

Working Group for Calibration and Validation (WGCV) Report and Actions May 2011

Greg Stensaas (USGS) - WGCV chair
Satish Srivastava (CSA) - WGCV vice-chair
Marie-Claire Greening (Greening Consulting) - WGCV Secretariat

SIT26 – ESA, Italy – 5/2011; rescheduled from Japan - 3/2011

WGCV Meetings

- **WGCV-33 Plenary Meeting**
 - Hosted by ROSCOSMOS in Moscow on May 16-20, 2011
 - Pre-meetings for WGCV and QA4EO planning
 - Very successful meeting, extensive Russian support
- **WGCV-34 -- Feb 2012 in Brisbane, Australia (Nominations for vice chair required)**
 - *Commonwealth Scientific and Industrial Research Organisation (CSIRO), the Space Policy Unit of the federal Department of Innovation, Industry, Science and Research (DIISR), Geoscience Australia, the Bureau of Meteorology, and the remote sensing facilities in the DIISR Science Infrastructure programs - TERN (the “Terrestrial Ecosystem Research Network”) and IMOS (“Integrated Marine Observing System”).*
- **WGCV-35 -- Sept 2012 – Location to TBD (new vice chair election)**

WGCV Subgroup Meetings/Efforts (cont.)

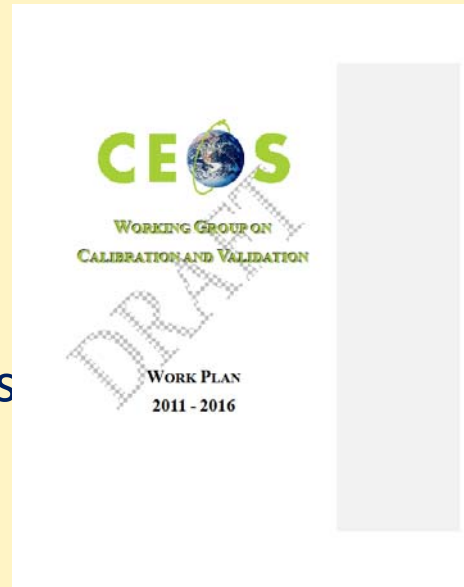
- **LPV SG** - (Dr Joanne Nightengale, NASA) (Dr Gabriela Schaepman-Strub, University of Zurich)
 - Multiple meetings
 - **Focus Groups** - Land Cover, Fire, Biophysical, Surface Radiation, Land Surface Temperature, Soil Moisture, Land Surface Phenology
- **SAR SG** - (Dr Manfred Zink, DLR) (Dr Satish Srivastava, CSA)
 - 7-9 November 2011, Annual Subgroup Meeting/workshop, Fairbanks, Canada
- **IVOS SG Meeting** (Dr Nigel Fox, UKSA/NPL)
 - April 13-15, CNES , Toulouse, France
 - CalVal Portal Update, Comparisons, Test Site discussions, QA4EO, Process discussion, Thematic Focus Groups

WGCV Subgroup Meetings/Efforts (cont.)

- **MWSG** (Dr Xiaolong Dong, Center for Space Science and Applied Research, Chinese Academy of Sciences, China)
 - 2011 CEOS Microwave Sensor Calibration and Validation Workshop and CEOS WGCV MSSG Meeting, Beijing, China (24-28 October, 2011)
 - Rescheduled from April 2011 due to US Government funding issue
- **TMSG Meetings** - (Prof. Jan-Peter Muller, University College London, UKSA)
 - Discussion telecons and email contacts
- **ACSG** (Dr Bojan Bojkov, ESA; Dr Jean-Christopher Lambert, BIRA-IASB)
 - ACSG Meeting - 2010
 - Many joint meetings with other atmospheric groups
 - All Subgroups Working toward document processes and best practices for calibration and validation

WGCV 5 Year Work Plan

- Draft Version 6
- Input from each WGCV Subgroup
- Discussion at WGCV plenary
- Obtain input from other WGs and constellations
- **Goal is to complete and present to CEOS Sec and SIT prior to CEOS Plenary**



Data Quality Information needed

- The GEOSS must deliver timely, quality, long-term, global information to meet the needs of its nine SBAs
- This will be achieved through the synergistic use of data derived from a variety of sources (satellite, airborne and surface-based) and the coordination of resources and efforts of the members
- Accomplishing this vision, starting from a system of disparate systems that were built for a multitude of applications, requires the establishment of an internationally coordinated framework to facilitate interoperability and harmonization

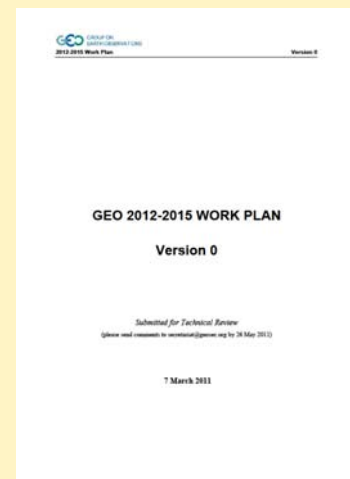
WGCV - GEO Task

- **The QA4EO was established and endorsed by the CEOS as a direct response to GEO Task DA-06-02 (now [Task DA-09-01a](#))**
 - **TASK-DA-09-01a: GEOSS Quality Assurance Strategy**
<http://www.grouponearthobservations.org/cdb/ts.php?id=54>
- **Develop a GEO data quality assurance strategy and implementation process, beginning with space-based observations and expanding to in-situ observations, taking account of existing associated GEOSS quality assurance work, and including the quality issues of derived Earth observation information products.**
- **A Quality Assurance framework for Earth Observation (QA4EO) has been established and is now being implemented within GEO and CEOS.**
 - Approved by WGCV (28th Plenary Meeting, Oct. 2008)
 - Endorsed by CEOS (22nd CEOS Plenary, Nov. 2008)
 - Reviewed by GSICS and WMO (early 2009)

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CEOS GEO Work Planning Mtg. Feb 2011

- **TASK-DA-09-01a: GEOSS Quality Assurance Strategy** (previously was GEO Task DA-06-02)
- **Updated:**
 - **DA-09-01a_12:** DOME-C Multi-Sensor Experiment
 - **DA-09-01a_13:** The Quality Assurance Framework for Earth Observation (QA4EO) will be implemented for GEOSS.
 - **DA-09-01a_14:** Develop a cal/val test site dossier over the WGCV subgroup domains to assist implementation of QA4EO for GEOSS
 - **DA-09-01a_15:** Undertake a pilot project to exemplify QA4EO implementation in Cal/Val activities.
 - **DA-09-01a_16 :** Develop Cal/Val Portal and post-launch test sites to assist implementation of QA4EO for GEOSS.
- **New - DA-09-01a_17: Investigate options for QA4EO support services and tools, including support for the development of peer-reviewed lower-level guidelines through templates, structures and/or tools.**



GEO Work Plan Symposium to focus on 2012-2015 Plan 4-6 May in Geneva

WHAT IS QA4EO?

- The Quality Assurance framework for Earth Observation (QA4EO) principles:
 - It is critical that data and derived products are easily accessible in an open manner and have associated with them an indicator of their quality traceable to reference standards (preferably SI) to enable users to assess its suitability for their application i.e. its “fitness for purpose”.
 - This Quality Indicator needs to be unequivocal in its interpretation and derivation, yet sufficiently flexible, to be implemented across the full range of EO activities which are coordinated through GEO.

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GEO QA4EO Workshop



REVISED “SAVE THE DATE”: October 18 – 20, 2011

QA4EO Workshop on Providing Harmonised Quality Information in Earth Observation Data by 2015

The Quality Assurance for Earth Observation (QA4EO) Workshop on Providing Quality Information in Harmonised Earth Observation Data by 2015 will be held from 18 – 20 October 2011 at Rutherford Appleton Laboratory (RAL) near Oxford, UK.

The workshop will present and discuss data quality assurance implementation examples across a wide variety of societal benefit areas. In particular how quality information is derived, maintained and presented following the QA4EO principle that “all data and derived products must have associated with them a Quality Indicator (QI) based on documented quantitative assessment of its traceability to community agreed (ideally SI) absolute reference standards”.

Examples will be drawn from a broad cross-section of disciplines that span from global modeling and systems of distributed sensors to local environmental monitoring and small-scale field-based observations. Best practices within each community will be discussed with the ultimate aim of addressing any existing gap(s) and necessary improvements to achieve the implementation of QA4EO.

This event will establish a roadmap of key objectives by 2015 that will cover technical, coordination and governance aspects of QA4EO. Your active participation in this very important workshop is critical to moving forward with the Group on Earth Observation (GEO)’s vision for a Global Earth Observation System of Systems (GEOSS).

Additional logistical information about the workshop will follow shortly, **please reserve the workshop dates in your calendar**. If you have a contribution to make to this event by way of a presentation or poster, please do not hesitate to contact the workshop local organiser Dave Smith (dave.smith@stfc.ac.uk) to register your interest.

Sincerely, The GEO QA4EO Team




- Hosted by UKSA at Rutherford Appleton Laboratory (RAL) near Oxford, UK on Oct 18-20, 2011

- Key SBA application examples showing the benefit of and the need for enhanced quality in GEO and CEOS data and processes

QA4EO Executive Summary

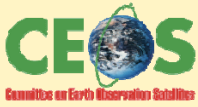
- **4TH GEO QA4EO Workshop (Oct 2011) - Providing Harmonised Quality Information for 2015**
- **Many presentations and papers to date**
- **However; very hard to find CEOS data with traceable uncertainty included in quality indicators**
- **Need better implementation process and examples in GEO/CEOS**
 - **Need quality evaluation and verification methods**
 - **Need agency support of the effort for developing key examples**
 - **Need self evaluation processes and examples**
 - **CEOS support team needed**
- **Enhanced CEOS Strategic Implementation Board Proposed**

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QA4EO Strategic Implementation Boards for GEO and CEOS

- **Implementation of CEOS and GEO QA4EO requirements**
- **CEOS implements the “space segment” QA4EO processes and supports the GEO QA4EO “space segment” components for the whole of GEOSS**
- **GEO supports the overall SBA requirements and integrated via CEOS**
- **WGCV acts as the point of contact for the CEOS QA4EO efforts**
- **QA4EO Secretariat, science, administration, and web support needed for GEO and CEOS**

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QA4EO Strategic Implementation Board for GEO

- | | |
|--|--|
| <ul style="list-style-type: none"> • GEO Secretariat • GEO DA-09-01a task team co-chairs • WMO • FAO • GSICS • Metrology • NIST • CEOS/GEO | <ul style="list-style-type: none"> • Rob Koopman • CEOS WGCV & IEEE • Jérôme Lafeuille • John Latham • Mitchell Goldberg • Nigel Fox / Carol Johnson NPL/ • SBA Leads |
|--|--|

- Social Benefit Areas - POCs**
- Disasters
 - Health
 - Energy
 - Climate
 - Water
 - Weather
 - Ecosystems
 - Agriculture
 - Biodiversity

- Observers**
- GEO Architecture and Data Committee
 - GEO Data Sharing Taskforce
 - INSPIRE
 - OGC
 - GMES
 - GCOS
 - ISPRS

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QA4EO Strategic Implementation Board for CEOS (proposed)

- Re-establish a CEOS QA4EO team/board and a telecon meeting every couple months and a face-to-face meeting in conjunction with other CEOS venues.
- Proposed New CEOS QA4EO Board
- Proposed New CEOS QA4EO Board Charter

- CEOS QA4EO Board Voting members: (11)**
- WGCV Chair + Vice Chair - 2
 - NPL - 1
 - NIST - 1
 - IEEE - 1
 - EDU WG - 1
 - WGISS - 1
 - Climate WG - 1
 - A technical representative from the current SIT Chair and Vice Chair organization. - 2
 - CEOS SEO - 1

- Supporting members - (20)**
- Virtual Constellation Delegates – 6
 - CEOS Societal Benefit Area (SBA) Coordinator Delegates - 9 (Agriculture, Climate, Disasters, Ecosystems, Energy, Health, Water, Weather, and Cross-Cutting)
 - GEO QA4EO Board Chair- 1
 - WGCV Sec -1
 - GEO QA4EO Sec - 1
 - Invited Space Agency, Science, and Quality Expertise as required – 2

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WGCV Support for Constellations and Cross WG representation

- Atmospheric Composition, LSI, Ocean Surface Topography, Precipitation, Ocean Colour Radiometry, Ocean Surface Vector Winds, (SST and GPS Radio Occultation)
- Alignment of a WGCV representative(s) to each constellation
 - e.g., WGCV LSI Support:
 - LSI Mid-Resolution Optical Guidelines Document
 - Review required
 - Forest Carbon Tracking Task
 - Joint Experiment for Crop Assessment and Monitoring (JECAM)
 - Continued similar support for all current constellations
 - Prepare for new constellations
- Establish representatives to each working group for crosscutting efforts

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CEOS Showcase Status

- Defined at Joint WGCV/WGISS meeting 9/2010; Approved via Plenary 2010s
- Need to define QA4EO requirements and present results for:
 - Forest Carbon Tracking
 - Utilize FCT team – Stephan Ward/Alex Held/Frank Martin/Per Erik Skrovseth/Martin Herold
 - Support from WGCV and subgroups, WGISS (Lyn Oleson/Tom Holm), WGClimate, CTF, LSI
 - Air Quality
 - Albrecht von Bargaen, Bojan Bojkov, Jean-Christopher Lambert (ACC needed)
 - Focus on Air Quality; changing from NO2 to Ozone
 - WGISS (Stefan Falke and Francis Lindsay) and additional WGCV support
 - Global Elevation
 - Jan-Peter Muller (WGCV) and Wyn Cudlip (WGISS)
 - Good information but need funded effort
- Need support to finalize common presentation format and tools
- Completion time of showcases are varying – concerned about slipping into 2012

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Forest Carbon Tracking Support

- LPV and IVOS continue to work with the FCT team to ensure appropriate cal/val sites
- LPV, IVOS, and ACC subgroups looking at ground instrumentation requirements
- WGCV needs to better understand the carbon estimate requirements and process
- Work with NEON Forest Assessment tasks
 - Intercalibration using Hyperspectral and LiDAR airborne data over cal/val sites
 - Extensive biomass, FPAR, ..., needed for forest carbon assessment

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ISO Cal Val and QA Standards

- **CEOS WGCV and QA4EO teams need to review and provide input to ISO**
 - ISO -19159 - **Geographic information - Calibration and validation of remote sensing imagery sensors and data** http://www.iso.org/iso/iso_catalogue/catalogue_tc/catalogue_detail.htm?csnumber=32577
 - This International Specification defines the calibration and validation of identified airborne and space borne remote sensing imagery sensors and data.
 - The term calibration refers to geometry and radiometry, and includes the instrument calibration in a laboratory as well as in-situ calibration methods.
 - The validation methods are split into process- and product-validation, and include the prerequisites for installing a validation environment.
 - ISO -19157 - **Geographic information -- Data quality** http://www.iso.org/iso/iso_catalogue/catalogue_tc/catalogue_detail.htm?csnumber=32575
 - This Technical Specification defines a set of measures for the data quality sub-elements identified in ISO 19113 Geographic information - Quality principles.
 - The measures will be applicable when evaluating the quality of geographic datasets and assessing their fitness for their intended purpose. Multiple measures will be defined for each data quality sub-element, and the choice of which to use will depend on the type of the data and its intended purpose.
 - Others – ISO 19115 (Metadata) and ISO 19130 (Sensor Models)
- **Letter in process establishing CEOS WGCV as an ISO TC-211 member**

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Quality Assurance Support and Integration

- **SEC action 149-4 / SIT action 24-12 (open)**
 - GEO QA4EO secretariat, documentation, and web support required
 - Agency funding needed in September 2011
 - Approximately \$65-75K /year (depends on travel and # of coordinated documents)
- **SEC action 149-5 (complete)**
 - Integrating common quality activities into QA4EO
 - Working with Carol Meyer/ Federation of Earth Science Information Partners (ESIP) Information Quality Cluster and NASA, Rob Koopman/GEO QA4EO, ESA GEOViQua & GMES QA requirements (QUALity aware Visualisation for the Global Earth Observation system of systems) and (Global Monitoring and Security)

Support and Integrating Quality

- SIT action 24-13 (open; completion by SIT-27)
 - All CEOS recommended **cal/val sites** available from IVOS, LPV, SAR, and TMSG on **Cal/Val Portal**
 - **Request CEOS members begin collection over the CEOS reference sites**
 - **Working on a cal/val request document** to be forwarded to all CEOS members including **support for the 2nd CEOS DOME-C collection in Dec 2011/Jan 2012**
 - ACSG and MWSG working on recommended sites and process
 - **Minimum instrumentation list and labor for sites** being worked by WGCV subgroups and will be **update SIT-27**

CEOS WGCV Support Needs From SEC/SIT

- CEOS Showcases
 - **CEOS WGs and constellation involvement needed**
 - Appropriate CEOS/GEO SBA
 - Appropriate WGs, Constellations, and GEO tasks
- QA4EO
 - **Agency resource support for GEO secretariat and administration**
 - ESA funded through Oct 2010, USGS minimal funding until Oct 2011, additional support for the QA4EO workshop is a must
 - CEOS Agency adoption of principles and associated QA4EO implementation actions
 - CEOS team to enhance and endorse of QA process
- **Agency support** for WGCV TMSG, Global DEM Task, and Elevation Showcase (UKSA was funding in the past)
- **WGCV Vice Chair nominations needed**; Sept 2012 vote

CEOS WGCV Support Needs From SEC/SIT

- New WGCV-33 action to SIT and Plenary
 - **International across agency funding for needed**; e.g., international field campaigns (DOME-C, Tuz Golu, and Miami Radiometer campaign)
 - **Integrated process in CEOS needed** to understand the quality of CEOS data and information products
 - Concern about **coordinated comments** to key documents; i.e., CEOS GCOS Satellite Supplement comments (**resolved**)
 - **Recommend support for calibration missions** - Traceable Radiometry Underpinning Terrestrial- and Helio- Studies (TRUTHS) / Climate Absolute Radiance and Refractivity Observatory (*CLARREO*)
 - Key climate quality data not only **requires traceability** but also significant **improvement in accuracy**, to allow benchmark measurements
 - Measurements of Total Solar Irradiance (TSI) indicate that there has been little overall change in output over 30 years (~0.01%) but this is derived from sensors with biases of up to approximately 1%



Questions & Additional Information