

**COMMITTEE ON EARTH OBSERVATION SATELLITES
WORKING GROUP ON CALIBRATION AND VALIDATION**

**MINUTES OF THE 21ST MEETING
WGCV-21**

15 – 17 October 2003

Hosted by:

**Center for Space Science and Applied Research (CSSAR)
&**

Chinese Academy of Sciences (CAS)

at

**Club Conference Room, Friendship Hotel,
Beijing,
P.R. China**

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Acronyms

AATSR	Advanced Along Track Scanning Radiometer
AVHRR	Advanced Very High Resolution Radiometer
BNSC	British National Space Centre
Cal/Val	Calibration / Validation
CCRS	Canada Centre for Remote Sensing
CEOP	Coordinated Enhanced Observing Period
CEOS	Committee on Earth Observation Satellites
CHRIS/PROBA	Compact High-Resolution Imaging Spectrometer / Project for On-Board Autonomy
COSPAR	Committee on Space Research
CRT	CEOS Review Team
DEM	Digital Elevation Model
Envisat	Environmental Satellite
EOS	Earth Observing Satellite
ERS	Earth Resources Satellite
ESA	European Space Agency
ESRIN	European Space Research Institute
ESSAC	Earth Systems Science Advisory Committee
ESTEC	European Space Research and Technology Centre
GHz	Gigahertz
GIFTSS	Government Information From The Space Sector
GOFC	Global Observation of Forest Cover
GOME	Global Ozone Monitoring Experiment
IGOS	Integrated Global Observing Strategy
ISPRS	International Society for Photogrammetry and Remote Sensing
ISSMAP	<i>In situ</i> Sensor Measurement Assimilation Programme
IVOS	Infrared and Visible Optical Sensors
JERS	Japanese Earth Resources Satellite
LPV	Land Product Validation
MERIS	Medium Resolution Imaging Spectrometer
MHz	Megahertz
MODIS	Moderate-Resolution Imagination Spectrometer
NASA	National Aeronautics and Space Administration, USA
NASDA	National Space Development Agency, Japan
NIST	National Institute of Standards and Technology, USA
NOAA	National Oceanic and Atmospheric Administration
NPL	National Physical Laboratory
NPOESS	National Polar-orbiting Operational Environmental Satellite System
NPP	NPOESS Preparatory Project
RV	Research Vessel
RADARSAT	Radar Satellite
SAR	Synthetic Aperture Radar
SIT	Strategic Implementation Team
SPOT	Systeme Probatoire pour l'Oberservation de la Terre
SRTM	Shuttle Radar Topography Mission
TIFRI	Technology Innovations for Radiometer Instruments
TM	Terrain Mapping
USGS	United States Geological Survey
WGCV	Working Group on Calibration and Validation
WGEdu	Working Group on Training and Education
WGISS	Working Group on Information Systems and Services
WMO	World Meteorological Organisation
WTF	WGCV / WGISS Test Facility

1 Welcome from the official WGCV-21 hosts (Li-Qin Shao)

Li-Qin Shao welcomed the WGCV-21 delegates on behalf of the Ministry of China, CSSAR and CAS. He informed the meeting that at 09:00 that morning the first Chinese manned space mission had been launched. The timing of the WGCV-21 plenary was thus very relevant to China. He hoped that all present would enjoy their stay in Beijing and have a successful meeting.

1.1 The development and tendency of Chinese satellites for Earth Observation (Li De-Ren)

De-ren Li provided a short introduction to Earth Observation satellites in China. He also covered the receipt, processing and distribution of EO data, and the variety of applications considered both within China and also internationally.

Desnos thanked **Li-Qin Shao** and **Li De-Ren** for their warm welcome. He also expressed his thanks to He-Guang Liu and to Xang-Fei Wang for their efforts in organising the meeting.

The agenda (Annex A) was unanimously approved.

Apologies for absence had been received from Philippe Teillet and Peter White (CCRS), Evert Attema and Manuel Martin-Neira (ESA), Ian Dowman (UCL), Bruce Davis (NASA), Giuseppe Zibordi (JRC) and Lasse Petterson (NERSC).

Morissette asked that best wishes be passed from the WGCV onto **Evert Attema** during his time of illness.

2 WGCV chair's report

2.1 Report from the WGCV Chair (*Yves-Louis Desnos*)

Desnos presented the WGCV chair's report. **Hilsenrath** asked about publications and enquired whether the newsletter could be released as hardcopy and not just .pdf. Hardcopy versions would be better for distribution to colleagues. He also raised the issue of the latest version of the WGCV brochure; a new version has been produced but has not yet been made available. **Desnos** agreed to send 50 copies of the WGCV brochure to each of the subgroup chairs, and to the WGCV secretariat (*Action WGCV21-1*). He also agreed to investigate the production and distribution of the newsletter as hardcopy (*Action WGCV21-2*).

2.2 Update from the WGCV Secretariat (*Marie-Claire Robinson*)

Robinson presented an update from the WGCV secretariat.

2.3 Review of Action Items from WGCV-20

WGCV17-10	SAR subgroup to request WGISS to provide task team for POL-INSAR data formatting.	Open – to be discussed at the next SAR subgroup meeting
WGCV18-13	Subgroup chairs to provide the secretariat with contributions to the next cal/val newsletter (issue 10).	Closed
WGCV19-1	WGCV Members to provide to Secretariat cal/val case studies for inclusion on the website.	Closed
WGCV19-5	Martin-Neira / Hilsenrath to identify existing education material and channel this to WGEdu through secretariat.	Open – not received
WGCV19-8	WGCV members to provide comments on the first draft of the test facility.	Closed
WGCV20-1	Secretariat to update the WGCV website in collaboration with the ESA Graphics Bureau.	Closed
WGCV20-2	WGCV members to propose a replacement for Desnos as WGCV chair.	Closed
WGCV20-3	Secretariat to update the Work Plan v 3.0 (into v 3.1) and distribute to WGCV members for approval.	Closed
WGCV20-4	WGCV members to comment on Bullet 4, Page 1 of the WGCV Work Plan v3.0 ('Be such that the Members and Associates will support the action').	Closed
WGCV20-5	Subgroup chairs to update the subgroup mission, objectives and / or action plan in v3.0 of the WGCV Work Plan as appropriate.	Closed
WGCV20-6	Desnos to contact the EUMETSAT CEOS secretariat representative (David Williams) to request that EUMETSAT be actively represented within the WGCV.	Closed
WGCV20-7	Hilsenrath to include the issue of the two ground-station project proposals in discussions with the Atmospheric Chemistry IGOS theme and report back at WGCV-21.	Closed
WGCV20-8	Martin-Neira to re-work the Microwave Sensors subgroup recommendations and report back to WGCV-21.	Open – to be reworked for WGCV-22
WGCV20-9	Rast to check if MERIS data is available for the WGCV / WGISS test facility core sites and liase with Morisette / Dwyer .	Closed
WGCV20-10	Morisette to provide the Secretariat with the links to reports / websites / publications that relate to the LAI intercomparison & the Fire / burn scar work.	Closed
WGCV20-11	Subgroup chairs to actively communicate with the Secretariat to ensure that all meetings / workshops are publicised throughout the WGCV membership.	Closed
WGCV20-12	Subgroup chairs to liase with the relevant IGOS themes and report back at WGCV-21.	Closed

WGCV20-13	Muller to provide the Secretariat with a copy of, or a link to, the best practise dossier for the WGCV website.	Open - awaiting reviewed and updated version before distribution
WGCV20-14	Muller to provide to the Secretariat with a text document, as a supplement to the presentation made at WGCV-20 on his behalf by Gordon Keyte, to explain the activities of the Terrain Mapping subgroup.	Closed – not received
WGCV20-15	Morisette / Dwyer to prepare a proposal to ESA to access data over the WTF core test sites included in Phase 1.	Closed
WGCV20-16	Morisette / Dwyer to arrange for a WGCV / WGISS Test facility demonstration at the CEOS-17.	CEOS-17
WGCV20-17	Weinreb to propose a NOAA representative for the joint ISPRS / WGCV taskforce.	Closed
WGCV20-18	Hilsenrath to ask the NGST (system contractor for NPOESS) to be represented on the joint ISPRS / WGCV taskforce.	Open
WGCV20-19	Dowman to confirm the updated Action plan for the joint ISPRS taskforce in the WGCV work plan and to send any comments to the Secretariat.	Closed
WGCV20-20	Secretariat to forward the draft version of the Action plan related to the ISPRS taskforce to Bruce Davis (taskforce chair) for approval.	Closed
WGCV20-21	Datla to follow up on the Action plan for the joint ISPRS taskforce, encourage the participation of the Taskforce chair to WGCV-21, and to report back to the WGCV.	Closed
WGCV20-22	Secretariat to invite the joint ISPRS / WGCV taskforce chair, Bruce Davis, and Ian Dowman to WGCV-21.	Closed
WGCV20-23	Muller to provide the Secretariat with the minutes from the Terrain Mapping subgroup held in 2000 in Gaithersburg, which should give the background to the joint ISPRS taskforce. Secretariat to distribute these to the WGCV members.	Closed
WGCV20-24	Secretariat to produce a draft cal/val Newsletter (issue 10) for approval.	Closed
WGCV20-25	Secretariat to produce issue 10 of the cal/val Newsletter and post it on the WGCV website.	Closed
WGCV20-26	Rast / Hilsenrath to refine a recommendation submitted by IVOS on instrument convolution and reference solar spectrum and report back at WGCV-21.	Closed

2.4 CEOS Chair update (*James Yoe*)

Yoe presented an update on behalf of the CEOS chair, Greg Withee (NOAA). **Hilsenrath** questioned how GEO would fit in as there seemed to be a lot of overlap with IGOS. **Yoe** was not sure of the exact details for the implementation of GEO as it is a relative newcomer to the picture. He agreed that there was a potential conflict with GEO and that every effort should be made to ensure co-operation rather than conflict. **Hilsenrath** added that there would not necessarily be a conflict, more of an overlap. **Yoe** explained that GEO was initially politically motivated and it is incumbent on CEOS to approach them for clarification. **Hilsenrath** suggested that the WGCV should raise this at CEOS plenary to make sure that GEO recognises what CEOS has already done and the importance of cal/val in achieving the GEO goals. **Muller** added that there is no mention of cal/val at all on the GEO website. **Yoe** explained that, so far, discussions have been very high level and talk has been in general terms. CEOS therefore needs to openly approach GEO to inform them of what CEOS has done. CEOS and the working groups are essential and Greg Withee, as CEOS chair, has recognized that. **Morisette** suggested that the WGCV should be formally recognised by the GEO. A recommendation could be put forward to CEOS plenary to ensure that CEOS is fully recognised by GEO and to suggest that the WGCV serve as a possible subgroup of GEO to ensure full integration of any activities undertaken. It was agreed to review the GEO terms of reference and report back to WGCV-22 (*Action WGCV21-3*).

2.5 IGOS and the WGCV (*Gordon Keyte*)

Keyte explained that in December 2003 BNSC plan to hold a workshop to cover international collaboration programmes such as CEOS, IGOS, GMES etc., with the idea of informing the UK community what is going on. At that workshop, the link between the workings of the subgroup and what is happening within IGOS at an international level will be addressed. **Keyte** asked that he be kept informed of any subgroup activities so that he will be able to feedback at the December workshop. There is a need to identify what is going on and the potential involvement of the wider (UK) community. **Morisette** suggested that **Keyte** could present the structure and workings of the WGCV and its subgroups at the workshop. **Keyte** is planning to do this and hopes to improve the UK support to the workings of the WGCV and its subgroups, e.g. at present the UK does not have a representative to the Microwave Sensors subgroup and this needs to be rectified.

2.6 WGCV Work Plan

The WGCV work plan was update into version 3.3.

2.7 Nomination / election of new chair for the WGCV

Desnos introduced **Ungar** (NASA) as the proposed next WGCV chair. **Ungar** has a history of involvement in cal/val experiments and has been involved in many joint activities. He has worked very successfully with individuals in different institutions and countries and this way of working has proved to be very effective.

The appointment of **Stephen Ungar** as the next WGCV chair was unanimously approved by the delegates present at WGCV-21. His appointment will be put forward to CEOS plenary in November 2003 for ratification.

3 Reports from Subgroups

3.1 Atmospheric Chemistry (*Ernest Hilsenrath*)

Hilsenrath reiterated the origins of the Atmospheric Chemistry subgroup, its goals and objectives, and how they fit in with IGOS and integrated activities. The issue of the closing of key ground station sites was raised. **Yoe** asked if a letter of support should be sent from CEOS supporting the reopening of the Eureka ASTRO ground station. **Hilsenrath** suggested that discussions with the Canadians should be undertaken to work out how such a letter should be formulated. Funds have to be raised to reopen the station and this would require some national support. The Canadians would want to provide support not just for international use, but also to support domestic activities. **Muller** asked whether aerosols should become part of the remit of the Atmospheric Chemistry subgroup. Aerosols have so far been treated discretely and it would be a shame for aerosols to be lost from the Atmospheric Chemistry subgroup. **Hilsenrath** expressed the concern that this would make the group very large. Although there is already a strong area of expertise and research in aerosols within the group, it would double the content of the working group. **Muller** identified that there are a lot of ground-level air quality measurement networks and he asked if any of these communities are represented within the Atmospheric Chemistry subgroup. **Hilsenrath** explained that, from space, it is difficult to quantify many of the parameters being measured by these ground networks. It may be that a comparison of meteorological measurements and ground-level tools would be useful. Talks with the EPA to see how ground-level sources are measured and to see how compatible these measurements will be to satellite remote sensing are just beginning. **Muller** further added that all of the ground-based measurements for aerosols are currently outside urban areas and this needs to change.

Desnos explained that EUMETSAT representation within the Atmospheric Chemistry subgroup is vital to coordinate the validation activities of Metop and NPOESS. NPOESS is already onboard and starting huge validation programmes. If the WGCV, therefore, had the support and involvement of EUMETSAT, a complete coordination exercise could be carried out. This should be put into the CEOS plenary report. **Rast** also expressed the desire to have a EUMETSAT representative in the IVOS subgroup, although this is not as urgent a requirement as for the Atmospheric Chemistry subgroup.

3.2 Infrared and Visible Optical Sensors (*Michael Rast*)

Rast reported on the 13th IVOS meeting, held in the two days prior to WGCV-21. A document on traceability in the thermal infrared had been produced and this will be provided to the Secretariat. Under discussion is another infrared radiometer intercomparison. A workshop on the intercomparison of large-scale optical sensors is also being planned for October 2004, in conjunction with an IVOS meeting.

Rast reported that he had been trying to access the CEOS dossier and to assess its current status. This had not been successful and had thus given up on this issue. **Morisette** explained that there was never the infrastructure to support the maintenance and updating of the dossier site. **Rast** stressed that he was not being negative about the dossier, just pointing out that it is now outdated. **Desnos** asked **Morisette** to clarify the status of the CEOS dossier at NASA (*Action WGCV21-4*).

The IVOS subgroup are proposing more use and involvement in the WTF, and also in improvements to the facilities it provides. **Morisette** welcomed this and said that he would be happy to discuss it further with **Rast**.

Following on from the work already undertaken by the IVOS subgroup on the terrestrial carbon IGOS theme, **Keyte** asked about the other IGOS themes. **Rast** affirmed that good cross calibration is very important and that the carbon examples are part of an overarching theme. IVOS is concerned with

radiances and not applications. **Rast** recognised that ocean targets have so far be rather neglected, but there are plans to find out what intercomparisons over ocean sites have been undertaken thus far.

3.3 Land Product Validation (*Jeffrey Morisette*)

Morisette gave the report from the LPV subgroup. The CEOS WMO database, hosted at <http://altostratus.wmo.ch/sat/stations/SatSystem.html>, was brought to the attention of the delegates. This database is a fantastic resource for the WGCV and CEOS needs to be more involved in it. It currently tries to relay accuracy information at different product levels, but **Morisette** raised concerns about the importance of ensuring that standards are upheld and that there is a link to supporting statements / documents to back up the accuracy claims made. Where possible the supporting documentation should be peer reviewed. **Desnos** agreed that there should be some interaction between the WMO website and the CEOS subgroups, but he also explained that accuracy statements evolve with time and we have to be careful about making such demands. **Shiue** suggested that a best practice guideline could be added if a statement of accuracy is made, and this should then be backed up with estimates of uncertainty. **Morisette** suggested that all the subgroups visit the WMO pages and relate it to their sensors (*Action WGCV21-5*). **Morisette** was additionally tasked with finding out who actually maintains the site (*Action WGCV21-6*). Information on the WMO site and the WGCV's concerns will be included in the WGCV's report to CEOS plenary. This is an important issue as there is a CEOS label on it and we need to pass the message that we are looking into it on to CEOS.

The LPV is planning a special issue publication with the objective of providing "acceptable standards" (but not "mandatory protocols"). **Morisette** will communicate with the WGCV to identify and invite potential contributors (*Action WGCV21-7*) to the proposed TGARS special issue, which will probably be submitted to IEEE in 2003. **Desnos** agreed to check how the SAR special issue was published a few years ago and to let **Morisette** know how they went about it (*Action WGCV21-8*).

3.4 Terrain Mapping (*Gordon Keyte*)

Muller provided details on the background and mission of the Terrain Mapping group. His presentation included details of the SRTM context, distribution issues, quality assessment and examples over cal/val test sites. The original plan was for the subgroup to meet on 1 Dec 2003, but this has now been postponed until next year. **Desnos** offered to host the next meeting at ESRIN and it was agreed to discuss this further offline.

Some discussion on DEM availability was undertaken. **Desnos** identified that there is already another source of DEM available to replace GTOPO30. This is a global DEM that is publically available for a small fee from De Montford University. This DEM was used in the Envisat ground segment and the plan is to include it in the product tools, e.g. for MERIS. **Muller** explained that he had tried to get hold of this DEM but so far had been unsuccessful. It would be interesting to do a comparison with ACE and GTOPO30. **Desnos** explained that this has already been done and he showed examples of ACE and Envisat altimetry to show that there are other sources of DEM and that some work has already been done. He agreed to arrange for the ACE-GDEM to be supplied to the TM subgroup for peer review (*Action WGCV21-9*)

Concerning the WTF, within phase 2 there should maybe be some DEM activity. It would be a real achievement for the community if we could document some of the findings and artifacts. It maybe that WTF phase 2 should provide the facility for a DEM test site.

3.5 Microwave Sensors (*Yves-Louis Desnos*)

Desnos presented the report from the Microwave Sensor subgroup on behalf of **Martin-Neira**. The recommendations from the subgroup will be presented at the next WGCV plenary as they require further discussion and clarification.

3.6 SAR (*Masanobu Shimada*)

Shimada reported on the SAR workshop held in 2003, which produced one recommendation (Recommendation 4 in section 9). **Keyte** was concerned about the recommendation as it originally said that the Amazon could be used as a reliable calibration target. The Amazon is not, however, a primary target, and should only be used as a secondary reference for characterisation of the antenna pattern. **Shimada** informed that it had been agreed at Montreal that the Amazon can be used for absolute calibration. **Shiue** asked what would be used to characterise the variability the Amazon. **Shimada** explained that the Amazon has been shown to exhibit very little variability over time. **Keyte** expressed concern about using the Amazon for absolute calibration. Man-made targets should continue to be used, the Amazon is not a primary standard. **Desnos** agreed that it should be ensured that what is done is traceable to the primary standard. **Fox** suggested that it could be used as a reliable transfer standard to allow cross-calibration of sensors having been traced to an internationally accepted standard. **Keyte** asked if we know enough about the Amazon to use it for all radars. **Shimada** explained that this was relevant to just C- and L-band. He agreed to document analysis made over the Amazon using SAR (*Action WGCV21-10*)

The next meeting of the SAR subgroup is planned for 27-28 May 2004 in Ulm, Germany.

4 Joint WGCV / ISPRS Taskforce (*Nigel Fox*)

Fox presented the latest news from the joint ISPRS / WGCV taskforce on radiometric and geometric standards. Looking at the final agenda, **Ungar** was concerned about the structure of the taskforce and the need for their discussions to filter back through the WGCV to CEOS plenary. It is currently unsettling that there are names on the distribution list who cannot be there, and also there are names of people who do not even know they are on the list. **Rast** agreed that, even though this taskforce is the missing link in the chain, there is a worry that the original taskforce objectives seem to be taking a back-seat at the workshop, which is being held in conjunction with the taskforce meeting. The taskforce seems to be going ahead without more involvement of the WGCV and its subgroups. **Rast** identified that the taskforce is planning on doing things for IVOS that they need, but without really asking for their help.

Ungar suggested that a teleconference should be set up, with a well-defined agenda, to try to gain some understanding on the objectives of the meeting. **Rast** expressed the opinion that it should be the WGCV chair's job to get together with the ISPRS and make sure that the goals are being aimed for. David Meyer and Nigel Fox, both IVOS members, will be present at the workshop and so should be able to feedback to the WGCV (*Action WGCV21-11*) and ensure that there is no overlap with IVOS. **Fox** backed up **Rast's** fear that the taskforce is seeking to do work that IVOS is already trying to do. **Ungar** further expressed the concern that standards may be laid down by the taskforce without being passed through the WGCV. It is not desirable to make decisions based on a limited perspective. **Meyer** asked if there would be an opportunity to introduce the WGCV at the workshop. **Ungar** explained that he would not be present at the meeting but **Jeffrey Privette** would be and would present on the WGCV's behalf. The opportunity of having a group of experts together should not be

missed and it is important to tap into this group. What is important is to ensure that they have a constructive and helpful framework within which to work.

5 The WGISS / WGCV Test Facility Prototype (*Jeffrey Morisette*)

Morisette presented an update from the WGISS / WGCV Test Facility (WTF). **Muller** asked how the size of the test site is decided upon. **Morisette** explained that the CEOS member providing the data determines the size of the subset. There is no funding available for this work and the data that is available is somewhat limited. WGISS does not hold the data, the WTF knows where the datasets are held and provides links to them.

Morisette explained that to access the WTF, one visits <http://edcsgs16.cr.usgs.gov/wgiss> and logs on as *calval99*, password *wgiss03*. Once data has been chosen, an email notification of its ftp location is sent. **Rast** identified that the IVOS objectives fit nicely with what the WTF is trying to do, and maybe the intercomparison experiment result should be housed alongside. **Desnos** responded that it is important to ensure that the initial key objectives have been met before going further. Now is the right point in time to show that we have met the goals. An example needs to be chosen and taken through to see an actual cal/val result using the test site. **Morisette** explained that at the moment the WTF is a technology demonstration and it would be difficult to take an example all the way through. There is not enough data there and the WTF has not been around long enough to provide a detailed description of its operational use. **Desnos** explained that an example of what can be done with the facility is all that is needed. **Morisette** showed a vegetation index example from Kruger National Park, S. Africa, and suggested that this and other possible uses of the WTF could be presented at CEOS plenary. **Hilsenrath** suggested that, with the validation data centres for Envisat and Aura maturing, they could provide some added value to the WTF. **Morisette** explained that, as the WTF is a technology development, it would require more software for, e.g., atmospheric datasets. **Hilsenrath** suggested that this could be built in and it may be worth talking to the manager of the WTF, Tim Smith (USGS).

Morisette agreed to provide **Desnos** with examples of what can be done currently with the WTF to illustrate this to CEOS plenary (*Action WGCV20-16*). When this has been done, it will be possible to discuss what is planned for phase 2. Concerning this second phase, the subgroups were asked to comment on how they would utilise the system (*Action WGCV21-12*); this would then feed back into phase 2 planning. Additionally, actions were placed to investigate the possible addition of more data into the WTF (*Actions WGCV21-13, WGCV21-14, WGCV21-15, WGCV21-16, WGCV21-17*).

6 Special Session from Chinese hosts

Wu Ji provided a brief introduction to the Center for Space Science and Applied Research (CSSAR). He apologised for his absence during this meeting thus far but this had been due to the recent manned space flight launch. **Fraser** asked about the next plans for the manned space programme. **Wu Ji** explained that they had just overcome the first step and nothing official had been decided upon for the future. Unofficially, it is thought that there will be a concerted effort on either the development of an independent space station (including space laboratory), else international collaboration will be sought with the International Space Station. China has proposed several times that they be included in the ISS but so far this offer has always been declined. Therefore, talks would need to be held to find out if collaboration would be possible.

Desnos asked about plans for a new SAR instrument. **Wu Ji** explained that the Institute for Electronics are developing a SAR. They have been working with SAR since the 1970s and have had a lot of programmes incorporating both airborne and spaceborne SAR.

Zhang presented details of the in-orbit calibration of the Chinese meteorological satellites. **Junwu Tang** then detailed the HY-1 calibration and validation activities. **Morisette** asked about the relation of these activities to IGOS. He asked if there would be the need for an ocean colour subgroup within the WGCV, or is it close enough in the domain of IGOS so that it could remain in IGOS. **Barton** explained that this subject had been revisited several times in the past. It had always been decided that ocean colour was sufficiently covered by the IOCCG (an associate member of the WGCV) and that the main needs were already covered by IVOS. **Rast** explained that he has been trying to encourage contributions to the IOCCG, and this has so far worked well.

7 Country / Agency reports

7.1 Australia (*Ian Barton*)

Barton presented the Australian country report. **Morisette** asked if anything was being done in Australia on airborne radiometers similar to that work undertaken on ferries. He suggested that commuter planes could be used as “ships of opportunity”. **Barton** was not sure of the use of planes would work. The work in Australia currently involves two ferries, one in Perth and one in Townsville. The companies do not get paid for their contribution, although being involved in operational research does help in, e.g., the renewal of licences. The costs involved in using planes would be much greater, and safety and licensing would be a big issue especially on commuter planes.

7.2 China (*Xiaoxian Huang / He-guang Liu*)

Zhang presented the report from the CSSAR.

Huang presented the SITP report. **Yoe** asked if the new calibration laboratories are in the planning stage only, or if they are being built now. **Huang** replied that they are being build now.

7.3 ESA (*Michael Rast*)

Rast presented the report from ESA. **Shimada** asked which SAR would be used for EgyptSAR. **Desnos** did not know which airborne SAR would be used, but guessed it would probably be DLR’s.

7.4 NPL (*Nigel Fox*)

Fox provided the report from NPL.

7.5 NASA (*Stephen Ungar*)

Ungar provided the NASA report. **Barton** inquired about “TRMM next”. **Shiue** explained that “TRMM next” is TRMM with 2 radars, and is a joint NASA / JAXA venture. **Hilsenrath** explained that NPOESS is a new way of operating in that there is a prime system contractor developing and implementing systems. The science community is thus worried about the decisions that the contractors make. **Muller** added that it is important that the contractors are made to adhere to CEOS and cal/val. **Ungar** agreed and added that they should be transparent about their work.

7.6 JAXA (Masanobu Shimada)

Shimada provided the JAXA report. **Muller** asked about plans to use SRTM to rectify the L-band. He also asked about using ALOS test sites in Europe. **Shimada** explained that a project to rectify L-band has been initiated, but not currently using SRTM. He added that JAXA would like ALOS test sites in Europe. **Desnos** asked about the operational timescale for polarimetric data acquisition. **Shimada** quantified that the duration of the polarimetric campaign is 92 days by 1.5 years. Data will be downlinked to Japan at 240 megabit per sec.

7.7 NIST (Jerry Fraser)

Fraser presented the NIST agency report.

7.8 NOAA (James Yoe)

Yoe provided the NOAA agency report. **Morisette** brought up NPOESS cal/val, and **Hilsenrath** identified that the NGST have not mentioned cal/val or CEOS at all so far. It is, however, probably just a matter of time as they are just getting started and they will need the WGCV's resources. **Yoe** identified that it would not be a bad idea to remind them.

7.9 UK (Gordon Keyte)

Keyte provided the UK country report. **Muller** asked if any calibration had been undertaken for the MOSAIC satellites. **Keyte** replied that none had been as it did not fit into the terms of reference for MOSAIC. **Muller** continued by suggesting that all satellites should have calibration plans. **Keyte** explained that as soon as there is a cost constraint, as with small satellites, it is inevitable that the cal/val activity will be severely restricted.

7.10 USGS (John Dwyer)

Meyer provided the USGS agency report. **Muller** expressed the opinion that for the USGS open sites it would be useful to be able to acquire small quantities of data to carry out calibration activities with. **Meyer** explained that they are currently experimenting with some such technology that will be available soon for some of the datasets.

8 Actions

WGCV17-10	SAR subgroup to request WGISS to provide task team for POL-INSAR data formatting.	WGCV-22
WGCV19-5	Martin-Neira / Hilsenrath to identify existing education material and channel this to WGEdu through secretariat.	1 Dec 2003
WGCV20-8	Martin-Neira to re-work the Microwave Sensors subgroup recommendations and report back to WGCV-21.	WGCV-22
WGCV20-13	Muller to provide the Secretariat with a copy of, or a link to, the best practise dossier for the WGCV website.	WGCV-22

WGCV20-18	Hilsenrath to ask the NGST (system contractor for NPOESS) to be represented on the joint ISPRS / WGCV taskforce.	Dec 2003
WGCV21-1	Desnos to send 50 copies of the updated WGCV brochure to each of the subgroup chairs and to the Secretariat.	Dec 2003
WGCV21-2	Desnos to investigate the possibility of producing and distributing issue 10 of the newsletter in hardcopy format.	Dec 2003
WGCV21-3	WGCV members to review the GEO terms of reference and scrutinise the cal/val aspects. This would then be opened for discussion at WGCV-22.	WGCV-22
WGCV21-4	Morisette to clarify the status of the CEOS dossier at NASA.	WGCV-22
WGCV21-5	Subgroup chairs to visit the CEOS WMO database at http://alt-stratus.wmo.ch/sat/stations/SatSystem.html and check it for any instruments or parameters relevant to their subgroups.	WGCV-22
WGCV21-6	Morisette to find out who maintains the CEOS WMO site at: http://alt-stratus.wmo.ch/sat/stations/SatSystem.html . Also to establish a mechanism for the WGCV to supply up-to-date information to the database and relevant supporting material.	WGCV-22
WGCV21-7	Morisette to get further input on invited authors and potential reviewers from WGCV for the proposed TGARS/IEEE special issue.	Oct 2003
WGCV21-8	Desnos to supply Morisette with the reference for the SAR special issue as example of publication under the auspice of the WGCV.	Oct 2003
WGCV21-9	Desnos to arrange for ACE-GDEM to be supplied to TMSG for peer review validation and clarify issues of availability and distribution (particularly regarding derivative products).	Jan 2004
WGCV21-10	SAR subgroup to document analysis over the Amazon using SAR data, in particular noting any differences at C-band HH polarisation (examples from Radarsat and Envisat).	WGCV-22
WGCV21-11	Fox & Meyer to feedback from the ISPRS/WGCV workshop in December 2003 at Stennis Space Center. Secretariat to distribute the feedback to members.	Feb 2004
WGCV21-12	Subgroup chairs to comment on how their subgroups would plan to utilise the WTF, test site descriptions, objectives and expected outputs (this would then feed into phase 2 of the project).	10 Nov 2003
WGCV21-13	Liu & Morisette to explore the possible incorporation of Chinese FY-1 (and maybe FY-2), CBERS-1 and CBERS-2 data into the WTF within the 2005 phase of WTF.	Dec 2003
WGCV21-14	Morisette, Dwyer & Rast to work on getting MERIS data available within the WTF.	WGCV-22
WGCV21-15	Morisette & Dwyer to explore the feasibility of getting MODIS swath data available within the WTF.	WGCV-22

WGCV21-16	Morisette, Dwyer, Gesch & Muller to work on getting SRTM data available within the WTF.	WGCV-22
WGCV21-17	Morisette, Dwyer & Shimada to explore the feasibility of getting SAR data available within the WTF.	WGCV-22
WGCV21-18	Ungar & Yoe to determine the time and location of the next WGCV plenary.	Nov 2003

9 Recommendations

9.1 Recommendation 1

Since satellite operators and data providers globally use varying solar irradiance profiles for the derivation of radiances and reflectances, WGCV recommends for consistency, to converge to the recently refined solar reference spectrum by G. Thuillier and encourages its use at the highest possible spectral resolution.

The source spectrum will be provided also through the WGCV website, with pointers to different instrument (resampled) spectra (Reference: The Solar Spectral Irradiance from 200 to 2400 nm as Measured by the SOLSPEC Spectrometer from the Atlas and Eureka Missions, Solar Physics 214(1): 1-22; May 2003, by: G. Thuillier; M. Hersé; D. Labs; T. Foujols; W. Peetermans; D. Gillotay; P.C. Simon; H. Mandel).

WGCV further recommends that instrument teams should post the exo-atmospheric solar irradiances they use, together with processing/resampling information, in a band-integrated form on the www (single spectrum recommended).

9.2 Recommendation 2

Considering the experience with current satellite sensors and the preliminary study carried out by a Standard Laboratory for the WGCV, the need for testing on board diffusers under hard radiation, UV radiation and contamination environments is recognised.

WGCV recommends to further support the in-depth study of the behaviour of satellite onboard calibration diffusers and their stability in the space environment.

9.3 Recommendation 3

The polar regions are most sensitive to, and are early indicators of, climate change. Atmospheric chemistry observation in these regions are needed by the IGOS and satellite cal/val.

The WGCV recommend that CEOS strongly encourages that full use of high latitude ground stations be maintained or restored to full operation. This recommendation should be considered by CEOS member agencies and passed on to their partner national agencies who have the interest and resources to implement this recommendation.

9.4 Recommendation 4

Noting that the Amazon rainforest has been well studied and is currently the best natural target for SAR calibration.

Statistical evaluation of the Amazon rainforest SAR data sets acquired for more than five years shows that C and L band SAR data (ERS-2 Scatterometer data for AMI, Radarsat SAR, JERS-1 SAR) are ultimately stable with the absolute backscattering coefficients (sigma-naught or gamma-naught), which vary with frequency, polarization, and incidence angle (for sigma-naught and not for gamma-naught), and standard deviation of less than 0.3 dB, which includes diurnal and seasonal variation (WGCV SAR subgroup's 11th workshop report to be published Dec 2003).

The WGCV recommends that the Amazon rainforest area be used as one of the calibration transfer standards. The Amazon rainforest must be regularly measured to maintain its traceability to the internationally agreed standards.

9.5 Recommendation 5

The WTF has received significant interest among both LPV subgroup members and other WGCV subgroups in support of their cal/val activities.

WGCV recommends that the joint WGCV/WGISS Test Facility be continued through 2006.

The primary roles for the two subgroups within this activity are:

WGISS – web based interface, distributed storage infrastructure and simple processing functionality (e.g. reformatting/reprojection)

WGCV – data set and site selection, case studies to demonstrate the effectiveness of the system

9.6 Recommendation 6

WGCV recognises the significant improvements in spaceborne DEM quality over pre-existing DEM products currently used in satellite data processing systems.

WGCV recommends use of newly available spaceborne DEMs, where available and suitably validated, to replace existing coarse data-sets for processing land and atmospheric data-sets at the earliest opportunity.

10 Date and Place of next meeting

The date and place of the next WGCV plenary was unknown. **Ungar** agreed to rectify this as soon as possible (*Action WGCV21-18*).

Annex A: Agenda

Wednesday 15 October 2003

9:00 Registration

10:00 Welcome from the official WGCV-21 hosts

10:10 The development and tendency of Chinese satellites for Earth Observation (*Li De-ren*)

10:30 Approval of the Agenda

10:35 WGCV Chair's report

10:35 Report from WGCV Chair (*Yves-Louis Desnos*)

11:10 Update from WGCV Secretariat (*Marie-Claire Robinson*)

11:20 Action items from WGCV-20 (*Marie-Claire Robinson*)

11:40 CEOS chair update 2002-3 (*James Yoe*)

12:00 IGOS and the WGCV (*Gordon Keyte*)

12:20 Review of WGCV Work Plan issue 3.1 in light of new CEOS 5-year Work Plan

12:50 Nomination / election of new chair for the WGCV

13:00 Lunch

14:00 Reports from Subgroups

14:00 Atmospheric Chemistry (*Ernest Hilsenrath*)

15:00 Infrared and Visible Optical Sensors (*Michael Rast*)

16:00 Coffee

16:30 Reports from Subgroups (continued)

16:30 Land Product Validation (*Jeffrey Morisette*)

Thursday 16 October 2003

09:00 Reports from Subgroups (continued)

09:00 Microwave Sensors (*Yves-Louis Desnos*)

10:00 Terrain Mapping (*Jan-Peter Muller*)

11:00 Coffee

11:30 Reports from Subgroups (continued)

11:30 SAR (*Masanobu Shimada*)

12:30 Joint WGCV / ISPRS Task Force (*Nigel Fox*)

13:00 Joint WGCV / WGISS Test Facility (*Jeff Morisette*)

13:30 Lunch

14:30 Introduction to CSSAR (*Wu Ji, Deputy Director, CSSAR*)

14:50 On-Orbit calibration of Chinese meteorological satellites (*Zhang*)

15:10 Scene of Chinese ocean color satellite (*Tang Junwu*)

16:00 Visit to the National Satellite Meteorological Center

17:30 Visit to the Center for Space Science and Applied Research

19:30 Banquet, Friendship Palace, Friendship Hotel

Address by Prof. Guo Huadong, Director General, Bureau Cooperation, Academy of Sciences

Friday 17 October 2003

09:00 Country and agency reports

09:00 Australia

09:30 China

10:00 ESA

10:30 NASA

11:00 Coffee

11:30 Country and agency reports (continued)

11:30 NASDA

12:00 NIST

12:30 NOAA

13:00 Lunch

14:00 Country and agency reports (continued)

14:00 NPL

14:30 UK

15:00 USGS

15:30 Coffee

16:00 Review of action items

16:20 Recommendations and reporting to Plenary

16:55 Date and place of next meeting

17:00 Close

Annex B: Participants

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Other attendees:

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De-Ren Li	NRSCC
Li-Qin Shao	NRSCC
Pei-Ying Gao	CEOS China Secretariat
Jun-Wu Tang	SOAS
Ji Wu	CSSAR
Yu-Xiang Zhang	NSMC
Jing-Shan Jiang	CSSAR