International Ocean Colour Science Meeting 2025

Advancing Global Ocean Colour Observations

S3NGO AOLCI early calibration concepts

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SENTINEL-3 NEXT GENERATION OPTICAL (S3NGO) MISSION: AOLCI EARLY AND TENTATIVE CONFIGURATION

Advanced OLCI (AOLCI) = enhanced continuity of Sentinel-3 Visible measurements

AOLCI industrial studies are ongoing to define technology capabilities against the evolving user needs

AOLCI tentative configuration

- Constellation of 2 satellites, S3NGO-A and S3NGO-B
- Revisit time ≤ 2 days over ocean
- As hyperspectral as possible, tentatively several hundred bands in the range 340 nm – 1040 nm
- Spatial resolution ≤ 150 m

Enhancements in the synergistic use of AOLCI and ASLSTR

S3 CALIBRATION LESSONS LEARNED AND S3NGO CONCEPTS

Radiometric calibration and characterisation

- Diffuser BRDF characterisation pre-launch on-ground
  - Absolute characterisation of the diffusers' BRDF at geometries that represent the full range of solar azimuth and zenith angles encountered during in-flight calibrations
  - BRDF characterisation focus on the reference geometry in the middle of in-flight solar observations, repeated measurements for noise reduction
  - Primary and ageing diffusers to have the same BRDF behaviour
  - BRDF characterisations in the lab can reach 0.5% (k=1) absolute uncertainty in the visible (when done with a lot of care)
- Diffuser BRDF characterisation on-orbit
  - Yaw manoeuvres for on-orbit relative BRDF characterization (require accurate absolute BRDF for the one reference geometry)
- On-orbit radiometric gain model maintained within ≤ 0.1% uncertainty and regularly updated
- Radiometric stability requirement over a 1 year and 10 year mission (none for OLCI)
- Inter-band relative radiometric uncertainty reduction (based on heritage bands)
- Inter-camera relative radiometric uncertainty reduction (OLCI discontinuities at camera interfaces)
- Definition of radiometric calibration schedules based on solar geometry optimization on the diffuser (SAA) and annual repeatability
- Dark current stability: frequent dark-only calibrations, reduction of the periodic noise in dark signal

Additional resources:
- IOCCG Report #13
- PACE OCI specs

Straylight reduced by design, and pre-launch detailed characterisation, incl. calibration mechanism

High Energy Particle events reduced by design

Spectral characterisation

- Detailed pre-launch spectral characterisation, and additional understanding of the bands at the edges of the CCD
- Temporal spectral model implementation
- On-orbit spectral stability required ≤ 0.1 nm uncertainty, inter-camera relative spectral accuracy to be ensured

Geometric stability and cross-track relative geolocation accuracy

Commissioning: tandem phase, yaw manoeuvres for diffuser BRDF, lunar observations