

Radiometric calibration of SGLI on-orbit

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1. Radiometric calibration system



- ✓ Post-launch Level-1 calibration will be based on the <u>onboard calibration</u> with sensor model developed by the <u>pre-launch characterization</u>
- ✓ <u>Vicarious</u> and <u>cross calibration</u> will be used for confirmation of the onboard calibration, and more accurate calibration (adjustment) required for the L2 algorithms



2. SGLI CAL: on-board calibration



□ Solar reflective bands trend for 9 months

- Same solar diffuser degradation at both LED and Sun Calibration is observed for VNR wavelength.
- ✓ Detailed analysis and a comparison with other results is ongoing.



First year on-orbit cal activities of SGLI, Sep 26, 2018 SPIE Hawaii 2018

Cited from K. Tanaka 2018, SPIE-APRS (Earth Observing Missions and Sensors [10781-27])



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3. SGLI Lunar CAL by GIRO



VNR-NP Nadir relative trend (Normalized 2018/2/1) [only Roll angle =0 or +1deg]

IRS-SWI relative trend (Normalized 2018/2/1) (After phase angle dependence correction)



T. Hashiguchi, presented in GSICS Annual Meeting 2019, ESA-ESRIN, Frascati, Italy, 2019-03-04/08 http://gsics.atmos.umd.edu/bin/view/Development/AnnualMeeting2019



4. Image quality: possible noise pattern





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- ✓ Statistics of the overlap pixels (~112 pixels) weighted around the connection pixel (the center of the overlap)
- ✓ Correction is applied with weighting around the connection pixel
- \checkmark OC radiance range is used for the statistics
- ✓ Coefficients are changed gradually by 1500 lines (~1/4 scene)





C1SG1 201804210138V05510 1BSG VNRDQ E2211.h5, 20180421 01:41:05.647, chl





30

10

3

- 0.1

0.03

✓ An example of Chl-*a* image without the table revision + gap correction





C1SG1_201804210138V05510_1BSG_VNRDQ_E0010.h5, 20180421 01:41:05.647, chl





 ✓ An example of Chl-*a* image without the table revision + gap correction



4. Image quality: Stray light



GCOMP

.75

W/m²/um/sr

10

133.4

0.45 0.15 -0.15 -0.45 -0.75

4. Image quality: Stray light

✓ The correction results are confirmed by ocean color images (e.g., ρ_w , Chl-*a*..)



Level-2 $\rho_w(530 \text{ nm})$ images with and without the straylight correction (in Level-1 processing) around Oki islands in Japan on 1 Aug. 2018.



4. Image quality:

Overall comparison with other ocean color imagers



Chl-*a* derived by SGLI, Sentinel-3/OLCI (by OC4ME algorithm), Terra/MODIS, and Suomi NPP/VIIRS in the northwest of Australia on 27 Aug 2018.



5. Summary



- ✓ Solar and lamp calibration: diffuser degradation
- ✓ Monthly lunar calibration: works well by using GIRO
- ✓ Image quality
 - Stray light correction confirmed by Moon and ocean color images
 - Inter-telescope difference is corrected by using the 90-deg yaw maneuver data over Antarctica (on 17 Feb. 2018) and overlap samples for each scene
 - Detector noise: not so significant; the remaining noise was corrected by the yaw maneuver data; further improvement is still under evaluation
 - Random noise: stable in the first year; monitored continuously