Breakout Workshop #4

Ocean Colour Satellite Sensor Calibration

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Goals of the Satellite Sensor Calibration Breakout Workshop

- Meeting of the IOCCG Task Force on Satellite Sensor Calibration to support exchange of calibration methods and ideas
- Focus on the delivery of highly accurate top-of-atmosphere radiances (or reflectances) based on direct instrument calibrations
- Polarimeter calibration included for the first time

Lessons learned

- Hyperspectral - PACE OCI launched Feb 2024
- Polarimeters - PACE (SPEXone + HARP2), SGLI, 3MI
- Operational sensors - VIIRS, OLCI
- GEO sensors - GOCI-II, GLIMR
- New missions - SABIA-Mar, S3NGO
- Lunar calibration

Existing IOCS Satellite Sensor Calibration Recommendations are still standing

New Recommendations for Agencies

- ➔ **Traceability chain** from science/user requirements to instrument requirements is critical during instrument development
- ➔ **Redundancy** is important, e.g.
  - on-orbit radiometric trend modelling with solar diffuser (primary) and lunar observations (secondary);
  - two solar diffusers
- ➔ **Sensor artifacts**
  - reduced by design, e.g. straylight, OOB
  - adequately characterized prelaunch and corrections developed
- ➔ **Lunar observations** implementation for long-term trending and for sensor characterisation, e.g. straylight
- ➔ Lunar model absolute performance
  - significant differences between the ROLO reference and many new models +- 5% and more
  - LSICS = GSICS Lunar Spectral Irradiance Calibration System to replace the GIRO as the new shared reference for lunar calibration
  - 5th CGMS/GSICS – CEOS/WGCV IVOS Lunar Calibration workshop at Darmstadt, Q4 2026

New IOCS Satellite Sensor Calibration Recommendations for Agencies

➔ **Radiometric characterisation - solar diffusers are on-orbit radiometric standard**

- mandatory prelaunch solar diffuser BRDF characterisation “as you fly” with on-orbit solar calibration geometries
- prelaunch pinpoint the BRDF at a reference on-orbit solar geometry, high accuracy and precision at high FOV sampling (e.g. 0.5% (k=1) absolute possible)
- yaw maneuvers mandatory to recharacterize BRDF on-orbit for geometries relative to the reference
- prelaunch BRDF may cause seasonal effects in gains if yaw maneuvers or highest accuracy characterization are not implemented
- use at least 2 independently absolutely calibrated radiometric sources, directly traceable to NMI
- spectral shape and intensity of sources is important
- SWIR band additional focus, as biases possible
- Lower budget sensors need to devise alternative strategies (e.g. crosscalibration to other sensors, vicarious calibration, lunar calibration)

➔ Hyper/spectral characterisation

- prelaunch at dedicated laser facilities
- spectral temporal model applied on-orbit

➔ Geometric calibration

- start early after launch
- stability and cross-track relative consistency