Recent progress of GOSAT and GOSAT-2 SWIR L2 products

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GOSAT & GOSAT-2

		GOSAT (2009.01 ~)	GOSAT-2 (2018.10 ~)
revisit cycle (alt.)		3-day (666 km)	6-day (613 km)
target gases		CO_2, CH_4, H_2O	CO_2, CH_4, H_2O, CO
FTS / FTS-2	Spectral Ranges / SNR	12900 ~ 13200 cm^{-1} / 343 5800 ~ 6400 cm^{-1} / 316 4800 ~ 5200 cm^{-1} / 410 700 ~ 1800 cm^{-1} / 304	12950 ~ 13250 cm^{-1} / 562 5900 ~ 6400 cm^{-1} / 509 4200 ~ 5200 cm^{-1} / 379 1188 ~ 1800 cm^{-1} / 1045 700 ~ 1188 cm^{-1} / 350
	Sampling	1.1, 2, 4 sec/scan 10.5 kmϕ	4 sec/scan 9.7 kmϕ
	Pointing	AT: ±20 deg., CT: ±35 deg.	AT: ±40 deg., CT: ±35 deg. Intelligent pointing
CAI / CAI-2	Spectral Ranges (**N**adir/ **F**orward/ **B**ackward)	370 ~ 390 nm (N) 664 ~ 684 nm (N) 860 ~ 880 nm (N) 1555 ~ 1645 nm (N)	333 ~ 353 (F), 371 ~ 391 (B) 433 ~ 453 (F), 540 ~ 560 (B) 663 ~ 683 (F), 663 ~ 683 (B) 858 ~ 878 (F), 858 ~ 878 (B) 1582 ~ 1672 (F),1582 ~ 1672 (B)
	Spatial Resolution / Swath	0.5 km / 1000 km (others) 1.5 km / 750 km (1.6 μm)	0.46 km / 920 km (others) 0.92 km / 920 km (1.6 μm)

GOSAT & GOSAT-2 : SWIR L2 Products

GOSAT:

CO_2 column amount product

CH_4 column amount product

H_2O column amount product

~ XCO_2, XCH_4, and XH_2O over the cloud-free region are simultaneously retrieved by the full-physics based algorithm.

GOSAT-2:

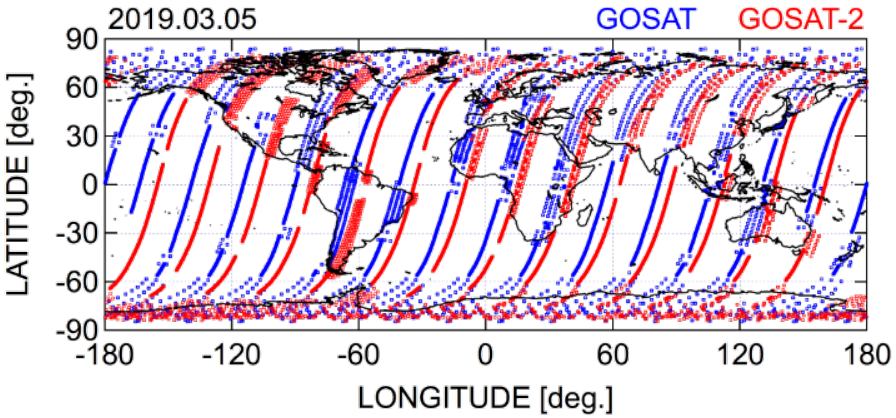
chlorophyll fluorescence and proxy-method product

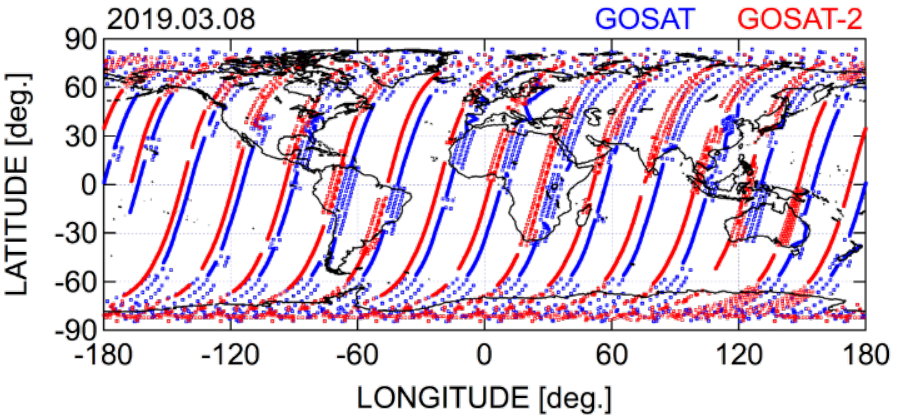
~ SIF, proxy-based XCH_4 & XCO, and aerosol/cloud related information are retrieved under the cloud-free assumption.

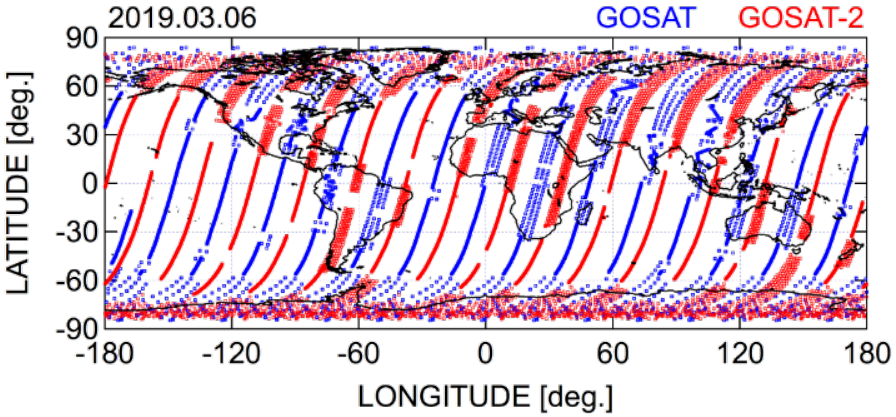
column-averaged dry-air mole fraction product

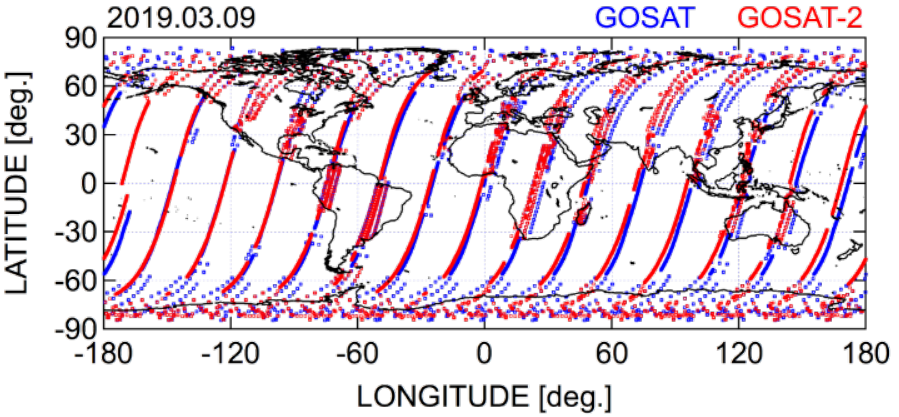
~ XCO_2, XCH_4, XCO, and XH_2O over the cloud-free region are simultaneously retrieved by the full-physics based algorithm.

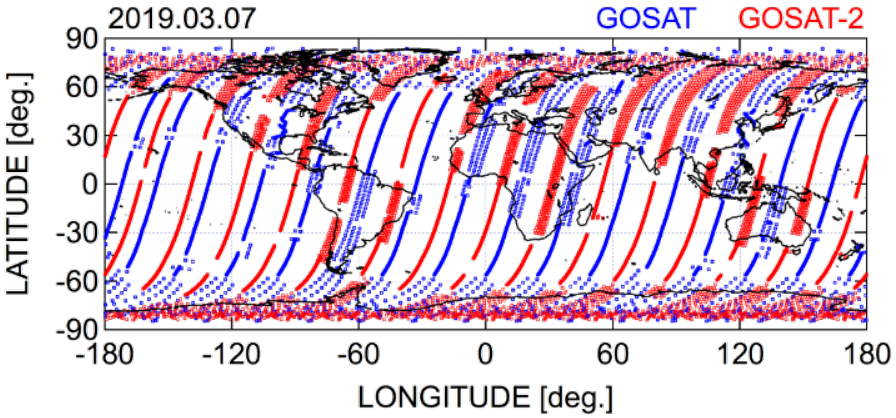
GOSAT & GOSAT-2 : FTS observation pattern

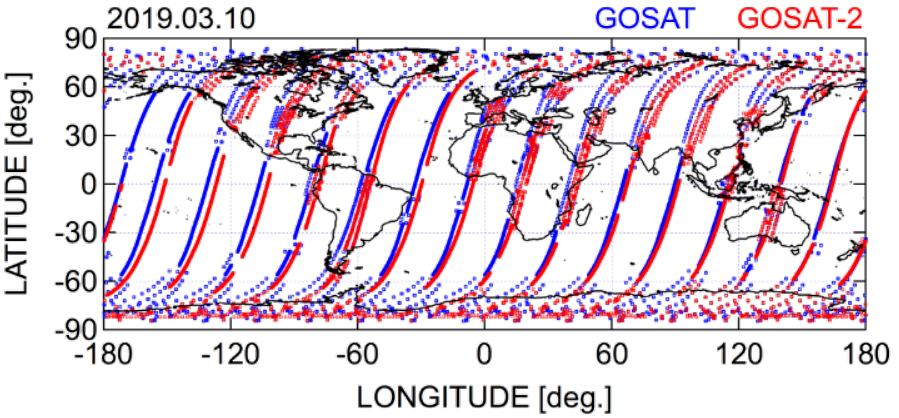




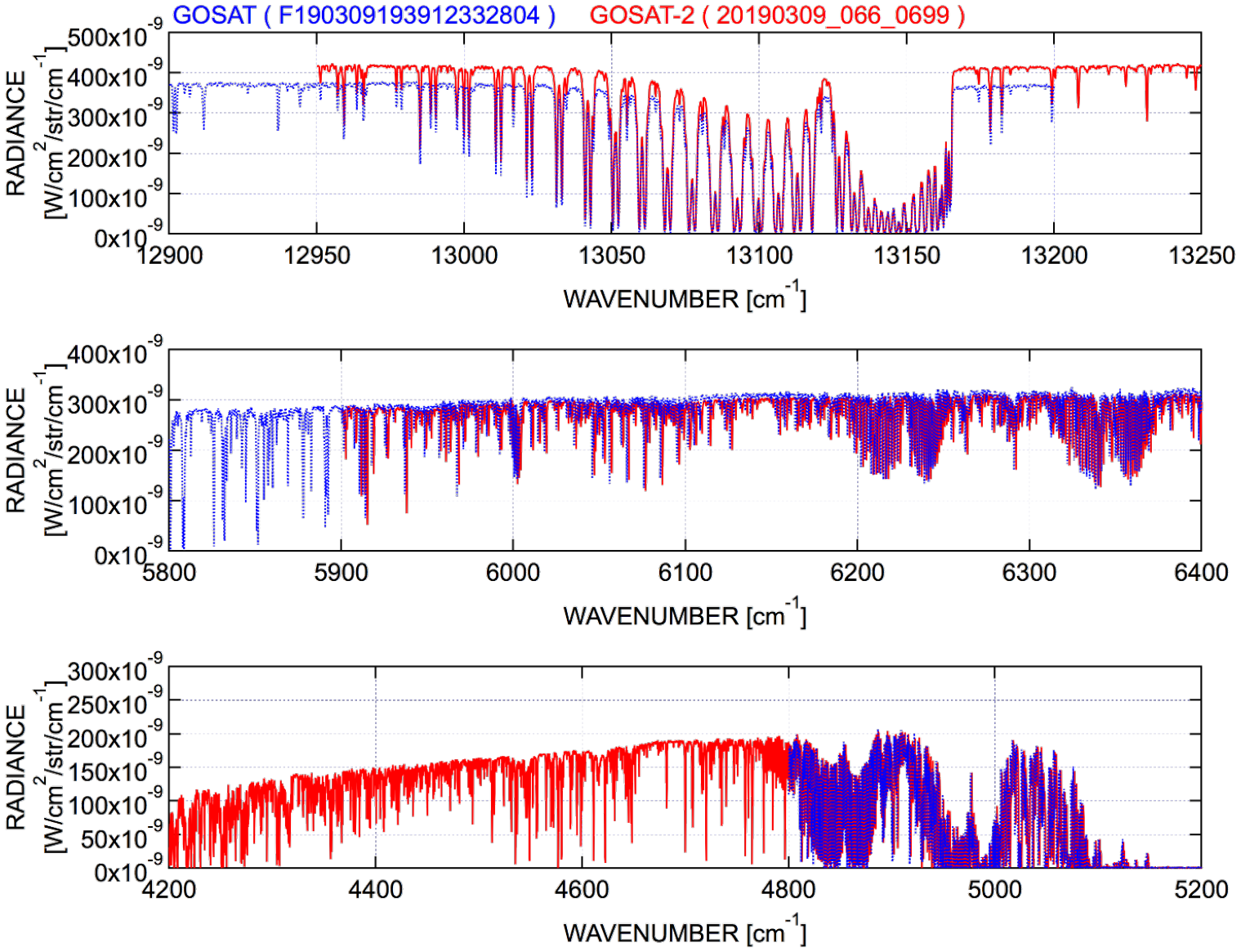






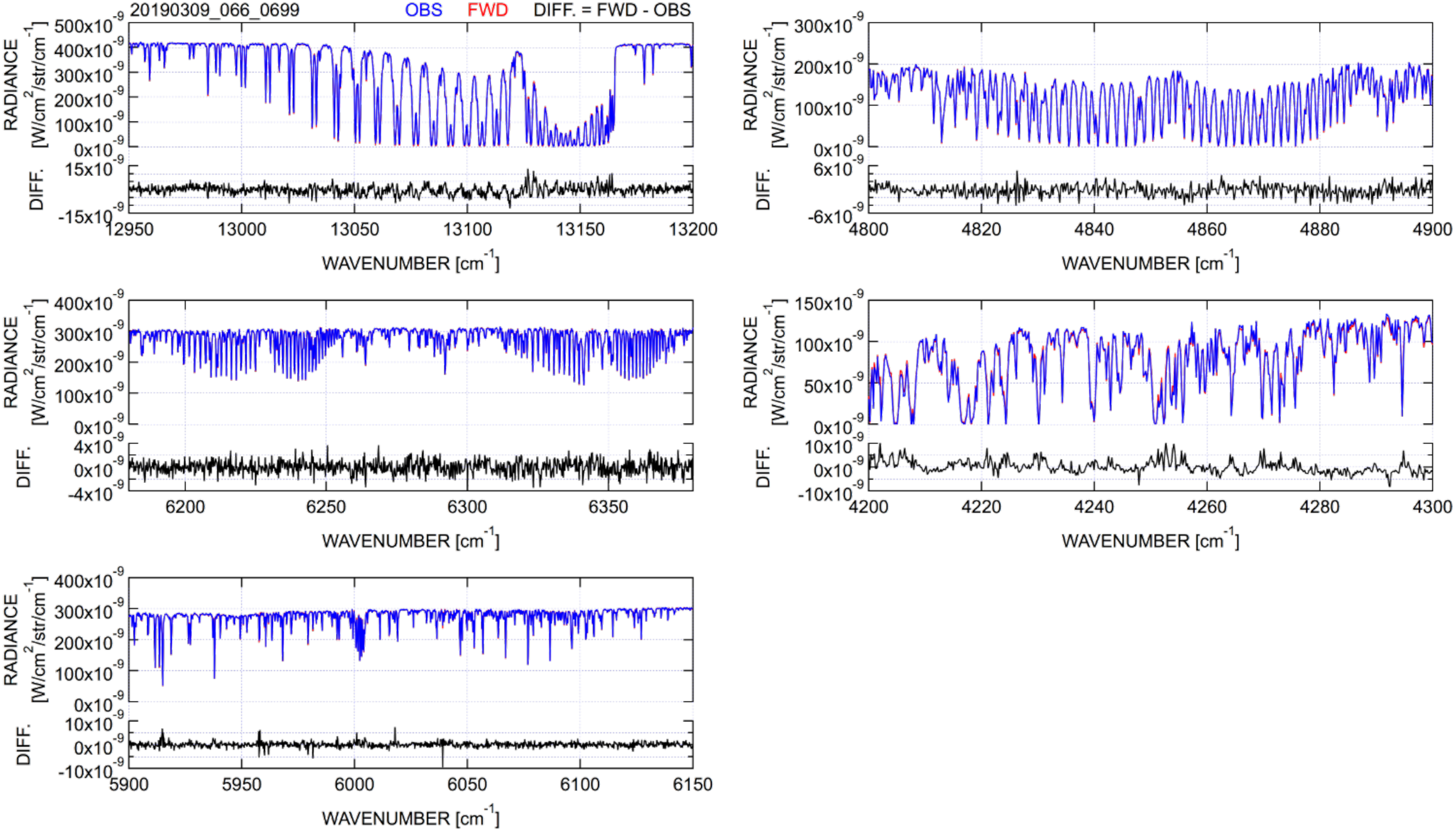


GOSAT & GOSAT-2 : SWIR spectrum

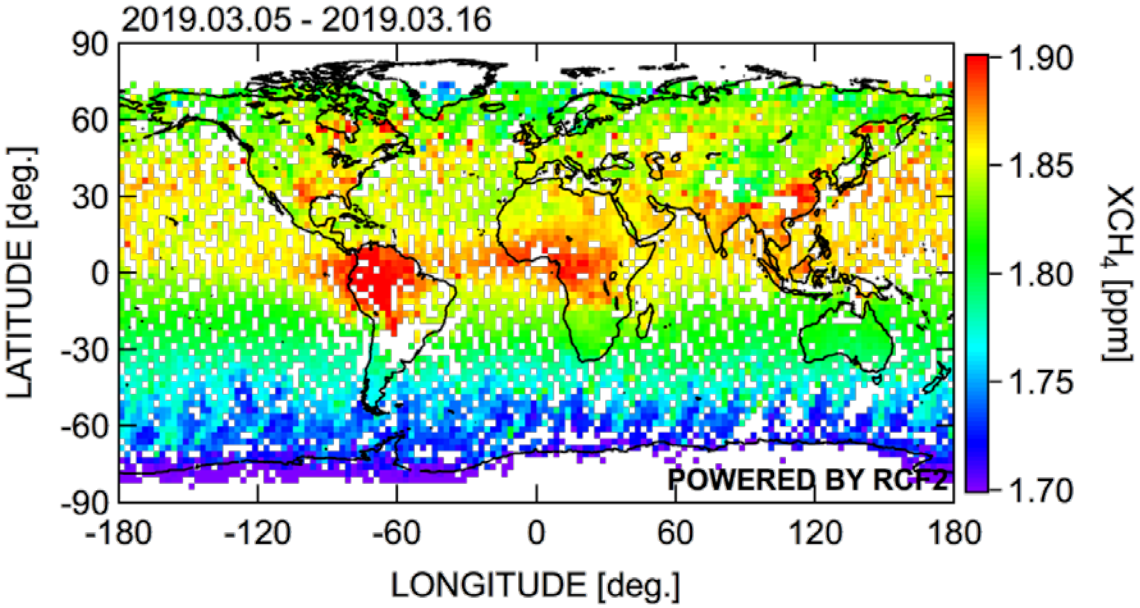


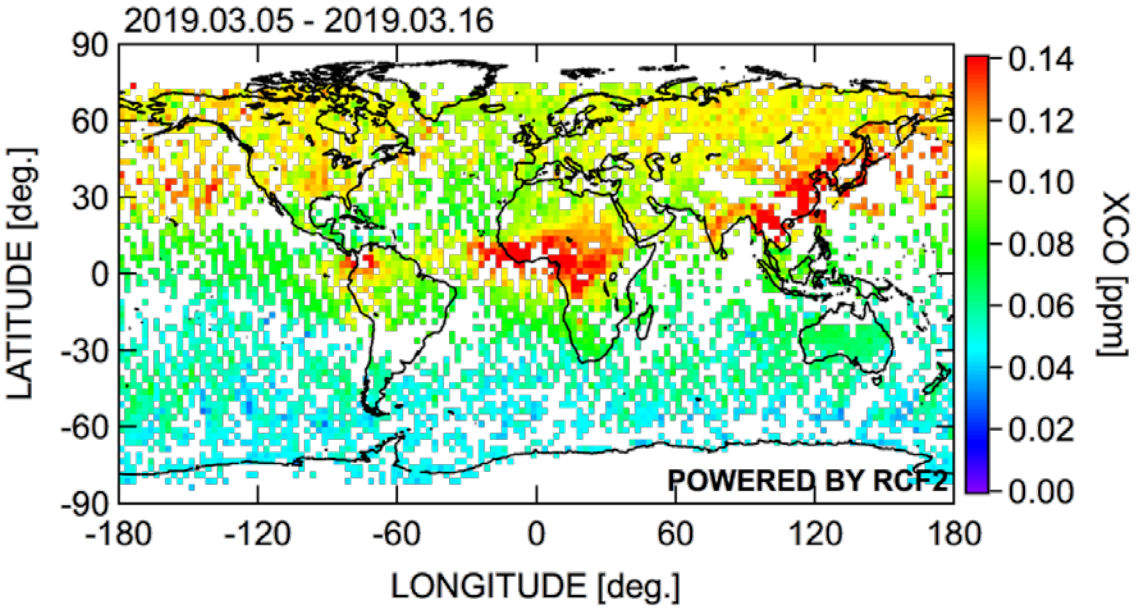
Further investigation is required for radiometric calibration.

GOSAT-2 : Spectral fitting (clear-sky assumption)



GOSAT-2 : proxy-based XCH_4 & XCO



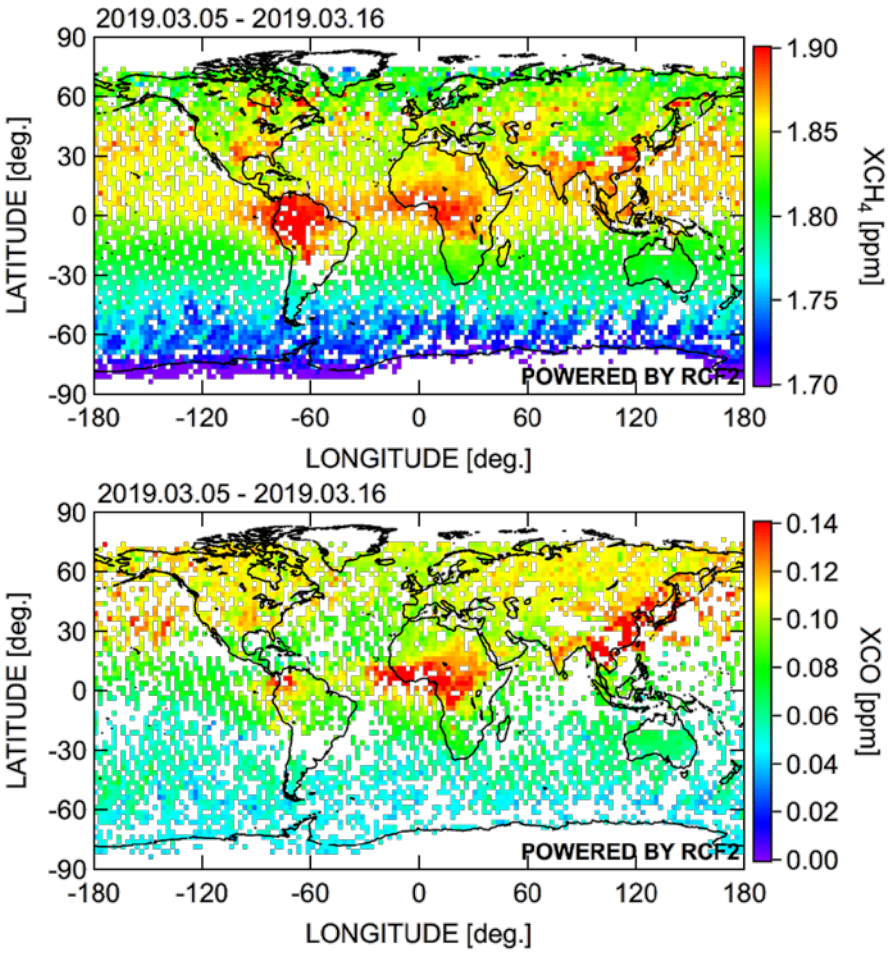


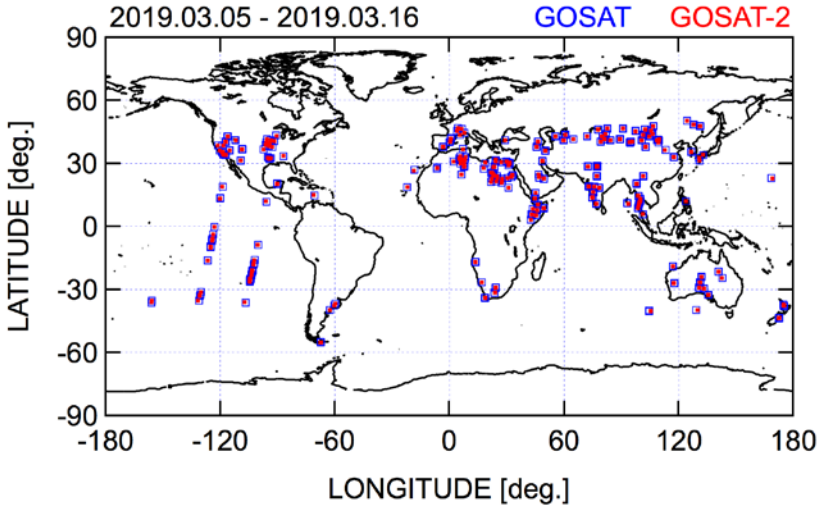
Preliminary results.

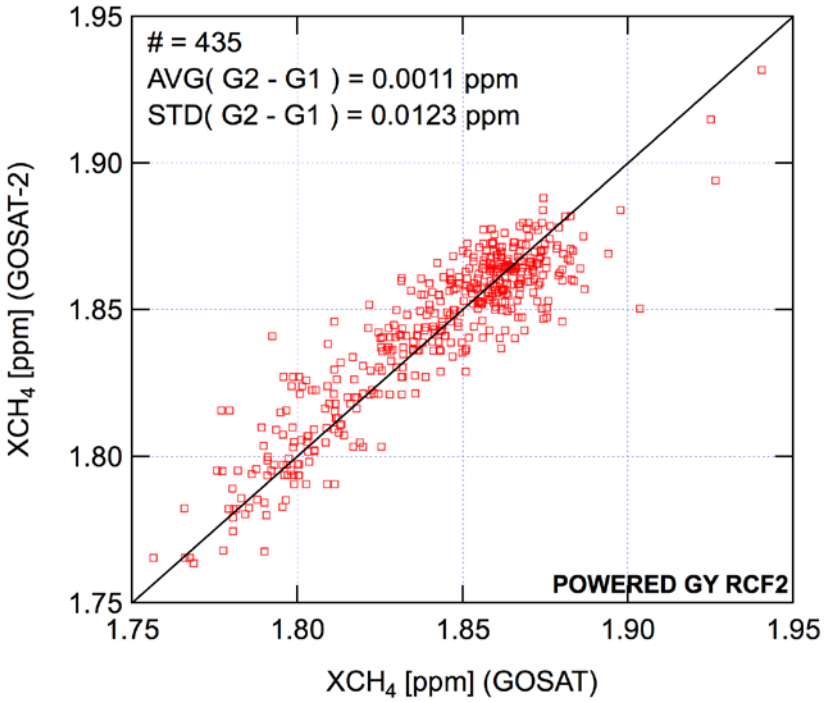
Cloud-screening is insufficient, because CAI-2 data is not used. Only FTS-2 2 µm-band cloud-screening is applied.

GOSAT-2 : Comparison with other satellite

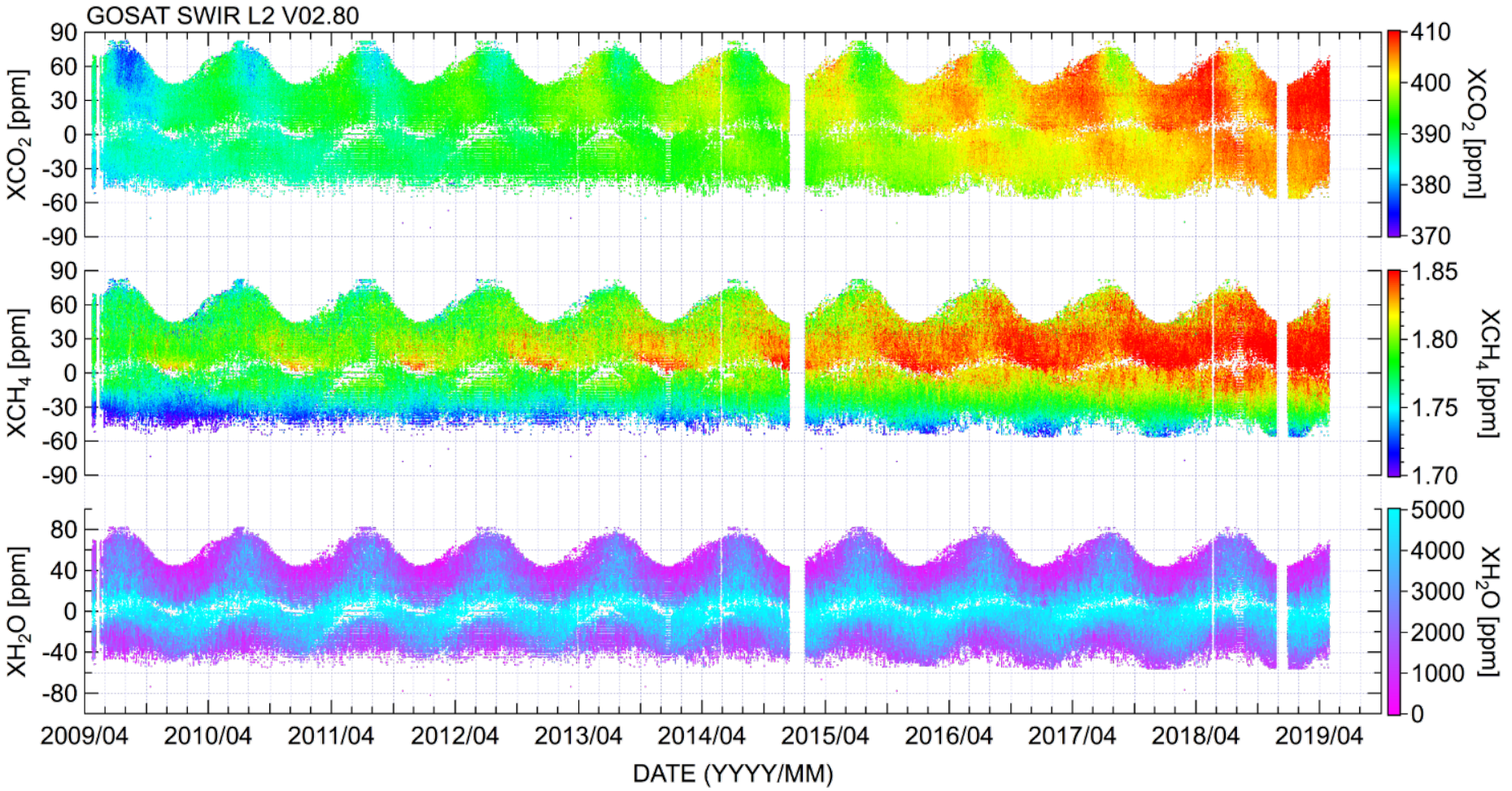
GOSAT-2







GOSAT : 10-year observational data !

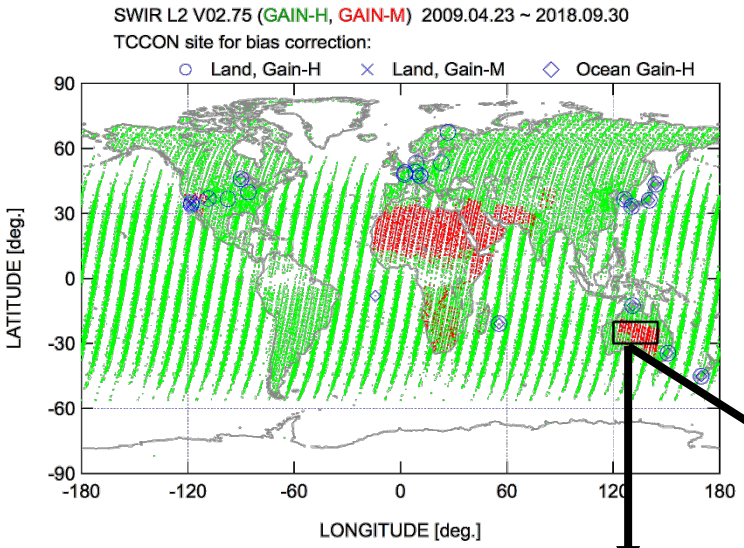


Bias uncorrected => Bias corrected:

V02.72 (L1B V201.202) => V02.75: 2009.04 - 2018.11

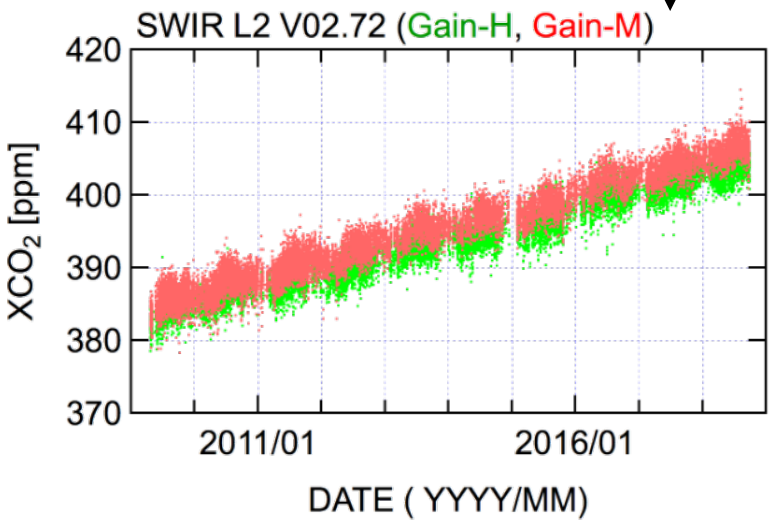
V02.80 (L1B V210.210) => V02.85 (under preparation): 2009.04 - current

GOSAT : SWIR L2 V02.75

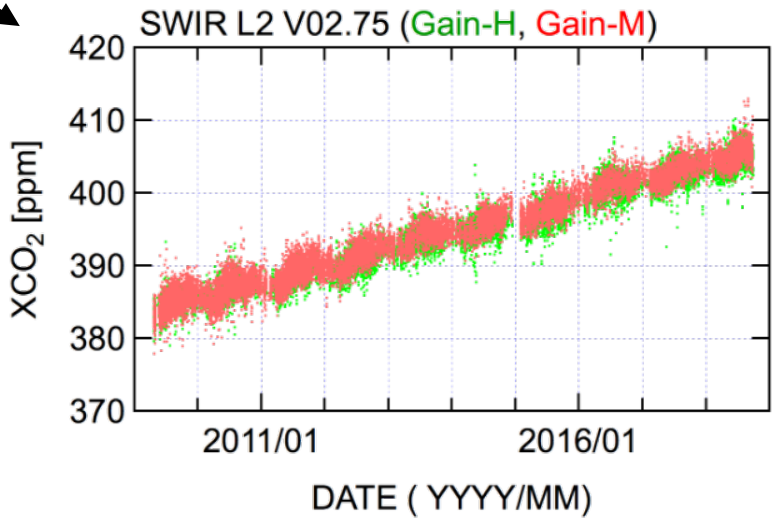


Empirical bias correction based on the TCCON data is applied.

The correction coefficients are evaluated for land & H-gain, land & M-gain, and ocean cases.



Bias correction



Gain-dependent bias is reduced after bias correction.

Summary

GOSAT-2 proxy based XCH_4 and XCO look reasonable.

- TROPOMI shows similar spatial pattern.
- Agree well with GOSAT full-physics based XCH_4.

Radiance level is mismatched between GOSAT and GOSAT-2.

- Degradation model of TANSO-FTS/GOSAT is under re-evaluation.
- Investigate solar calibration data of TANSO-FTS-2/GOSAT-2.

Updates of solar irradiance model and gas absorption coefficient are under investigation.