

# GSICS Agency Report 2024

Misako KACHI\*, Hiroshi MURAKAMI,  
Kosuke YAMAMOTO, Takuji KUBOTA,  
Kei SHIOMI, Akihiko KUZE, Takeo TADONO, Yukio KURIHARA

**Japan Aerospace Exploration Agency (JAXA)**

## ❖ Current GSICS Activities

- Monthly lunar calibration of GCOM-C/SGLI by GIRO is updated regularly and all GIRO I/O files have been submitted to GLOD
- Lunar calibration of GOSAT-2/CAI-2 by GIRO is updated regularly and the gain degradation is estimated. (details by K. Shiomi at UVN-S Break-out session)
- The GPM Core Observatory satellite performed two orbit boost maneuvers on Nov. 7 and 8, 2023 that raised its altitude by 35km. Calibration and validation of the DPR products corresponding to the orbit boost has been conducted to resume processing in March 2024.
- Cross-calibration of Himawari-9/AHI and SGLI IR bands by applying a physical SST method (Kurihara and Kachi, submitted to JSTARS)
- ALOS-2/PALSAR-2 calibration activities, geometric accuracy, radiometric accuracy, and polarimetric accuracy of the standard product are regularly evaluated, and the resolution, sidelobe level, noise equivalent sigma zero (NESZ), ambiguity, etc. are measured as the image quality evaluation.
- Monitoring and analysis of Radio Frequency Interferences (RFIs) found in GCOM-W/AMSR2 C-band over 11 years are ongoing.
- Preparation of cross-calibration of GOAST-GW/AMSR3 high-frequency channels (166, 183GHz) with GPM-CO/GMI is underway.

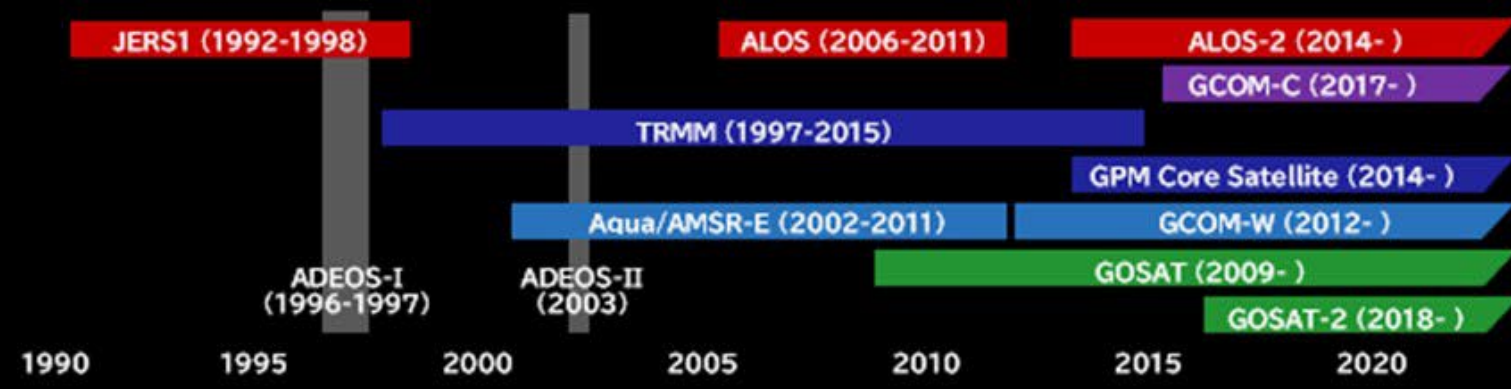
## ❖ Status of Agency's GSICS Actions

- Internal discussion/preparation of standardized landing pages for JAXA sensors upon request from GDWG in January 2024

❖ Summary of current and future instruments (JFY: Japanese fiscal year, April-March)

- GOSAT, GCOM-W, GPM Core/DPR, ALOS-2, GCOM-C, GOSAT-2: Operating
- Mar. 2023: ALOS-3 (Optical) was lost due to H3 Test Flight #1 (TF1) rocket failure
- Feb. 17, 2024: H3 TF2 rocket launch (successful)
- May 2024: EarthCARE launched by Space X Falcon 9, JAXA provides Cloud Profiling Radar (CPR).
- FY2024: ALOS-4 (SAR) by H-3 F3
- FY2024: GOSAT-GW (GHG spectrometers and microwave radiometer) launched by H-IIA

## JAXA's Earth Observation History

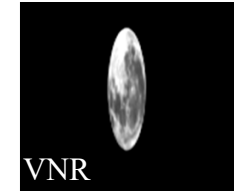


## New Satellites Scheduled for Launch



# Agency's Calibration Major Updates

## (1) SGLI Lunar CAL by GIRO



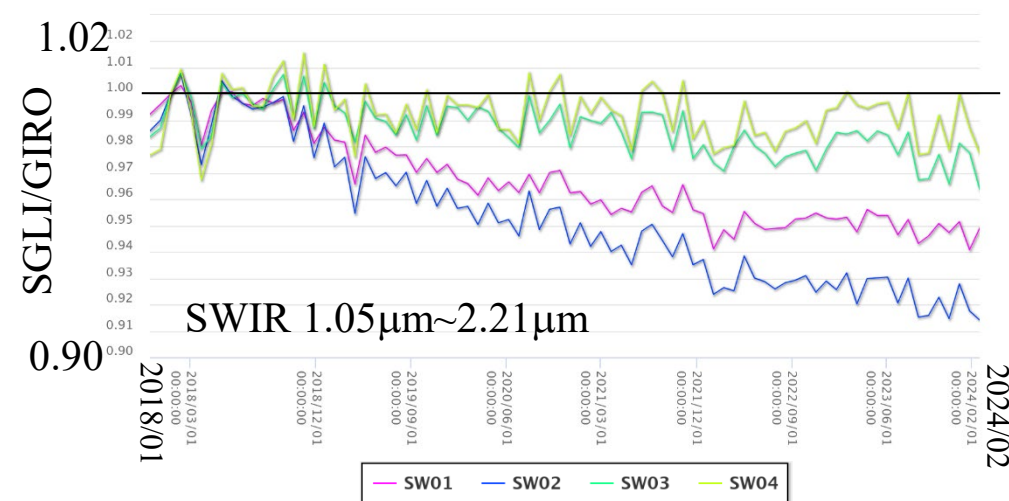
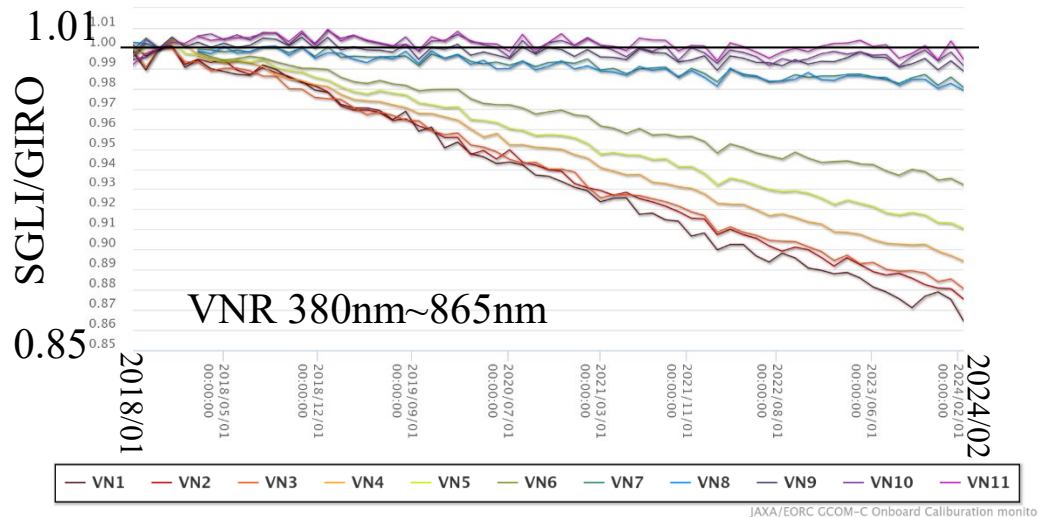
- GCOM-C SGLI lunar calibration is regularly updated by the monthly (phase angle  $\sim +7^\circ$ ) lunar observation operations (by the pitch maneuver; **80 times from Jan. 2018 to Feb. 2024**) with GIRO
- All SGLI lunar observation data (GIRO input/output files) **have been submitted to GLOD**

✓ The temporal change,  $b_{ch}$ , is estimated by the multiple regression with the lunar phase angle,  $g_n$

$$f_{ch,n} = a_{ch} \times g_n + b_{ch} \times d_n + c_{ch} \quad (\text{d: days from launch, ch: SGLI channels})$$

✓  $b_{ch}$  is updated half-yearly, and  $L_{ch}^{orig}$  is corrected to  $L_{ch}^{LIB}$  in the Level-1B processing

$$L_{ch}^{LIB} = L_{ch}^{orig} / (1.0 + b_{ch} \times d)$$



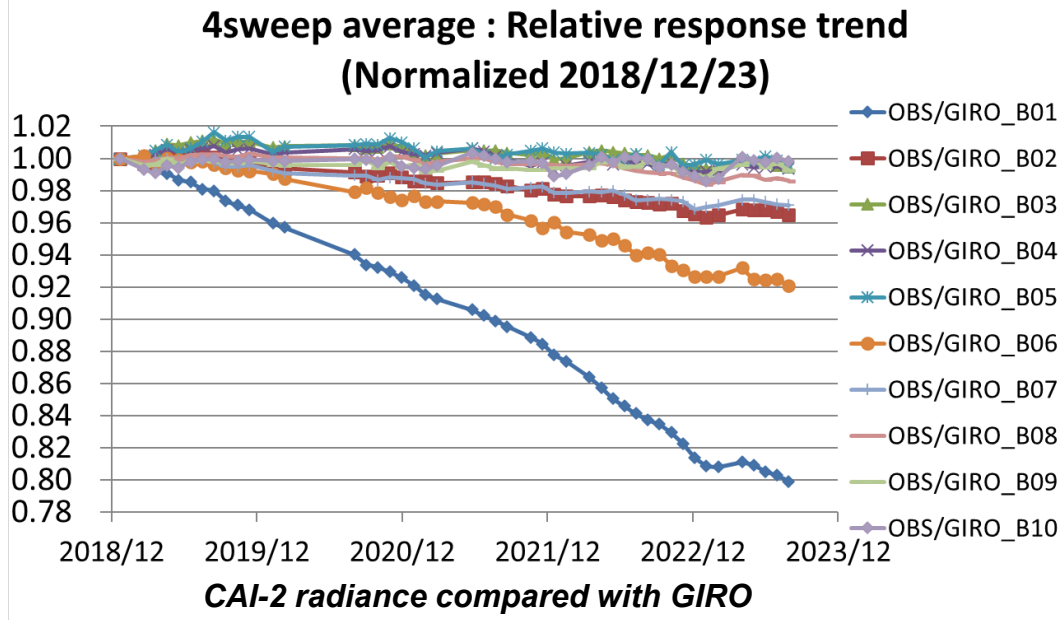
Time series of SGLI/GIRO trend (Normalized by 2018/2/1)

- Urabe et al. (2020). DOI: [10.3390/rs12010069](https://doi.org/10.3390/rs12010069);
- Urabe et al. (2019) DOI: [10.1109/IGARSS.2019.8897892](https://doi.org/10.1109/IGARSS.2019.8897892)

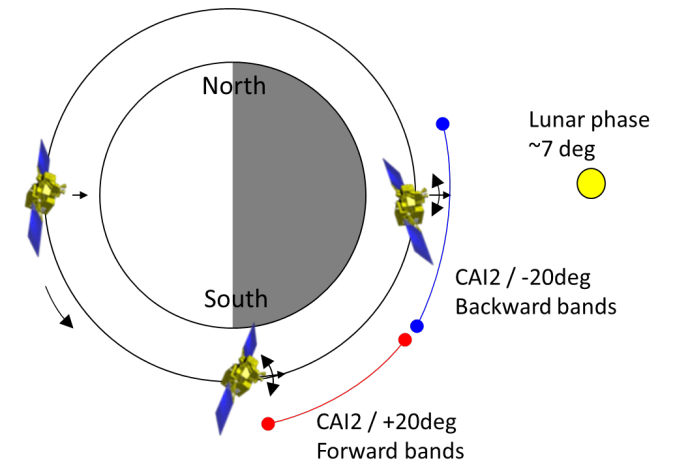
# Agency's Calibration Major Updates

## (2) GOSAT-2 Lunar CAL by GIRO

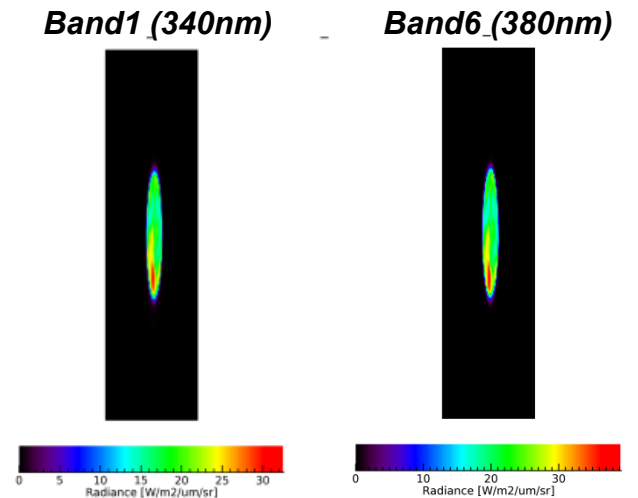
- CAI-2 has been operated the lunar calibration for radiometric calibration by along-track (AT) scans (satellite pitch rotations) once a month since December 2018. The lunar phase angle is targeted around 7 deg.
- CAI-2 observes at 340, 380, 440, 550, 670, 870, and 1630 nm and compared with GIRO. 340nm is compared with the extrapolated model.
- CAI-2 B1 340 nm band degraded around 20 %, B6 380 nm band around 8 % in 5 years. Degradation has become slowly since 2023.



Details will be presented by K. Shiomi at UVN-S Break-out Session, Wed. pm., Mar-13



**Illustration of GOSAT-2 lunar calibration**



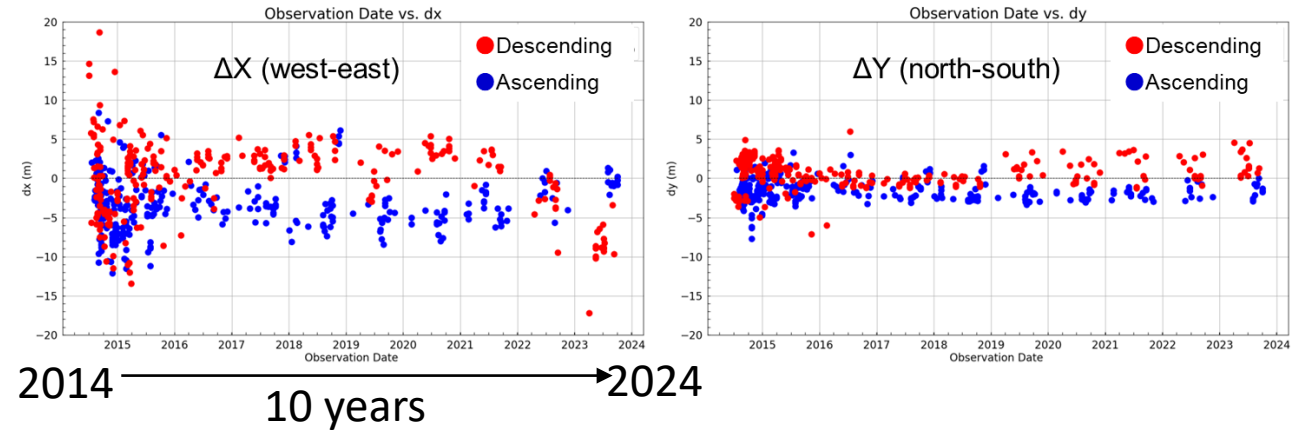
**CAI-2 first lunar calibration by AT scan on December 23, 2018**



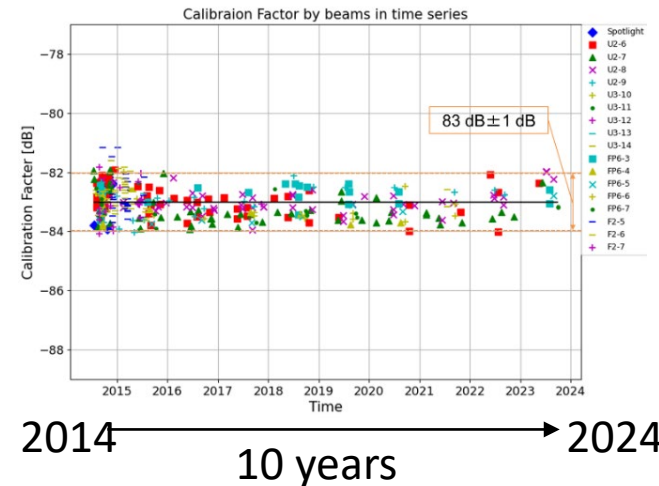
# Agency's Calibration Major Updates

## (3) ALOS-2 Calibration over 10 years

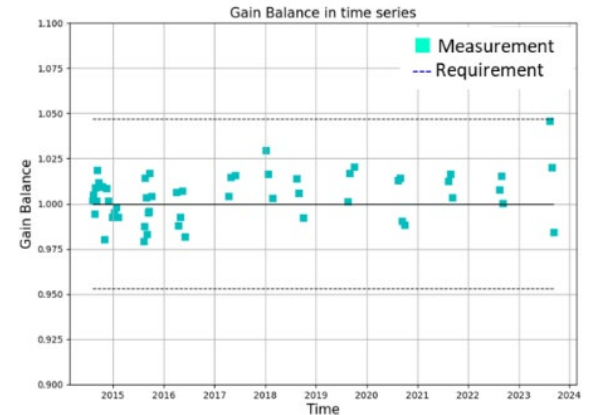
- ❖ ALOS-2 currently continues to operate smoothly by PALSAR-2, which is an L-band SAR and suitable for monitoring disasters, forest, agriculture, and infrastructures.
- ❖ As the calibration activities, geometric accuracy, radiometric accuracy, and polarimetric accuracy of the standard product are regularly evaluated, and the resolution, sidelobe level, noise equivalent sigma zero (NESZ), ambiguity, etc. are measured as the image quality evaluation.



ALOS-2/PALSAR-2 geometric accuracy



(a) Time trend of the radiometric accuracy.



(b) Time trend of the gain imbalance of VV/HH polarizations.

ALOS-2/PALSAR-2 radiometric and polarimetric accuracies

# Agency's Personnel Supporting GSICS

## ❖ Points of contacts/meeting participants:

- EP Focal Point: Misako Kachi
- GRWG members: Hiroshi Murakami (optical & IR imager) , Misako Kachi (MW)
- Other Key Agency Personal
  - GHGs: Akihiko Kuze, Hiroshi Suto & Kei Shiomi
  - SAR & advanced optical: Takeo Tadono
  - Precipitation radar: Takuji Kubota & Kosuke Yamamoto
  - Overall coordination: Toshiyuki Kurino

# Agency's GSICS related research activities

## (1) GPM-CO Orbit Boost in Nov. 2023

- ❖ The GPM Core Observatory (GPM-CO) satellite performed two orbit boost maneuvers on Nov. 7 and 8, 2023 that raised its altitude by 35km.
  - The goal of these boosts is to restore the GPM-CO's lifespan closer to the original estimates of ending in the early 2030's. Recent lifespan estimates have been getting shorter due to unexpectedly high solar activity, which causes additional atmospheric drag on the spacecraft.
  - The primary goal of restoring GPM-CO's lifespan is to allow the GPM mission to overlap with the satellites associated with the future Atmosphere Observing System (AOS) mission planned by NASA, JAXA, and other agencies, allowing for intercalibration of instruments between the GPM and AOS missions.  
<https://gpm.nasa.gov/missions/gpm/orbit-boost>
  - NASA and JAXA started to provide the Dual-frequency Precipitation Radar (DPR) products, experimentally corresponding to the GPM Orbit Boost, on 16th January 2024, and are planning to resume the standard DPR products in March 2024.
  - JAXA has been conducting calibration and validation of the DPR products corresponding to the GPM orbit boost.

