



Committee on Earth Observation Satellites

Recommendations from various CEOS WGCV IVOS related workshops





Workshop on Radiometric Cal of 'European primarily' missions Aug 2017



ESA organised included NASA overview: (<https://earth.esa.int/web/sppa/meetings-workshops/expert-meetings/workshop-on-radiometric-calibration-for-european-optical-missions/programme>).

Reference	Recommendation	Framework
[Rec-1]	To reinforce the focus on instrument pre-flight characterization activities during the mission development phase by allocating the required time and budget.	ESA
[Rec-2]	To ease access to instrument pre-flight characterization dataset for ensuring Level 1 full traceability during mission lifetime and beyond.	ESA
[Rec-3]	To support sensor in-flight radiometric calibration and inter-calibration activities and allocate the proper budget during mission operations (and beyond) for maintaining and continuously improving (re-processing) the relevant Level 1 dataset.	ESA
[Rec-4]	To work toward a community-agreed reference for Level 1 TOA radiances/reflectances and provide the relevant protocols and tools allowing different sensors to link to it. To propose and discuss this reference at the next CEOS WG Cal/Val Meeting.	CEOS
[Rec-5]	To further investigate and understand the impact of the incorrect SRFs for S-2A B01 and B02 bands both for vicarious calibration and for data exploitation.	S2-MPC

[Rec-6]	To continue investigation on S2 SRFs inter-detectors variability in collaboration with Landsat team.	S2-MPC
[Rec-7]	To redo the yaw manoeuvre, recently performed for S-3A in order to characterize OLCI sun diffuser BRDF, also for the S-3B unit.	S3-MPC
[Rec-8]	To further investigate the trend observed for Proba-V in-flight vicarious calibration over Libya-4, in particular the higher degradation rate in the SWIR as compared to VNIR channels.	Proba-V QWG
[Rec-9]	To harmonize definition of ROI for desert sites between S-2 and S-3 MPC teams in order to ease radiometric cross-calibration between MSI, OLCI and SLSTR sensors.	S-2 and S-3 MPC
[Rec-10]	To collect the results of vicarious calibration and inter-calibration over PICS from the different S-2, S-3 and Proba-V calibrations teams. To compile a table providing the estimated radiometric accuracy for each site with reference to the adopted methodology and ancillary data.	S-2 and S-3 MPCs, Proba-V QWG
[Rec-11]	To work toward providing uncertainty information for vicarious calibration results, discriminating between random and systematic component.	S-2 and S-3 MPCs, Proba-V QWG
[Rec-12]	To continue the work on harmonization of PICS both in terms of ROI definition as well as for the relevant protocols and procedures.	CEOS
[Rec-13]	To sustain the effort for the development of a community agreed RTM, able to model all the complexity of the surface-atmosphere coupled system, with the final goal to attain the required accuracy for sensor in-flight calibration (better than 3%).	ESA- CEOS



~ 50 attendees 2 days

Recommendations /Conclusions

- Interest in improving availability and use of Uc, supported by an engaged community
- Need Uc principles more widely embedded in agency and community practice
- Need more fora to bring several communities together including instrument manufacturers, range of contexts and foci, across levels
- Uncertainty info reqs need to be embedded at high levels of mission and system requirements
- Involves definition of practicalities about how mission will deliver Uc to users
- Precedent of Sentinel 3 MRD – partly driven by Dat Assim community
- Need methods to invert from user requirements back to radiance error covariance, and methods to ensure that user requirements on uncertainty are well founded
- **Need to find ways to raise profile of these issues**



- **Demonstrations of users benefitting from U information,**
 - - links of user and mission requirements need to be more obvious
 - - e.g. Dat Assim use case
- **Uncertainty analysis as a way of identifying priorities and investment, and driving improvements in products**
- **What does absence of U prevent?**
 - Relatively clear for climate - societal impacts in future.
 - Soil moisture, precip.- for use in satellite-indexed insurance of drought etc.
 - Providing U helps users avoid misuse of data (and wasted science!), and increases dialogue
- **Develop tools, methods/guidance for uncertainty tree etc to lower the level of expertise required to exploit**
- **Areas needing theoretical advances:**
 - uncertainty associated with classification including cloud masks, categorical variables (eg burnt pixels), Neural Networks

Need to classify recommendations by whom they are addressed to



FRM4STS: Fiducial Reference measurements for validation of Surface Temperature from Satellites: Results of Lab and near lab comparisons:

All info is available here: www.frm4sts.org

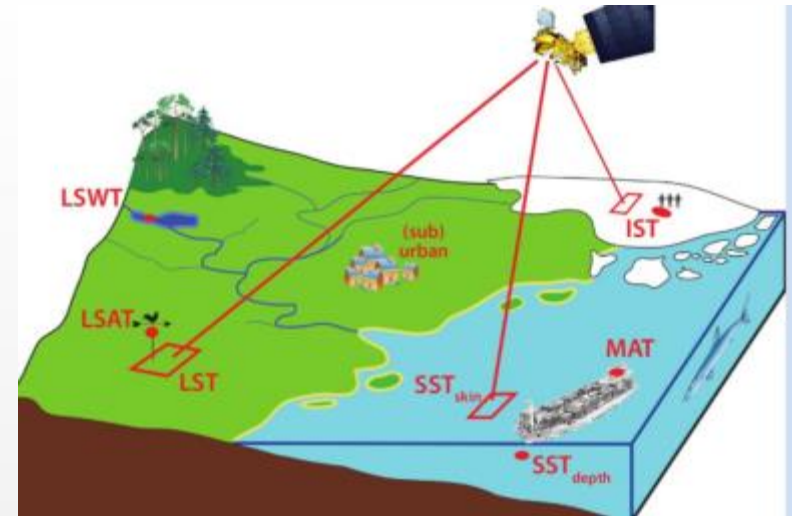


Working Group on Calibration and Validation



- ~ 40 attendees from 4 continents representing sat surface T validation community.
- Endorsed good practises for Land, Ocean and Ice
- Land already incorporated into LPV good practice guide
- Propose that others are adopted by CEOS WGCV IVOS

- FRMs should be encouraged need more sites, more match-ups and more comparisons
 - Super-sites with WMO? particularly over land (also urban, mountains. Polar ...)
- Research to look at scaling – point to satellite, heterogeneity, global representativeness
- Research to look at effects of T skin to depth – water, snow, Ice
- Training / Case studies on U_c estimation and analysis + good practice guides on measurements and instruments
- Comparisons designed to account for operational conditions (low/high ambient T)
 - Ship based multi laterals for oceans
- Cloud detection/masking (day/night) Satellite and Validation



- **Link Satellites to Validation – compare traceability and reference standards (not rely on models)**
- **Compare retrieval algorithms (using standardised data)**
- **More (traceable Buoys) consider triple sensors for redundancy, recoverability?**
- **Look for synergy in other observations e.g. passive microwave and IR could be encouraged need more sites, more match-ups and more comparisons**
 - **Super-sites with WMO? particularly over land (also urban, mountains. Polar ...)**

Encouraging what we are doing and food for thought on future

- **CEOS sites are very valuable and being used**
 - **Need to be sure of definition of RoI**
- **Encourage super sites not just radiometric but build on in-situ networks or add instrumentation**
- **Want to have consistent Uc analysis**
- **Work towards community TOA L1 reference**
- **Database of results**
- **Stories/evidence to show value of Uc Cal/Val effort**