



Working Group on Calibration and Validation (WGCV): 50

Infrared Visible and Optical Sensors (IVOS) subgroup: update

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NPL (with UKSA support)

WGCV 50



Working Group on Calibration and Validation



- 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 Practises*
- *Interchangeable/readable formats*
- *Results/metadata - databases*

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

- **RadCalNet**
- **PICSCAR (with GSICS)**
- **Lunar (led by GSICS)**
- **SST cross-comparison (+ VC-SST & LPV (instrument Cal for LST))**
- **O-Colour Vicarious Cal comparisons**
- **Vocabulary**
- **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)**
 - **Comparison of Rayleigh and Sun-Glint methods ??**
- **Bouvet (ESA)**
- **Henry (CNES, F)**
- **Wagener (Eumetsat)**
- **Fox (NPL, UK)**
- **Fox (NPL, UK)**
- **Woolliams (NPL, UK)**

- **No meeting since last WGCV -**
 - **Currently looking at potential for hybrid meeting June/July or Sep/Oct (location TBD)**
- **Topics for meeting**
 - **Updates on agency activities/progress - missions**
 - **Thematic groups : PICSCAR, RadCalNet, Surf reflec, Oc Col, Lunar**
 - **Uncertainty/traceability what is needed? How to achieve?
@ level 1 through to Level 2 sur ref and CARD4L**
 - **Solar spec irradiance update**
 - **Terminology**
 - **Sensor level 1 harmonisation**
 - **QA frameworks: assessment/reporting**
 - **Needs of climate/commercial sector**
 - **Priorities, future needs for IVOS to work on**



Site characteristics

- Algeria3
- Algeria5
- Libya1
- Libya4
- Mauritania1
- Mauritania2

Open simulation tools

View PICSCAR Exercises

View calibration over Libya4

Pseudo invariant calibration sites have been widely and successfully used on-orbit radiometric trending of optical satellite systems for more than 20 years. At the IVOS 27 meeting in November 2015, a new initiative was established to facilitate coordination and help prioritize research on PICS and their usage for the benefit of the EO community as a whole.

A roadmap has been set up at IVOS 28 in March 2017 where the subjects have been identified and priorities given to:

- PICS's BRDF characterization
- Spectral characterization
- Atmosphere properties
- Temporal stability
- Combining multiple sites calibration results
- Revisiting the sites

This portal contains general and detailed information about 6 PICS. It provides also a tool simulate the reflectance normalized to nadir. Please register to have access to the document.

Newsletter

2019/03/26 - Please note that the next PICSCAR meeting will be held in C/SIRO/Perth on March 26th, 2019.

2018/02/07 - On going activity : PICSCAR intercalibration exercise.

- Exercise 1: Intercalibrating S2A and Landsat 8. Sentinel 2 should be the reference sensor.
- Exercise 2: Intercalibrating MERIS and MODIS Aqua for a 10 years period. MERIS should be the reference sensor.
- Exercise 3: Assessing the BRDF of the site to normalise MERIS TOA reflectance to the following geometry using BRDF model for the following geometry: SZA = 30°, VZA = 0°, relative azimuth angle=0.

Please see the invitation letter to get the instructions and data.

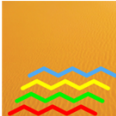
<https://picscar.magellium.com/>

Accessible through CEOS Cal/Val Portal

Working Group on Calibration and Validation

PICSCAR roadmap



 Action is to extend activity to other sites

Tool = Portal
Action is to continue to gather information

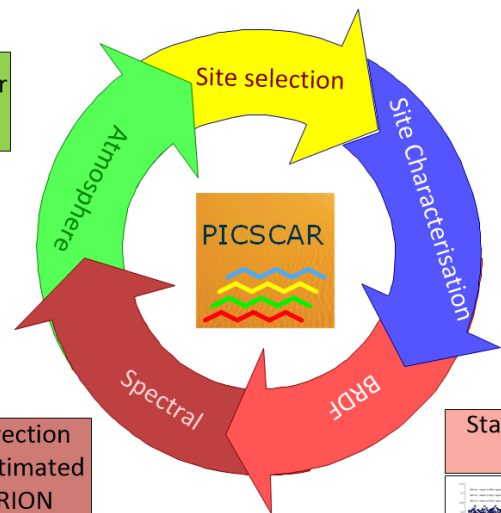
Impact assess ed

Use of :
• ERA5

Use of ERA for all sensors

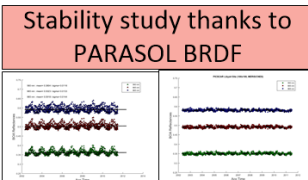
Through location, radiometry, altitude, geologic properties, homogeneity (based on VHR acquisitions), Climatology

Site characteristics	Algeria3	Algeria5	Libya1	Libya4	Mauritania1	Mauritania2
Latitude/Longitude						
Site	Central latitude	Central Longitude	Minimum Latitude	Maximum Latitude	Minimum Longitude	Maximum Longitude
Libya4 (Standard Site)	28.58	22.28	28.58	28.58	22.09	22.09
Libya4 (Small Site)	28.58	22.28	28.45	28.65	22.28	22.49



Spectral correction using SBAF estimated from HYPERION

Use of :
• Other hyperspectral sensor ?
• Hyperspectral insitu measurements



Use of Other model ?

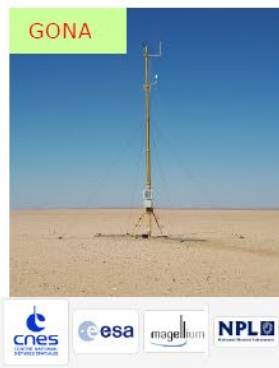


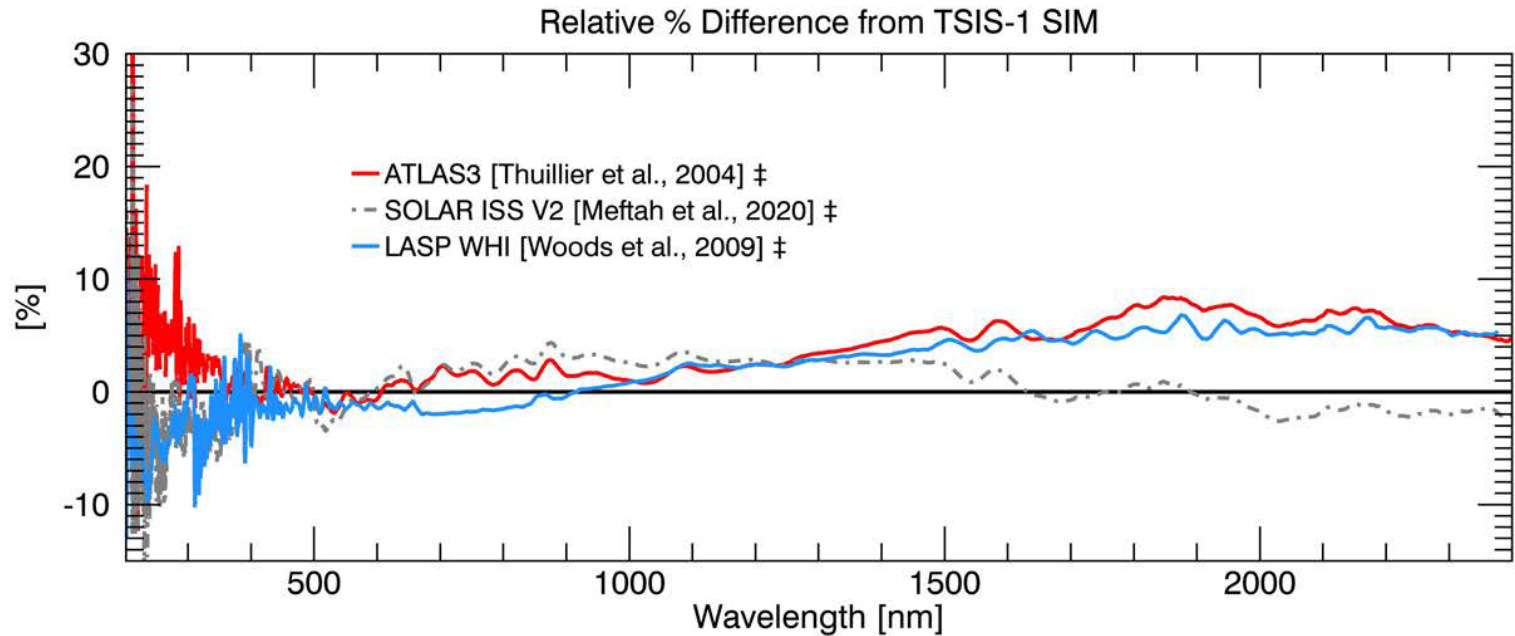


The RadCalNet sites



Today 5 sites (+2 more in preparation)





Recommendation approved?

Prospective CEOS Solar Irradiance Spectrum



- **Context**

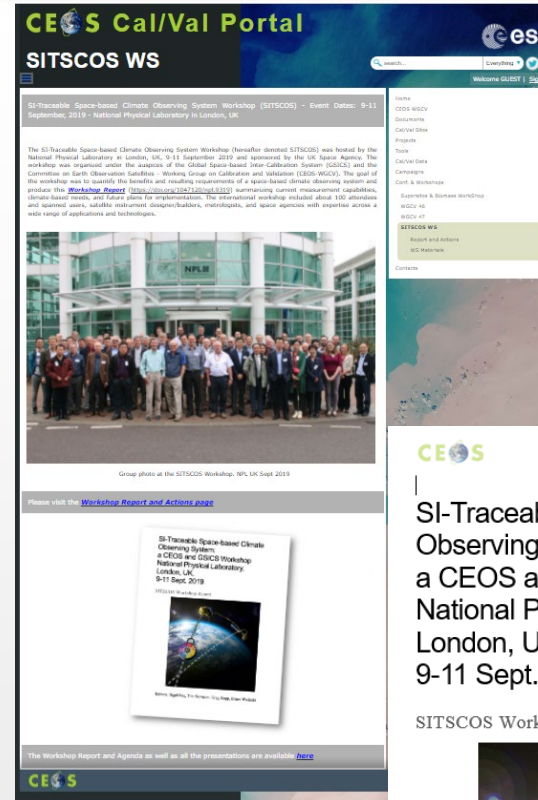
- Following relatively recent new high accuracy observations of the Solar spectral Irradiance by the NASA TSIS mission and reanalysis of the ISS SOLSPEC mission there are now considered to be significant differences between the current recommended CEOS solar irradiance spectrum particularly in the SWIR 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 here https://lasp.colorado.edu/lisird/data/tsis1_hsr
- 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.



- Published on CalVal portal together with (slide set for use by community)
- Has Doi: <https://doi.org/10.47120/npl.9319>
- Exec summary to be extracted and promoted
- Presented/Referenced at
 - COP 26
 - AGU
 - ESA Living planet 2022
 - CalCon 2022
 - How to increase visibility further?
- Feedback
 - when next workshop to discuss active sensors?



CEOS Cal/Val Portal
SITSCOS WS

ES-Traceable Space-based Climate Observing System Workshop (SITSCOS) - Event Dates: 9-11 September, 2019 - National Physical Laboratory in London, UK


The ES-Traceable Space-based Climate Observing System Workshop (hereafter denoted SITSCOS) was hosted by the National Physical Laboratory in London, UK, 9-11 September 2019 and sponsored by the UK Space Agency. The workshop was organized under the auspices of the Global Space-based Year-Calibration System (GSICS) and the Committee on Earth Observation Satellites - Working Group on Calibration and Validation (CEOS-WGCV). The goal of the workshop was to identify the benefits and enabling requirements of a space-based climate observing system and produce the [Workshop Report](#) (<https://doi.org/10.47120/npl.9319>) summarizing current measurement capabilities, climate-based needs, and future plans for implementation. The international workshop included about 100 attendees and featured users, satellite instrument designers/builders, metrologists, and space agencies with expertise across a wide range of applications and technologies.

Group photo at the SITSCOS Workshop, NPL, UK, Sept 2019

Please visit the [Workshop Report and Agenda page](#)

SITSCOS Workshop Report and Agenda

The Workshop Report and Agenda as well as all the presentations are available [here](#)



SI-Traceable Space-based Climate Observing System: a CEOS and GSICS Workshop National Physical Laboratory, London, UK, 9-11 Sept. 2019

SITSCOS Workshop Report





5th CEOS comparison of SST Satellite validation capabilities

UK June (Laboratory- NPL Field- Pier (Bournemouth))

- 11 Radiometers & 7 black bodies (hope to include drone)
- US (2), Europe (7), China, Australia

