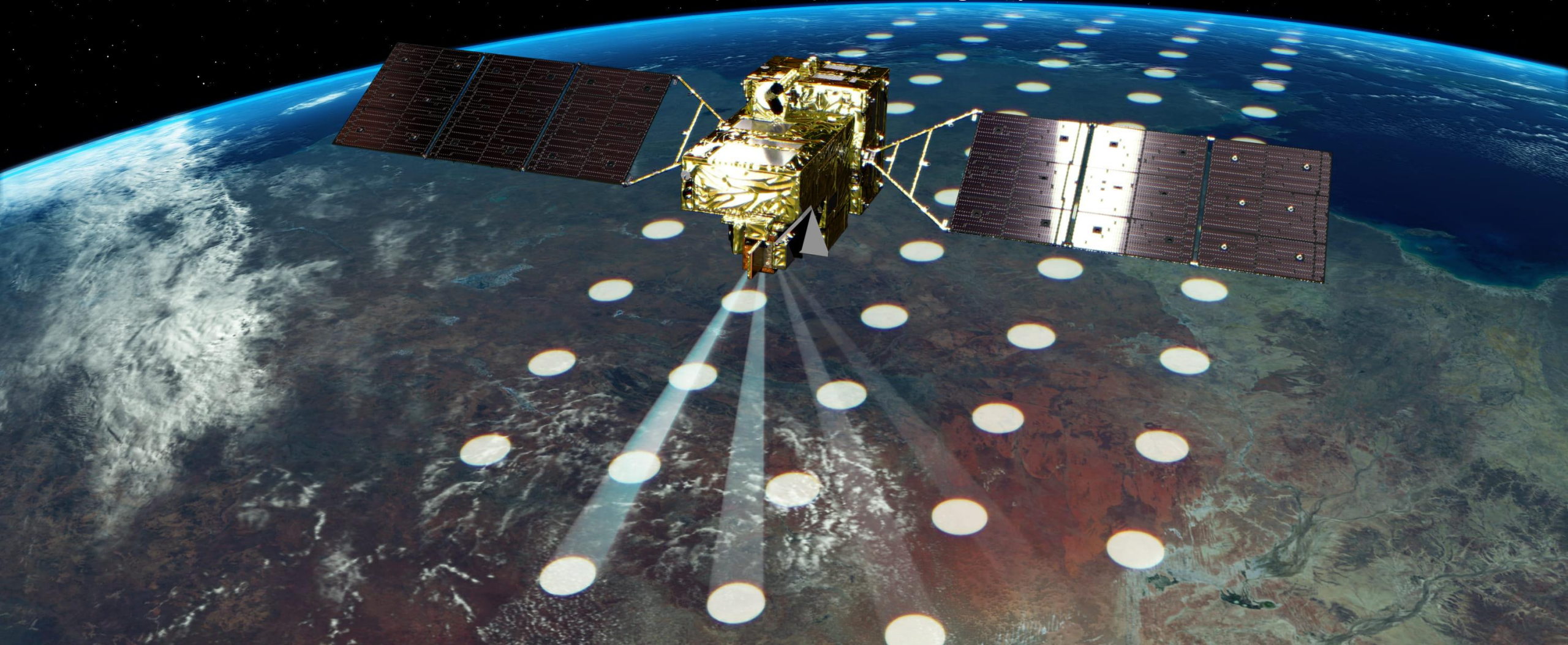
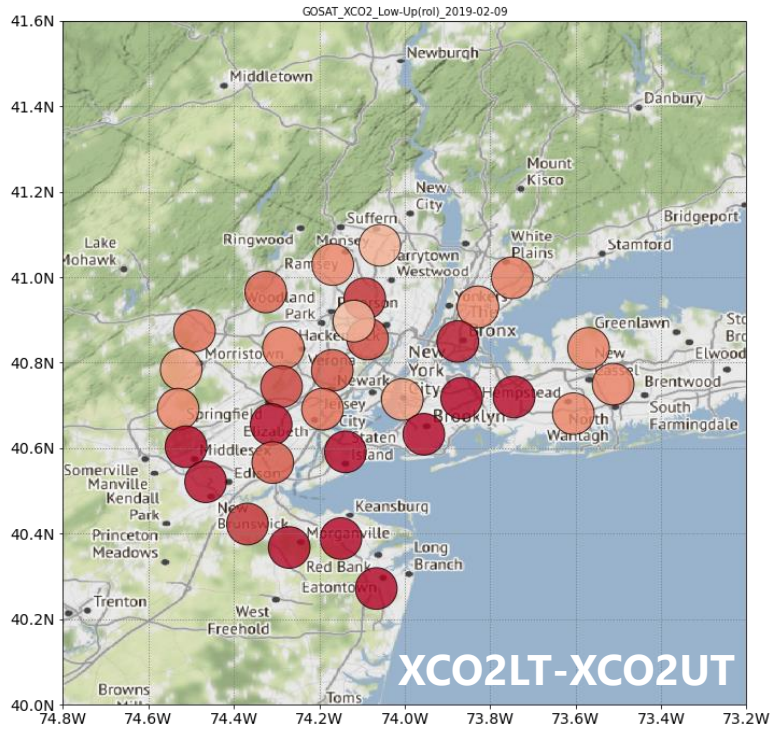
Characterization of TANSO-FTS-2 onboard GOSAT-2 and the Level-1 algorithm updates

July 12, 2022, IWGGMS18

Junko Kasuya, Hiroshi Suto, Kei Shiomi, Mayumi Shigetoh, Akihiko Kuze
Japan Aerospace Exploration Agency

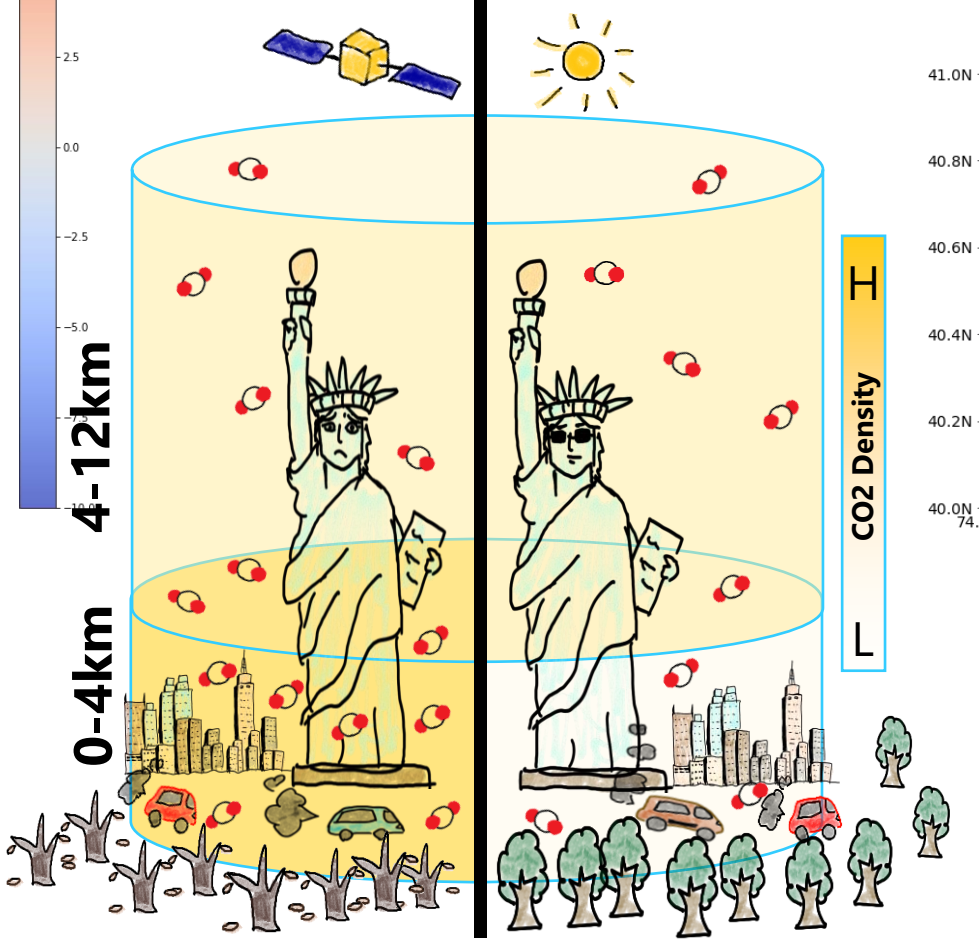


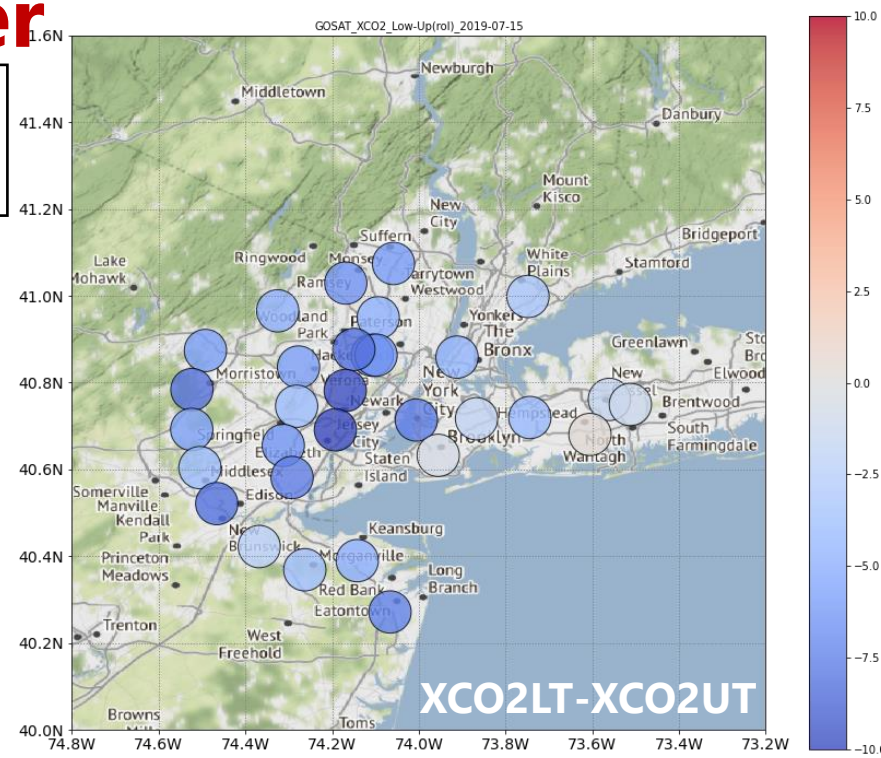
JAXA Advanced Research: CO2 Retrieval

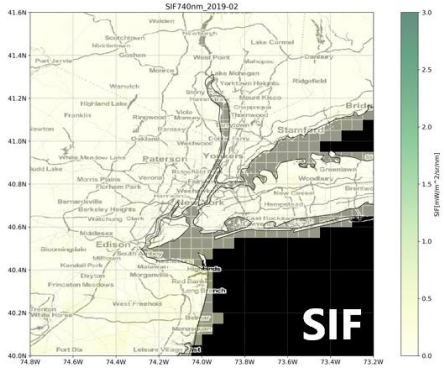


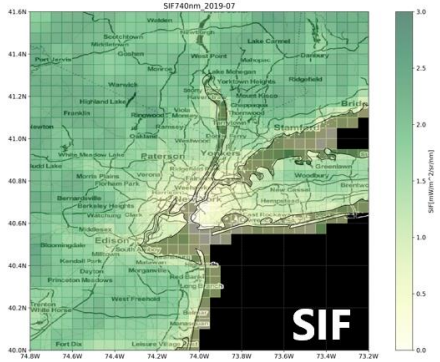
Winter | **Summer**

High **CO2 emissions** Low
Low **CO2 uptake by forests** High



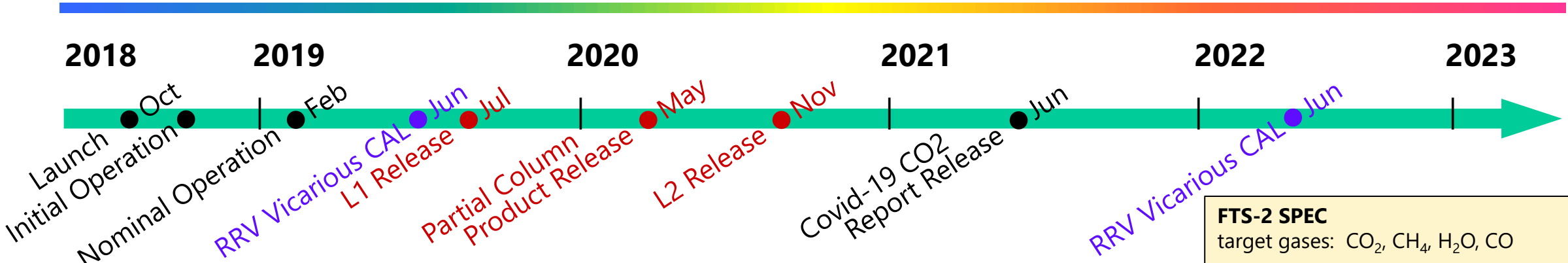






SIF: Solar-Induced chlorophyll fluorescence

GOSAT-2 FTS-2 Overview

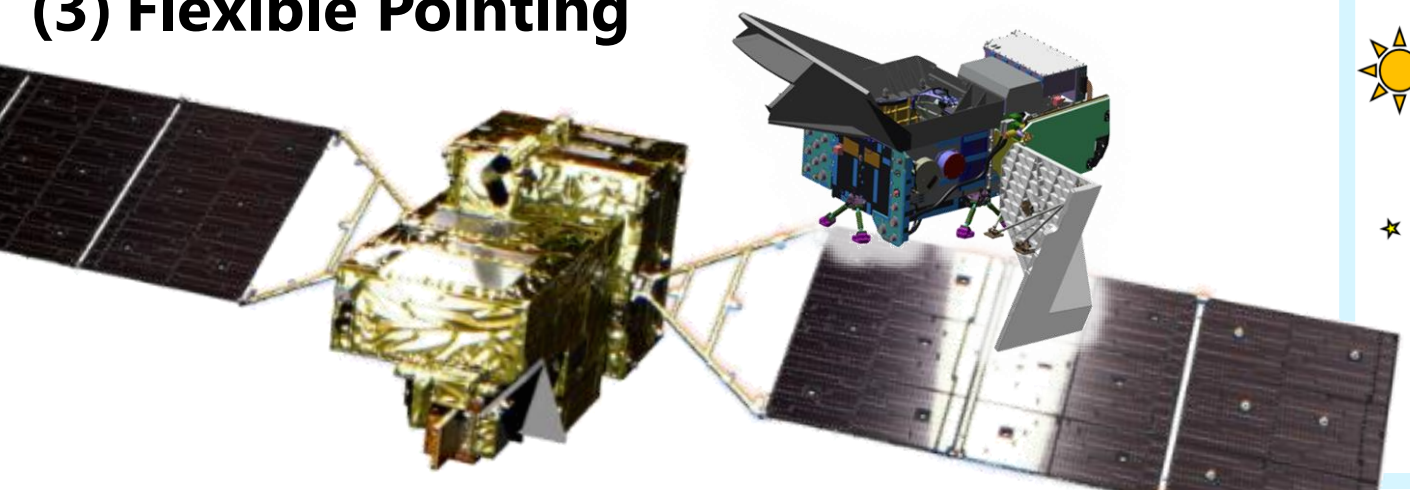


3 updated points of GOSAT-2

(1) Add CO bands and separate CO2 CH4 bands

(2) Polarized SWIR 3 bands (P+S) + TIR 2 bands

(3) Flexible Pointing



FTS-2 SPEC

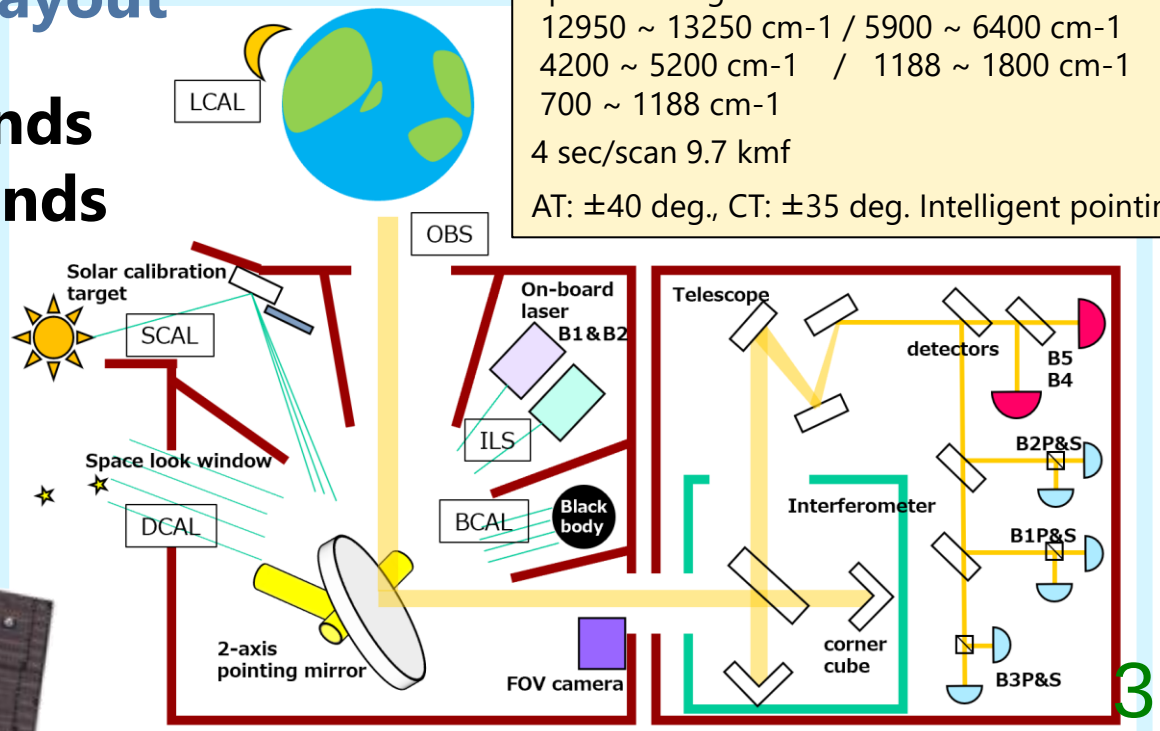
target gases: CO_2, CH_4, H_2O, CO

Spectral Ranges :
12950 ~ 13250 cm-1 / 5900 ~ 6400 cm-1
4200 ~ 5200 cm-1 / 1188 ~ 1800 cm-1
700 ~ 1188 cm-1

4 sec/scan 9.7 kmf

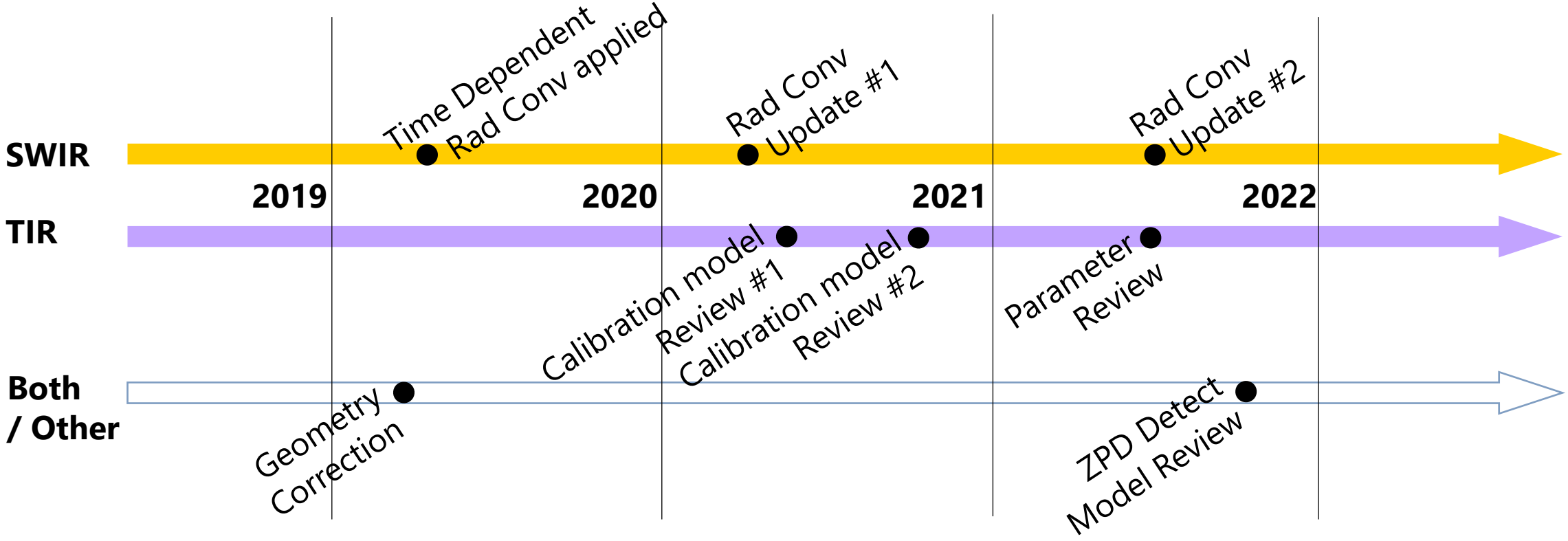
AT: ±40 deg., CT: ±35 deg. Intelligent pointing

Layout



History of Level-1 Algorithm Updates

- SWIR: The time dependent radiation conversion coefficients degradation factor was introduced in 2019, and parameters have been updated based on the vicarious calibration.
- TIR: Calibration models and parameters are updated based on match-up with other satellites (AIRS & IASI). In particular, the angle-dependent difference of the pointing mirror is minimized.



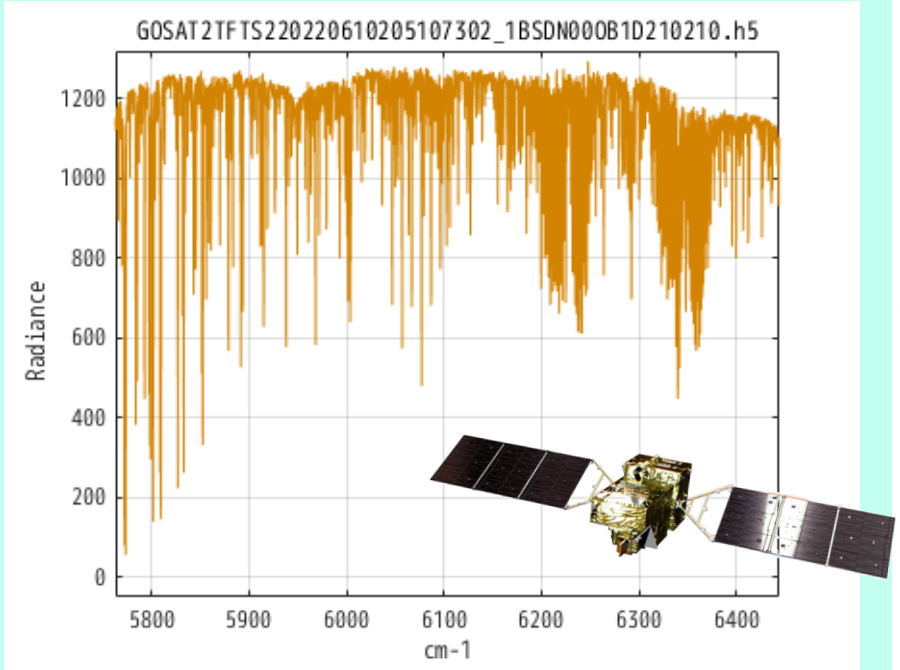
Version No.	101.101	102.102	200.200	210.210	220.220

Radiance Calibration

SWIR

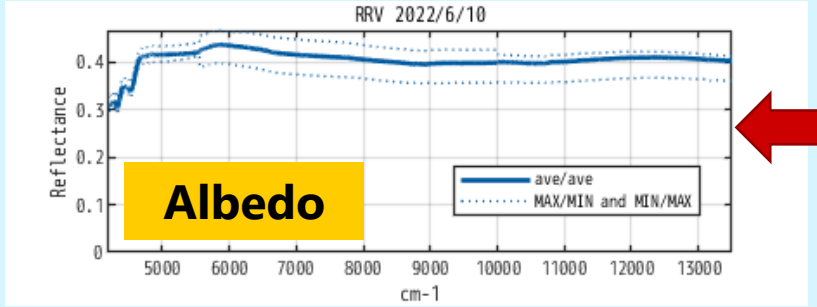
- On June 2022, JPL JAXA NIES collaborated on the RRV vicarious calibration
- Comparison of GOSAT-2 FTS-2 and the forward calculation using the surface albedo to verify the accuracy of SWIR parameters.

FTS-2 observation Spectrum

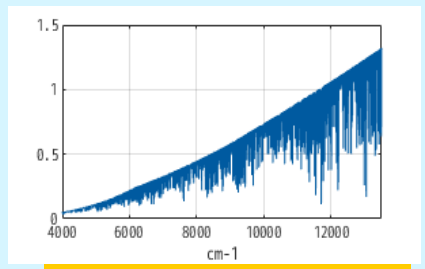


VS

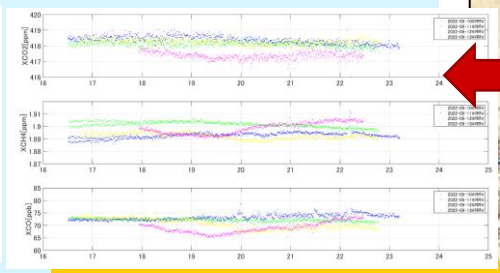
Forward Calculation



Albedo



Solar model TSIS-HSRS



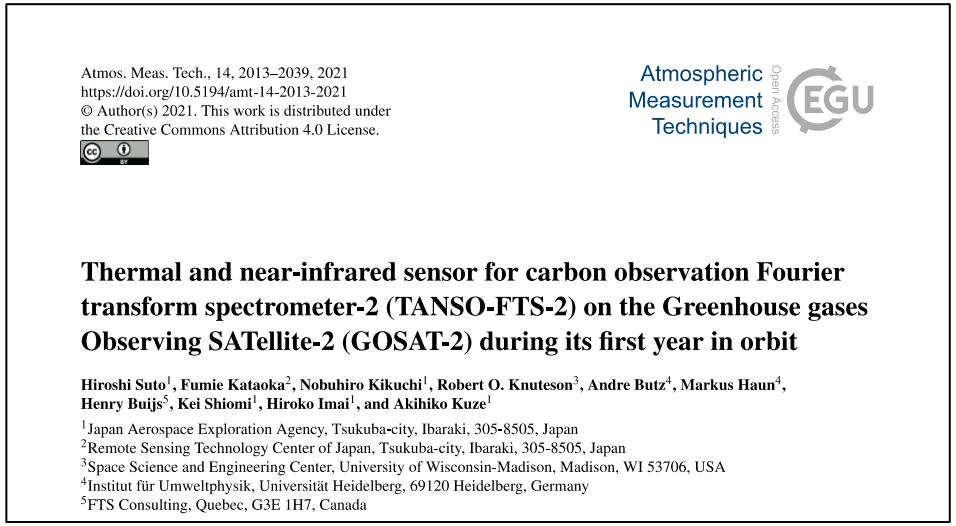
Atmosphere model

Conclusion

- **GOSAT-2 FTS-2 has**
  - Polarized SWIR 3 bands (P+S) + TIR 2 bands
  - Flexible Pointing

-> Solve partial column density in large cities

- **Level-1 products are verified on all bands with vicarious calibrations and match-up.**
- **JAXA will continue to update Level-1 algorithm.**
- **For more information, see our papers.**



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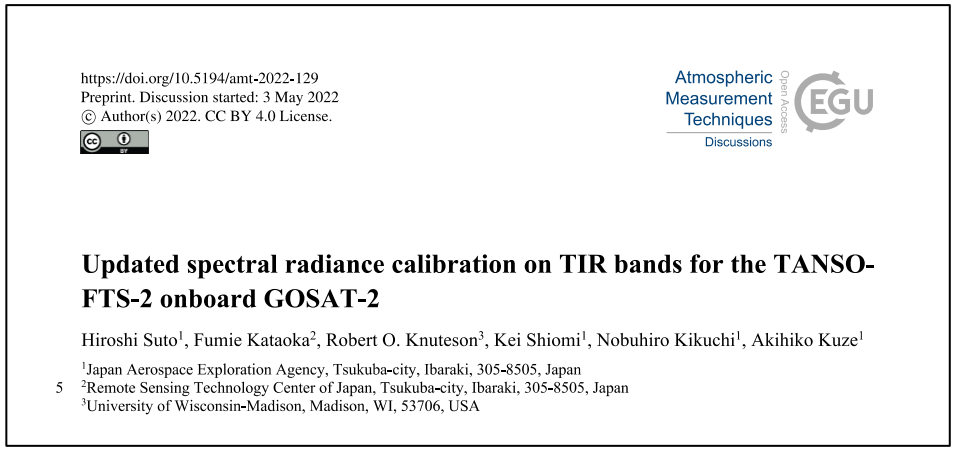
Atmospheric Measurement Techniques

Thermal and near-infrared sensor for carbon observation Fourier transform spectrometer-2 (TANSO-FTS-2) on the Greenhouse gases Observing SATellite-2 (GOSAT-2) during its first year in orbit

Hiroshi Suto[1], Fumie Kataoka[2], Nobuhiro Kikuchi[1], Robert O. Knuteson[3], Andre Butz[4], Markus Haun[4], Henry Buijs[5], Kei Shiomi[1], Hiroko Imai[1], and Akihiko Kuze[1]

[1]Japan Aerospace Exploration Agency, Tsukuba-city, Ibaraki, 305-8505, Japan
[2]Remote Sensing Technology Center of Japan, Tsukuba-city, Ibaraki, 305-8505, Japan
[3]Space Science and Engineering Center, University of Wisconsin-Madison, Madison, WI 53706, USA
[4]Institut für Umweltphysik, Universität Heidelberg, 69120 Heidelberg, Germany
[5]FTS Consulting, Quebec, G3E 1H7, Canada



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Atmospheric Measurement Techniques Discussions

Updated spectral radiance calibration on TIR bands for the TANSO-FTS-2 onboard GOSAT-2

Hiroshi Suto[1], Fumie Kataoka[2], Robert O. Knuteson[3], Kei Shiomi[1], Nobuhiro Kikuchi[1], Akihiko Kuze[1]

[1]Japan Aerospace Exploration Agency, Tsukuba-city, Ibaraki, 305-8505, Japan
[2]Remote Sensing Technology Center of Japan, Tsukuba-city, Ibaraki, 305-8505, Japan
[3]University of Wisconsin-Madison, Madison, WI, 53706, USA

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