that the LSI portal provided links to all available data through that portal. The data was restricted to that being made available by the data providers. Killough further expanded on this to say that it was not meant to be a clearing house, rather it was meant to be topically specific to the mid-resolution missions and provided a single entry point through which to easily find data in that topical area. Muller suggested that there currently was already a commercial mechanism for looking at the earth – Google Earth – and it was already possible to dig deeper. However, there was nothing really in the public domain to march through time. All the systems currently available made the data source irrelevant as there was no





information on where the data came from. Killough accepted the idea and the need to push for it, but the data was so complex and different that it would be difficult. Fox added that it would be useful to have the LSI constellation as part of the GEO task process as well as WGISS. These two communities were already moving towards WGCV / QA4EO goals and so they should be involved in the relevant tasks.

## 5 GEO / CEOS CONSTELLATIONS

Stensaas led the discussions on the GEO / CEOS Constellations.

Johnson presented the Ocean Colour Radiometry (OCR) constellation. There were two instruments globally

1. NASA's MOBY optical buoy with 11 years of data and
2. BOUSSOLE, a European buoy.

Lecomte explained that a few months ago ESA had decided to invite two US colleagues into the MERIS quality working group. Since then they had participated to meetings and had been invited to be involved in the way ESA managed missions, as well as working on data access exchange. The cooperation with the USA was now more active than it had been two years ago. NASA was also participating to BOUSSOLE in a small way, along with CNES and ESA. Stensaas asked if there was any feedback on the QA4EO processes and prototype process evaluation across the OCR virtual constellation working group. Fox explained that in IVOS there had been significant interest from Korea and from JRC at the last subgroup meeting. It was suggested that there should be more pro-activity in establishing procedures for ocean colour and this was something that IVOS were proposing to do. Already there was AERONET for ocean colour and CEOS reference standards to support the ocean colour network. Two procedures had already been written. The first of these was for the ocean colour network and the second for establishing the emersion correction factor for radiometry. It was worth making more formal visibility to inform the community that IVOS were willing to actively support ocean colour radiometry and had expertise to facilitate comparisons and QA4EO procedures. Lecomte reported that, at the last SIT meeting, almost all the constellations leads requested involvement from the WGCV. Each constellation needed support in terms of data quality, but the requests for assistance / collaboration were rather generic and vague and there was currently no mechanism to handle these generic requests. Fox suggested it may be a good idea to put together a statement of capability and abilities that the WGCV could provide. This should detail what the WGCV was able to do, the way the group handled its work and by what mechanism those seeking help would need to adopt in order to enlist support. Stensaas suggested that this be summarised into a bulleted list with a point of contact for each (*Action WGCV30-7*).



## 6 SYSTEMS ENGINEERING OFFICE

### 6.1 CEOS Spacecraft Coverage Analysis Visualisation Tool – COVE (Killough)

Killough provided a report from the CEOS Systems Engineering Office (SEO) and some details on the CEOS Spacecraft Coverage Analysis Visualisation tool (COVE). Muller commented that the Global Hydrology Research Centre had a coincidence engine that incorporated data for 43 satellites from ESA, JAXA and NOAA. The difficulty was translating the output of the system and also this type of tool was often completely incompatible with the ordering system. SensorML had been developed to provide a platform-independent information source. This had been adopted by the OGC community as a fundamental way of assessing orbit information across the board. It would therefore be useful to have SensorML coefficients as an output from COVE. However, SensorML had been developed with NASA funding and was probably not open source. Another useful tool was SOAP, which used Python with MODIS data to identify a scene of interest and then a time series for all relevant sensors. Muller suggested that something like this would be a useful front end to COVE. Killough agreed to try and work with these to improve COVE. Mackin suggested that a good approach would be to incorporate all the sensors involved in the Turkey intercomparison into COVE. Lecomte congratulated the SEO on the work into COVE and agreed that the tool would greatly assist any intercomparison exercises. Fox added that the simplest implementation activity would be to incorporate the reference standard test sites that had already been identified. It would probably be wise, at this stage, to incorporate the reference standard test sites only rather than populate it with all known sites. It would be useful to have a link such that when one clicks the link, standard documentation / information could be made available (the source of the documentation may well be external, such as the test site pages hosted at USGS). Some of the sites were already automated, were already public domain and accessible. COVE could then become an operational calibration tool for the sensors and for the LSI constellation. It would also be a good mechanism to request that satellite operators provide data over all these sites and that data was access-linked to the sites. Currently there were eight reference standard sites and five invariant reference sites. For calibration and a long-term calibration service, all fourteen sites would be needed, with other sites being more *ad hoc*. Killough explained that there was a way that the COVE tool could be linked to a kind of portal of data. For a few limited sites the message that these were important sites and needed to be maintained in the long term had started to be emphasised. Lecomte summarised that the SEO were offering a tool and this met the WGCV's requirement. Cao added that GSICS had started this with SMO. Currently there was a limitation in the accuracy and the STG4 code was being used (giving an accuracy of 1Km), but that was not sufficient for the higher resolution instruments. Killough and Cao agreed to talk through the detail offline. Chander went on to say that the CEOS reference sites were the main ones, but the different missions had



different ground tracks and repeat. Because of these limitations there were very few chances for coincidence over the globe and so enhancing COVE would become hard. However, it was a vital tool and he suggested that COVE should be taken forward to CEOS plenary with the WGCV recommending it and its active use. At the moment COVE had only been incorporating IVOS sites and the other subgroups should be involved. Lecomte agreed that COVE should be recommended to CEOS plenary. It was not completely mature from the WGCV's perspective and should be improved in line with the WGCV's requirements before being proposed to the SIT and plenary; other subgroup activities / requirements should be incorporated.

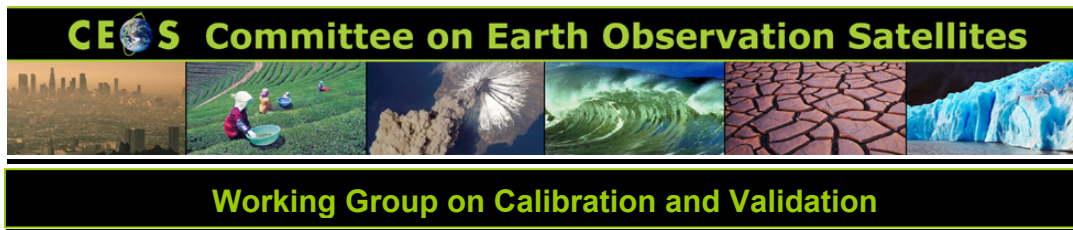
## **6.2 CEOS & WGCV Websites (Killough / Greening)**

Killough & Greening presented the new WGCV website, now at <http://ceos.org/wgcv/>. It was agreed to keep the main CEOS "Google" calendar up-to-date with WGCV dates and to additionally have an event page on the WGCV website to highlight those activities that relate to the WGCV. The membership would also be brought more up-to-date and efforts to fill any gaps from relevant missing agencies / organisations would be undertaken. A message should be sent to those CEOS agencies not represented at the WGCV to tell them about WGCV-31 and that they were requested to send a representative. It was agreed that the subgroup chairs should be given "editor" access and be responsible for updating their subgroup page.

## **7 COUNTY / AGENCY REPORTS (PART 2)**

### **7.1 DMCii (Mackin)**

Mackin provided a report on DMCii activities. Muller asked if any attempt had been made to transfer DMCii cross calibration efforts to others, e.g. Landsat. Mackin explained that they had been working on the DOME C intercomparison. A procedure related to the spectral response function had already been written and this would allow the differences between the spectral response function of other sensors to be identified. In theory it should be possible to attain a direct relationship between the different sensors. Muller asked about some DMCii data that had showed that some variability had not been due to cloud cover over DOME C and he suggested that BRDF effects would have influenced the data. Mackin explained that they had yawed the spacecraft just before acquisition to minimise the BRDF effects.



## **7.2 ESA (Lecomte)**

Lecomte provided the report from ESA. Buck asked about the increase in the repeat cycle of the SAR on ERS-2 and if that had been done at the expense of scatterometer data. Lecomte explained that SAR was normally flown over land and the radar scatterometer over the ocean so there was little or no loss.

## **7.3 JRC (Widlowski)**

Widlowski reported on the activities of the Joint Research Centre (JRC) of the European Commission, in particular, on a land cover validation initiative in the context of FAO's Forest Resource Assessment Report 2010, and, the fourth phase of the RAdiative transfer Model Intercomparison (RAMI) activity. A possible QA4EO-support experiment for the next (fifth) phase of RAMI was described. This would involve a field campaign to obtain an exhaustive characterisation of the architectural, spectral and illumination related conditions of an existing forest site. Muller applauded the work being done in RAMI-IV but expressed concern about the large amount of information that would need to be collected in the field in order to approach reality. UCL had attempted this for a tiny patch of forest and it was a huge job. Widlowski believed the task to be achievable since it was already being carried out by different teams in different parts of the world. The issue is thus primarily one of getting all these groups to work together on the same test site. However, dense forest canopies will probably have to be excluded from such activities because it is not yet possible to resolve individual trees in those environments with terrestrial lidar scans. Also there is currently no instrument available to measure the directional scattering properties of foliage in the field under controlled illumination conditions. Chander asked if there had been any thought of including the RAMI sites within the CEOS reference site lists. Widlowski explained that the sites in Estonia were part of the VALERI validation sites and could be included, although the sites do change through the year and RAMI-IV provides a snapshot in time only. RAMI itself does not maintain the site, but essentially there would be nothing wrong with using these sites as reference sites. Widlowski mentioned that Giuseppe Zibordi would be attending the next IVOS meeting. Gutman asked if the studies over Estonia were undertaken in the summer season only. Widlowski explained that one of the RAMI sites in Estonia was a Birch stand and this was included in both winter and summer study periods.

## **7.4 NASA (Gutman)**

Gutman provided a report from NASA. Muller asked if there were plans to use the ASTER global DEM for orthorectification and if so would that mean reprocessing all the historical datasets. Gutman responded to say that, at the moment, a standard set of DEMs are used, although NASA was always ready to reprocess old data if new tools were available. Muller asked about how the fact that some SRTM pixels were missing was





handled and what alternatives were used, because most other options are very poor quality. Gutman explained that if the funding is available it would be possible to reprocess with a better sensor selection over and over. Muller asked if NASA had any plans to extract precise BRDF measurement from images and to correct for the atmosphere and BDRF at the surface. Gutman agreed that this would be important, although if this was done it would be more likely that NASA would provide users with a tool to do the extraction themselves from TOA data should they wish to do so. Stensaas asked if NASA had a requirement for revisit time with respect to global land cover. Gutman explained that there was no such requirement at the moment but this kind of information should be defined within the constellations and proposed as a global CEOS requirement. Stensaas went on to further ask if NASA was working with ESA on the Sentinels to define the revisit. Gutman replied that they were not.

## 7.5 NIST (Johnson)

Johnson provided a report from NIST. Gutman asked why calibration over bright deserts was thought to work the same as calibration over forests. Johnson had the same question over the oceans. Ungar explained that the reason this assumption was made concerning large arrays was that they were “known” to be linear. However, some work had been done with a solar calibrator that had a variable strip. The variable responses were partially understood but invariably ignored. Johnson added that, at some level, there would be a need to ascertain what was important when related to the uncertainty budget and so what to worry about.

## 7.6 University of Leicester, UK (Llewellyn-Jones)

Llewellyn-Jones provided a presentation on the work on AATSR at the University of Leicester. He suggested that GHRSSST be considered by the WGCV as a CEOS constellation. Lecomte explained that the mechanism to do this would be to recommend this to CEOS. Llewellyn-Jones tabled a discussion on who should be responsible for paying for validation. Lecomte replied that, in his opinion, the customer should request that the product was validated but that the demonstration of validation lies with the data provider. The customer had a responsibility in that they should request it. Lambert suggested that the role of the data provider (agency) was to provide a basic, in depth and accurate validation of the many data products. However, there were many examples of level 4 data that were produced for atmospheric composition work, and this would be totally beyond this scope. The atmospheric community had tried to install a collaborative process whereby some validation was provided by the agencies and other validation was done by the users themselves using validation tools. Fox added that the key principle of QA4EO was that data products and derived products must have a QI associated with them; therefore, it must *de facto* be delivered with the product. It may be that different skills of different community groups would be needed to do this, but the QI must be



associated and delivered with the product as a fundamental requirement. It was not up to the user to do this, but it is up to the user to request it. This process could involve a whole link and be done external to the agency, but it should be delivered with the data. Reference standards to allow an assessment of products at various levels of the chain are also needed. At the various stages, it would be the reference standard tests that would need to be undertaken by the community, and the big question was how to make that happen. Lecomte explained that it would be the data provider who had to provide the QIs, and this would not necessarily be the satellite owner. Lambert replied that it would not be possible to provide validation for every user; it would only be possible to provide generic validation. The QA had no meaning if it had no application attached to it. It would be possible to provide a basic validation, although there would be some limitations. Fox reiterated that the process was still that the QI is provided. Nowhere in QA4EO did it say that the QI was a generic quantity. The QI was associated with the product and should give enough information for the user to assess its suitability for application. This did not mean that the user had to do the assessment. It would often not be easy to fulfil this requirement, but that should still be the aim. The end user was probably the policy maker and it was those users that really needed the quality information to assess the data's fitness for purpose. Lambert accepted the message and concluded that it would be important to be very clear about what was needed. Ungar added that a QI would miss a lot of things and metadata should also be attached that described the QI. Srivastava suggested that the WGCV's definition of calibration should be updated to say "physical parameter". If the SAR had been calibrated, then a SAR system did not need to be validated. He added that the data provider could not be responsible for validation as there were constantly new applications.

## **7.7 NOAA (Cao)**

Cao reported from NOAA. Muller asked about the status of calibration for AVHRR on METOP. Cao responded that METOP was not part of the traditional satellite series and both EUMETSAT and NOAA are responsible and both were doing comparisons.

## **7.8 NPL (Fox)**

Fox provided a report from NPL.

## **7.9 USGS (Stensaas)**

Stensaas reported from USGS. Llewellyn-Jones asked about any leverage USGS had over those who received free data. Stensaas explained that USGS provides data equally without favours, and the USGS has been working with all Landsat ground station





operators to obtain copies of the data. One problem that would hamper progress with historical data is old media and format, such as tapes.

### 7.10 VNIIOFI (Burdakin)

Burdakin provided a report from VNIIOFI. VNIIOFI and its scientific institute partners were carrying out work to try and to establish long term data assurance strategy. VNIIOFI was the process driver in Russia and a report had been written for a QA meeting of fifteen ministers and agencies in Russia. This report had been approved and Russian experts on Cal/Val had met and agreed to follow QA4EO or at least ISO. The derivation of QIs was something that Russia was already doing so there was no problem to provide this detail. The Russians next planned to start to assimilate QA4EO, based on the presentations heard at WGCV-30.

## 8 FUTURE TASKS & CONCLUDING BUSINESS

### 8.1 Actions (Greening)

Greening presented the actions from the meeting.

Action	Description	Responsible	Due Date
<b>WGCV29-6</b>	CRESDA (Xiaolong Dong) potentially providing sample high spectral resolution data HJ-1 A, over select sites: Dome C, Dunhuang and Libyan desert.	Dong	WGCV-31
<b>WGCV29-9</b>	WGCV, WGISS and LSI – put together a study to achieve: coordinated quality index for land cover products.	Baret	WGCV-31
<b>WGCV30-1</b>	WGCV Subgroups to follow the QA4EO reference standard and the associated IVOS procedure to provide information related to the CEOS World Wide Test Sites. The IVOS procedure should be used, changed or updated as needed to meet subgroup requirements. Cal/Val and test site information should be provided (via the WGCV secretariat) for incorporation into the World Wide Test Site Page.	WGCV subgroup chairs	01 Sept 09



Action	Description	Responsible	Due Date
<b>WGCV30-2</b>	Remind CEOS chair of accepted CEOS plenary recommendations regarding ASTER GDEM data access & redistribution and request their action.	WGCV chair	01 July 09
<b>WGCV30-3</b>	Report on why MERIS fAPAR was not used over the BELMANIP2 sites for work done within GEO task DA-09-01b_1. WGCV Secretariat to ask Baret (task lead).	WGCV Secretariat / Baret	01 July 09
<b>WGCV30-4</b>	Subgroups to consider their specific requirements for data formats (including metadata) and consider proposing a standard format or standard set of processes where appropriate.	WGCV subgroup chairs	WGCV-31
<b>WGCV30-5</b>	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	01 Sept 09
<b>WGCV30-6</b>	Discuss with AR-09-01c (GEOSS Best Practices Registry) leads to identify exactly how their catalogue works and to discuss establishing links to QA4EO best practice and Cal/Val related documentation.	Lecomte / Stensaas	SIT-24
<b>WGCV30-7</b>	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	SIT-24
<b>WGCV30-8</b>	Enhance the proposed QA4EO Governance Structure to ensure inclusion of all relevant parties from both within CEOS and also from the wider GEO community.	Lecomte / Stensaas / QA4EO Secretariat	GEO VI
<b>WGCV30-9</b>	Draft a proposition for an implementation strategy for QA4EO for presentation to GEO at GEO-VI.	Lecomte / Stensaas / Ungar / QA4EO Secretariat	01 July 09



Action	Description	Responsible	Due Date
<b>WGCV30-10</b>	Define a list of IVOS instruments and encourage (write a letter to) all agencies to participate in a prototype global intercomparison experiment (Tuz Golu campaign – August 2009) to include all IVOS test sites. Pass this information to the SEO.	Fox / Lecomte	13 July 09
<b>WGCV30-11</b>	WGCV representatives to ensure that their WGCV plenary report includes particular reference to any current CEOS or GEO task issues. For example, the agency / country report may include details on progress towards the goal of making DEM data available for the GEO Global DEM (in response to GEO task DA-09-03d) and/or a report on progress in implementation of QA4EO (in response to GEO task DA-09-01a).	All WGCV plenary participants	WGCV-31

## 8.2 Concluding Discussions

Ungar stressed the need to each come up with concrete ideas of getting other people engaged in WGCV and in QA4EO. The SEC meetings should be told that the WGCV was seeking their input and this should be asked for on a regular basis. Stensaas agreed that, as there were a lot of things happening in WGCV and QA4EO at the moment, it would be important to get people involved and assisting in taking the process forward. Llewellyn-Jones suggested that a wider and constructive interest should be sought from those not aware about what the group was trying to achieve. The general idea of trying to get more people involved and accepting responsibility for validation should be pushed. Organisations that had money and also had a stake in the quality of data should be sought out. Fox reiterated that QA4EO was about those producing products and the various stages of the products were responsible for putting the QI to those data. It was those that deliver at each stage of the chain who would be delivering the QI for that product. Llewellyn-Jones asked if there was any way of helping organisations that could step forward to do validation. Lecomte responded to say that it would be possible to ask specific agencies to set up ground truth data acquisition that could be used for the validation of satellites. This would be the responsibility of the specific agency. Llewellyn-Jones suggested that, if it was decided that a network of ocean colour sensors was needed, an agency probably would not take that onboard as it would be too large an undertaking. Lecomte responded to say that ESA already funded a lot of validation



sensors. Stensaas added that once people saw the value of QA4EO they would push for its implementation and the funding should follow. As a working group, the WGCV could make recommendations about what was good to do, but the WGCV could not force an agency to provide funding. Fox reiterated that the important thing was the requirement from the user and this would drive the process.

The WGCV's recommendations to CEOS plenary would be complied by the secretariat over the coming weeks and would be sent to all for review once ready.

The next WGCV meeting (WGCV-31) would be provisionally held during the first two weeks of March 2009. No host had come forward and invitations to host this meeting were welcomed. WGCV-32 was provisionally booked for September 2010.



## **ANNEX A: WGCV-30 MEETING AGENDA**



## **Tuesday 26 May 2009**

### **08:30 Registration & Coffee**

- 09:00 Introduction & adoption of agenda (Lecomte)
- 09:20 Welcome and background to INPE's activities (Dr Vianei, Head of Earth Observation Coordination)
- 10:00 Chair's report (Lecomte)
- 10:30 WGCV's action plan, mission statement and group objectives (Lecomte)
- 11:00 WGCV-29 Action items (Greening)

### **11:10 – 11:30 Coffee**

#### **Subgroup reports**

- 11:30 Atmospheric Chemistry subgroup report (Lambert)
- 12:00 Infrared & Visible Optical Sensors subgroup report (Fox)
- 12:30 Land Product Validation subgroup report (Baret)

### **13:00 – 14:00 Lunch**

- 14:00 Microwave subgroup report (Buck / Dong)
- 14:30 SAR subgroup report (Srivastava)
- 15:00 Terrain Mapping subgroup report (Muller)

### **15:30 – 15:50 Coffee**

#### **Country & agency reports**

- 15:50 INPE (D'Alge)
- 16:10 BelSPO/IASB-BIRA (Lambert)
- 16:30 CIS (Huang)
- 16:50 CSA (Srivastava)
- 17:10 DLR (von Bargaen)

### **17:30 Close**

### **19:00 Welcome Drink**





## **Wednesday 27 May 2009**

### **GEO task DA-09-01a & action items**

- 09:00 Task DA-09-01a (Lecomte, Stensaas, Fox)
- 09:10 Action DA-09-01a\_5: Benchmark Mission Coordination (Fox)
- 09:20 Action DA-09-01a\_6: Ground-based Cal/Val Campaign (Fox)
- 09:30 Action DA-09-01a\_7: DOME C Experiment (Cao)
- 09:40 Action DA-09-01a\_8: Cal/Val & Post-launch Test Sites (Chander)
- 09:50 Action DA-09-01a\_9: Radiometric Standards (Fox)
- 10:00 Action DA-09-01a\_11: Reference Test Site Data Collaboration & Comparison (Fox / Chander / Cao)

### **Other GEO task actions being led by the WGCV & its subgroups**

- 10:10 Action DA-09-01b\_1: Land Product Harmonisation (Baret)
- 10:20 Action DA-09-01b\_2: Data, Metadata & Product Harmonisation; Interactions between WGCV & WGISS (Apaphant)

**10:40 – 11:00 Coffee**

### **QA4EO**

- 11:00 Action DA-09-01a\_10: QA4EO (Lecomte / Stensaas)
- 12:00 GSICS Quality Assurance Processes (Cao)
- 12:20 DMCii Cal/Val Programme & Preliminary Experiences towards QA4EO Implementation (Mackin)
- 12:40 NASA Cal/Val Programmes & QA4EO Implementation (Ungar)

**13:00 – 14:00 Lunch**

- 14:00 Action DA-09-03d\_3: Global DEM (Muller)
- 14:10 Action DA-09-03d\_4: Global DEM (Muller)

### **Proposed involvement of WGCV in new GEO task activities** (Stensaas)

- 14:20 AR-09-01c: GEOSS Best Practices Registry
- 14:25 DA-09-03a: Global Land Cover
- 14:30 DA-06-01: GEOSS Data Sharing Principles
- 14:35 EC-09-01a: Ecosystem Classification and Mapping
- 14:40 EC-09-01c: Regional Networks for Ecosystems
- 14:45 ST-09-02: Promoting Awareness and Benefits of GEO in the Science and Technology Community
- 14:50 US-09-03c: Bio-geophysical, Soil & Land Surface Data
- 14:55 US-09-05d: Global Phenology Data



**Wednesday 27 May 2009 (continued)**

**15:00 – 15:30 Coffee**

15:30 Round-up discussion on GEO task commitments

**Constellations**

16:00 Constellation interactions with WGCV (Stensaas)

16:15 LSI

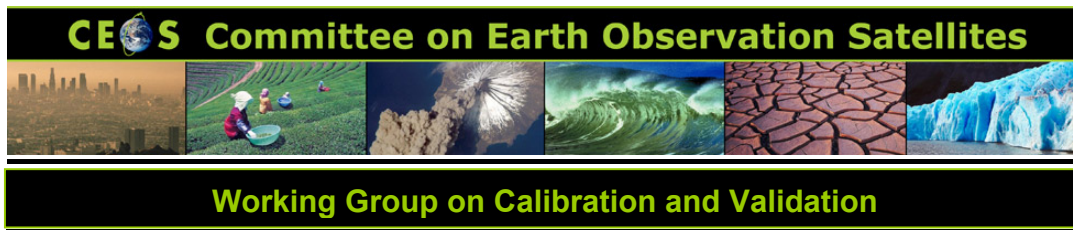
16:30 Oceans (Johnson)

16:45 Others

17:00 Round-up discussion on Constellation commitments

**17:30 Close**

**20:00 Hosted Dinner**



## **Thursday 28 May 2009**

### **CEOS SEO's interaction with the WGCV**

- 09:00 SEO 2009 tasks and their relevance to the WGCV (Killough)
- 09:30 Specific domain (WGCV Subgroup) inputs to the SEO's Google Earth visualisation tool (Chander)
- 10:10 WGCV website (Greening / Keith)

**10:40 – 11:00 Coffee**

### **Country & agency reports (continued)**

- 11:00 DMCii (Mackin)
- 11:20 ESA (Lecomte)
- 11:40 INRA (Baret)
- 12:00 JRC (Widlowski)
- 12:20 NASA (Gutman)
- 12:40 NIST (Johnson)

**13:00 – 14:00 lunch**

- 14:00 NOAA (Cao)
- 14:20 NPL (Fox)
- 14:40 University of Leicester, UK (Llewellyn-Jones)
- 15:00 USGS (Stensaas)
- 15:20 VNIIOFI (Burdakin)

**15:40 – 16:00 Coffee**

- 16:00 WGCV Future Tasks Discussion / WGCV Committee requirements
- 16:30 Concluding business / discussion including recommendations to CEOS plenary
- 17:00 Action items from this meeting (Greening)
- 17:20 Dates and place for WGCV-31

**17:30 Close**



## **ANNEX B: WGCV-30 PARTICIPANTS**



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