



Current status of KMA VIS/NIR Calibration : Long-term Analysis of Five years

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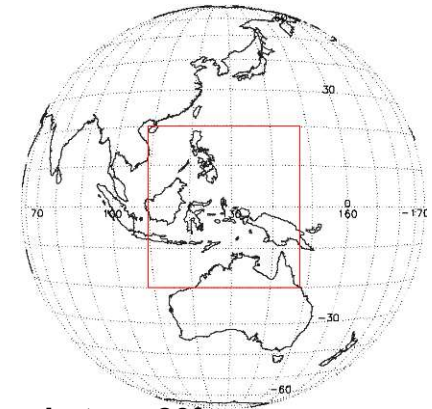
❖ AMI VIS/NIR Calibration

- Ray-Matching(SNPP, NOAA-20, NOAA-21)
- GSICS DCC(AMI, SNPP)
- Lunar Calibration(GIRO)

❖ Summary and Future Plans

KMA's Calibration (VNIR)

- ◆ KMA monitors GK2A VIS/NIR channels' radiometric performance
 - Ray Matching(Terra MODIS, S-NPP VIIRS, NOAA-20,21 VIIRS)
 - GSICS DCC(Aqua MODIS, S-NPP, NOAA20 VIIRS, Histogram and monthly time series of Mean and Mode)
- ◆ Applied SBAF from NASA SCIAMACHY.

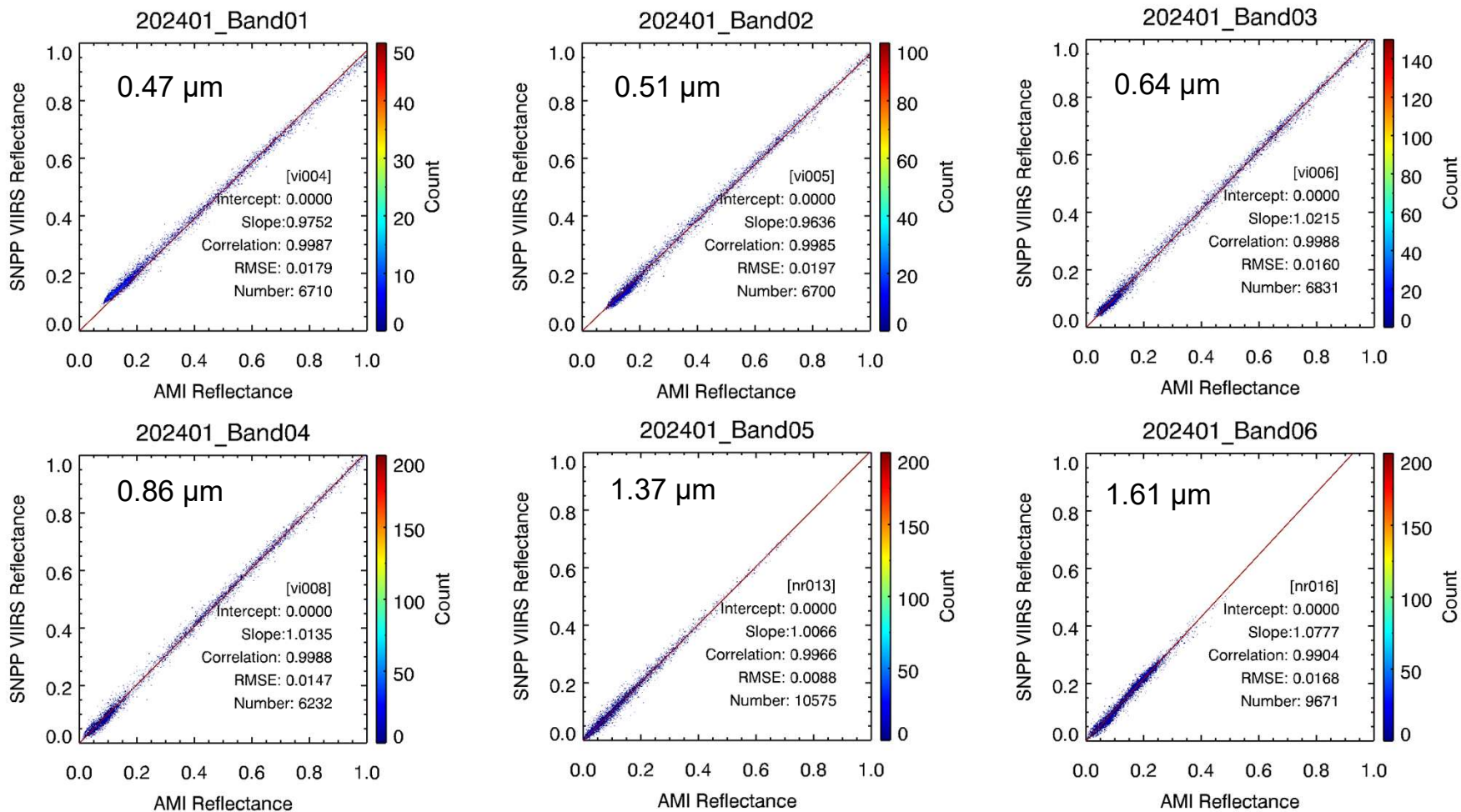


Lat. : $\pm 20^\circ$
Lon. : $108.2^\circ \sim 148.2^\circ$

Method	Thresholds	Reference Values
Ray Matching (All Sky)	- Time Difference $\leq 5\text{min.}$ $0.1^\circ \times 0.1^\circ$ Grid (Lat/Lon) $\text{SZA} < 40^\circ$, $\text{VZA} < 40^\circ$ $\text{SZA Difference} \leq 5^\circ$ - Reflectance STDV in each grid < 0.05 - Viewing Angle Difference $\leq 10^\circ$ - Bin Spatial homogeneity $< 80\%$ - Remove Sun-glint pixels	Terra MODIS S-NPP VIIRS NOAA20 VIIRS NOAA21 VIIRS
GSICS DCC	$\text{IR_TB} \leq 205^\circ\text{K}$ $\text{VZA} < 40^\circ$ $10^\circ < \text{RAA} < 170^\circ$, $190^\circ < \text{RAA} < 350^\circ$ $\text{TB_IR} < 1\text{K}$ $\text{STDV Rad_VIS} / \text{Mean Rad_VIS} < 0.03$	

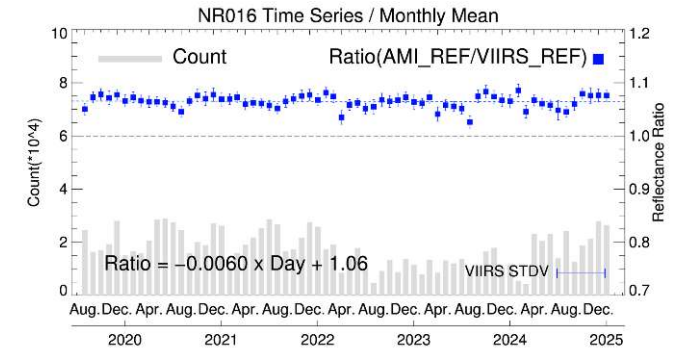
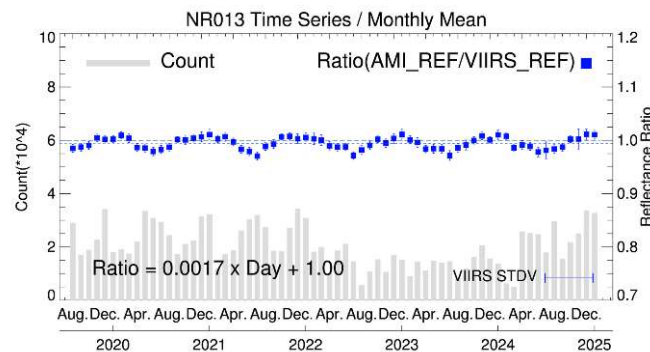
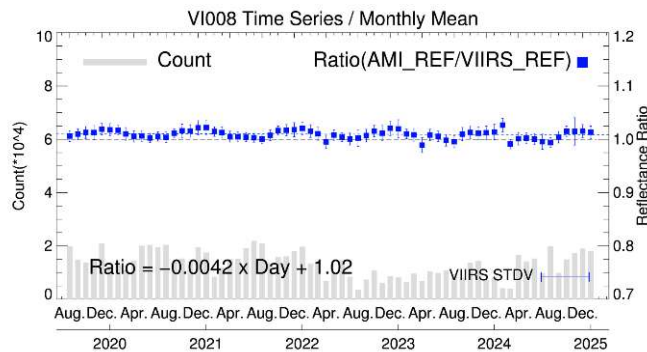
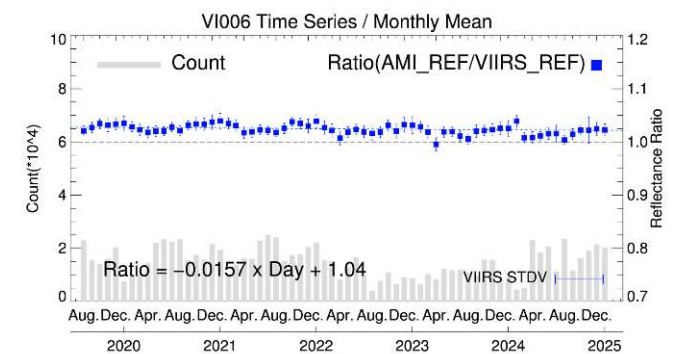
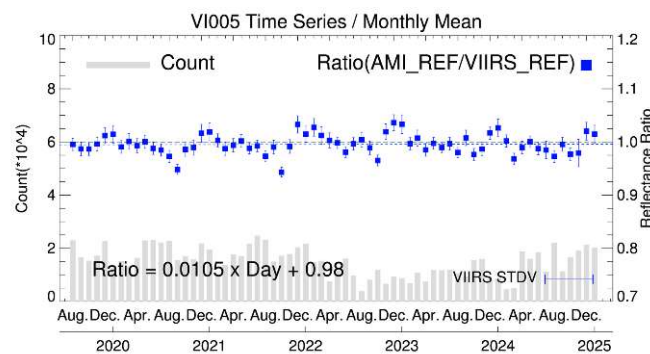
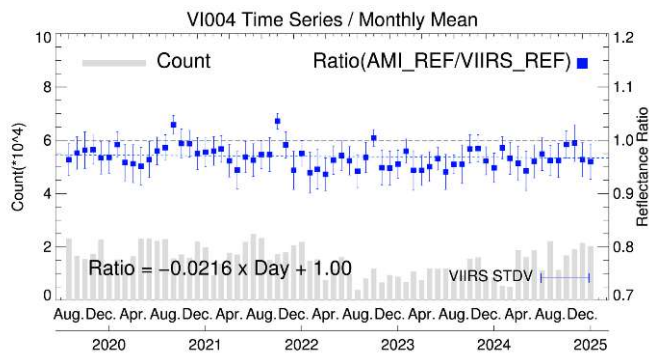
	From NASA LADSWEB	From NOAA CLASS	
	Central Wavelength(μm)		
	AMI	MODIS	VIIRS
1	0.47	B3 (0.459~0.479)	M3 (0.49)
2	0.51	B4 (0.545~0.565)	M3 (0.49)
3	0.64	B1 (0.620~0.670)	I1 (0.64)
4	0.86	B2 (0.841~0.876)	M7 (0.865)
5	1.37	B26 (1.360~1.390)	M9 (1.378)
6	1.61	B6 (1.628~1.652)	M10 (1.61)

Ray Matching - Monthly Scatter plot



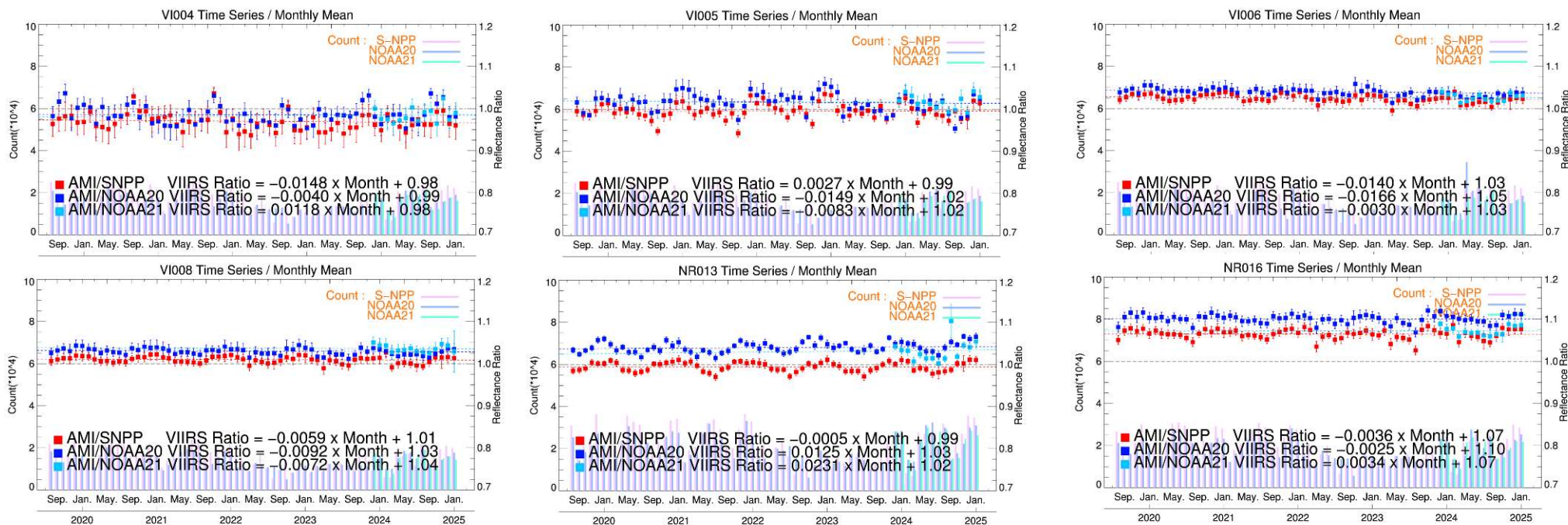
Ray Matching – Monthly Timeseries

■ AMI vs. SNPP VIIRS (Aug. 2019. ~ Jan. 2025.)



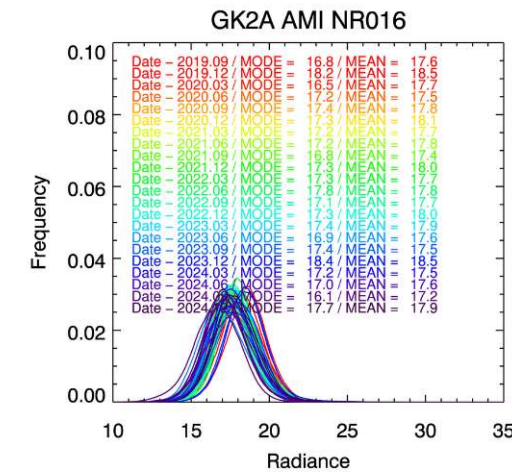
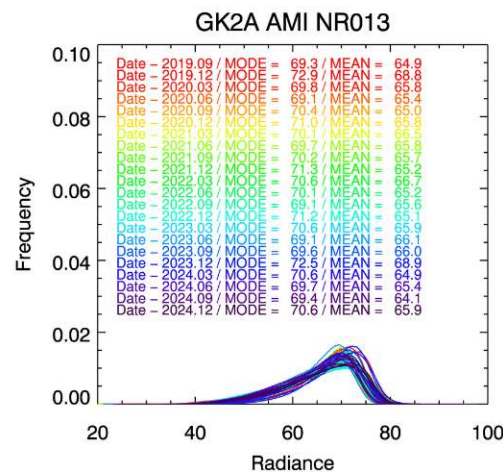
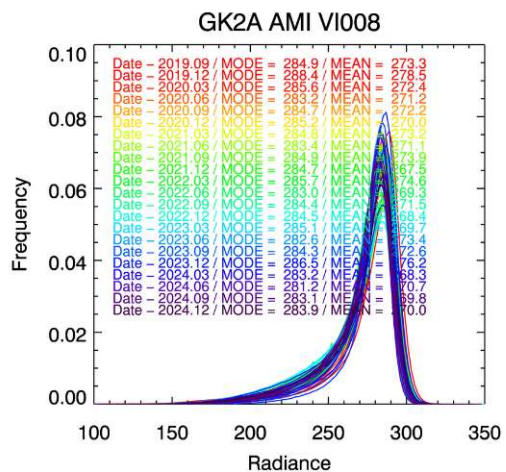
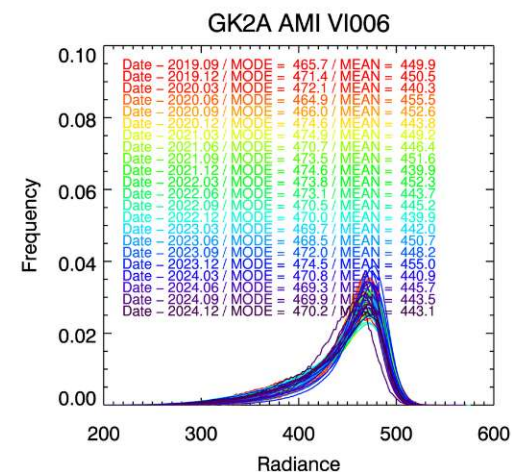
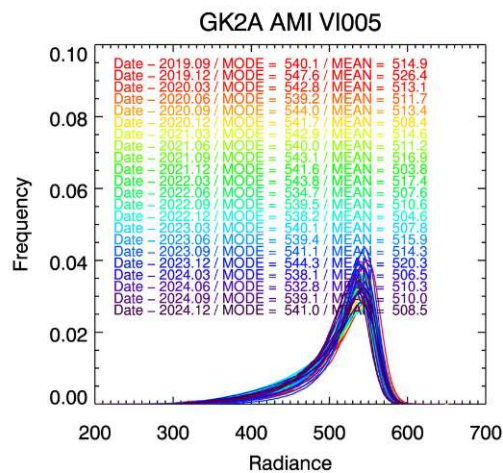
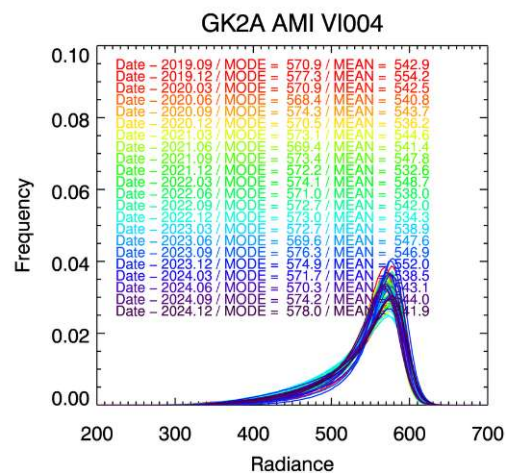
Ray Matching - Monthly Timeseries

- AMI vs. **VIIRS** (**SNPP**, **NOAA20**: Aug. 2019. ~ Jan. 2025., **NOAA21**: Dec. 2023. – Jan. 2025.)



Reference Satellite	Mean Bias (Uncertainty)					
	VI004_0.47 μm	VI005_0.51 μm	VI006_0.64 μm	VI008_0.86 μm	NR013_1.37 μm	NR016_1.61 μm
S-NPP/VIIRS	-3.67 (±2.08)	-0.40 (±1.08)	2.00 (±0.99)	0.39 (±1.06)	-1.92 (±0.68)	4.85 (±0.97)
NOAA-20/VIIRS	-1.85 (±1.76)	1.62(±1.14)	3.39(±1.02)	2.06 (±1.15)	2.79 (±0.62)	8.46 (±1.01)
NOAA-21/VIIRS	-2.13 (±1.76)	1.58 (±1.25)	2.10 (±1.00)	2.53 (±1.27)	0.85 (±0.74)	6.07 (±0.98)

AMI Radiance, DCC Target (Aug. 2019. ~ Jan. 2025.)

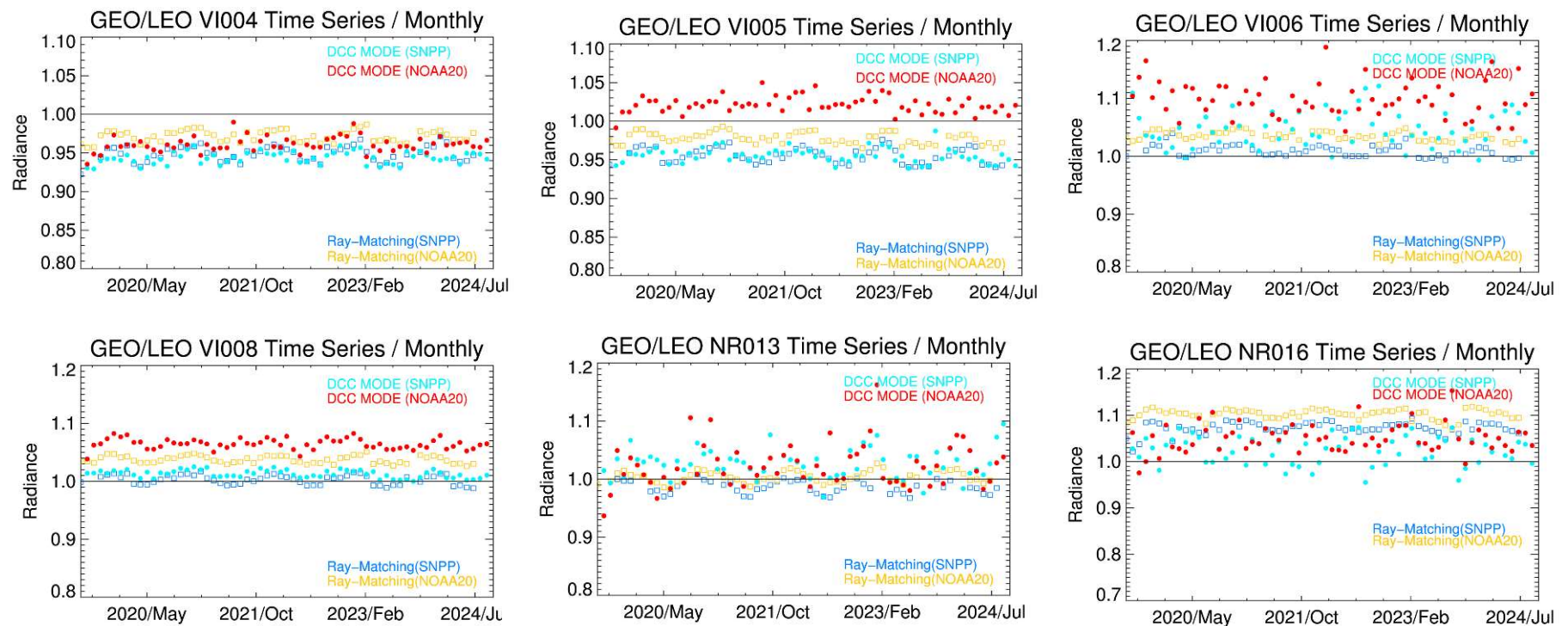


GSICS DCC & Ray-matching

Analyze Ray-Matching and GSICS DCC for long-term variation from Sep. 2019 to Jul. 2024.

※ Ray-Matching calibration data selected for DCC target

→ AMI and VIIRS Reflectance : < 0.8 for VIS band, < 0.6 and < 0.1 for NIR band



AMI Normalized Lunar Ratio

(Sep. 2019 ~ Jan. 2025)

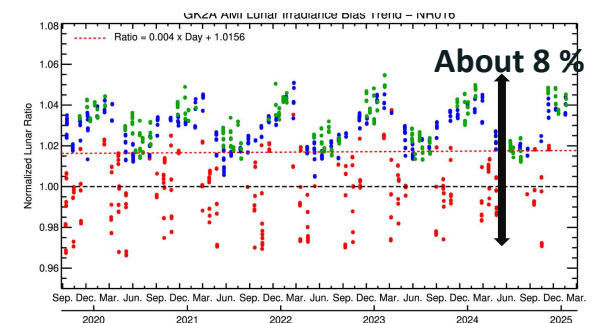
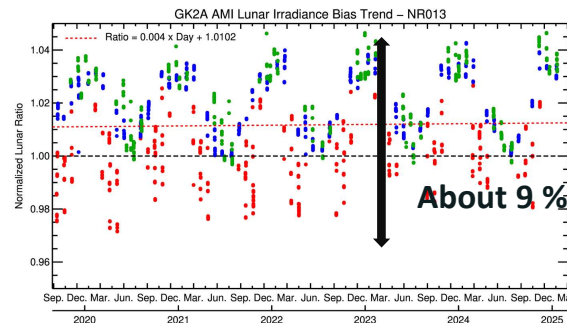
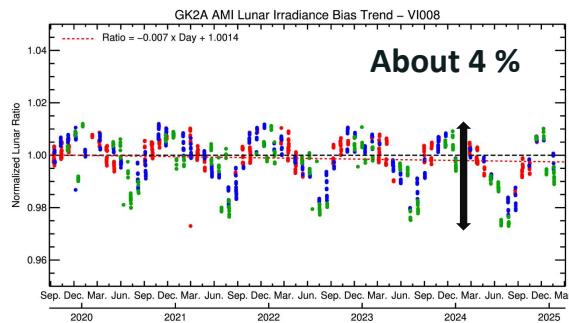
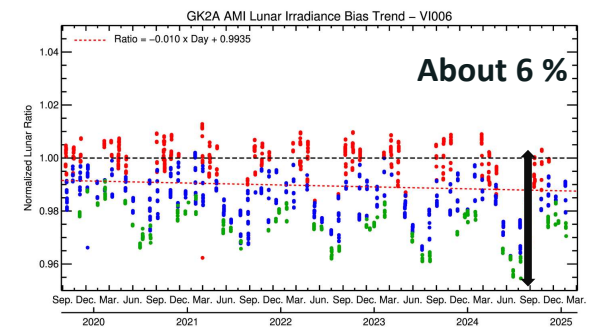
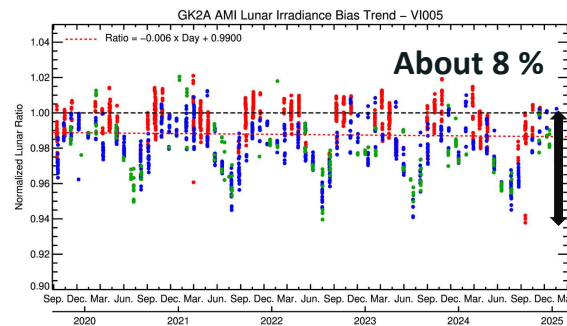
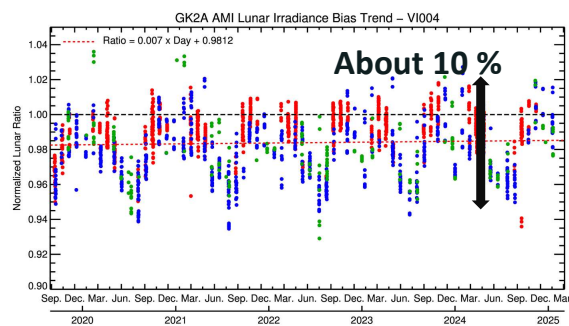
➤ Normalized Lunar Ratio

$$R_{nor} = \frac{\Delta Irr_t}{\Delta Irr_{t=0}}$$

$$\Delta Irr = \left(\frac{Irr_{Obs,t}}{Irr_{GIRO,t}} \right)$$

Difference of lunar irradiance between the observation and GIRO

- Absolute PA $\leq 30^\circ$
- $30^\circ < \text{Absolute PA} \leq 60^\circ$
- Absolute PA $> 60^\circ$



✓ Note : Sub-sampled lunar observations are shown, Ratio is normalized by Ratio_{t₀} (t₀: 1 Sep. 2019)

Thank you

 **National Meteorological Satellite Center**

2025 GSICS Annual Meeting

17 Mon – 21 March 2025, GSICS Annual and EP Meeting (Hybrid), Changchun China

Summary

❖ GK2A AMI VIS/NIR Calibration

- Ray-matching between AMI and VIIRS (SNPP, NOAA-20, -21) has been updated
- Overall ray-matching inter-calibration results are within 5%, except for NOAA-20, -21 NIR016

❖ GK2A AMI Lunar Calibration

- Lunar observation data quality is under review
- Unexpected seasonal variations of about 5–10% were observed, depending on the channel (SRF)

❖ Plan:

- Conduct VIS/NIR SCT analysis to assess AMI sensor degradation and seasonal variation
- GEO-GEO : AMI vs. AHI, AMI vs. GEMS
- Apply the SLIM model to AMI lunar observation data