

# CEOS Working Group on Calibration and Validation (WGCV) Report

**Satish Srivastava** (CSA), WGCV Chair,  
**Albrecht von Barga** (DLR), WGCV Vice-Chair  
**Eric Arsenault** (CSA), WGCV Secretariat  
SIT Workshop Agenda Item #8  
CEOS SIT Technical Workshop  
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17<sup>th</sup>-18<sup>th</sup> September 2014





## For Information to SIT:

- WGCV Updates on CEOS 2014-2016 Work Plan Deliverables
- WGCV-38
- WGCV-Land Product Validation (LPV) Information Items
- WGCV and VC Interactions:
  - Successes and Potential Concerns
  - Product and Services available from WGCV subgroups



## Recent WGCV Progress on CEOS 2014-2016 Work Plan Deliverables:

Objective/Deliverable	Projected Completion Date	Status of Progress
<b>CV-3:</b> Workshop on state of the art for pre-flight calibration techniques	Q1 2016	<ul style="list-style-type: none"> <li>Planning has started during CEOS WGCV IVOS meeting in June 2014 for discussion at CEOS WGCV-38 plenary</li> </ul>
<b>CV-5:</b> GSICS cooperation	Q4 2014 to Q4 2016	<ul style="list-style-type: none"> <li>WGCV will continue discussions with GSICS in a special session at WGCV-38 regarding potential areas of cooperation.</li> </ul>



## Recent WGCV Progress on CEOS 2014-2016 Work Plan Deliverables (...continued):

Objective/Deliverable	Projected Completion Date	Status of Progress
<b>CV-8:</b> Sea Surface Temperature (SST) & Land Surface Temperature (LST) Comparison Campaign Plan	Q2 2014	<ul style="list-style-type: none"> <li>• <b>ESA-ITT “FRM4-CEOS”</b> : SI traceability of Fiducial Reference Measurements (FRM) for satellite derived surface temperature product validation including laboratory and field inter-comparison experiment for FRM TIR radiometers</li> <li>• Further reporting about AI after ESA ITT completion @ coming SIT meeting</li> </ul>



## Recent WGCV Progress on CEOS 2014-2016 Work Plan Deliverables (...continued):

Objective/Deliverable	Projected Completion Date	Status of Progress
<b>CV-9: Radiometric Calibration Network (RADCALNET)</b>	Q1 2014 to Q4 2016	<ul style="list-style-type: none"> <li>• Project plan is established and two meetings were held.</li> <li>• Database to collect site ground data and associated satellite data is being established by ESA.</li> <li>• NASA are making plans to provide the common processing of ground measured data.</li> <li>• During a WGCV-IVOS sub-group meeting a potential new site was discussed in Namibia (Gobabeb). WGCV-LPV sub-group provided an analysis of the representativeness of the site.</li> </ul>



## Recent WGCV Progress on CEOS 2014-2016 Work Plan Deliverables (...continued):

Objective/Deliverable	Projected Completion Date	Status of Progress
<b>CV-11:</b> Validation of terrestrial ECV products	Q1 2015 – Q4 2016	<ul style="list-style-type: none"> <li>WGCV-LPV has updated all Focus area webpages with consistent validation information, including an update of the validation stage, product list, current reference data sets, state of the art validation methods.</li> </ul>



## ***WGCV-LPV Information Items for SIT***

- **WGCV-LPV presence at meetings and symposiums:**
  - WGCV-LPV will have a special session on validation during AGU14 (1 oral, 1 poster slot), submit a session proposal to EGU15, and present a poster during the Climate Symposium in Darmstadt in Oct 14.
- **DOI assignment for LAI validation protocol:**
  - This topic was raised at SIT-Chair Tag Up Telecon with WGCV on June 2, 2014 resulting in an action to be pursued at SIT Workshop. Because WGCV-LPV was faced with tight deadlines, it has pursued Digital Object Identifier (DOI) assignment possibilities via NASA.
  - The NASA DOI assignment procedure now allows assigning DOIs to the best practice validation protocols developed within LPV for traceability and reference.
  - The final citation of the LAI validation protocol is:

Fernandes, R., Plummer, S., Nightingale, J., Baret, F., Camacho, F., Fang, H., Garrigues, S., Gobron, N., Lang, M., Lacaze, R., LeBlanc, S., Meroni, M., Martinez, B., Nilson, T., Pinty, B., Pisek, J., Sonnentag, O., Verger, A., Welles, J., Weiss, M., & Widlowski, J.L. (2014). Global Leaf Area Index Product Validation Good Practices. Version 2.0. In G. Schaepman-Strub, M. Román, & J. Nickeson (Eds.), *Best Practice for Satellite-Derived Land Product Validation* (p. 76): Land Product Validation Subgroup (WGCV/CEOS), doi:10.5067/doc/ceoswgcv/lpv/lai.002



## Success story: Interaction between WGCV and SST-VC

General Approach: Experts from both groups work together to define scope and range of calibration activities and range of conditions to be evaluated

### Role of SST-VC:

- discusses specific validation and calibration needs in its own community and communicates its requirements to WGCV
- SST-VC representative regularly attends WGCV plenary and sub-group meetings (here IVOS) to ascertain latest developments from other fields, pass on details on its activities and specifically its calibration needs.
- carries out its own specific product validation activities using QA best practises learnt from CEOS WGCV e.g. QA4EO principles

### Role of WGCV:

- reports requirements to CEOS
- organises calibration and post launch comparison activities (e.g. Miami series on behalf of SST-VC) via its sub-groups (here IVOS)
- responsible for and discusses pre-flight calibration aspects, along with post-launch cal/val of radiometric properties of satellite sensors measuring SST/LST (includes different sub-groups)





*...continued*

### **Combined Roles of SST-VC and CEOS WGCV**

- Responsible for validation activities associated with LST measurements after field instrument radiometric calibration.



## **Atmospheric Composition Sub-group (ACSG)**

- On-ground sensor characterization
- Level 1 radiometric calibration
- Level 2 product validation

## **Infrared and Visible Optical Sensors Sub-group (IVOS)**

- On-ground sensor characterisation
- Harmonised approach for radiometric calibration
- Cross-calibration approaches for optical sensors

## **Land Product Validation Sub-group (LPV)**

- Geo-physical product validation at sensor level (level 2)
- Harmonization of validation approaches (c.f. LAI)

## **Microwave & Radar Sensors Sub-group (MW)**

- Sensor characterization and calibration

## **Synthetic Aperture Radar Sub-group (SAR)**

- Sensor characterization and calibration and inter-comparison

## **Terrain-Mapping Sub-group (TM)**

- Advice in production of Global DEMs and usage of DEMs from optical and SAR sensors



### Observation:

- WGCV, specifically some sub-groups are carrying tremendous effort in development of calibration methods, inter-comparison, and harmonization; etc. For validation of data products.
- Usually, experts joined meetings in the past of sub-groups for knowledge exchange.
- Some virtual constellations tend to implement sub-groups or teams with dedicated task for calibration and characterization of in-situ and satellite sensors excluding the similarity to other sensors in use for other applications.

### Concern:

- Duplication of effort
- Potential of different calibration on the same sensors used for different products
- Added meetings for agency staff
- Inefficient planning and coordination of activities between agencies
- Potential confusion among the EO community at large

WGCV would like to foster better coordination of cal/val work to avoid duplication of effort and to strongly encourage other groups working in cal/val to communicate with WGCV as it is the central point of reference on matters of cal/val within CEOS.



**WGCV plenary #38** – co-hosted by NASA, NOAA and USGS in College Park, Maryland, USA from Sep 30<sup>th</sup> to Oct 2<sup>nd</sup>, 2014

## Agenda Highlights:

- WGCV subgroup and agency reports
- Cross-cutting theme sessions to foster discussion between subgroups and agencies on specific cal/val topics.
- Special session on WGCV and VC Interactions where VCs have been invited to present and discuss their cal/val requirements.
- Nomination of new WGCV Vice-Chair to be presented to the CEOS plenary in October for endorsement.

*More info on WGCV-38 at <http://www.ceos.org/wgcv>*

- The meeting minutes of WGCV-37 were made available on the WGCV website as of July 29, 2014.



- WGCV has made progress on its deliverables contained in the CEOS 2014-2016 Work Plan
- WGCV interaction with the CEOS Virtual Constellations is on-going with successes to report.
- WGCV would like other groups working in Cal/Val to communicate with WGCV for coordination and use of its expertise.
- WGCV-38 will be hosted at NOAA, College Park, Maryland, USA from Sep 30<sup>th</sup> to Oct 2<sup>nd</sup>, 2014 (<http://www.ceos.org/wgcv>)



## WGCV Services and Products

Selection of activities for the sub-groups  
Terrain Mapping and Land Product Validation



## *Example of services available from the WGCV Terrain Mapping Subgroup:*

- Advice on what spaceborne GLOBAL DEMs are available at what spatial resolution, URLs & from whom, whether free or commercially
- Advice on the accuracy, completeness and location within the landscape of the elevation values (they are not usually of the ground)
- Advice on what DEMs to use for georadiometric correction of VNIR, TIR and SAR EO image data
- Advice on the best methods to employ for georadiometric correction or what R&D areas need investment
- Advice on technical points of contact and experts to assist with georadiometric correction



## Example of services and products available from the WGCV Land Product Validation Subgroup:

Coordination of satellite-derived land product validation

1. Development of guidelines for
  - Intercomparison of satellite products
  - Validation with reference data
  - Standard reporting of accuracy, precision
2. Identification of 'golden standard' of (in situ) reference data sets
3. Online platforms with implemented validation algorithms and reference data
4. Evaluation and development of \*new\* validation methods

<http://lpvs.gsfc.nasa.gov/> - Updated Sept14  
Includes product list for each variable!

### In situ networks



### Experts



### International structures



### User community







(.. LPV, continued)

\* Essential Climate Variable

G. Schaepman-Strub (UZH, LPV Chair), M. Roman (NASA, vice), J. Nickeson (NASA, support)

Snow cover*, Ice	Thomas Nagler (ENVEO, Austria)	Tao Che (Chinese Academy of Sciences)
Surface radiation (Reflectance, BRDF, Albed*)	Crystal Schaaf (U. Massachusetts)	Xavier Ceamanos (Meteo France)
Land cover*	Pontus Olofsson (Boston University)	Martin Herold (Wageningen University, NL)
FAPAR*	Arturo Sanchez-Azofeifa (U. Alberta)	Nadine Gobron (JRC, IT)
Leaf area index*	Oliver Sonnentag (University Montreal, CA)	Stephen Plummer (Harwell, UK)
Fire* (Active Fire, Burned Area)	Luigi Boschetti (University of Maryland)	Kevin Tansey (University of Leicester, UK)
Land surface temperature	Simon Hook (NASA JPL)	Jose Sobrino (University of Valencia, SP)
Soil moisture*	Tom Jackson (USDA)	Wolfgang Wagner (Vienna Uni of Technology, AT)
Land surface phenology	Matt Jones (U of Montana)	Jadu Dash (University of Southampton, UK)