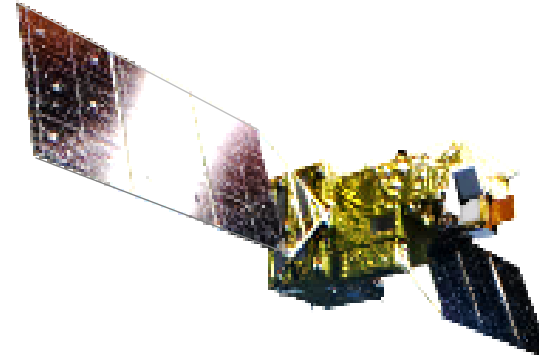


GOSAT and GOSAT-2 Progress Report



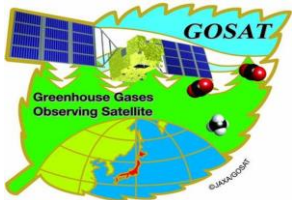
2009-Now



2018-Now

Akihiko KUZE (JAXA/EORC)

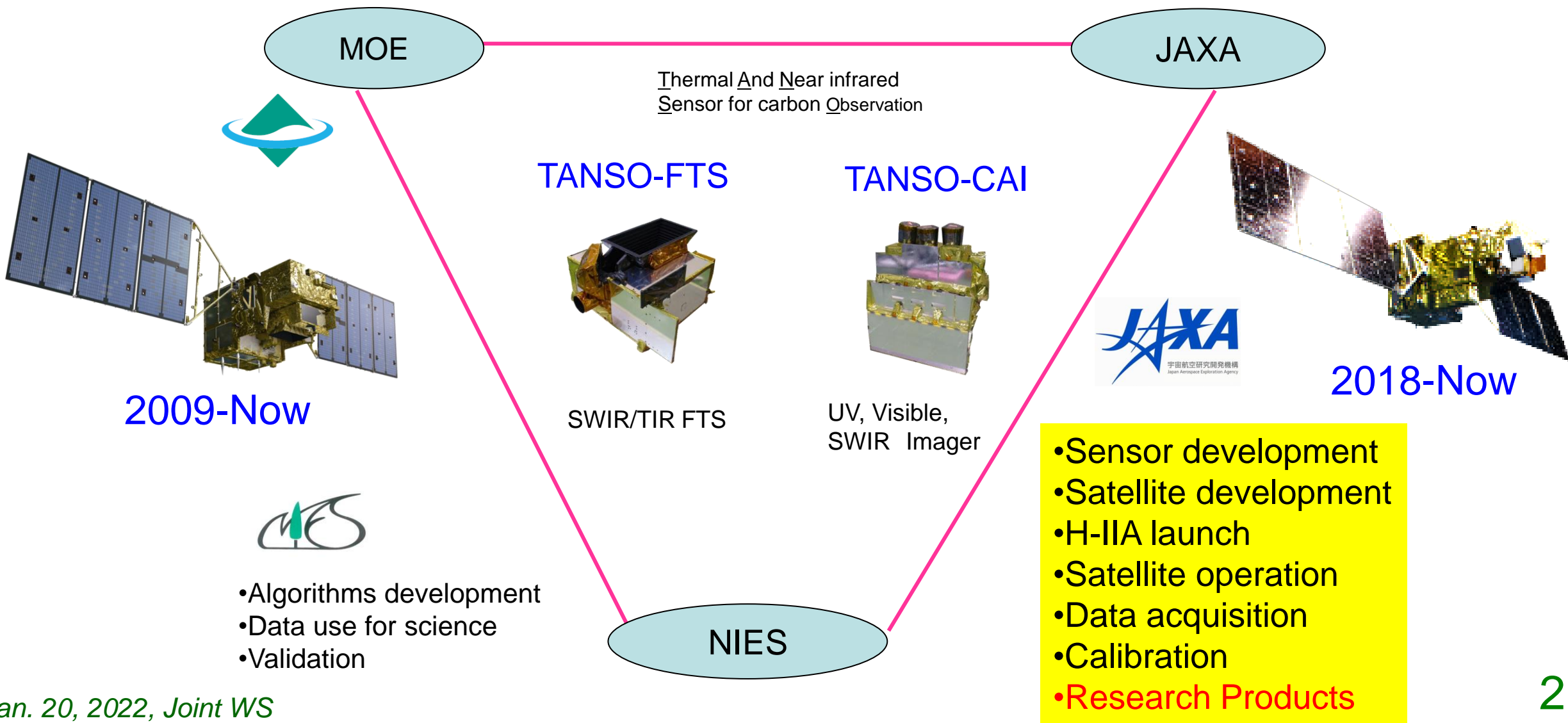
16:14-16:21 Jan. 20, 2022



GOSAT & GOSAT-2 Organization



GOSAT and GOSAT-2 are the joint projects of JAXA, MOE (Ministry of the Environment) and NIES (National Institute for Environmental Studies)





On orbit Status



Operation in 2021

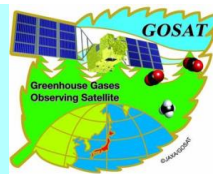
No COVID-19 impact

Satellite Condition

Enough fuel to operate for at least another 10-year
All four batteries are healthy

13-year data set of JAXA EORC research product
(partial column density).

Fine temperature control for the FTS mechanism has been performed since 2020 to operate under lower metrology laser detection level after decade long operation, considering seasonal, diurnal, and orbital temperature variation.



Operation in 2021

No COVID-19 Impact

Calibration

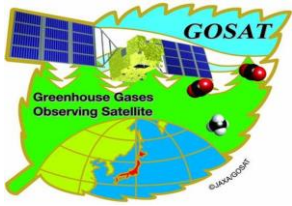
February 2021, Anomaly occurred in the solar diffuser panel mechanism.

The solar irradiance calibration has been suspended since then,

Lunar and ILS laser calibrations are normal.

Primary radiometric calibration has been performed by annual vicarious calibration in Nevada.

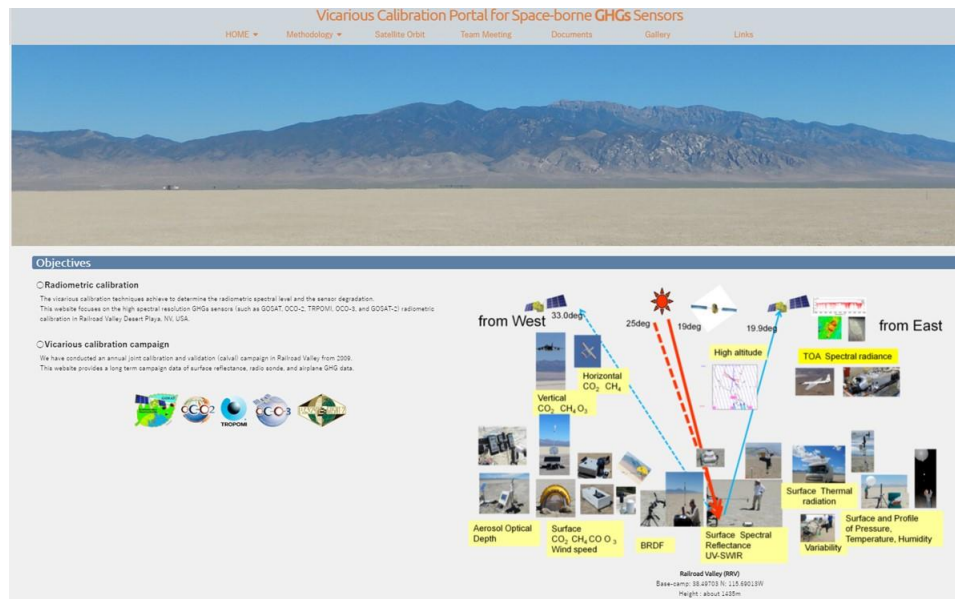




VCAL portal for GHG sensors



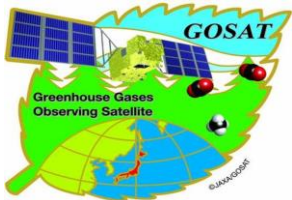
- GHG sensors have wide swath with larger footprints and SWIR channels at CO₂ and CH₄ bands.
- Radiometric calibration is required to estimate the light path modification by aerosol and clouds, which is one of the largest error sources in GHG column density retrieval.



❖ https://www.eorc.jaxa.jp/GOSAT/GHG_Vical/index.html

The VCAL Portal site provides

- (1) Methodology of vicarious calibration for various size footprint and off-nadir data.
- (2) 13-year annual joint campaign data for CAL-VAL
- (3) Dataset for analysis
- (4) Analytical results from various type of spectrometers: GOSAT FTS, OCO, S5P TROPOMI



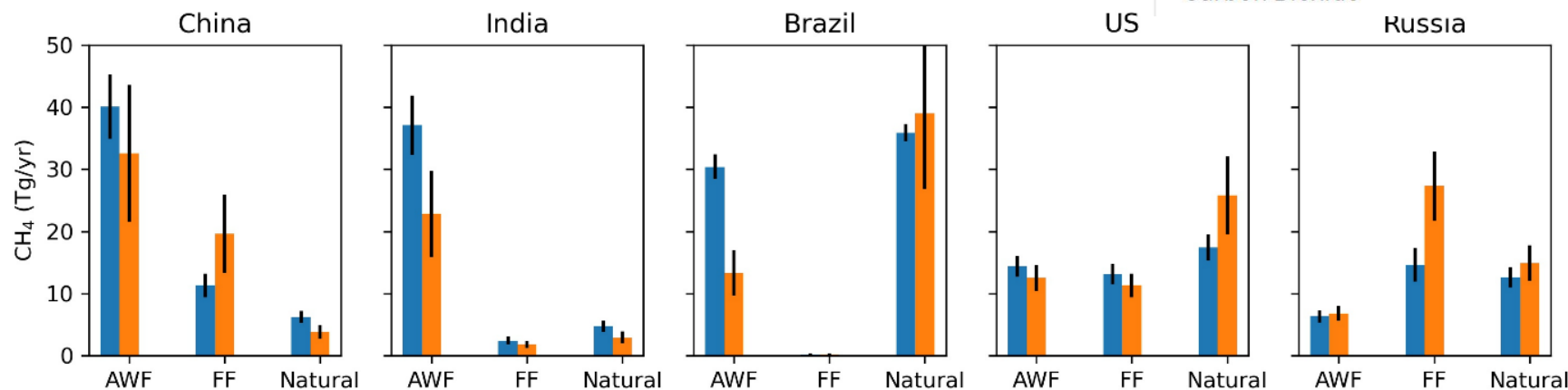
COP26 Global Stocktake GOSAT methane



Carbon Dioxide



Methane



TD: Top down using GOSAT

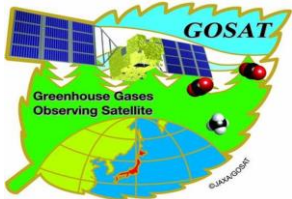
BU: Bottom up

AWF = Agriculture, Waste and Fires

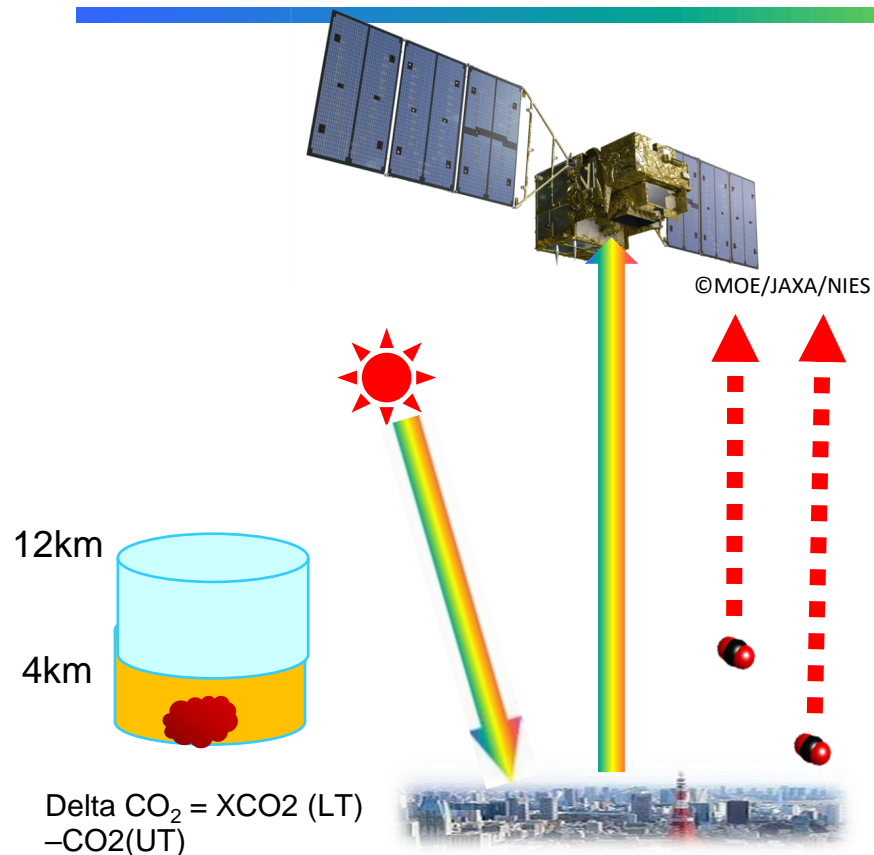
FF = Fossil Fuels (FF)

Natural = such as wetlands and seeps.

1. (GOSAT data + GEOS-Chem) can quantify total emissions for about 58 of the 242 countries.
2. The largest CH₄ emissions are from the agricultural sector, primarily livestock
3. The top five emitting countries are responsible for about half of the global anthropogenic CH₄ emission budget.



JAXA EORC Partial Column Retrieval



FTS multiplex advantage

- (1) SWIR constrains column density
- (2) Two orthogonal linear polarization data remove aerosol contamination.
- (3) TIR provides difference in partial column density between lower and upper troposphere.

13-year GOSAT and 2-year GOSAT-2 products

One file per month with clear sky data, CSV format

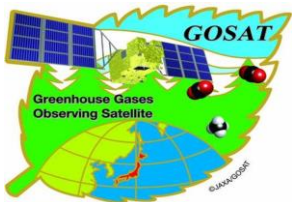
XCO₂, XCH₄, XCO₂ (LT, UT), XCH₄ (LT, UT), XCO (GOSAT-2 only),

H₂O (11 layers) aerosol optical thickness (AOT),

Retrieved surface pressure (P), solar-induced chlorophyll fluorescence (SIF)

time, geometry

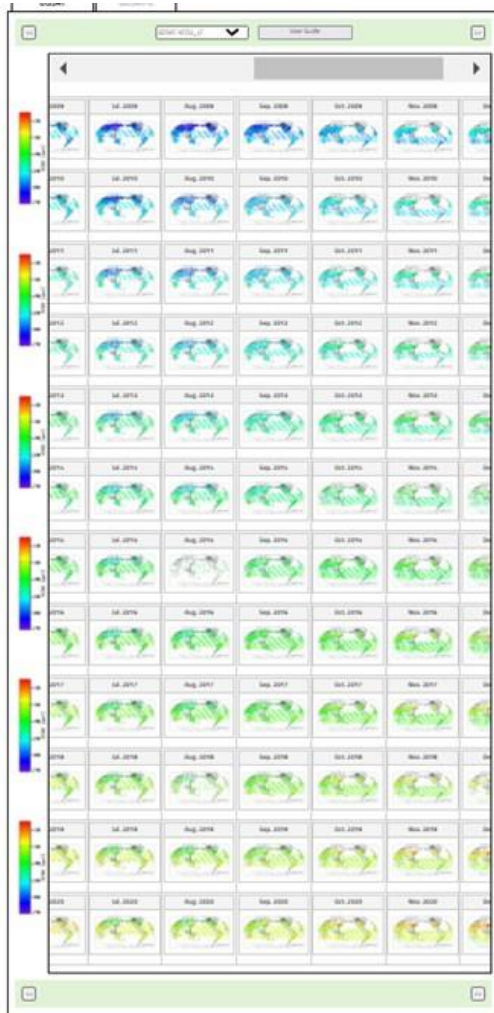
GOSAT-1 Version 1		Latitude	Longitude	LSFLG	XCO ₂ _apr	XCO ₂ _tot	XCO ₂ _low	XCO ₂ _upp	XCH ₄ _apr	XCH ₄ _tot	XCH ₄ _low	XCH ₄ _upp	XCO_apr	XCO_tot	Psrf_apr	Psrf_ret	AOT_076	AOT_160	AOT_206	SIF	Cloud	
2019/01/01	01:13:04	-41.3061	173.4926	0	406.5682	397.9352	395.1537	399.3747	1.7439	1.7464	1.8315	1.7634	0.00000	0.00000	967.86	977.05	0.0963	0.0886	0.0820	10.4642	-1.000000	F190101011304
2019/01/01	02:46:15	-23.9153	151.2222	0	407.7506	402.3643	402.1988	403.2452	1.7683	1.8030	1.7950	1.8469	0.00000	0.00000	1007.32	1001.42	0.3487	0.3636	0.3583	1.2205	-1.000000	F190101024615
2019/01/01	02:47:06	-23.9548	148.3777	0	407.6141	404.1903	401.7923	406.6639	1.7696	1.8011	1.8437	1.8281	0.00000	0.00000	990.35	989.26	0.0255	0.0134	0.0110	-0.1822	-1.000000	F190101024706



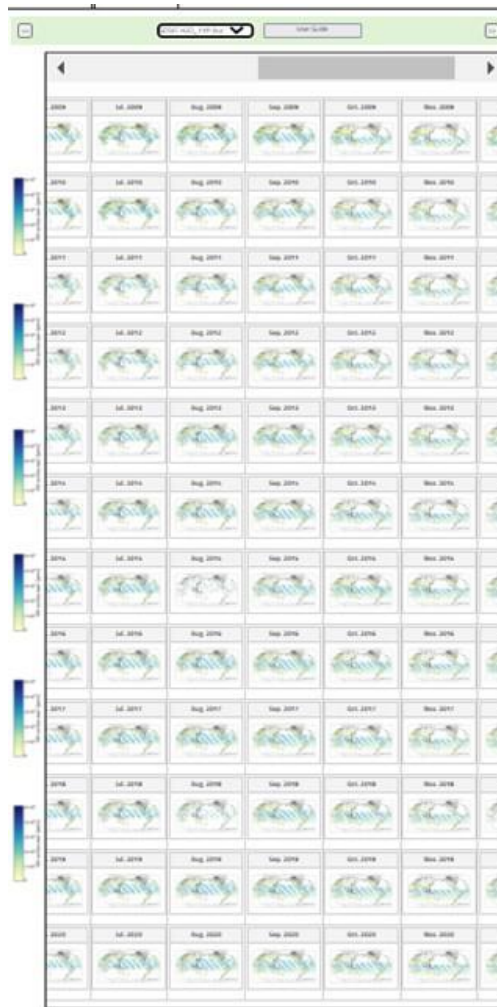
JAXA EORC Partial Column Products



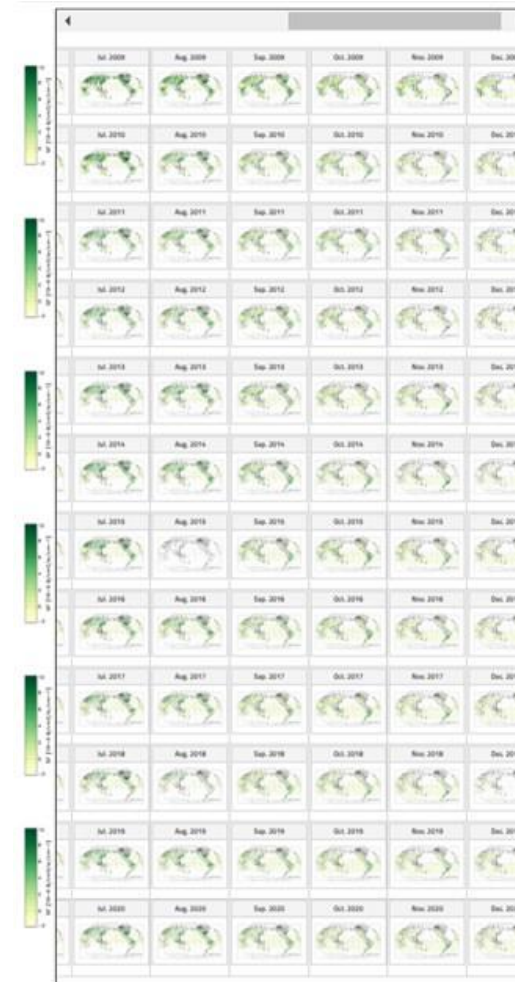
XCO₂^{LT}
(1-0.6 P_{surf})



XH₂O(11)
(11th lowest)



SIF
solar-induced
chlorophyll
fluorescence



https://www.eorc.jaxa.jp/GOSAT/GPCG/download_v2/ ID: gosat、PW: ***** (please contact us)