Working Group on Calibration and Validation (WGCV)

Infrared Visible and Optical Sensors (IVOS) subgroup: #34

Nigel Fox

NPL (with UKSA support)

Reston, VA, USA 2022

Introductions

20 seconds:

Name
Organisation
Particular specialism / interest

Objectives of meeting

- 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: CEOS solar Spectral Irradiance update, LST (FRM), Uncertainty/traceability, Terminology

CEOS WGCV IVOS 34

Meeting Draft agenda (V2.1)

Location: USGS, Reston, VA, USA

Virtual: Click here to join the meeting

	Monday, Aug 29		
9:00 AM	**RadCalNet- WG meeting** (see separate agenda)		
12:00	**Lunch**		
	Mon Aug 29th PM **IVOS Plenary Meeting**		
13:30	**Registration/Entrance Logistics**		
14:00	**Welcome/Logistics by USGS hosts (USGS):**		
14:10:		Fox (NPL)	**Meeting intro** • Brief Introductions • Objectives • Agenda • Actions • Terms of reference
14:30	**USGS activities**		
14:30	**TBC**	TBC	
15:15		**Break**	
15:30		**'CEOS/international' initiatives**	
15:30:	Vocabulary	Woolliams	Status
15:45	Metrology Needs (EMN, BIPM/WMO)	Woolliams	Discussion
16:15		**Cal Methods (pt 1)**	
16:15	FLARE Network	Durell (Labsphere)	
16:35	Use of FLARE	Leigh/Kaewmanee (SDSU)	
16:55	FLARE as a point source	Schiller (Raytheon)	
17:05	ESA Lunar model	Bouvet (ESA)	
17:25	CEOS Recommending methods?		Discussion
17:40		**End of Day 1**	

		Tuesday 30th August	
		Click here to join the meeting	
08:30		**Ocean Colour special session**	(Zibordi era)
08:30	'25 yrs of JRC Ocean Colour Cal/Val activities''	G Zibordi, JRC	**Keynote**
10:00	GCOM-C/SGLI CalVal with Aeronet OC	Murakami (Jaxa)	
10:20	Moby	Voss (U of Miami)	
10:40	Copernicus OC	Kwiatkowska (Eumetsat)	
11:00		**Break**	
11:20	FRM4SOC 2	Vendt (TO)	
11:40	NASA PACE mission	Mannino (NASA)	
12:10	Landsat 8/9 consistency	Pahlevan (SSAI/NASA)	
12:30	Crosscal of OC sensors in polar orbit	Frouin (Scripps)	
12:45			**General Discussion**
13:00		**Lunch**	
14:15		**Cal Methods (pt 2)**	
14:15	Hypernets	Ruddick (RBINS)	
14:35	CNES methods	Meygret	
15:20		**Break**	
15:40		**Si Traceability in space**	
15:40	SITSat report	Fox	
16:00	CLARREO PF (CPF|)	Shea (NASA)	
16:20	CPF intercalibration	Bhatt (NASA)	
16:40	ESA TRUTHS	Fox (NPL/ESA/UKSA)	
17:10		Discussion	
17:30		END of DAY2	

Wed 31 st Aug Click here to join the meeting			
08:30	**Use and characterization of PICS**		
08:30	PICSCAR	Henry (CNES)	
09:15	S2 & L8 with Libya 4	Alhammoud (Argans)	
09:35	Use of Global PICS	Leigh/Kaewmanee (SDSU)	
09:55	Eradiate simulation of PICS radiance	Misk (Rayference)	
10:15	Discussion		
10:30	**Break**		
11:00	**Sensor performance assessment**		
11:00	GCOM-C/SGLI Cal/Val L1 and L2	Murakami (Jaxa)	
11:20	Aster using RadCalNet	Yamamoto (AIST)	
11:40	Sentinel 2: Dimitri & RadCalNet	Alhammoud (Argans)	
12:00	L8/L9 crossCal	Leigh/Kaewmanee (SDSU)	
12:20	**LUNCH**		
13:50	**Uncertainty/Traceability & QA (Workshop)**		
13:50:	Needs for sensors L1/L2, ARD	Woolliams (NPL) Anderson (USGS)	Discussion
14:20	QA Framework (ESA/NASA)	Hunt (ESA/NPL) + NASA team	Maturity matrix discussion
15:00	What is Traceability?	Woolliams/Hunt (NPL)	Discussion
15:30	**Break**		
15:50	What is Uncertainty/Fiduceo/case study	Hunt (NPL)	Discussion
16:20	Landsat 8 per pixel uncertainty	Pagnutti (I2R)	Presentation and discussion
17:10	Interoperability Next steps (pre and post launch)		Discussion
17:40	- **End of Day 3**		
TBD	- **No HOST DINNER**		

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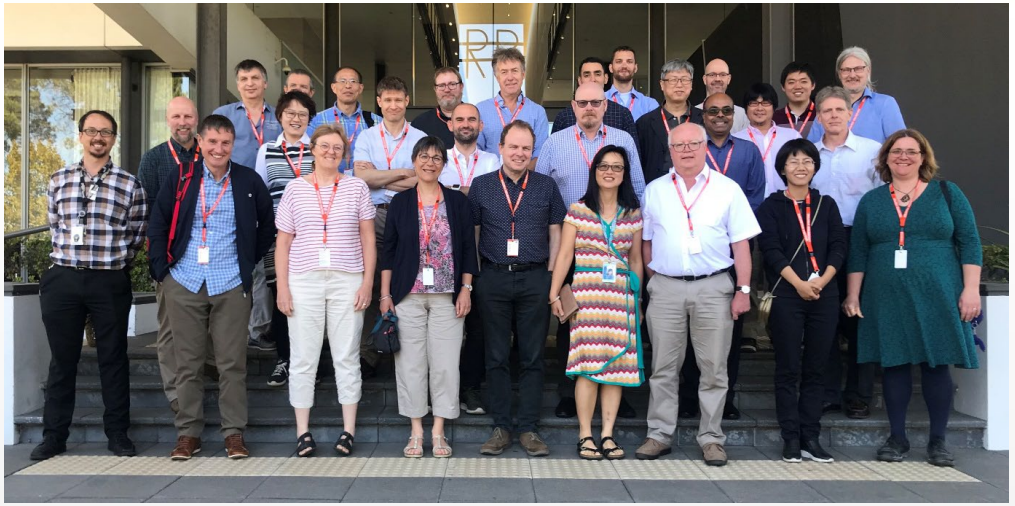
Thurs 1st Sep Click here to join the meeting		
08:30	**Hyperspectral sensors**	
08:30	DESIS/Hysics	Carmona (DLR)
08:50	EnMap	Carmona (DLR)
9:10	Calibrations for imaging spectroscopy	Wang (NASA)
0930	SBG	Thome (NASA)
10:00	IEEE Hyperspectral standards	Durrell (Labsphere)
10:20		**Break**
10:50	**Missions/Status**	
10:50	Landsat program	Micijevic (USGS)
11:10	Sentinel 3 status	Dransfield (ESA)
11:30	Uncertainty for SLSTR/LSTM	Smith (STFC)
12:00	VIIRS/MODIS	NASA
12:20		RadCalNet
12:20	RadCalNet status	Bouvet (ESA)
12:20		**Lunch**
14:00		**Networking opportunity**
18:00	**End of day 4**	

Friday 2 Sep Click here to join the meeting		
	Actions/Recommendations	
09:00	Update on CEOS solar irradiance	Coddington (LASP)
09:40	CEOS TIR (SST) FRM radiometer comparison	Yamada (NPL)
10:00	TIR/LST Cal/Val network discussion	Dransfield/Meygret (led)
11:00	Break	
11:10	Discussion cont	
	Actions /AOB	
12:15	Actions /recommendations /AOB	
13:00		Lunch and Meeting close

Validation

Summary of activities

- IVOS 31 @ Perth, Australia hosted by GA/CSIRO Mar 2019
- 19 agency/orgs represented
- 28 attendees + 9 remote
- Most themes and topics (work-plan discussed or summarised
- **SITSCOS workshop Sep 2019)**
- **Solar spec irradiance 2021**
- **Calval portal 2021**
- **ARD/Interoperability 2021**
- **PISCAR virtual 2021**



Special Projects:

- **RadCalNet team met Mar 2019/Aug 22 Various telecons since covid inc users workshop**
- **Terminology task team established and active with WGCV**
- **FRM4Veg Comparison (LPV) surf refl Jul 22**
- **FRM4STS comparison Jun 22**

Mission Statement

Mission

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

Terms of Reference

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.

IVOS: Vision

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

- **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, GHRSST) - Corlett (Eumetsat)

Geo spatial image quality - Helder (SDSU, USA) & Viallefont (ONERA F)

Atmospheric Correction (Link to AC subgroup) - Thome (NASA, USA)

Specific projects/cross-cutting

- RadCalNet - Bouvet (ESA)
- PICSCAR (with GSICS) - Henry (CNES, F)
- Lunar (led by GSICS) - Wagener (Eumetsat)
- SST cross-comparison (+ VC-SST & LPV (instrument Cal for LST) - Fox (NPL, UK)
- O-Colour Vicarious Cal comparisons - Fox (NPL, UK)
- Vocabulary - Woolliams (NPL, UK)
- Sensor pre-flight workshop
- MTF/Image quality (did a good job. now dormant without a lead)
- Others in progress/development/related
  - Establishing a CEOS Reference and method of use for L1 radiometric interoperability (with GSICS) (including potential tools/databases)

Recommend updated CEOS Solar Irradiance Spectrum

- **Context**
- Following relatively recent new high accuracy observations of the Solar spectral Irradiance by the NASA TSIS mission and reanalysis of the ISS SOLSPEC mission there are now considered to be significant differences between the current recommended CEOS solar irradiance spectrum particularly in the SWIR spectral region. Recognising the increasing importance of this spectral region for GHG missions it is urgent to revise the recommended spectrum.
- **Recommendation**
- After consultation within the IVOS team and also noting parallel discussions within GSICS, CEOS WGCV IVOS recommends that the newly published TSIS high resolution spectrum (Coddington et al., 2021, **https://doi.org/10.1029/2020GL091709**) together with its corresponding uncertainty be adopted as the new CEOS solar irradiance reference spectrum for the spectral range 350 – 2700 nm. The new spectrum is available herehttps://lasp.colorado.edu/lisird/data/tsis1_hsrs
- However, noting on-going analysis within the international solar and Earth Observation community this spectrum should be subject to review in a years time. CEOS encourages the international community to continue discussions and comparisons to assess the impact, merit and uncertainty associated with this choice with the aim for an updated confirmatory discussion or refinement in 2022.

Minutes and Actions of IVOS 31

Action number	Activity	Date
AP.2019-1	**Dave Smith** to consider whether and how a workshop should or could be held on the thermal infrared at the next meeting and to discuss concept with **Nigel Fox**.	Next IVOS
AP.2019-2 Carried over AP.2018-1	**Nigel Fox** 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.2019-3 carried over AP2018-2	**Everyone** 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. **Nigel Fox** to liaise with **Steffen Dransfeld** to get an appropriate location in the CalVal wiki to store these "stories"	Next IVOS
AP.2019-4 carried over AP.2018-3	**Emma Woolliams** and **Patrice Henry** to explore requirements for the uncertainty analysis for modelling-related case studies (BRDF or spectral modelling of PICS).	Next IVOS
AP.2019-5 carried over AP.2018-4	**Steffen Dransfeld** and **Nigel Fox** to explore prospect of an end-to-end benefit of Cal/Val for SST (Linking FRM4STS and SLSTR/ATSR+ series)	Next IVOS
AP.2019-6 carried over AP.2018-19	**Patrice Henry** to work with **Nigel Fox** to create a "news story" on PICSCAR that shows the link to WGCV priorities.	Next IVOS
AP.2019-7 carried over AP.2018-21	**Nigel Fox** to find a way of bringing the sea surface temperature good practice guides to come under the IVOS envelope (consider DOI, format/title page layout, putting on portal)	Next IVOS
AP.2019-8 carried over AP.2018-22	**Everyone** to find ways of making our impact widely known and to prepare "stories" that show what we have done.	Next IVOS
	Everyone is encouraged to pass information about the Microwave Sensors Subgroup to suitable colleagues and to get them to contact	July WGCV

Minutes and Actions of IVOS 31

AP.2019-10	**Everyone** who wishes to attend the Climate Observing Systems workshop to register at https://ceoswmogsicsworkshop.eventbrite.co.uk and to provide an abstract for any desired presentation.	10 April 2019 for abstracts August for registration
AP.2019-11	**Nigel Fox** to send everyone the logon details for the new calval portal website draft so that people can review the website for checking.	Complete – email sent on 27/03/19 with subject "Link to new website"
AP.2019-12	**Everyone** who can comment on the draft new calval portal website should provide feedback (specific suggestions of what to include/change) to **Nigel Fox** and **Emma Woolliams**.	"19 April 2019"
AP.2019-13	**Everyone** should comment on the hierarchy of test sites suggested for the calval portal website and send feedback to **Nigel Fox** and **Emma Woolliams**	"19 April 2019"
AP.2019-14	**Nigel Fox** and **Kurt Thome** to provide a single coherent set of feedback comments on the website to WGCV	End May 2019
AP.2019-15	**Emma Woolliams** to provide **Kevin Turpie** with information about the difference between the ESA-project lunar model and the ROLO/GIRO	End April 2019
AP.2019-16	**Nigel Fox** and **Dave Doelling** to organise a teleconference to discuss the solar spectrum with the right community and those interested in this information and to report back to IVOS and WGCV.	July WGCV meeting
AP.2019-17	**Emma Woolliams** to prepare a draft template of the table to provide uncertainty estimates for different vicarious methods and to make this available on the cloud for people to fill in	End March 2019
AP.2019-18	**Everyone** to fill in the template table on vicarious calibration methods with the information that they have	End April 2019
AP.2019-19	**Nigel Fox** to organise a teleconference to discuss and agree a version	July WGCV

Minutes and Actions of IVOS 31

AP.2019-19	**Nigel Fox** to organise a teleconference to discuss and agree a version of the table of vicarious methods that can go on the website	July WGCV meeting
AP.2019-20	**Lingling Ma** to provide hyperspectral data over Libya-4 to the PICSCAR group from the GF-5 instrument	End July 2019
AP.2019-21	**Nigel Fox** to develop a strategy on how IVOS, working with GSICS, could collate information on potential methods for pre-flight calibration that meet the requirements of the GHG missions	July WGCV meeting
AP.2019-22	**Nigel Fox** to develop a strategy on how IVOS, working with GSICS, could collate information on potential methods for vicarious calibration that meet the requirements of the GHG missions	July WGCV meeting
AP.2019-23	**Anyone** intending to establish a new RadCalNet site is encouraged to contact the RadCalNet working group	Next IVOS meeting
AP.2019-24	**Steffen Dransfeld**, **Marc Bouvet** and **Béatrice Berthelot** to consider how and whether to incorporate the RadCalNet website within the CalVal portal and to make a recommendation to the next IVOS meeting.	Next IVOS meeting
AP.2019-25	**Everyone** to advertise a link to the CalVal portal in their presentations and discussions	Next IVOS meeting
AP.2019-26	**Emma Woolliams** to provide a simple initial training pathway to **Steffen Dransfeld** and **Paolo Castracane** to go on the CalVal portal	End April 2019
AP.2019-27	**Patrice Henry** to ensure information of CEOS PICS is put on the CalVal portal	End April 2019
AP.2019-28	**Francoise Viallefont-Robinet** to consider whether and how to put information on the MTF sites onto the CalVal portal.	End April 2019
AP.2019-29	**Emma Woolliams**, building on the discussions in this meeting, to send round a potential definition of "Interoperability" to be discussed as a potential proposal for consideration by WGCV	End April 2019

Minutes and Actions of IVOS 31

AP.2019-30	**Nigel Fox** to consider alternative ways of sharing information about activities of participants to the CEOS-WGCV-IVOS meeting while increasing time for discussion.	Next IVOS meeting
AP.2018-31	**Anyone** wishing to propose a location for the next meeting should contact **Nigel Fox**	End April 2019
AP.2018-32	**Emma Woolliams** to complete the minutes and Nigel Fox to send these to IVOS along with a link to all presentations onto the CalVal portal.	End April 2019
AP.2018-33	**Nigel Fox** to organise dates and practicalities for the next IVOS meeting.	Next IVOS meeting

Thursday Networking!

- Opportunity to have 1 2 1 meetings
- To catch-up on mail etc/ Take a breath!

Individually or as a group! (Following previous IVOS recommendations)

- Air & Space museum Dulles
- Downtown monuments
- Hike in great falls park
- Manassas Battlefield (civil war)
- Washington Nationals Baseball (4pm)