



# Working Group on Calibration and Validation (WGCV)

## Infrared Visible and Optical Sensors (IVOS) subgroup: #31

Nigel Fox

NPL (with UKSA support)

Perth, 2019



Working Group on Calibration and Validation

20 seconds:

Name

Organisation

Particular specialism / interest



- **Information exchange between agencies**
  - **Up and down through CEOS**
- **Reporting on progress on projects**
- **Interactions/activities in other related groups**
- **Updates on work-plan / new project ideas/collaborations**
- **Communications**
- **Responses to WGCV: Review GHG paper, ARD support, CalVal portal (site naming convention), Summary of Status of vicarious Cal, Terminology**



**Wednesday Mar 27<sup>th</sup>**  
**IVOS Plenary Meeting**



08:30A	<b>Registration/Entrance Logistics</b>		
M			
09:00	<b>Welcome by CSIRO hosts (CSIRO &amp; GA):</b>		
09:30	<b>IVOS chair Intro</b>	Nigel Fox (NPL)	<b>Meeting intro</b> <ul style="list-style-type: none"> <li>• Brief Introductions</li> <li>• Objectives</li> <li>• Agenda</li> <li>• Actions</li> <li>• Terms of reference</li> <li>• IVOS report to CEOS WGCV 42/43</li> </ul>
10:15	<b>Break</b>		
10:45	<b>CEOS WGCV and CEOS initiatives</b>		
10:45	<b>Introduction and discussion on how IVOS can and should contribute</b>	Cindy Ong (WGCV chair, CSIRO)	CEOS & CEOS WGCV workplan <ul style="list-style-type: none"> <li>- WGCV chair report</li> <li>- Carbon task force actions?</li> <li>- .</li> </ul>
11:15	<b>Analysis Ready Data</b>	Medhavy Thankappan Anderson (GA)	Intro and Discussion on ARD CARD4L and how we can help review compliance etc
12:00	<b>Pre-flight/on-board Cal workshop planning</b>	Fox	Update
12:10	<b>Cal/Val portal CEOS website</b>	Steffen Dransfield	Update and discussion inc site hierachy
12:40	<b>Lunch</b>		
14:00	<b>Australian activities</b>		
14:00	<b>Pinnacles site</b>	Cindy Ong/Ian Lau/Peter (CSIRO)	Instruments and site characteisatoin
14:40	<b>Surface reflectance validation in Australia</b>	Byrne/Broomall (GA)	Presentation on activities and good practices
15:00	<b>Ocean Colour activities in Australia</b>	David Antoine (Curtin Univ)	





15:20	<b>Break</b>		
15:40	<b>Sensor radiometric calibration/monitoring methods</b>		
15:40	<b>Pre-flight calibration of CLARREO pathfinder</b>	Yigit Aytak (SSAI/NASA)	Detector based Pre-flight cal techniques
16:00	<b>Calibrating the Moon</b>	Marc Bouvet (ESA)/Emma Woolliams (NPL)	Ground based radiometric cal of moon
16:20	<b>Air-LUSI</b>	Kevin Turpie (UoM/NASA) Rem	Lunar calibrations by Aircraft
16:40	<b>DIMITRI toolbox advancements</b>	Alhammoud (Argans))	Use with S2 and S3 (remote)
17:000	<b>Metrology methods</b>		
17:00	<b>FIDUCEO Uncertainty trees and QA reporting</b>	Emma Woolliams (NPL)	
17:20.	<b>End of day 1</b>		
	<b>Hosted DINNER TBD ~18:00</b>		

### Thursday 28th March

09:00	<b>Sensor to Sensor to surface cross-comparison/Validation</b>		
09:00	<b>BRDF validation of MODIS data over Railroad Valley</b>	Carol Bruegge (JPL)	Inc discussion
	Plus solar irradiance		
09:40	<b>Intercomparison of GEO and LEO using RadCaTSA</b>	Jeff Czapl Myers (UoA)	
10:00	<b>On Orbit performance of VIIRS</b>	Xiong (NASA)	
10:20	<b>Sensor to Sensor to surface cross-comparison/Validation</b>		
10:20	<b>Aster: RadCalNet sites</b>	Hirokazu Yamamoto (AIST)	
10:40	<b>DESI on board ISS</b>	Bachmann (DLR)	
11:00	<b>Break</b>		
11:20	<b>USGS EROS CalVal Update inc landsat, PICS, Radcalnet</b>	Cody Anderson (USGS)	



11:50	<b>EnMap</b>	Bachmann (DLR)	
12:10	<b>Sentinel 3 (OLCI &amp; SLSTR) Cal Status</b>	Steffen Dransfield (ESA)	
12:30	<b>Lunch</b>		
13:30	<b>Sentinel 3 SLSTR cal and traceability and post-launch</b>	Dave Smith (RAL)	
13:45	<b>SLSTR post-launch Cal/Val results</b>	Dave Smith (RAL)	
14:00	<b>Discussion on status of Cal/Val methods</b>	Emma Woolliams (NPL)	Facillitating
14:30	<b>IVOS Projects (task groups)</b>		
14:30	<b>MTF Project summary</b>	Francoise Viallefont-Robinet (ONERA))	Presentation and Discussion
15:00	<b>PICSCAR summary</b>	Patrice Henry (CNES)	
15:30	<b>Break</b>		
16:00	<b>Post launch Cal/Val</b>		
16:00	<b>Results Desert Sand Proj</b>	Francoise Viallefont-Robinet (ONERA))	
16:20	<b>Dunhuang site</b>	Yuan Li (NSMC/CMA)	
16:40	<b>AVHRR reprocessing</b>	Bachmann (DLR)	
17:00	<b>IVOS projects</b>		
17:00	<b>Vocabulary</b>	Emma Woolliams (NPL)	-
17:20	<b>EMN on Climate and Ocean</b>	Emma Woolliams (NPL)	-
17:30	<b>END OF DAY</b>		

**CEOS WGCV INPUT**

09:00 **GHG white paper (circulated)**  
**How can IVOS Help?** Carol Bruegge - Facilitated discussion  
(JPL)

09:30 **Calibration technologies**

09:30 **Calibration transfer standards** Ling-Ling Ma -  
(AOE)

09:50 **Ocean Colour comparisons**  
**(FRM4SOC)** N Fox on behalf -  
of FRM4SOC  
team

10:10 **IVOS Projects**

10:10 **RadCalNet report** M Bouvet (ESA) -  
on behalf of  
team

10:40 - **Break**

11:00 - Review of Actions N Fox -  
- Recommendations  
- Future topics  
- Work plan  
Next meeting

**AOB**

12:00 **End of Meeting**



- IVOS 30 @ ESTEC, Noordwijk, Holland. hosted by ESA Mar 2018
- 24 agency/orgs represented
- 30 attendees + 7 remote
- Most themes and topics (work-plan discussed or summarised)



- **4 th MTF workshop (Mar 2018)**
- **~ PICSCAR webex (Joint GSICS)**
  - (several)

## Special Projects:

- **RadCalNet team met Mar 2018 Various telecons**
- **O-colour workshop Oct 2018**
- **Terminology task team established**



## Mission

**“To ensure high quality calibration and validation of infrared and visible optical data from Earth observation satellites and validation of higher level products”**



- 1. Promote international and national collaboration in the calibration and validation of all IVOS member sensors.**
- 2. Address all sensors (ground based, airborne, and satellite) for which there is a direct link to the calibration and validation of satellite sensors;**
- 3. Identify and agree on calibration and validation requirements and standard specifications for IVOS members;**
- 4. Identify test sites and encourage continuing observations and inter-comparison of data from these sites;**
- 5. Encourage the preservation, unencumbered and timely release of data relating to calibration and validation activities including details of pre-launch and in flight parameters.**
- 6. In the context of calibration and validation encourage the full consideration of “traceability” in all activities involved in the end-to-end development of an EO product including appropriate models and algorithms.**

*To facilitate the provision of 'fit for purpose' information through enabling data interoperability and performance assessment through an 'operational' CEOS coordinated & internationally harmonised Cal/Val infrastructure consistent with QA4EO principles.*

- *Pre-flight characterisation & calibration*
- *Test – sites*
- *Comparisons*
- *Agreed methodologies*
- *Community Good Practices*
- *Interchangeable/readable formats*
- *Results/metadata - databases*

**Key Infrastructure to be established and maintained independent of sensor specific projects and/or agencies**

# Work plan

The logo for the Committee on Earth Observing Satellites (CEOS), featuring the letters 'CEOS' in green with a small globe of the Earth integrated into the letter 'O'.

## Structured into themes and led by 'champions' (Plus specific projects)

- Look to develop community good practises
- Organise comparisons
- Shared learning (research activities)
- Shared infrastructure / tools / Methods
- Recommendations as needed

Land surface reflectance	- Czapler Myers (U of Arizona USA)
Ocean colour (link to IOCCG, VC-OCR etc)	- Zibordi (JRC, EU) & Murakami (JAXA JPN)
Surface Temperature (link to VC-SST, GHRSSST)	- Corlett (U of Leicester, UK)
Geo spatial image quality	- Helder (SDSU, USA) & Viallefont (ONERA F)
Atmospheric Correction (Link to AC subgroup)	- Thome (NASA, USA)
RT codes (context of IVOS use in calibration)	- ?

Working Group on Calibration and Validation

- **RadCalNet** - Bouvet (ESA)
- **PICSCAR (with GSICS)** - Henry (CNES, F)
- **SST/LST cross-comparison (+ VC-SST & LPV (instrument Cal for LST))** - Fox (NPL, UK)
- **O-Colour Vicarious Cal comparisons** - Fox (NPL, UK)
- **Vocabulary** - Woolliams (NPL, UK)
- **Others in progress/development/related**
  - **Establishing a CEOS Reference and method of use for L1 radiometric interoperability (with GSICS) (including potential tools/databases)**
  - **Good practise for convolving spectral data sets (solar/surface/sensor bandwidth) Selection of Reference Solar irradiance spectrum(CEOS WGCV (sub-groups) & GSICS)**
  - **Comparison of Rayleigh and Sun-Glint methods**



R.2018-1	CEOS-WGCV-IVOS proposes to WGCV that validation of surface reflectance be the subject of either a new task force or the extension of ACIX.
R.2018-2	CEOS-WGCV-IVOS proposes to WGCV the holding of a workshop on pre-flight calibration of optical (VIS, SWIR, TIR) sensors in Europe in late 2018 or 2019 that is organised around specific calibration challenges and which is focussed on calibration engineers from Agencies and industry, while also involving the Science PIs of key missions.

Action number	Activity	Date
AP.2018-1 Carried over AP.2017-2	<b>Nigel Fox</b> to ensure we hold a half to one day workshop to evaluate state-of-the art on sensor L1 interoperability and the different methods used for comparisons to prioritise a work plan	Next IVOS
AP.2018-2 carried over AP.2017-4	All to identify where possible simple examples at the application level (typically 3 or higher) where the impact of Cal/Val (at Level 1) can be demonstrated particularly quantitatively. <b>Nigel Fox</b> to liaise with <b>Steffen Dransfeld</b> to get an appropriate location in the CalVal wiki to store these "stories"	Next IVOS
AP.2018-3 carried over AP2017-12	<b>Emma Woolliams</b> and <b>Patrice Henry</b> to explore requirements for the uncertainty analysis for modelling-related case studies (BRDF or spectral modelling of PICS).	Next IVOS
AP.2018-4	Following suggestion from Mike Rast, <b>Steffen Dransfeld</b> and <b>Nigel Fox</b> to explore prospect of an end-to-end benefit of Cal/Val for SST (Linking FRM4STS and SLSTR/ATSR+ series)	Next IVOS
AP.2018-5	<b>Nigel Fox</b> to ensure there is a link on the CalVal portal to the new recommended solar spectrum	WGCV 43
AP.2018-6	<b>Jeff Czapla-Myers</b> supported by <b>Cody Anderson</b> to scope by WGCV 43 meeting the goals of the new task group on surface reflectance validation as a set of bullet points and then to send this to IVOS to get volunteers to join the task group. After this to hold an initial teleconference for the task group.	WGCV 43
AP.2018-7	<b>Nigel Fox</b> to discuss within IVOS who should represent IVOS at the IGARSS meeting of the new IEEE standardisation group.	By IGARSS 2018
AP.2018-8	<b>Anyone interested</b> to propose potential locations/dates for preflight cal workshop	By September 2018
AP.2018-9	<b>Nigel Fox</b> to provide to WGCV the IVOS perspective on priorities and structures for the preflight calibration workshop	WGCV meeting April 2018
AP.2018-10	<b>Francoise Villefont-Robinet</b> to send Sebastien Wagner, Tom Stone and NOAA contacts (GSICS lunar group) a summary report of IVOS work on MTF so that this can connect to the lunar calibration of MTF and to suggest a cross-comparison of approaches.	Next IVOS



AP.2018-11	<b>Sebastien Wagner</b> to invite Aime Meygret to attend a GSICS meeting to present the CNES lunar calibration work at a GSICS meeting.	GSICS meeting
AP.2018-12	<b>Anyone interested</b> to contact Lingling Ma about attending the workshop in August/September 2018 on the Chinese radiometric calibration activities	April 2018
AP.2018-13	<b>Anyone interested</b> to provide Vincent Leroy with any requirements for RT code development	April 2018

AP.2018-14	<b>Nigel Fox</b> to support the organisation of CEOS/GSICS workshop on 'benchmark/cal reference sensors in Europe in 2019 and make IVOS membership aware.	Next IVOS
AP.2018-15	<b>Anyone interested</b> to volunteer as candidate to be IVOS representative in WGCV test site approval panel.	WGCV 43
AP.2018-16	Following successful review of uncertainty documentation by RadCalNet, <b>Marc Bouvet</b> on behalf of the RadCalNet WG to submit recommendation to accept the sites to the new Test Site Admissions Panel and then to open the portal to the public, linked through the CEOS WGCV CalVal Portal.	Next IVOS
AP.2018-17	<b>Anyone interested</b> to contact Jeff Czapla-Myers about participating in the Railroad Valley comparison in May 2018.	May 2018
AP.2018-18	<b>Anyone interested</b> in the TNO calibration facility to contact Ralph Snel with user requirements.	Next IVOS





AP.2018-19	<b>Patrice Henry</b> to look at the requirements coming from the workshop (Nigel's final presentation slide 3) to check that we are working towards these items in the PICSCAR group and to provide a response that can be highlighted as a "news story".	Next IVOS
AP.2018-20	<b>Emma Woolliams</b> to review the recommendations coming from the workshop (Nigel's final presentation slides 5/6) to check that we are working towards these items in the vocabulary/uncertainty group and to provide a response that can be highlighted as a "news story"	Next IVOS
AP.2018-21	<b>Nigel Fox</b> to find a way of bringing the sea surface temperature good practice guides to come under the IVOS envelope.	Next IVOS
AP.2018-22	<b>Everyone</b> to find ways of making our impact widely known and to prepare "stories" that show what we have done.	Next IVOS
AP.2018-23	<b>Emma Woolliams</b> to complete the minutes and Nigel Fox to send these to IVOS along with a link to all presentations onto the CalVal portal.	April 2018
AP.2018-24	<b>Nigel Fox</b> to organise dates and practicalities for the next IVOS meeting.	Next IVOS