Tu-021

Collaborative vicarious calibrations for GHG sensors - OCO, TROPOMI and GOSAT

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and

OCO-TROPOMI-GOSAT calibration team

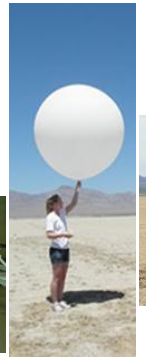
CEOS AC-VC-19 / ACSG Joint Meeting 2023, Brussels, Belgium / Hybrid, October 24, 2023

International collaboration for GHG sensors calibration

2008 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23

Radiometric calibration

Prelaunch X-CAL



Annual Vicarious Calibration at the desert playa in Nevada

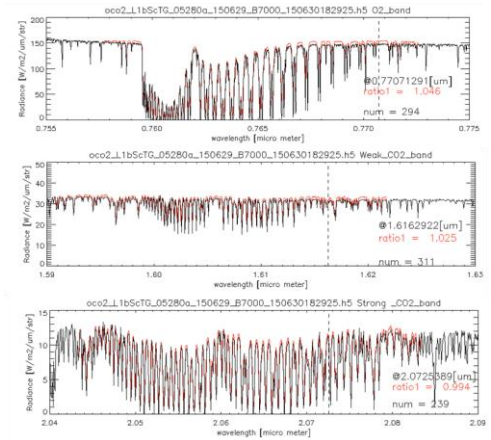
CO_2 & CH_4 profile

In situ CO_2 and CH_4 on AJAX

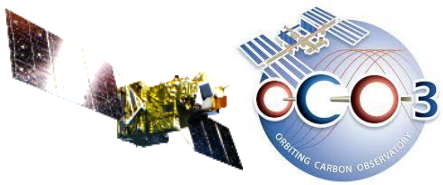
XCO_2 & XCH_4

Column with EM-27 FTS

GOSAT OCO-2

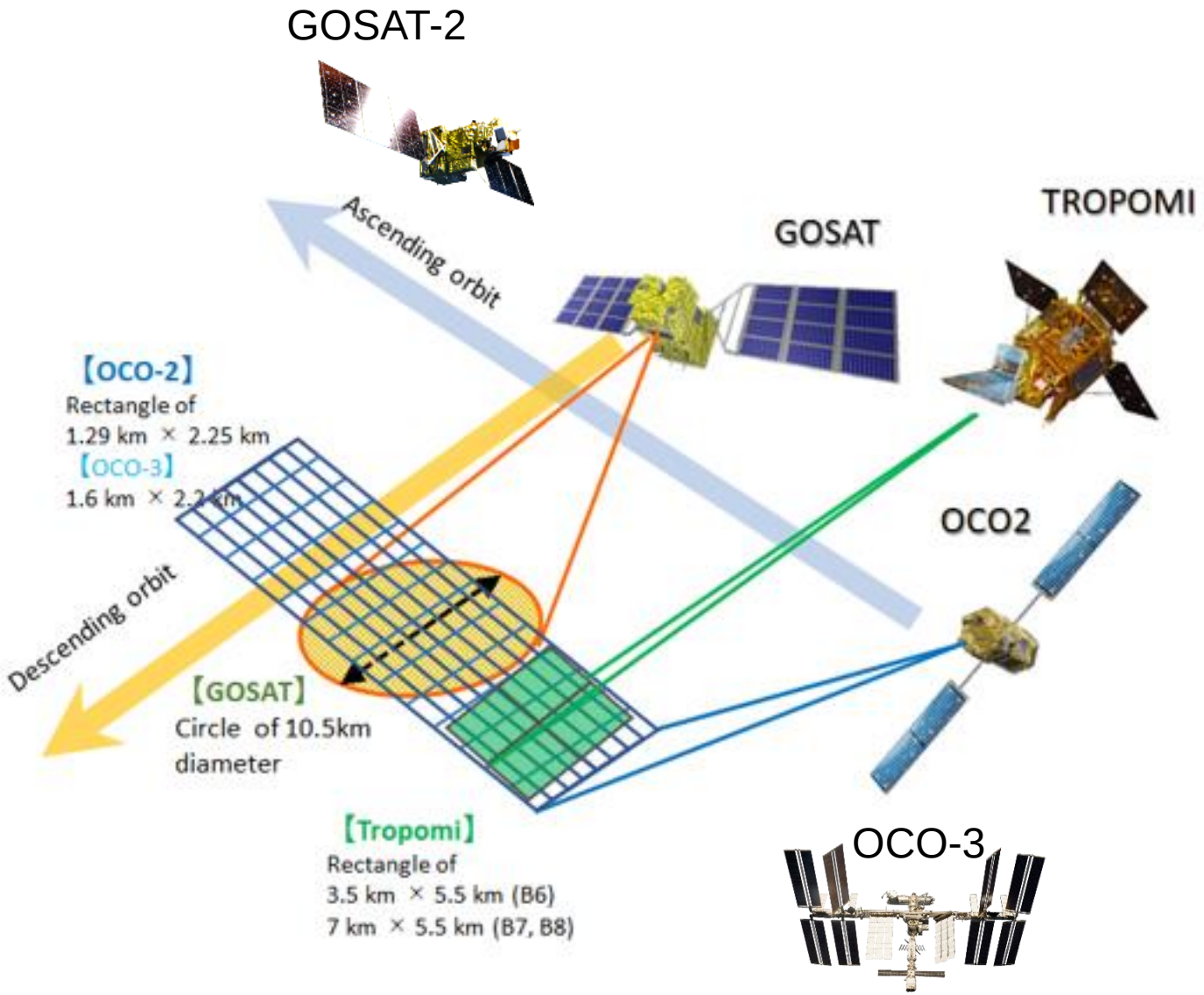


Coincident Target



Calibrated GOSAT and OCO-2 radiance spectra agrees within 5% for all bands.

Railroad Valley target by 5 GHG sensors



RRV 2022 Summer Campaign schedule

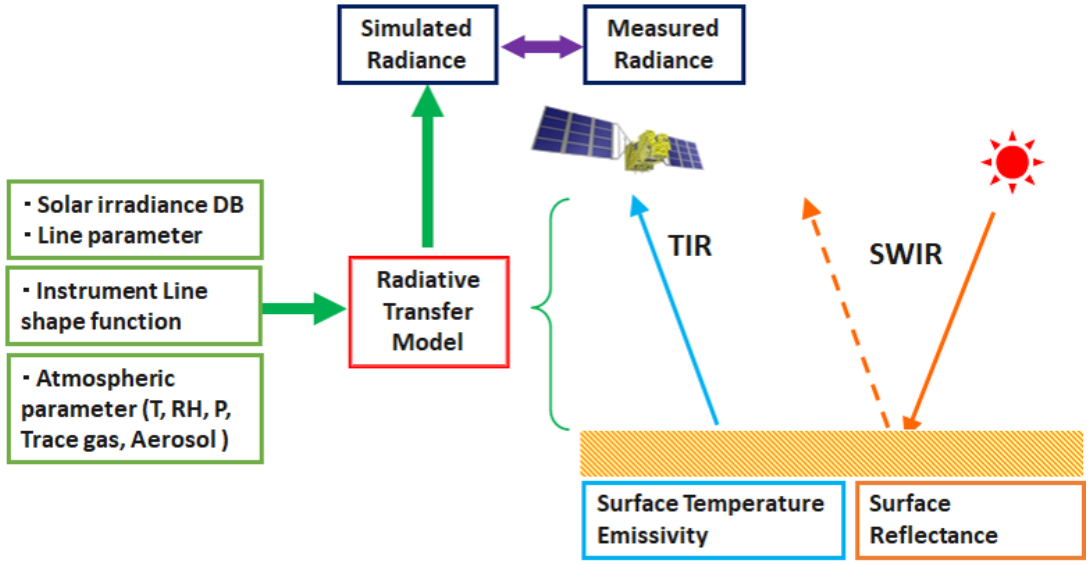
Date	DoW	OCO-2 path	GOSAT path	GOSAT-2 path	TROPOMI InstZA [deg]	
8-Jun-22	Wed		no	no	53.6	RRV
9-Jun-22	Thu	138	36	72	8.1	RRV
10-Jun-22	Fri		37	73	6.9	RRV
11-Jun-22	Sat	136	no	74	46.3	RRV
12-Jun-22	Sun		36	no	31.7	RRV
13-Jun-22	Mon		37	no	46.6	RRV

Good conditions for all sensors come every 48 days.

	Nadir footprint size
GOSAT	Circle of 10.5km diameter
GOSAT-2	Circle of 9.6km diameter
OCO-2	Rectangle of 1.3 km * 2.3 km
OCO-3	Rectangle of 1.6 km * 2.2 km
TROPOMI	Rectangle of 3.5 km * 5.5 km (B6) 7 km * 5.5 km (B7, B8)

VCAL comparison for 5 GHG sensors

VCAL scheme



Key parameters

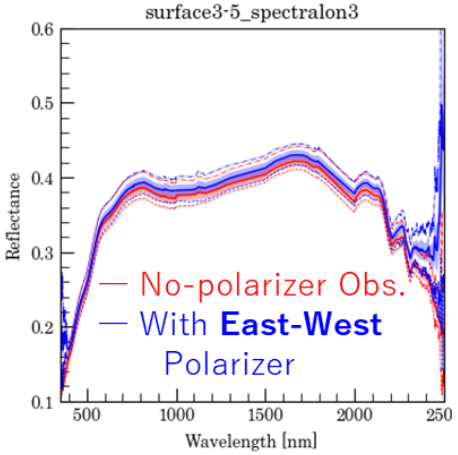
(1) Surface reflectance inhomogeneity correction
(2) Surface BRF correction
(3) Solar database
(4) Atmospheric parameter

We will calculate all 5 sensors for validating radiometric calibration accuracy by the same target.

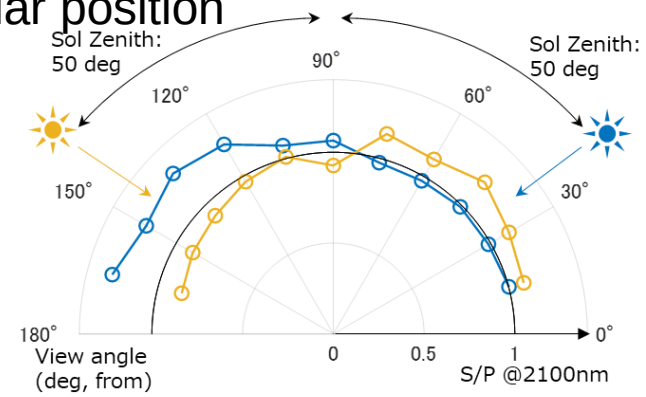
RRV2023 update

Polarization effect in surface measurement to reduce uncertainty

(1) Site to site dependency in Nad
Polarization effect < Max 5 %

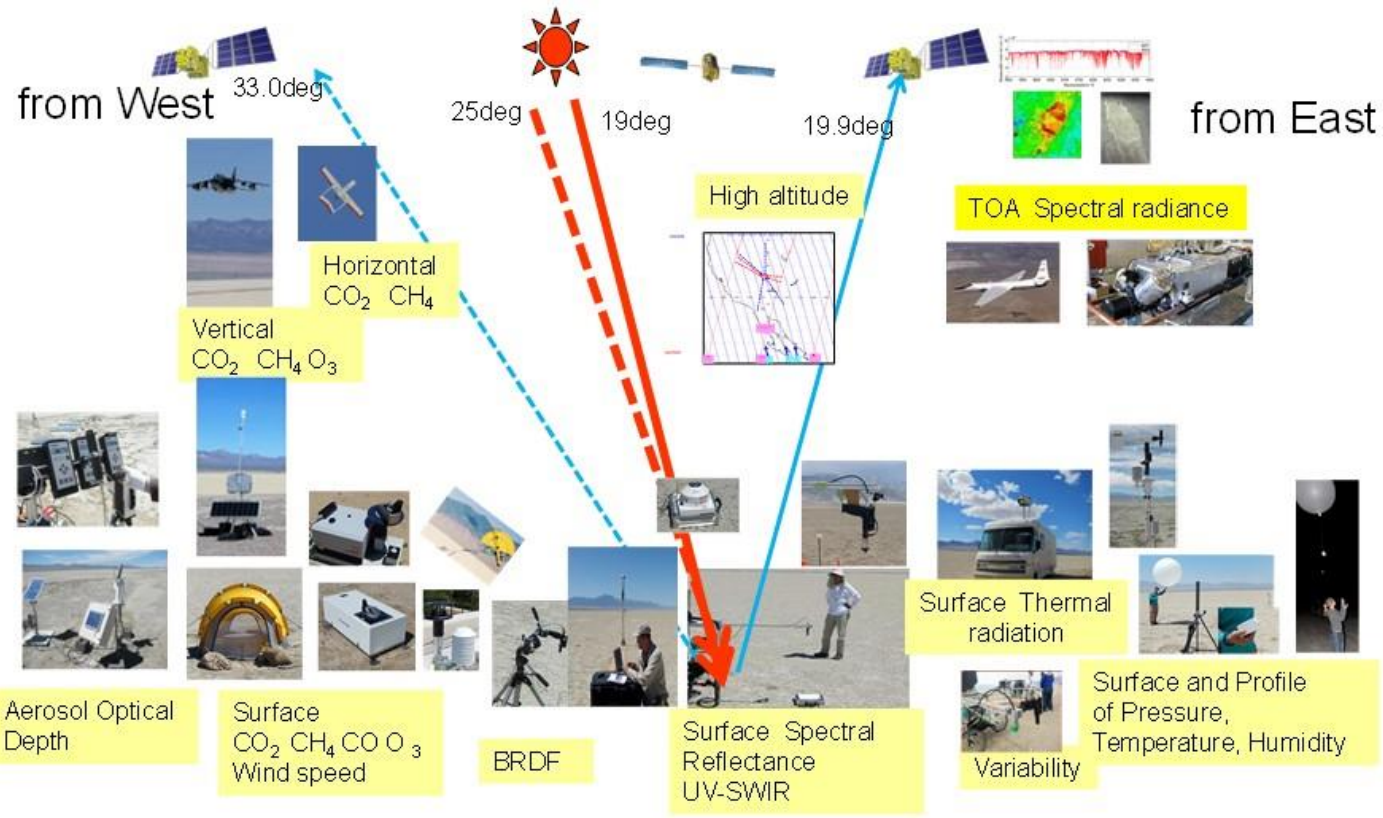


(2) Solar zenith angle and View angle at fixed point
Polarization effect is small for backscatter against the solar position



Polarization sensitivity of nadir measurement

VCAL Portal site for field data access



https://www.eorc.jaxa.jp/GOSAT/GHGs_Vical/index.html

- The Railroad Valley field data are available from VCAL portal site.
- VCAL team meeting is held every 3-4 months. Next meeting: 6-7UTC, January 19, 2024.
- Next RRV: TEMPO team will be joined. OCO-3 will be out of storage. OCO-2 will conduct only summer campaign.