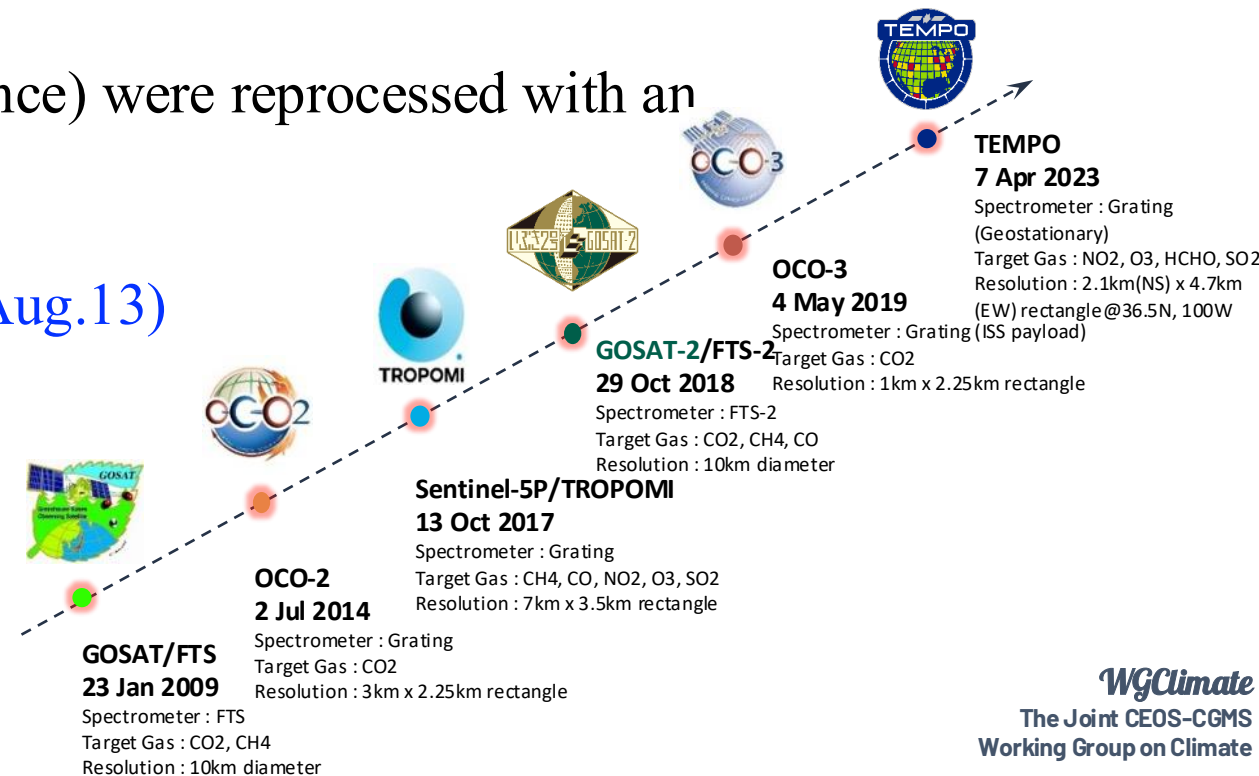


Calibration Campaigns update

Vi-cal. Campaign 2025

- In the 2025 Railroad Valley (RRV) campaign with JPL, 6 instruments joined **+2 (Fall)**.
(**GOSAT/OCO-2/OCO-3/TROPOMI/GOSAT-2/TEMPO +GOSAT-GW/MicroCARB**).
- The spectral radiance for each sensor was evaluated using the common campaign data and forward model (LIDORT)
- 16 years of campaign data (mainly surface reflectance) were reprocessed with an improved processing algorithm
- Launched GW (Jun.29), MicroCARB(Jul.25), S5(Aug.13)
- Plan for RRV2026

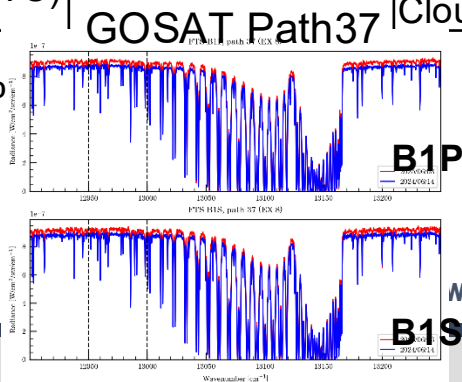
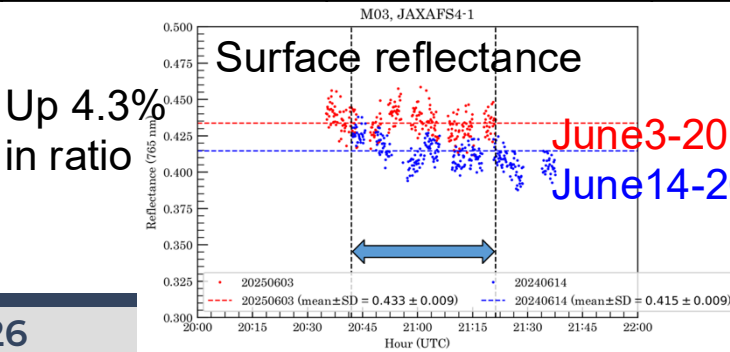


Summary of RRV2025 summer campaign

Surface data collected by OCO and GOSAT teams



	30-May-25	31-May-25	1-Jun-25	2-Jun-25	3-Jun-25	4-Jun-25	5-Jun-25
OCO-2 path			138 (20:53UTC)		136 (20:40UTC)		
GOSAT path	36 (20:52UTC)	37 (21:24UTC)		36 (20:52UTC)	37 (21:24UTC)	No	36 (20:52UTC)
GOSAT-2 path	72 (20:54UTC)	73 (21:10UTC)	74 (21:26UTC)			No	72 (20:54UTC)
TROPOMI VZA[deg]	28deg	53.6deg	8.1deg	6.9deg	46.3deg	31.7deg	46.6deg
OCO-3			19:07UTC				17:35UTC
TEMPO		SPECICAL(21UTC)	SPECICAL(21UTC)	SPECICAL(21UTC)	SPECICAL(21UTC)		SPECICAL(21UTC)
GOSAT-1/-2 FOV camera 10km-FOV							
Weather	Clear sky (21UTC)	Clear sky (21UTC)	Clear-up just noon Partly cloudy (21UTC)	Clear sky (21UTC)	Clear sky (21UTC)		Cloudy (17:35UTC) Cloudy (21UTC)



June3-2025

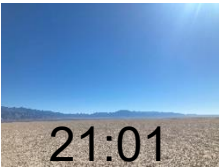
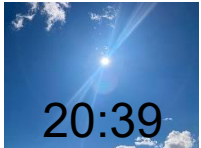
June14-2024

WGClimate

The Joint CEOS-CGMS Working Group on Climate

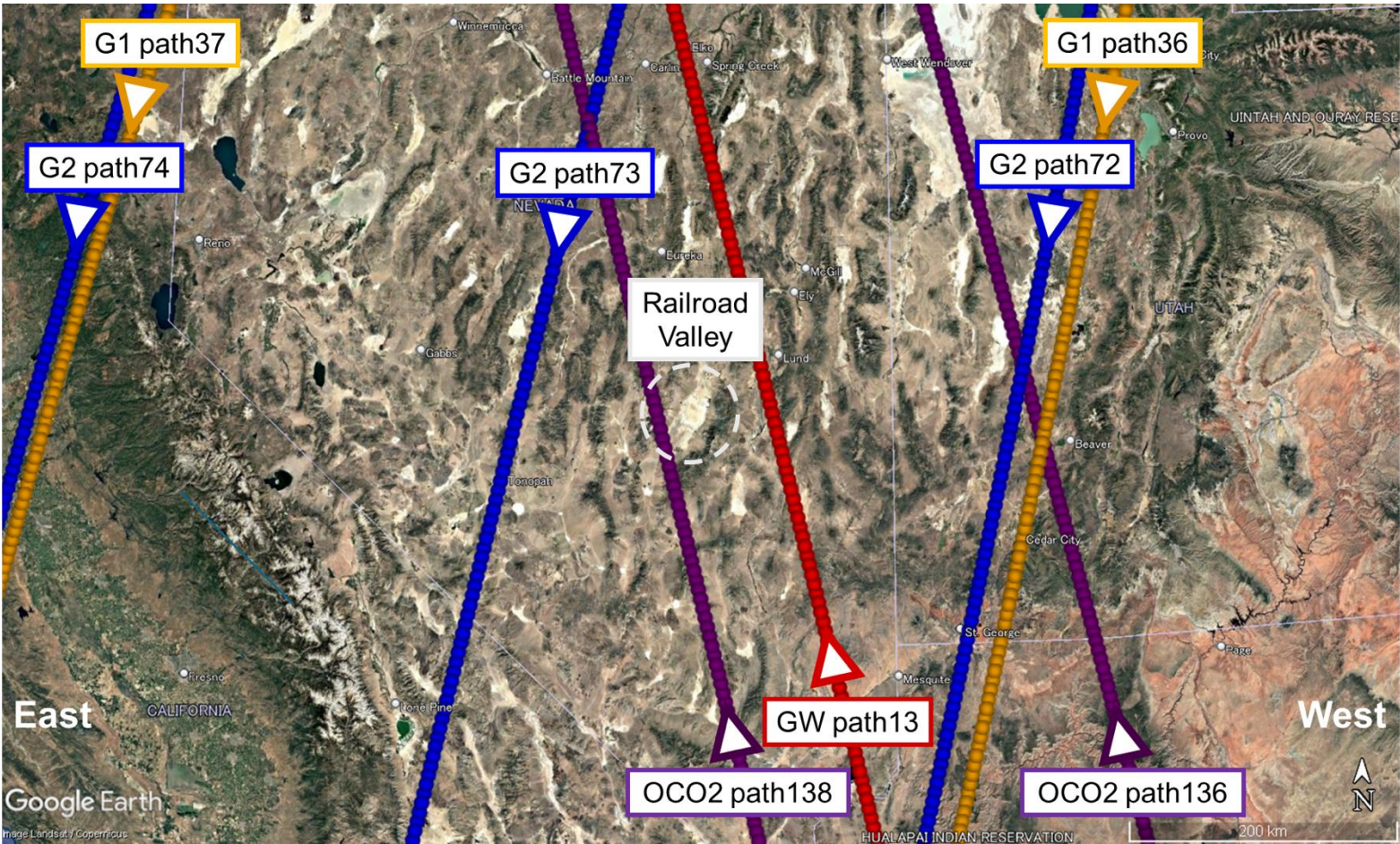
Summary of RRV2025 fall campaign

Surface data collected by OCO and GOSAT teams

	6-October-25	7-October-25	8-October-25	9-October-25	10-October-25
OCO-2		138 (20:53UTC)		136 (20:41UTC)	
GOSAT	36 (20:51UTC)	37 (21:23UTC)		36 (20:51UTC)	37 (21:24UTC)
GOSAT-2				72 (20:53UTC)	73 (21:09UTC)
GOSAT-GW		13 (20:37UTC)			13 (20:37UTC)
TROPOMI VZA[deg]	53.6deg	8.1deg	6.9deg	46.3deg	31.7deg
OCO-3		23:17UTC			
TEMPO	SPECICAL(21UTC)		SPECICAL(21UTC)	SPECICAL(21UTC)	SPECICAL(21UTC)
MicroCARB				18:43UTC	
GOSAT-1/-2 FOV camera 10km-FOV Overpass photo		  23:18	 21:01	 18:52 	 20:39 
Weather	Clear sky	Clear sky	Clear sky	Cloudy, Windy	Partly cloudy, Windy

- We have succeeded clear sky overpass dataset for GOSAT, OCO-2, OCO-3, TEMPO, TROPOMI and GOSAT-GW on Oct 6, 7 and 8.
- MicroCARB on Oct9, GOSAT-2 and GOSAT-GW on Oct10 must be confirmed that cloud contamination affected or not.

Railroad Valley overpasses

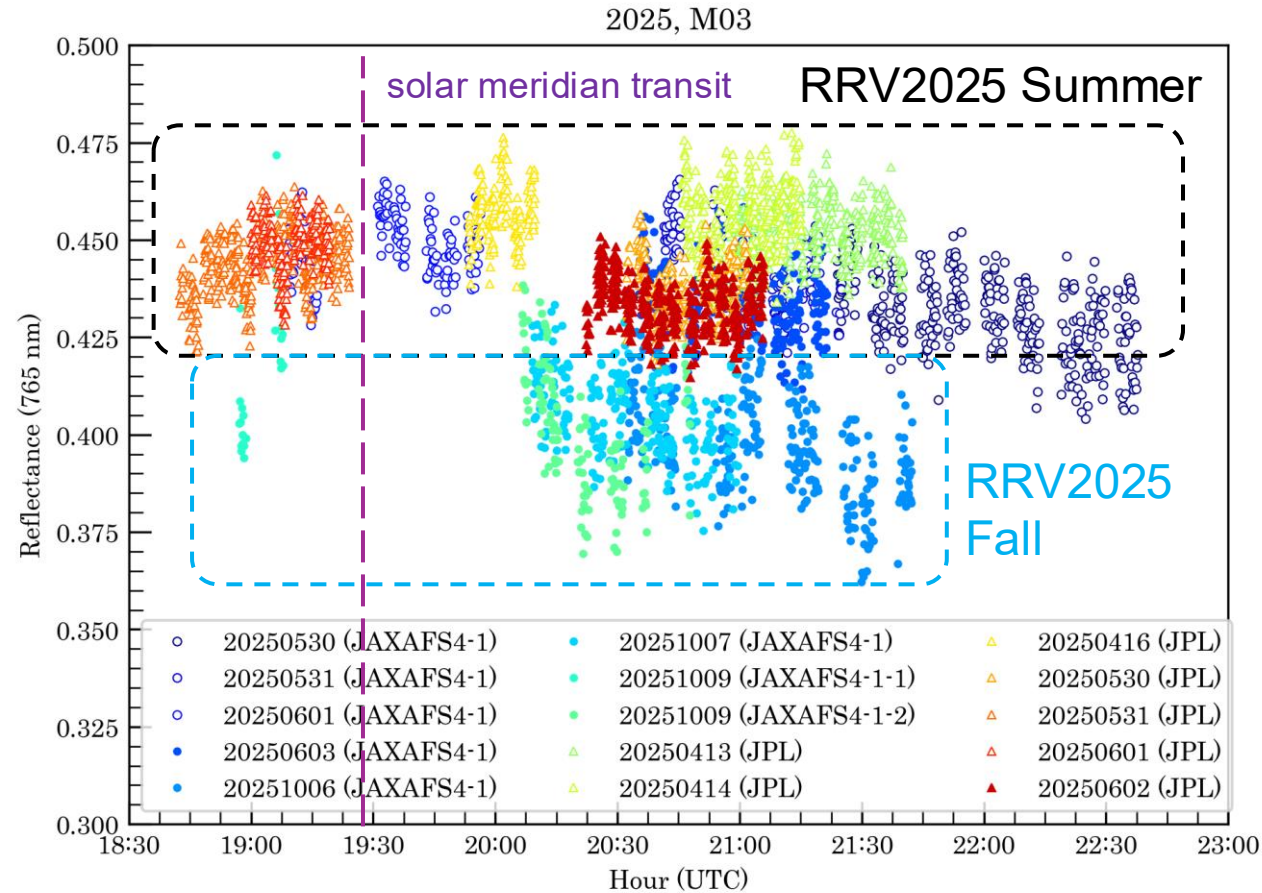


MicroCarb
~19UTC

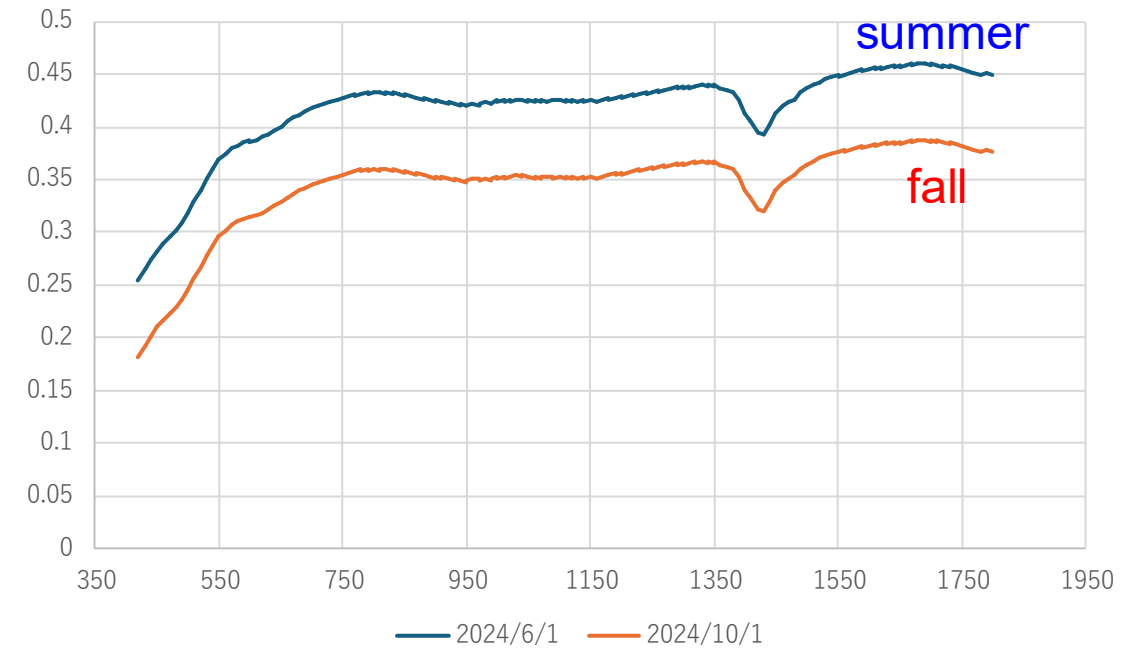
OCO2 path136 ~	GW path13 >	OCO2 path138 >	G1 path36 >	G2 path72 >	G2 path73 >	G1 path37 >	G2 path74
20:41	20:38	20:53	20:51	20:53	21:09	21:24	21:25

M03 surface reflectance in RRV 2025 Fall and Summer campaign

Surface reflectance time series (M03, 765nm)



RadCalNet reflectance (2024 season, UTC 21h)

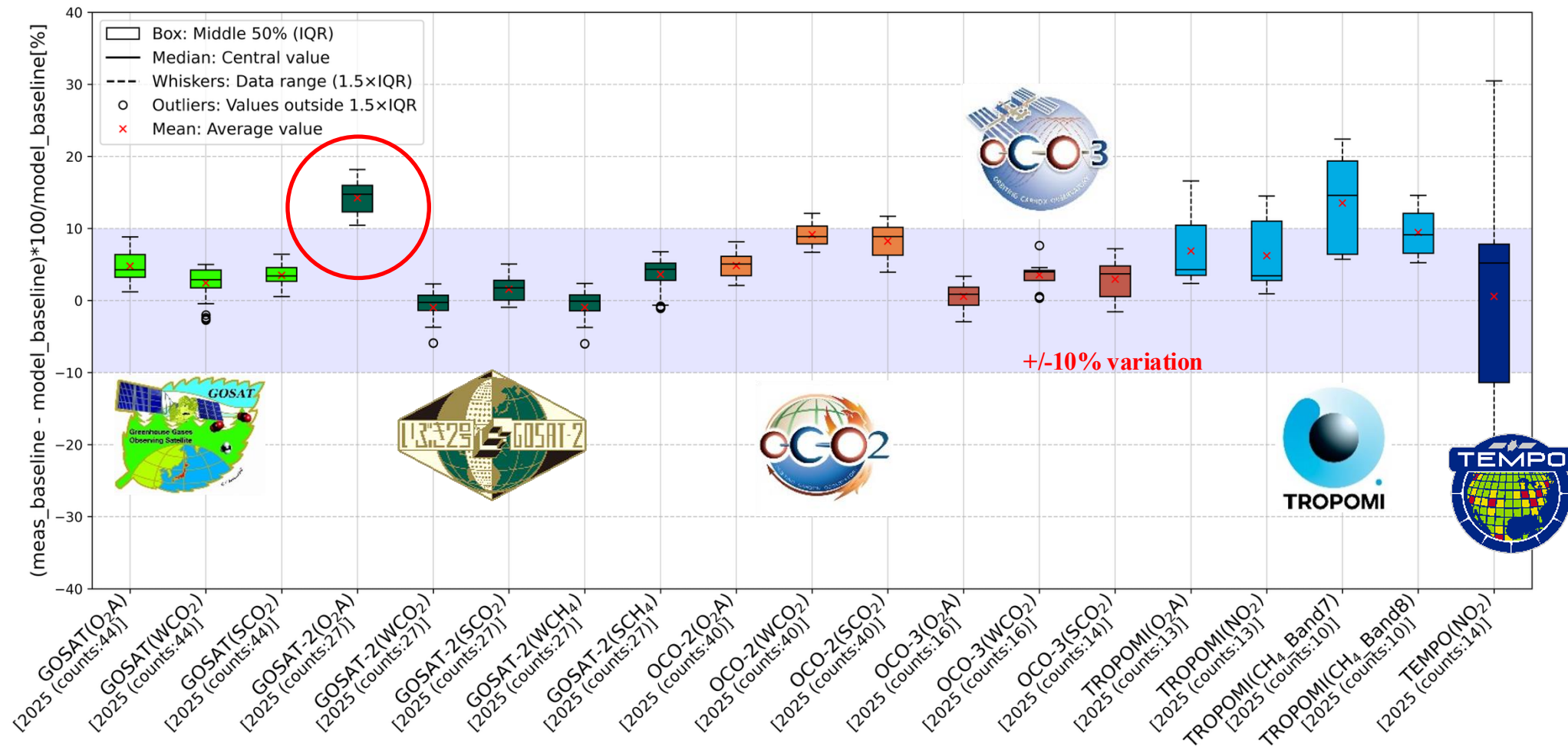


Check RadCalNet and Lspec features in 2025

Common processing conditions

Item	Using data	Note
Radiative Transfer Model	LIDORT v3.6 (*NASA/ACOS ' <i>RTRetrievalFramework</i> ' modified by JAXA.)	
Solar spectrum	TSIS-1 HSR(S(TSIS-1 Hybrid Solar Reference Spectrum)	
Meteorological Data	NCEP North American Regional Reanalysis (NARR)	North America Only Coverage
Line Parameter	O ₂ A: ABSCO v5.2 H ₂ O: HITRAN2020 CO ₂ : ABSCO v5.2 or HITRAN2020 CH ₄ : HITRAN2020 CO : HITRAN2020 N ₂ O: HITRAN2020 NO ₂ : HITRAN2012 (Cross section) O ³ : MODTRAN-3 Cross Section Table Data	For XCO ₂ Processes : We use ABSCOv5.2 as a Line Parameter data, which is also used in OCO-2 L2 retrieval. For XCH ₄ Processes : We created Line Parameter data using HITRAN2020 data and ReFRACtor/ABSCO code. https://github.com/ReFRACtor/ABSCO * For H ₂ O, we use HITRAN2020 in the both process because of its high accuracy.
Gas A priori	O ₂ A: Fixed value (0.20935[mol/mol]) H ₂ O: Meteorological Data (NARR) CO ₂ : AJAX (long-term corrected VMR) CH ₄ : AJAX (long-term corrected VMR) CO : Corrected from a fixed value N ₂ O: Corrected from a fixed value NO ₂ : Corrected from a fixed value O ₃ : Corrected from a fixed value	▪ Included gases For XCO ₂ Processes : O ₂ A, H ₂ O, CO ₂ For XCH ₄ Processes : O ₂ A, H ₂ O, CO ₂ , CH ₄ ,CO, N ₂ O ▪ AJAX is one of the RRV campaign project data measured in the past. ▪ CO, N₂O are used from gas profile data in the RtRetrievalFramework, with corrections for seasonal variation and long-term trends, etc.
Surface Reflectance	Reflectance in the nadir direction + MODIS BRDF(Ross-thick + Li-Sparse + Lambertian)	Reflectance in the nadir direction: Field measured data MODIS BRDF: MCD43A1 product is used
Aerosol	AOD@500[nm] from AERONET.	

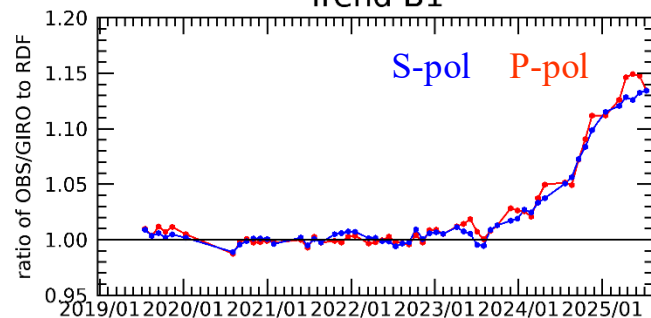
Validation of multi-GHG satellite sensors using LIDORT (2025 Summer results)



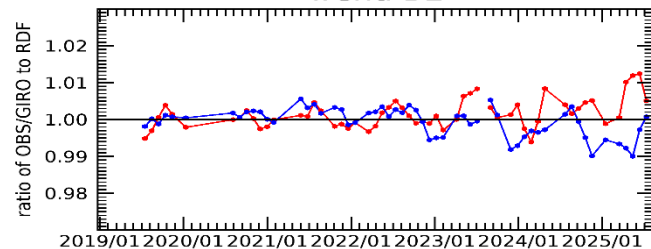
The result indicates that GOSAT-2 band1 has large difference between observed radiance and forward cal.

Ex. Trend of spectral radiance for GOSAT-2

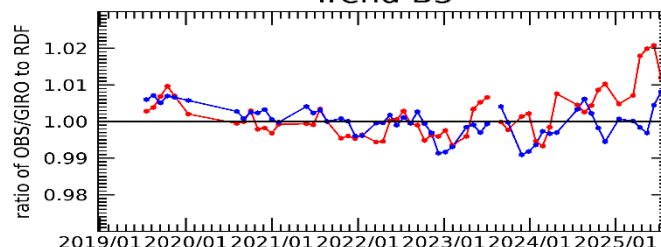
LunarCAL
monthly
Trend B1



Trend B2

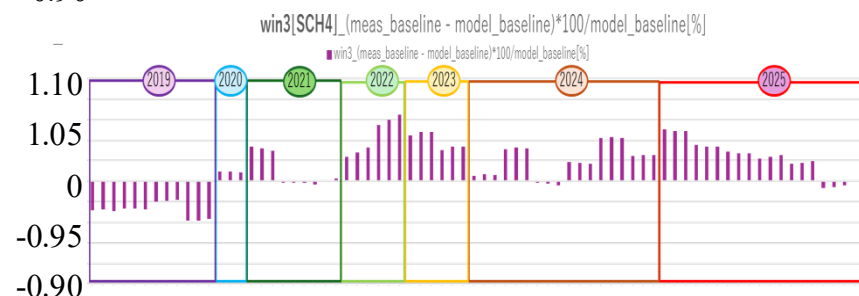
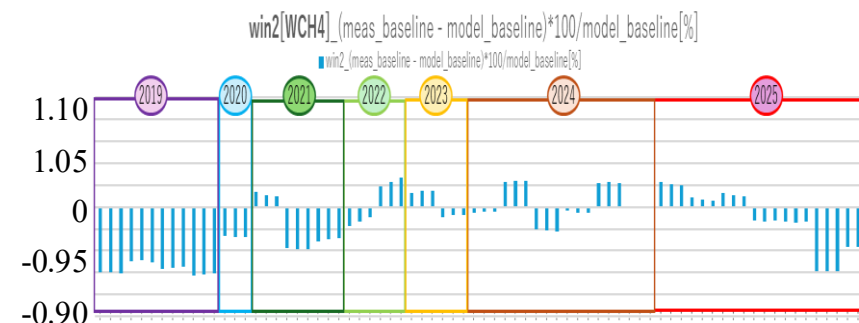


Trend B3

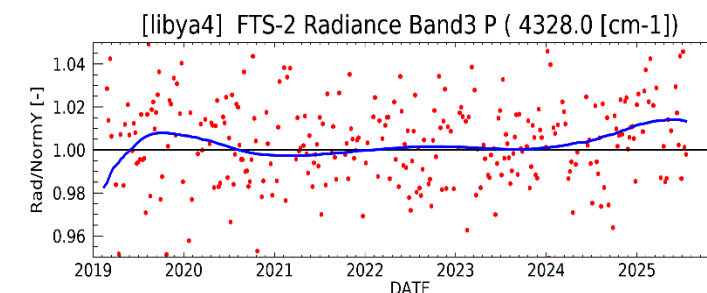
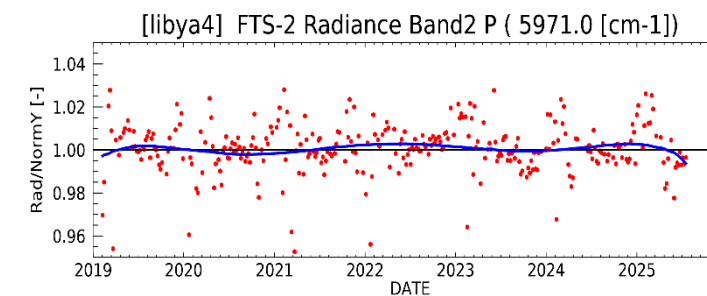
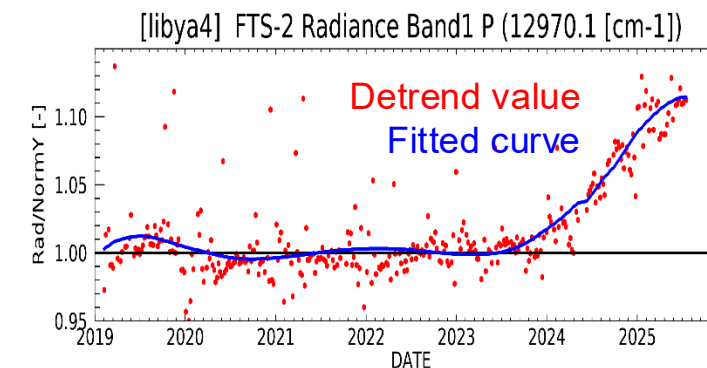


RRV ViCAL

Only May-June-July



Sahara desert
After detrend



Radiometric response change ratios to the current L1B RDF between 3 methods almost agree.

Plan for RRV2026 summer campaign



Tentative schedule

	Day from 01Jan2		OCO-2	OCO-2	GOSA T	GOSAT-2	GOSAT- GW	TROPOMI InstZA	OCO-3	
1-Jun-26	2344	Mon	15		37	73	13	4.1		Loading, Move to Tonopah
2-Jun-26	2345	Tue	16		no	74	no	28.0		① Gold+
3-Jun-26	2346	Wed	1		36	no	no	53.6		
4-Jun-26	2347	Thu	2	138	37	no	13	8.1		
5-Jun-26	2348	Fri	3		no	no	no	6.9		
6-Jun-26	2349	Sat	4	136	36	72	no	46.3		
7-Jun-26	2350	Sun	5		37	73	13	31.7		
8-Jun-26	2351	Mon	6		no	74	no	46.6		
9-Jun-26	2352	Tue	7		36	no	no	7.1		② Gold Silver+
10-Jun-26	2353	Wed	8		37	no	13	7.9		
11-Jun-26	2354	Thu	9	(139)	no	no	no	52.9		
12-Jun-26	2355	Fri	10		36	72	no	35.9		
13-Jun-26	2356	Sat	11	137	37	73	13	40.7		
14-Jun-26	2357	Sun	12		no	74	no	6.2		
15-Jun-26	2358	Mon	13		36	no	no	8.9		
16-Jun-26	2359	Tue	14		37	no	13	0.6		③ Gold++ Loading at JPL Move to Tonopah Gold Silver+ Gold+ Move to Pasadena Load off at JPL, Meeting Gold Regular day off Silver
17-Jun-26	2360	Wed	15		no	no	no	4.1		
18-Jun-26	2361	Thu	16		36	72	no	28.0		
19-Jun-26	2362	Fri	1		37	73	13	53.6		
20-Jun-26	2363	Sat	2	138	no	74	no	8.1		
21-Jun-26	2364	Sun	3		36	no	no	6.9		
22-Jun-26	2365	Mon	4	136	37	no	13	46.3		
23-Jun-26	2366	Tue	5		no	no	no	31.7		④ Gold+ Gold Silver
24-Jun-26	2367	Wed	6		36	72	no	46.6		
25-Jun-26	2368	Thu	7		37	73	13	7.1		
26-Jun-26	2369	Fri	8		no	74	no	7.9		
27-Jun-26	2370	Sat	9	(139)	36	no	no	52.9		
28-Jun-26	2371	Sun	10		37	no	13	35.9		

	Day from 01Jan2		OCO-2	OCO-2	GOSA T	GOSAT-2	GOSAT- GW	TROPOMI InstZA	OCO-3	
29-Jun-26	2372	Mon	11	137	no	no	no	40.7		
30-Jun-26	2373	Tue	12		36	72	no	6.2		
1-Jul-26	2374	Wed	13		37	73	13	8.9		Gold
2-Jul-26	2375	Thu	14		no	74	no	0.6		
3-Jul-26	2376	Fri	15		36	no	no	4.1		
4-Jul-26	2377	Sat	16		37	no	13	28.0		Holiday
5-Jul-26	2378	Sun	1		no	no	no	53.6		
6-Jul-26	2379	Mon	2	138	36	72	no	8.1		Gold+
7-Jul-26	2380	Tue	3		37	73	13	6.9		Gold
8-Jul-26	2381	Wed	4	136	no	74	no	46.3		Silver
9-Jul-26	2382	Thu	5		36	no	no	31.7		
10-Jul-26	2383	Fri	6		37	no	13	46.6		
11-Jul-26	2384	Sat	7		no	no	no	7.1		

- 3 plans for the RRV2026 summer campaign
- Plan 2 is preferable close to summer solstice.
- Flexible to shift 1 day later for the Caltech visit
- OCO-2: path138 and 136, G1: 4 overpasses, G2: 3 overpasses, GW: 2 overpasses, TROPOMI: close to nadir
- TEMPO special observation, MicroCarb: capable every 2 or 3 days (25-day revisit), Sentinel-5: every day (1-day revisit)