



39th CEOS WGCV Plenary

Hosted by DLR

DLR Representative's Office in Berlin

Friedrichstr. 171, Berlin, Germany

Minutes WGCV-39

Version 1.0 (Final)

July 28th, 2015

Pre-note

The minutes are taken along the original agenda which may be changed during the meeting in its order in some very rare cases. The minutes are extended by a separate list of the remaining open action items from this plenary and the plenaries before. Additionally, the list of participants is appended.

In order to distinguish between reporting or presentation minutes and discussion contributions, the discussion contributions have been indented. Contributions are assigned to persons and to be seen as part of a discussion process.

It shall be noted that in contrast to former meetings the current meeting minutes and those in the future shall concentrate on reporting results of discussions and presentations rather than providing lengthy, detailed transcriptions of the meeting over the course of the day. For that reason, some discussions were summarized, some topics (for example: status CEOS deliverables) were reported in total in one section. This approach had been selected to provide a result-oriented overview, especially for those, who could not participate in the plenary meeting.

Wednesday, May 6th, 2015

1. Introduction CEOS WGCV Plenary 39

Albrecht von Bargaen welcomed on behalf of DLR and CEOS WGCV all attendants. The meeting was hosted at the DLR liaison office in Berlin City Centre and provided by DLR chairman's office. The attendants did highly appreciate the opportunity to hold the meeting at this meeting place. The welcome was followed by a brief round table introduction of each attendant. It was highly acknowledged that many participants from far abroad did attend; with new representatives being welcomed from several agencies including CAST (China), NSO (Norway), NOAA (USA), and USGS (USA).

2. General Business I

Adoption of Agenda

The Agenda Version 1.1 was presented to the plenary. An additional discussion item about GEO tasks was added to General Business III (Friday May 8th). With that the agenda was unanimously adopted for the plenary session.

Chair's Report

Albrecht von Bargaen presented the Chair's report and went through the current CEOS WGCV work structure with an overview of new and upcoming CEOS activities including interaction between Working Groups (WGs) and Virtual constellations (VCs) and new ad hoc teams. He also informed about the planning and implementation of new CEOS WGCV activities. Those activities are strongly related to the use and benefit of Earth Observation applications and will be implemented by taking into account specifically this perspective. Those include especially the recommendations and usage of Global Digital Elevation Models (DEMs), clarification about the application of atmospheric corrections with emphasis to terrestrial and oceanographic applications, and finally the question of how cloud masking is defined and used in different algorithm developments and applications. Concerning the implementation of the CEOS WGCV secretariat, he provided an update to the plenary. All available documentation had been forwarded by CSA to DLR. The goal for the coming

nine months is to make the secretariat more visible for the members of CEOS WGCV. The chair himself aims to reach a higher attendance of the CEOS WGCV by new members. He identified approaches in addition to the usual general mailing such as direct consultation with CEOS members or direct invitations for specific topics or sessions and will implement these ideas in coming meetings. Currently, the membership is stable but coming challenges due to the CEOS deliverables will require an extension of expertise through additional members. It shall be noted that IOCCG could be welcomed during the plenary and JAXA will contribute in the future with a new representative.

Jan-Peter Muller (UCL) suggested inviting also guest speakers to meetings to discuss their best practices to which the chair agreed.

In addition to regular reporting to the CEOS chair via monthly CEOS SEC teleconferences and the CEOS SIT team, there was a presentation of the CEOS WGCV activities during the CEOS SIT meeting the end of March 2015 in Paris, France. The CEOS work plan update had been discussed between CEO/DCEO and chair and vice-chair intensively. It has been decided to wait for any amendment for the rolling update in 2015 and to collect input during the CEOS WGCV plenary and follow-up activities. This had been agreed to find a synchronization modus between deliverables deadlines and the CEOS WGCV internal work plan.

It was also stated that the interaction and cooperation with other CEOS entities shall be presented more proactively, e.g. by systematically working in fields of possible common interests. During the recent CEOS WGClimate meeting, CEOS WGCV had the opportunity to present in two slots more specifics of its portfolio which was positively acknowledged. It was also agreed in case a member is asked to present CEOS WGCV, that coordination with chair and vice-chair shall be in place in advance to have a well-structured approach. However, a discussion of cooperative activities will take place in more detail during the meeting as part of several different agenda topics. Today's meeting included as focus for interaction with other entities, the cooperation with GSICS and IOCCG, in particular. This is reflected in the agenda.

The plenary was also informed in general about the outcome of the WGCV Planning meeting held in February 2015 in Radebeul (Germany) which was a follow-up of an action item from CEOS WGCV plenary 38 (AI 38-08). A result of the meeting was not only the refinement of three activities to be defined but also a general approach ("task approach") to address cross-cutting activities in the future within CEOS WGCV or in cooperation with other entities. A more specific discussion will follow under agenda topic "WGCV planning meeting" and "General business III" where on one hand the road maps will be discussed and on the other hand the formal inclusion in the Terms of References.

Finally, the chair informed about the recent CEOS SIT meeting including side meetings of the LSI VC, the WSIST and the editorial board for the Data Application Report. The focus of the SIT meeting was also on the participation on the Climate Conference to be held in July 2015 in Paris, France, and COP-21 in December 2015 as well as GEO cooperation including the set-up of the new GEO work plan.

Xiaoxong Xiong requested for clarification how Ocean Colour is handled in CEOS WGCV. Albrecht von Barga described that IOCCG is associate member of CEOS and thus welcome to each VC or WG. In addition, there is also a VC on Ocean Colour Radiometry. The focus of the special session shall be the identification of possible cooperation fields between all three, OCR-VC, IOCCG and WGCV.

Albrecht von Barga did also confirm Gabriela Schaepman-Strub's request that the way forward and the handling of the Carbon action items is part of the agenda topic of the CEOS WGCV 39 plenary.

Open CEOS WGCV Action Items from former plenaries

A survey about the status is provided in the external document *CEOS-WGCV-39-OpenActionItemsFromRecentMeetings.pdf* as it is linked to the CEOS web page. Note that action items which remained open are also noted in the appendix of the minutes. Additional notes with respect to closure where needed:

WGCV-38-01: closed during meeting by email May 7th, 2015

WGCV-37-07: close-out during WGCV 39 plenary

WGCV-38-06 through 08: see general discussion on WGCV web outreach (General Business III); all action items set on hold.

Approval of CEOS WGCV 38 minutes

The minutes of the CEOS WGCV plenary 38 had been distributed two weeks in advance for review via the CEO web portal. The members of CEOS WGCV are able to provide comments until end of June 2015. It is unanimously agreed that if no comment is submitted for inclusion the minutes are agreed after that date for approval.

No comments had been submitted until end of July 2015 so that the minutes of CEOS WGCV plenary #38 are approved by CEOS-WGCV.

3. Agency Reports Part I

It should be noted that the UKSA agency report has been withdrawn from the agenda, because no report had been prepared for presentation and a change in the principle support of CEOS WGCV by UKSA has been announced (see below).

Geoscience Australia (Medhavy Thankappan)

Medhavy Thankappan reported a variety of activities from Geoscience Australia regarding Cal/Val. He started to present the SAR calibration activities informing about the finalization of the implementation of 40 corner cube reflectors in the north of Queensland. The field testing is relying on multiple missions and a published report is available. However, the results of RADARSAT-2 seem to be an outlier compared to three other missions.

The terrain illumination correction for optical sensors based on TandDEM-X data shows very encouraging results because of the finer details relative to other DEM sources. Geoscience Australia did also evaluate the World DEM against Lidar data and noted some issues in areas where landscape is moving due to vegetation growth and surface movement.

Jan Peter Muller pointed out that this had been predicted a decade ago.

Some further items had been also high-lighted by Medhavy Thankappan including the opportunity to migrate the National Spectroscopy Database to Geoscience Australia, the Cal/Val of Ocean altimetry in the Bass Strait, and the support of SMAP validation through the SMAPEX campaign. However, he provided also an update with respect to Geoscience Australia's Data Cube project showing as example case water observations from space which are now online and are also in use to evaluate sites for RADCALNET.

Medhavy Thankappan finalized his presentation pointing to the cooperation with ESA, USGS, and CSIRO; however, including also the interest in cooperation all actual cross-cutting activities of CEOS WGCV with additional interest in BRDF and terrain illumination correction.

China Academy of Space Technology CAST (Mingzhu Zhang)

The CEOS WGCV highly appreciated the initial plenary attendance. Thus, the presentation was divided into two parts; one was dedicated to the introduction of the entity itself, the other to specific Cal/Val activities.

CAST is working as the civilian based space technology arm of CASC where the core business in space is demonstrating a high share in Earth Observation. Located in Beijing, CAST is providing a range of

LEO/SSO/GEO satellites and constellations as well of GNSS (Beidou). CAST is also actively involved in Lunar and Human space flight. Upcoming key launches (14 in 2014 with one in science and 13 in Earth Observation) will be 22 launches of 8 pico- and nano-satellites with 3 Telecom and 9 Earth Observation payloads including numerous partners around the world.

Calibration facilities of CAST include pre-launch calibration (radiometric, geometric). On-orbit calibration is carried in collaboration with other research groups. The recent Cal/Val includes the ZY-3 satellite (mapping satellite) with CSIRO support for inflight calibration, the GF-2, the GF-4 geo mapping sensor (expected to be launched in 2016), and the GF-5 hyper-spectral pre-launch calibration. For the latter the launch date is expected for 2016 also.

Patrice Henry asked for data policy, especially with respect to GEO data. Xiaoxiong Xiong asked for clarification where data can be accessed.

CAST representatives pointed out that CAST is the satellite provider but not the satellite operator (CNSA) who is responsible for the data policy including data access.

Norwegian Space Centre (Vigdis Lonar Barth)

An update about the SIOS infrastructure project has been given which is an Arctic observing system with membership organizations having open access to research facilities and data. Currently it includes organizations from 10 countries as members. Cal/Val is key part of SIOS service infrastructure. Additionally, a sea ice cruise is becoming active part within SIOS. Pilot projects within SIOS include data access through data management system with interface to European Union's Copernicus programme. The ESA Cal/Val campaign CryoVex with Norwegian participation is not documented in ESA documentation system and available. It includes a variety of measurements from snow pits, core collections, etc.

Finally, the facility of the ALOMAR observatory was presented and the NIVA activities.

European Space Agency (Bojan Bojkov)

Bojan provided a brief update about the Earth Explorer and Sentinel mission status. He then pointed out that QA4EO principles are being maintained in the frame of the Long-term Data Preservation programme line which supported substantially the feedback mechanism of the knowledge from data products quality reliance on instrument quality. He then reported about Fiducial Reference Measurements (FRMs) based on the PANDONIA network for ozone and air quality, the RADCALNET prototype station, the projects FRM4STS for land, ocean, and ice surface temperature. Other FRM projects are planned with respect to Ocean Colour (FRM4SOC), corner reflectors (FRM4SAR), atmospheric species (FRM4AC), and ocean altimetry (FRM4ALT). He finally pointed out that the Sentinel 1A calibration is also relying on the Australian network of corner cubes.

Centre National D' Etudes Spatiales (Patrice Henry)

The presentation includes a survey about the re-calibration of completed missions, e.g. Parasol, VGT, and SPOT 5. Secondly, he reported about the calibration status of the missions Pleiades, IASI, Megha-Tropiques, and IIR on Calipso. The IASI A/B inter-calibration is quite good and also good in consistency with other sounders but there is a small consistent difference to CRiS for both IASI instruments on EUMETSAT MetOp A/B. He also presented the continuing work for the SPOT series (5,6, and 7) and Landsat 8 for vicarious calibration about Le Crau. His presentation was finalized with an outlook on future work with respect to ESA and European Commission Sentinel 2A, 3A and the French mission Venus.

Belgian Space Office (Jean-Christopher Lambert)

Jean-Christopher Lambert provided an update of the Belgian contributions to Earth Observation

missions regarding atmosphere, land, oceans, snow, ice and solar. He emphasized that a SOLSPEC workshop took place in March 2015 and gave an update about validation including round-robin activities on ozone products.

4. Sub-group Report Part I

Infra-red and Visible Optical Sensors Sub-group (Nigel Fox)

After stating the mission of the sub-group, the planned activities and intended workshop ideas had been presented. Thematically, the work plan is arranged around themes as land surface reflectance, Atmospheric Corrections, Ocean Colour, etc. with emphasis to the fundamental sensor baseline. The coming sub-group meeting in November in Toulouse, two months after the early commissioning phase of Sentinel 2A, had been announced. An outline of the coming meeting was presented. The original plan is to have a 1 to 1 ½ day sub-group meeting and workshops on invitation only grouped around specific themes. In response to the action item to provide the list of members to the secretariat, the sub-group chair stated that currently around 25 organizations or around 70 persons are in his listing. The action item WGCV-38-04 will be closed with handing over of the listing to the CEOS WGCV secretariat.

The CEOS WGCV chair and Vice Chair recommended that the full week of the sub-group meetings, including the topic-specific workshops, be open to all attendees. Allowing each individual to decide whether to attend one of the splinter meetings should help the open exchange of information from these workshops to the rest of CEOS.

Terrain-Mapping Sub-group (Jan Peter Muller)

The chair of the sub-group presented an overview about the mission and objectives of the sub-group. He pointed out that meetings are mostly carried out virtually or aside major conferences and workshops as for example IGARSS. He provided an update of recent results and of the current work from several members of the sub-group.

Finally, he brought up the topic that, in the future, UKSA will not continue to support his chairmanship after having an internal review about UK's CEOS activities. In explaining that fact it means that UKSA further supports the chair of the IVOS sub-group and moves in addition its focus to other CEOS activities.

However, the chair requested to discuss this item more intensively during the General Business III session, and discuss the fact that with this message, the sub-group will be without a chair after the CEOS WGCV plenary.

Atmospheric Composition Sub-group (Bojan Bojkov)

Bojan provided also an overview about the mission and objective of the sub-group and gave an update of the activities. He emphasized that the support of the FRMs is carried out in response to CEOS deliverables CV-6 and CV-7 and completes them. He also addressed, by highlighting the interaction with other VCs and WGs, the CEOS deliverable CV-4. In response to the deliverable CV-5, a small-scale meeting aside CEOS-WGCV 38 at NOAA led to the setup of an activity for instrument calibration.

Microwave Sensors Sub-group (Xiaolong Dong)

Recent progress was achieved by organizing the MW sensors sub-group into focus areas and identifying priorities and plans for implementation. The update included also a discussion how to interact with GSICS on possible joint meetings and preparations for meeting with Ocean Surface

Vector Wind Team including the OSVW VC in May, 2015. He discussed the progress and new activities along topic groups.

Land Product Validation Sub-group (Gabriela Schaepman-Strub)

Gabriela gave an overview about recent activities which included also a summary about the focus areas. She also plans to have a meeting for a further evolution of the sub-group strategy. Her presentation included examples of the focus group areas which provided a representative insight in the sub-group's work. She also addressed the good progress on the CEOS deliverables CV-11 and CV-12. She applied to set the status of CV-11 on "complete" which was agreed by the WGCV plenary.

5. CEOS Work Plan Deliverables

The plenary discussed one by one each Work Plan deliverable that is relevant to CEOS WGCV under CV to clarify the status of each deliverable. In the following table the results of the sub-group reporting and the other inputs are combined. Please note that CEOS deliverables discussed on other days are also included in this table for ease of reporting. Please note that instead the long-title version of the deliverable in the CEOS work plan a shortcut had been used. Title and background information in the CEOS work plan are compulsive.

#	Title	Status Description	Concluded Status
CV-01	Cal/Val portal update	See minutes under "General Business III"	Open / new concept for web outreach of WGCV in discussion
CV-02	Website for SAR calibration sites and targets	The website has been implemented and is prepared for completion by filling in information about calibration sites and targets	Completed – the website infrastructure exists and it is up to the community to provide the information which shall be displayed.
CV-03	Workshop on pre-flight characterization	Drafted discussion points have been circulated to the preparation team; however the draft workshop implementation is delayed, but will be drafted by the WGCV secretariat.	Delayed with some impact to schedule but no impact on content
CV-04	WGCV self-analysis on VC/WG interactions	WG is currently achieving progress by interacting with VCs and WGs and improving this. Self-analysis will be summarized at the announced target date.	Open
CV-05	GSICS Cooperation	Cooperation with GSICS is now structured on a good baseline. See also the minutes regarding this topic.	(partially) completed – an overview report is in preparation for close out during SIT workshop in 2015 at latest.

CV-06	Inter-calibration of ground-based networks	The NDACC and GAW networks do now cooperate with CEOS WGCV members on regular basis. The activities are part of sub-group (ACSG) reporting.	completed
CV-07	Co-ordinated set-up of ground based networks in supporting validation of air quality products	Work on Fiducial Reference Measurements as part of the deployment of the PANDONIA network addresses this	Completed
CV-08	SST & LST comparison campaign plan	The kick-off of the driving project for the activity was at the end of April 2015 so that the planning of the activities is finished and the implementation is ongoing	Completed
CV-09	RADCALNET	The implementation is progressing well along the implementation plan	In project plan
CV-10	Potential and fitness check for TanDEM-X DEM products	The activity (a) had been finished successfully; (b) is under implementation awaiting the final TanDEM-X product in 2016/2017 and (c) can be finally concluded with the end of Sentinel-2 commissioning phase	Partially completed
CV-11	Validation of terrestrial ECV products	Deliverables of CV-11 are available through the LPV website (Q1 2015, http://lpvs.gsfc.nasa.gov/). This includes for each ECV (essential climate variable) and EBV (essential biodiversity variable) a) the highest validation stage reached to date, b) state-of-art validation approach, c) best currently available in situ reference data set, d) status of validation protocol	Completed
CV-12	Evaluation of validation supersites and new validation approaches	– A list of new validation sites complementing an earlier list was submitted for the Sentinel-2 validation site planning. This list includes sites with major current and future validation activities by LPV members and are characterized at a level to allow for 3D radiative transfer modelling approaches (e.g. biochemical and structural characterization, including terrestrial lidar). A final list of LPV core sites (in addition to existing in situ networks) is planned as deliverable for Q4.	Extended Q4 / 2015

Thursday, May 7th, 2015

6. Agency Report Part II

CSIRO (Tim Malthus, remotely)

During his introduction Tim Malthus pointed out that CSIRO will become CEOS Chair in November 2015 for a one-year period.

With regard Cal/Val he started to report about the progress in Australia which is now documented in an action plan for a long-term vision and greater visibility. This document is available as a printed document. He then provided updates about the Cal/Cal exercises which had taken place in Perth and Canberra and with the Lake Lefroy. The introduction of a second land site was a good reason for him to request how to include those into the LandNet sites. However, he presented the future plans for the second test site including a field campaign during June 2015. He then discussed extensively the current validation activities in full variety.

In addition to his presentation, a discussion about the request how to include the Lake Lefroy site in the repository of Landnet occurred with a clarification by the Landnet project members how and in which steps they think to include those.

Gabriela Schaepman-Strub requested for PoCs for the sub-group LPV; Tim Malthus will provide those (see also Action Item WGCV-39-05)

Nigel Fox did also remind on the Sea Surface Temperature (SST) round robin activities and similar for LST because of the added value of having Australian representatives and the need for long lead times to budget such activities. Tim Malthus assumes that it is known but he will ensure that this is the case.

Jan Peter Muller asked about the BRDF function of the second test site. Tim Malthus emphasized the efforts about understanding the influence of the BRDF but reminded that the current work is still preliminary and the characterisation of BRDF is one activity to be carried out to fully understand the test site characterisation.

NOAA (Aaron Pearlman)

The NOAA agency report has been presented by Aaron Pearlman, his first time presenting to CEOS WGCV. He first reminded the group about a side meeting held during CEOS WGCV plenary 38 in which an inter-comparison of microwave instruments amongst international programmes had been discussed. He reported about the status at NOAA. Furthermore, he discussed the validation and cross-comparison efforts between S-NPP instruments and compared to similar activities as performed for GOES-R. He then informed that GOES-R Cal/Val activities will also include field campaign efforts along with other GEO satellite sensors. Finally, he listed also GSICS – CEOS interactions.

Xiaoxong Xiong asked about the use of the spectral polarimetry from Level 1 data; Aaron Pearlman emphasized the support of Radiative Transport Calculation (RTC) understanding and Aerosol characterizations.

Xiaoxong Xiong requested also for some details about NOAA ICVS web-tool for providing information on sensors for inter-calibration, e.g. the handling of large numbers of sensors; Aaron Pearlman reminded the numerous existing sensors in the system.

Prof Lingling Tang asked for clarifications about options for the Day-Night Band of the VIIRS sensor; Aaron Pearlman pointed out that well-characterized (and standardized) ground-based light sources appear to be a very good opportunity for characterizing the DNB.

NRSCC (Chuanrong Li)

Prof. Chunarong Li provided first an overview about environmental remote sensing in China but also about the important efforts carried out for the coordination of emergency response taking into account remote sensing assets. He also discussed the data sharing platform as part of requests from GEO and GEOSS. Then, he presented a detailed description about the Baotou flight campaign including an update about the Baotou site with respect to microwave and optical bar pattern targets. He finalized his reports with an outline of future work.

Jan Peter Muller asked about the humidity of the dry site and the usefulness for L-band and P-band SAR calibration; Prof. Li responded that the site can be seen as very dry because of about 300 clear days per year, but the suitability for the requested application must be proved.

DLR – moved to Sub.group Report II

See below

USGS (Ron Morfitt)

Ron Morfitt, also making an initial presentation to WGCV, presented a detailed overview about the Landsat 7 and 8 missions and performance including corrections for TIRS stray light and the TIRS encoder for the scene-selection mirror. Furthermore, he described the image assessment of a broader range of imagers including commercial systems and further international sensors. He also introduced the Land Product Characterization System (LCPS) which has been designed for the collection of information on sensor characterization to facilitate the characterization and validation of land-related products.

Patrice Henry asked about the Ground Control Points (GCP) programme with emphasis the geometric consistency between Landsat 8 and the coming Sentinel 2 in terms of common usage of GCPs. He amended with asking about who at USGS contacted about geometric evaluation whom at CNES; Ron Morfitt agreed that the GCP programme shall include a common approach for both missions and stated that USGS is very interested in collaboration on this, but he is currently not sure about the contacts between USGS and CNES in this particular item.

Jan Peter Muller recommended searching through the Landsat archive for possible GCPs rather using the archived GCPs. The well understood system shall be used for the development of new GCPs; Ron Morfitt responded that there is a need for well-known GCPs in order to retrieve the best geo-location.

Gabriela Schepman-Strub asked about a USGS PoC for the LPV sub-group (see also action item WGCV-39-07).

Prof. Tang requested what type of Laser systems (LIDAR) had been used for the evaluation (see also presentation); Ron Morfitt responded that an airborne system was in use.

NASA (Kurtis Thome)

Kurtis Thome provided an overview about near-term projects and high-lighted SLI and the activities regarding Landsat 8 and Sentinel 2 at NASA.

Gabriela Schepman-Strub and Jan-Peter Muller asked about the focus of the groups funded in the S2DUP programme; Kurtis Thome responded that the research groups or investigators who are funded through the recent proposal call are focussed on land cover application products. However, there are also research groups funded directly by the Landsat project for the evaluation of instrument-level inter-comparison.

Joint Research Centre / European Commission (Giuseppe Zibordi)

Giuseppe Zibordi provided first an overview about the terrestrial activities with emphasis to the RTC comparisons including the JRC code RTC programme RAMI. He then provided an overview about the activities regarding Ocean Colour which he presented in detail during the Special Session about Ocean Colour during the afternoon. He emphasized the issue how to introduce new and improved instrumentation for validation without compromising the quality of the results. New instruments may not necessarily lead to improved results and care and time must be taken for understanding the impacts of new instruments not only for themselves but also for a running validation network. He also brought up some recommendations (see presentation) for in-situ measurements for vicarious calibrations

Gabriela Schaepman-Strub did emphasize the importance of JRC's efforts and the LPV likes to be informed how LPV can raise the importance of the terrestrial research group at JRC; Giuseppe Zibordi thanked for the statement and agreed about the importance of cooperation with the LPV sub-group.

EUMETSAT (Tim Hewison)

Tim Hewison provided on behalf EUMETSAT a brief overview about current and near-term future missions. He also described the efforts for making the instrument calibration information available and readily accessible.

7. GSICS and CEOS WGCV

GSICS / IVOS Workshop on Lunar Calibration (Tim Hewison)

Tim Hewison provided a special presentation reporting about a Lunar Calibration workshop held in November 2014 introducing background information and the motivation to organize such a workshop. He presented a framework for the collaborative effort which leads to a lunar model suitable for instrument monitoring. He also described the requirements for absolute calibration of the lunar irradiance. However, he also pointed to the difficulty to get formal support from agencies for a long-term support to characterize the moon's irradiance.

Xiaoxong Xiong stated that NASA is currently not able to support by funds.

Jan-Peter Muller cited some examples of SCOPE-CM regarding coordinated efforts and asked whether a similar approach may be suitable; Tim Hewison responded that the funding is usually dedicated to individual research groups instead to a dedicated infrastructure for characterization of the absolute lunar irradiance which does not allow an approach such as SCOPE-CM.

Prof. Chuanrong Li asked what the next steps will be for the characterization of the absolute Lunar irradiance. Tim Hewison responded that the current data sets of the different research groups shall be brought together to achieve a precision around 1%. However, to achieve such level of precision is a significant investment.

Xiaoxong Xiong emphasized this point and reminded about NIST activities to provide a fixed point for scaling the different inputs via a standard.

A lengthy and fruitful detailed discussion on error budgets and precisions closed this topic of the agenda demonstrating many open issues (see also the presentation) related to the absolute Lunar irradiance calibration.

GSICS Organization and Collaboration

Tim Hewison provided during his presentation of EUMETSAT activities also an update about the GSICS organization which includes also a formation of a new Infra-red sub-group of the GSICS

Development Working Group (GDWG). He also informed that Rosemarie Munro (EUMETSAT) is now chairing the UV sub-group. He then discussed GSICS inter-comparison activities and efforts.

Medhavy Thankappan did ask how GSICS does choose the correct solution from the intercomparison efforts; Tim Hewison replied that there is developed a metrics especially for this item and the instrument quality will be automatically assessed continuously.

Discussion

Tim Hewison then started the discussion about the interaction with CEOS WGCV emphasizing that the working level activities between the GSICS VIS sub-group and the CEOS WGCV IVOS sub-group led also to the above mentioned Lunar calibration workshop in addition to many other activities. In addition, he also pointed to the interaction between the UV subgroup of GSICS with the CEOS WGCV ACSG which include inter-calibration activities and inter-comparisons and finally includes a joint workshop in October 2015 between both groups in College Park, MD (USA).

The Chair recommended to draft from each sub-groups reports a list for a short summary about the interaction between GSICS/CEOS-WGCV interaction in order to have a structured survey about current and future activities. Tim Hewison responded to pick up the list and to draft a summary (see also action item WGCV-39-09). However, some discussion about the mapping between the GSICS GDWG sub-groups and CEOS WGCV sub-group occurred but it was also reminded that there is not only a historical background but also a background in applications.

8. Interaction with Other CEOS Entities

Carbon Action Items

No charts were presented because this item had been discussed during the recent plenary session without any dedicated outcome. However, it can be concluded that the Carbon Action Items as they are currently formulated, cannot be translated into direct activities or action items for the CEOS WGCV. Thus, the first step will be to examine the action items for which the CEOS WGCV is responsible. This assessment shall provide an approach for close-out. There was a lengthy discussion about an approach. However a small group out of the plenary representing all sub-groups had been settled (so-called Carbon Action Item Group) in order to carry out the assessment. The Carbon Action Item Group includes the Chair, Vice-Chair, and an expert recommended by each sub-group chair to represent their respective sub-group. In addition the path forward has been agreed in action items WGCV39-10 through WGCV39-15.

LSI Constellations (Patrice Henry, Chair, Vice-Chair)

Patrice Henry provided a brief overview about the status of re-implementation discussion of the LSI VC. He highlighted proposed interactions with CEOS WGCV. Members agreed in principle with the approach of the implementation plan (version end of April 2015) and saw the representation of WGCV in the LSI VC activities as sufficient to follow the developments in the LSI VC work. Chair was commissioned to answer including some remarks with respect to wording. It shall be noted that chair and vice-chair took several times the opportunity to share the LSI VC teleconferences to discuss the implementation plan.

Sea Surface Temperature Constellation (Nigel Fox)

Nigel Fox presented on the progress of the SST/LST comparison to be carried out with the SST VC which is also a deliverable in the CEOS work plan (CV-8). He reported about the Kick-off meeting held

several weeks ago, of the ESA project which substantially supports the first phase of the comparison campaign. He also announced that the project team is open for volunteering agencies to participate, especially in comparisons of the field measurements. An invitation letter will be sent out by June 30th, 2015. He updated the plenary about the schedule according to the project which includes now the round robin at NPL in Q1/2016, with field comparisons in Namibia by Q1 / 2017, and a pilot IST in April 2016.

Excuse: RadCalNet (Nigel Fox)

Nigel Fox provided an update about the status of the project RADCALNET and to clarify multiple questions regarding accuracies, data products, and the inclusion of further validation sites. During the discussion it was observed that it is not even clear for all members of CEOS WGCV when a project as RADCALNET is part of the activities of CEOS WGCV or a project for its own about a member or different members are reporting. However, the Chair recommended for the future that it shall be clarified at the very beginning whether an activity report is for the benefit of CEOS WGCV or it is in order to become an activity of CEOS WGCV. If the latter is the case, it must be clear for everybody that then the activity is open to every member of CEOS WGCV to participate in different shape.

9. Special Topic Session: Ocean Colour

The Chair opened the session by coming back to his report from the very beginning of the plenary session. CEOS WGCV is now selecting a new path for setting up a concrete interaction with a Virtual Constellation, in this particular case the OCR-VC. He expressed his appreciation of the attendance of IOCCG and their willingness to join the plenary. He emphasized also that IOCCG as associate member of CEOS is able to attend the CEOS WGCV plenaries and hopes that today's plenary will be a good starting point for having IOCCG attending regularly.

Introduction to IOCCG and OCR-VC (Paul Digiaco, remotely)

Paul Digiaco of NOAA joined the session remotely. He is one of the chairs of the OCR-VC but also member of IOCCG. In his presentation he provided an overview about IOCCG, its organization and its mandate. He emphasized the impressive report series of IOCCG which is available about many subjects around the retrieval of Ocean Colour. The OCR-VC was also introduced with its ToRs. As interesting output of the OCR-VC the white paper on calibration and protocols had been introduced. He recommended some of the substantial outputs for discussion with CEOS WGCV.

Ocean Colour Calibration Approaches (Ewa Kwiatkowska)

Ewa Kwiatkowska of EUMETSAT is a member of the IOCCG Executive Committee and the OCR-VC. In order to provide a more in-depth understanding about the calibration approaches in the Ocean Colour community, Ewa Kwiatkowska summarized the issues with ocean colour retrieval emphasizing that, for achieving a surface leaving radiance uncertainty around 5%, 0.5% top-of-atmosphere radiance uncertainty is needed. She provided an overview about the typical calibration and characterization approaches for the Ocean Colour retrieval. Additionally she introduced the term "System vicarious calibration" as calibration to a well-characterized in-situ source of SI-traceable water-leaving radiance. She also reported about the IOCCG task force to unite the Ocean Colour expertise across the different agencies. This task force is chaired by G. Meister (NASA), L. Fournier (CNES) and herself.

Nigel Fox raised the question regarding the need to form an additional group on pre-flight calibration since there is no difference between the sensor groups characterizing sensors for terrestrial and ocean applications; Giuseppe Zibordi commented that IOCCG is interested in

advocating for Ocean Colour specific questions. Ewa Kwiatkowska pointed out the difference of Ocean Colour needs. She emphasized that the task force focuses on both pre-launch and on-orbit calibration requirements specific to ocean-colour applications.

The Chair responded with the comment that the requirements are different but the methods to be applied for characterization are the same.

However, one of the additional outcomes during the discussion was that the large overlap in persons working on sensor characterization between IOCCG and the sub-group IVOS leads and led to some limitation in participation in some cases because of limited resources. In order to strengthen the cooperation, the sub-group IVOS will evaluate the IOCCG documentation and consider endorsing IOCCG's cal/val-related recommendations as a starting point for future discussion and sharing of information. IOCCG as associate member is also welcome to attend furthermore the CEOS WGCV meetings and to participate on the sub-groups activities, in particular IVOS. However, the IOCCG task force on calibration is free to invite members of CEOS WGCV including sub-group members.

Ocean Colour Calibration and Validation Approaches (Giuseppe Zibordi)

Giuseppe Zibordi provided an overview about the validation of Ocean Colour by presenting the COASTS measurement approaches, campaigns, and others for the validation of SeaWiFS and VIIRS. He presented also an overview about BiOMaP. He demonstrated the quality of the validation efforts with numerous comparisons of water leaving radiance to multiple sensors and comparison for aerosol retrievals. In a laboratory example of calibration based on JRC and NIST SIRCUS he could demonstrate differences below 1%. Furthermore he presented example cases in order to underline the need for understanding the differences in calibration of operating radiometers in air versus in water for in-situ measurements. Finally, he presented the uncertainties in vicarious calibrations in relative and absolute terms.

Nigel Fox commented on the high quality need for traceability effort.

Friday, 8th, 2015

10. CEOS WGCV Planning Workshop

The chair reviewed the previous day emphasizing the discussion with the Ocean Colour community and the desire to continue the interaction in future CEOS WGCV plenaries.

Introduction and Survey (Albrecht von Bargaen)

The chair presented the outline of the WGCV Planning Workshop held in Radebeul (Germany) from February 25 to 27, 2015. The workshop addressed directly the planning and set-up of three concrete activities which had been identified during the past CEOS WGCV plenaries. Because it was noted that those activities are overarching several sub-groups and initiatives, a new approach seemed to be evident for the future for such kind of initiatives. Thus, the first goal of the workshop was the identification of a roadmap for implementation of the three activities as noted also in the action items of CEOS WGCV plenary 38. In order to be prepared for future challenges, a generalized approach was also discussed during the Radebeul workshop. For that reason, experts were invited to describe the concepts of SCOPE-CM, WCRP GEWEX or EUEMTSAT SAFs. This was taken as stimulation to define a **task approach** presented by the Chair (see also below). At the beginning of the workshop it was clearly emphasized that CEOS WGCV is not only working within its own cosmos but also strongly embedded within the CEOS work plan that requires interaction and cooperation with other

CEOS bodies or other external entities. For that reason an updated cycle for planning is needed including changes in reporting of milestone achievements and ensuring transparent status updates. Invitations to the workshop were forwarded to each sub-group lead with an invitation for each sub-group to be represented. The workshop was seen as being very fruitful by all participants. In conclusion the three announced tasks in response to the WGCV38 actions are *Atmospheric Correction*, *Cloud Masking*, and *Global Digital Elevation Model* in Earth Observation applications. Each task was concretely defined and an implementation lead identified to elaborate an implementation plan in a pre-phase period for each task. In order to inform the plenary, the different tasks and its status with respect to the road map outline were presented.

Tasks on Atmospheric Correction and Cloud Masking (Bojan Bojkov)

Bojan emphasized that - as it was noted as outcome during the workshop – two leads had been identified for each task: He will be in the lead position for both tasks together with Eric Vermote (NASA/GSFC) for Atmospheric Correction and with Rainer Hollmann (DWD) for Cloud Masking. He described the proposed objectives for both tasks. Bojan emphasized that the risks to achieving success for the tasks are minimized if the lead position is filled with an accepted person from the (science/research) community, there is clear programmatic acceptance by the agencies, and progress is seen as steady and in an efficient and timely manner. He pointed out that the timeline will terminate in 2018 because there is a need to properly set-up the implementation plan for the coming CEOS WGCV plenary.

Xiaxong Xiong asked about how the activity regarding *cloud masking* fits into the international programmes. Bojan responded that the proper cloud masking and the definition of what cloud masking is for a particular application is not on the agenda of these efforts, today.

Jan-Peter pointed out that there is no standardized method for showing that a cloud mask is fit for purpose and that there is no single standard cloud mask that works in each Earth Observation application properly. Bojan agreed and emphasized that the major issue is still the definition of, and consistency in, reporting the status of “*no cloud*”.

Ewa reminded that different sensors provide different type of masks.

Giuseppe pointed out past radiative transfer comparisons with regard to the task *Atmospheric Correction* and emphasized the need of a well-defined activity to ensure a relevant contribution.

Task on Global Digital Elevation Model (Jan Peter Muller)

An overview about the task was presented beginning with the motivation for such an activity. Global DEMs are the basis for many Earth Observation applications or research which points directly to the fact that those must be fit for purpose in use. Logically, the Global DEM objective is sub-divided along the needed spatial resolution. The task objective is to find a recommendation along this baseline. He pointed out that for a spatial resolution larger than 250 m, the GMTED2010 shall be the choice. Thus, he recommended an open license solution and to add a cross-reference on the CEOS WGCV webpage to GMTED2010 for coarse resolution sensor geometric and radiometric calibration.

Higher spatial resolution is an issue because no validated data set is available for the spatial resolution class between 30 and 250 m. A first flavour how a validated data set can be developed was presented. Additionally, the impact on Landsat 8 and Sentinel 2 data products was also discussed. Proposed next steps include also very high spatial resolution sensors and the access to corporate sources (mobile telecom sources) or “citizen science” (respond of citizens with respect to their spatial positioning).

He also raised the issue of the future of the TMSG sub-group reminding WGCV that his UKSA support

to act as chair was ending. Jan-Peter offered the recommendation that TMSG be allowed to expire and to transfer their activities as part of the Global DEM task. The discussion about that approach was moved to General Business III.

Question regarding how sub-groups may be included in the activities are recorded under the next agenda topic.

Task Process Approaches (Albrecht von Bargaen)

The chair introduced the task approach which has been set-up and intensively discussed during the CEOS WGCV workshop in Radebeul in February 2015. He reminded that the task approach origin stems from the situation that cross-cutting issues between several sub-groups have been raised during several recent plenaries with little further activity to address them.

The core of the drafted task approach shall be

- A task is defined including a concrete goal to be achieved in a clear time span;
- The time span shall be limited to two years;
- A task must be described in advance by a roadmap or implementation plan containing a clear definition of goals to be achieved, milestones and schedule;
- The roadmap or implementation plan shall be set-up during a short pre-phase not extending past the period between two plenary meetings;
- A minimum of two leads are needed but one must be nominated by an agency member to set-up the task team;
- A task team terminates after the envisaged schedule, milestone plan. If the goal cannot be achieved, termination shall include an assessment why;
- Progress, schedule, milestones and resource situation are subject to reporting during CEOS WGCV plenaries;
- The needed resources must be clarified and ensured during the pre-phase;
- The CEOS WGCV approves the task team after the pre-phase checking the pre-conditions laid out for task teams and provides the “Go” under CEOS auspices.

There was a long and open discussion about the implementation of such a process, especially with the emphasis on what the benefits for such a process would be. In summary, some questions were formulated. Two were related to the objection that there already is a formalized process and how this task approach is different and why it is needed; another was the question whether an activity shall now always be formulated as a task approach or whether it can be started as a sub-group activity and later transition to a task. It was clarified that for ensuring a resource-allocated process, some formalization is needed, especially for activities which are cross-cutting through different sub-groups or communities which are currently not served by a sub-group. It is also up to the members of CEOS WGCV or its sub-groups to define their activities in a sub-group or in a task approach. The task approach shall be seen as an alternative for a limited activity. A sub-group can elevate an activity to a task to ensure the capabilities to address it exist and ensure visibility of the task. However, if the conclusion of the task leads to a promising result, the result can be brought into a sub-group as a continuous activity if interest and resources are available.

The Chair pointed out that it is important to include very clearly the sub-group mechanisms for such an approach into the Terms of References. Furthermore there are two general reasons to rework the ToR. The first is because CEOS proposes to rework, with respect to the new implemented process papers, the ToRs of the Working Groups. The other reason is that currently the CEOS WGCV has a work plan including the ToRs and a high-level intended work plan. It was proposed by the chair to set-up ToRs which will be valid for several years and a separate work plan which includes also a reference to concrete CEOS WGCV deliverables in alignment with the CEOS deliverables. He proposed to work out these documents together with the Vice Chair and the secretariat by having advice from the CEO to present them to the CEOS WGCV at the end of this year so that a ToR and an update of the work plan can be approved during the coming plenary. The CEOS WGCV agreed about the proposal and the task approach.

Product Validation Metrics (Gabriela Schaepman-Strub)

In her presentation she briefed the CEOS WGCV plenary about the background and history of the Validation Metrics which had been developed some several years ago and finally evolved to the four stage approach. The aim of the presentation was also to open such an approach for the usage in other communities than the current LPV sub-group. However, the LPV sub-group is in the process to evolve the current scheme which includes the clarification of the definitions.

This is in accordance with the statement raised by Jan Peter Muller about the usage of uncertainty in this context and the heritage from developing many of these stages earlier which had been agreed upon by Gabriella in terms of further need for updating the terminology. The discussion resulted in Action Items WGCV39-21 and WGCV39-22.

11. General Business II

This part of the agenda was dedicated to the ToRs and the work plan which had also been discussed during the session about the “task approach”. The outcome of this session pointed directly to that agenda item. WGCV was reminded that the CEOS governance paper had been reworked and CEOS WGCV must also rework its ToR. In addition the proposal to carry out the rework includes the splitting of the current work plan into a permanent ToR document and a work plan as a living document including deliverables and action items within the CEOS WGCV.

Chair and Vice Chair will modify and work on these documents in cooperation with CEO of CEOS and report on this during coming plenary. A draft will be sent out in advance of the coming plenary for comments to allow an approval.

12. Sub-group Reports Part II

DLR agency report (Albrecht von Barga and Manfred Zink)

Because of scheduling, the DLR agency report was moved to this agenda topic. However, the reporting was mostly addressing SAR subjects readily allowing it to be placed before the sub-group report that followed.

First an overview about the National agency programme was given. More specifically, the status update regarding the TanDEM-X mission was provided. It is expected that the Global DEM product will be completed in the third quarter of 2016. It was also demonstrated that the data products are well within specifications.

Jan Peter Muller asked for clarification which water mask has been used. It was replied that an internal mask has been used.

Additionally, Jan Peter Muller asked about the public release of the 3 m DEM product. In general this product will be available for scientific purposes but a registration is needed.

Synthetic Aperture Radar (SAR) Sensor Sub-group (Manfred Zink)

The report emphasized that the primary progress is achieved during the sub-group workshops. The most recent was held during summer 2014 (EUSAR), and the upcoming one will be the CEOS Calibration and Validation workshop hosted at ESA ESTEC in Noordwijk, The Netherlands, from October 27th until 29th, 2015. Unfortunately, CSA did announce some days later the ASAR workshop for the week afterwards.

In response to the CEOS work plan deliverable CV-2, the webpage has been developed and implemented. Currently, the members of the sub-group are contacted to provide

input about the calibration and validation site information. CEOS WGCV acknowledged the progress on this deliverable and with the web site being updated with the site information, the deliverable can be seen as completed.

13. General Business III

CalVal Portal

ESA (Bojan Bojkov) informed the plenary about the funding status, the acceptance status, and the usage status of the Cal/Val portal. He reiterated that currently only one sub-group is taking advantage of this infrastructure by providing news and information via the Cal/Val portal. Observing the interested people who access the Cal/Val portal, he mentioned that mostly insiders make use of the web-site. In addition he also pointed out that the funding must be prolonged this year. He will be able to do so only if there will be a concept regarding the Cal/Val portal which includes all activities of the WG and does make the Cal/Val portal interesting. He also emphasized that some update in the structure is needed.

The CEOS WGCV Chair thanked Bojan for the open-minded statement which is very helpful for setting up a future plan. The chair reminded everyone that the CEOS web site had launched a new design at the end of 2014. Now, the CEOS WGCV is requested to decide what type of information will be provided and where it will be located in a consistent manner. He described two extrema which may be on one side having all information at the CEOS web portal with the consequence that all updates of each particular sub-group must flow via the CEOS WGCV secretariat to the SEO for implementation. Alternatively, the CEOS web portal can be used as an entry point to a distributed system of webpages which may then be coordinated by other mechanisms.

After having some discussions about the maturity of different available webpages regarding the CEOS WGCV, it was unanimously agreed that the WGCV secretariat under the supervision of the Chair and the advice of ESA will work out a sustainable concept for the web outreach of the CEOS WGCV. (see also action item WGCV39-23).

It was also recommended to have an Executive Summary of the plenary on the web-page including the highlights and achievements. (see action item WGCV39-24).

Action Item List at End of the CEOS WGCV Plenary 39

The following table lists the action items that were identified during the CEOS WGCV plenary 39. In order to complete the overview the listing of open action items from former CEOS WGCV plenaries are given in a second table.

Table 1 List of action items collected during the CEOS WGCV 39 plenary

	Action	Responsible Party	Due Date
WGCV39-01	Forward list of Action Items to Sub-Group chairs and all responsible parties as well as publish on the WGCV web site	Chair / Vice Chair	June 15, 2015
WGCV39-02	Propose methodology for updating LandNet list of approved test sites (both removal of non-active sites and inclusion of new sites)	Thome (NASA)	IVOS-27
WGCV39-03	Present proposed method for LandNet site update to WGCV plenary	Fox (BNL)	WGCV-40
WGCV39-04	Provide updated information regarding LandNet to the Cal/Val portal	Thome (NASA)	WGCV-40+1 week

	Action	Responsible Party	Due Date
WGCV39-05	Contact names for Australian representatives to LPV	Malthus (CSIRO)	WGCV-40
WGCV39-06	USGS to initiate contact with ESA/CNES for geometric calibration contact for Landsat 8/Sentinel 2 harmonization	Morfitt (USGS)	June 30, 2015
WGCV39-07	Contact name for USGS representative to LPV	Morfitt (USGS)	WGCV-40
WGCV39-08	Draft GSICS/WGCV collaborations based on WGCV-39 Sub-Group presentations provided to GSICS, WGCV, and Sub-Group chairs for comments	Vice Chair / Chair	July 31, 2015
WGCV39-09	GSICS/WGCV comments on draft GSICS/WGCV collaboration list provided to WGCV chair	GSICS Chair, WGCV Sub-Group Chairs	Aug. 31, 2015
WGCV39-10	Circulate excel sheet of Carbon Strategy action items to all sub-group leads, and vice chair	Chair	May 20, 2015
WGCV39-11	Sub-group leads and vice chair in case, if needed, will provide a name of an expert of their sub-group for the Carbon Strategy action items (Carbon Action Item Group)	Sub-group leads	June 3, 2015
WGCV39-12	Telecon called to discuss path forward for Carbon Action Item Group	Chair	June 12, 2015
WGCV39-13	Draft of initial mapping of AIs to activities of subgroups or other WGCV activities provided to WGCV Chair. This includes also process for addressing the action items	Sub-group chairs	June 30, 2015
WGCV39-14	Draft WGCV recommendations on Carbon Action Items provided to WGCV chair	Sub-Group chairs	Aug. 31, 2015
WGCV39-15	Presentation of draft response from WGSV to CEOS-SIT on Carbon Action Items (next step will await comments from SIT)	WGCV Chair	Sept. 17, 2015
WGCV39-16	Atmospheric Correction Task work plan including objectives; schedule; and deliverables	Bojkov (ESA)	WGCV-40
WGCV39-17	Cloud Masking Task work plan including objectives; schedule; and deliverables	Bojkov (ESA)	WGCV-40
WGCV39-18	Global DEM Task work plan including objectives; schedule; and deliverables	Muller (UCL)	WGCV-40
WGCV39-19	Add cross-reference on the WGCV web page to GMTED2010 for coarse resolution sensor geometric and radiometric calibration	Muller (UCL) Burini/Bojkov (ESA)	WGCV-40
WGCV39-21	Send revised Validation Stages Table to sub-group chairs for internal review within WGCV	Schaepman-Strub (LPV sub-group chair)	Sept. 30

	Action	Responsible Party	Due Date
WGCV39-22	Comments on Validation Stages Table provided to LPV chair	Sub-Group chairs	WGCV-40
WGCV39-23	Formulate a draft concept for the use of the Cal/Val portal and CEOS web site by WGCV	Chair and Secretariat, in cooperation with ESA	June 15, 2015
WGCV39-24	Distribute executive summary and highlights of the WGCV-39 meeting minutes to the Chair with the goal of having such text as part of the CEOS web site	Vice Chair	May 31, 2015
WGCV39-25	Evaluation of IOCCG Requirements as basis for future collaboration/discussion	IVOS	IVOS-27
WGCV39-26	Chair/Vice Chair to update the current status of the CEOS Work Plan deliverables versus the CEO/DCEO	Chair/Vice Chair	June 30, 2015
WGCV39-27	Chair and Vice Chair to provide LSI-VC implementation team comments to the LSI-VC Draft Implementation Plan	Chair/Vice Chair	May 15, 2015

Regarding the open action items of former CEOS WGCV plenaries following status occurs:

1. Action items from CEOS-WGCV plenary 36 are all closed
2. Action items from CEOS-WGCV plenary 37 are all closed except WGCV-37-02 with deadline extended to CEOS-WGCV IVOS sub-group meeting 27 in November 2015
3. Action items from CEOS-WGCV plenary 38
 - a. Open WGCV-38-02, WGCV-38-04, WGCV-38-06, WGCV-38-07, WGCV-38-08, WGCV-38-09, and WGCV-38-12
 - b. All others closed

Table 2 List of open action items from former CEOS WGCV plenaries: Relevant update with respect to due date and activity are noted in the right-most column.

	Action	Responsible Party	Due Date
WGCV-38-02	IVOS Chair to setup a doodle poll regarding availability of participants for a follow-up telecon to the October 2013 WebEX session with user community on the development of best practices for use of External Solar Irradiance Spectrum	IVOS chair (N.Fox)	<i>New due date (WGCV 39) is End of November 2015 (IVOS 27)</i>
	Revisit of Action Item during coming IVOS sub-group meeting 27		<i>New due date (WGCV 38) is Dec 31, 2014</i>
	Task team set-up during IVOS 27		<i>March 1st, 2014</i>
	Left Open (End-of November 2015)		
	Left Open (2014-10-02-WGCV38)		

	Action	Responsible Party	Due Date
WGCV-38-04	<p>Update WGCV 39: 4 sub-group chairs provided information</p> <p>Each subgroup to identify the active members of their subgroups (with their affiliation).</p>	Sub-group chairs	<p>Update: remaining sub-group information until end of May 2015</p> <p>WGCV-39</p>
WGCV-38-06	<p>TMSG Chair to provide definition / information of his sub-group to B. Bojkov and A. Burini (ESA) for hosting on cal/val portal.</p> <p>see webpage discussion during plenary 39 and AI WGCV-39-23</p>	J.P. Muller	WGCV 39
WGCV-38-07	<p>MWSG Chair to provide definition / information of his sub-group to B. Bojkov and A. Burini (ESA) for hosting on cal/val portal</p> <p>See update on WGCV-38-06</p>	X. Dong	WGCV-39
WGCV-38-08 a	LPV Chair to formulate a recommendation to WGCV to add functionality to current OLIVE tool on cal/val portal.	Schaepman-Strub (UoZ)	Oct 31 st , 2014
WGCV-38-08 a	To second the recommendation of LPV on adding functionality to OLIVE and will request support from the WGCV	Bojkov (ESA)	Nov 15, 2014
WGCV-38-08 a	WGCV Chair to write support letter to ESA for enhanced functionality of OLIVE tool	von Bargaen (DLR)	Dec 15, 2014
WGCV-38-09	To formulate an approach for sub-setting via cal/val portal by SIT-30 for recommendation to CEOS.	Bojkov (ESA)	SIT-30 Mar 29, 2015
WGCV-38-12	WGCV Chair to seek clarification with SAR Chair on recommendation 2 (SAR 2013-1) and recommendation 3 (SAR 2013-2).	Srivastava (CSA)	Oct 17, 2014
WGCV-37-02	<p>Revisit of Action Item during coming IVOS sub-group meeting 27</p> <p>Task team set-up during IVOS 27</p> <p>Left Open (End-of November 2015)</p> <p>Left Open (2014-10-02-WGCV38)</p> <p>IVOS Chair to setup a doodle poll regarding availability of participants for a follow-up telecon to the October 2013 WebEX session with user community on</p>	IVOS chair (N.Fox)	<p>New due date (WGCV 39) is End of November 2015 (IVOS 27)</p> <p>New due date (WGCV 38) is Dec 31,2014</p> <p>March 1st, 2014</p>

Action	Responsible Party	Due Date
the development of best practices for use of External Solar Irradiance Spectrum.		

Planning of coming plenary meetings

Because of efforts by several CEOS members, the Chair was fortunately able to present the place and date for the coming plenary meetings. First, he thanked CSIRO and GEOSCIENCE AUSTRALIA for offering to organize the coming plenary meeting (#40) in parallel with CEOS WGISS from March 14th – 18th, 2016, in Canberra, Australia. He shared also his appreciation that JAXA has offered to organize the 41st plenary at the end of September 2016 in Japan. A SAR sub-group session will be included in the session week.

The Chair did thank on behalf on the CEOS WGCV all three agencies for the help to organize a plenary.

Close-out of the meeting

The Chair closed the meeting with appreciation of everyone's attendance and thanked for the fruitful discussions. He emphasized that he is delighted about the productive achievements which may point to fruitful future activities.

The Vice Chair expressed on behalf of the plenary the appreciation about the meeting and the host.

Appendix

A List of Attendants

	Name		Entity	Role
Dr	Bojan	Bojkov	ESA	Member, ACSG chair
Dr	Paul	Di Giacomo*	NOAA	Chair OCR-VC
Prof	Xiaolong	Dong	NSSC, CAS	Member, MWSG Chair
Dr	Nigel	Fox	NPL	Expert, IVOS Chair
Ms	Hongyan	He	CAST	Member
Mr	Patrice	Henry	CNES	Member
Dr	Tim	Hewison	EUMETSAT	Member, GSICS
Dr	Ewa	Kwiatkowska	EUMETSAT	Member, IOCCG
Dr	Jean-Christopher	Lambert	BIRA-IASB	Member, ACSG Vice-Chair
Prof	Chuanrong	Li	NRSSC, CAS - AOE	Member
Prof	Heguang	Liu	NSSC, CAS	Member
Ms	Vigdis	Lonar Barth	NSO	Member
Dr	Tim	Malthus*	CSIRO	Member
Mr	Ronald	Morfitt	USGS	Member
Prof	Jan-Peter	Muller	UCL	Expert, TMSG Chair
Dr	Aaron	Pearlman	NOAA NESDIS	Member
Dr	Gabriela	Schaepman-Strub	University of Zurich	Expert, LPV Chair
Prof	Lingli	Tang	NRSSC, CAS - AOE	Member
Mr	Medhavy	Thankappan	Geoscience Australia	Member
Prof	Kurtis	Thome	NASA GSFC	Member, Vice-Chair
Dr	Albrecht	von Bargaen	DLR	Member, Chair
Dr	Xiaoxong	Xiong	NASA GSFC	Member
Ms	Mingzhu	Zhang	CAST	Member
Dr	Guiseppe	Zibordi	EC - JRC	Member
Dr	Manfred	Zink	DLR	Member, SARSG Chair

* Remote participation

B Acronyms

Acronym documentation is limited to acronyms which are not common in the CEOS environment. Agencies and entities names which are also logoed as acronym are not listed.

Listing to be added.