Release Notes

for GOSAT-2 TANSO-FTS-2 Level 1 Product

(R2023-A1)

Rev.NC Apr. 2023

Japan Aerospace Exploration Agency

Revision History

Rev.	Date	Page	Description
NC	Apr. 2023	-	First version.

1.Purpose

This document describes the release notes of GOSAT-2 TANSO-FTS-2 Level 1A, 1B product. The applied version numbers are shown in Table1-1 and Table1-2.

The GOSAT-2 TANSO-FTS-2 Level 1A products and Level 1B products (Common file) are internal products and are not distributed to general users.

The GOSAT-2 TANSO-FTS-2 Level 1B products (SWIR/TIR band file) are standard products and are available to general users.

Table1-1 Version for GOSAT-2 TANSO-FTS-2 Level 1A Product

Release Version	HDF5 files of product	Algorithm Version	Parameter Version
R2023-A1	Common file	**220**	**220**
	SWIR band file	**220**	**220**
	TIR band file	**220**	**220**

Table1-2 Version for GOSAT-2 TANSO-FTS-2 Level 1B Product

Release Version	HDF5 files of product	Algorithm Version	Parameter Version
R2023-A1	Common file	**220**	**220**
	SWIR band file	**220**	**220**
	TIR band file	**220**	**220**

2. Release Notes

The important information on this release are shown in Table 2-1.

Correction's summary and datasets are described in Table 2-2.

The format is unchanged from V200.200.

Table 2-1 Information for GOSAT-2 TANSO-FTS-2 Level 1B product

No.	Information	Dataset
1.	The SWIR radiance has been recorded the calibrated radiance by applying the bias correction estimated from the inter-comparison of the GOSAT later than V101101. In addition, the degradation factor estimated from solar calibration was applied later than V102102. The solar irradiance reference spectrum was changed to the Total and Spectral Solar Irradiance Sensor-1 (TSIS-1) Hybrid Solar Reference Spectrum (HSRS) and the radiance conversion factor for SWIR was updated later than V202202.	/SoundingData/Radiance (L1B SWIR)
2.	The along-track (AT) slant observation of GOSAT-2 TIR radiance is evaluated from inter-comparison of Metop-B/IASI and Aqua/AIRS cross-track (CT) slant observations. The AT=-20deg backward observation of TIR V210210 radiance had biases over +1K in high-temperature, in 680 cm^{-1} and 1030 cm^{-1} of Band 5, and 1300 cm^{-1} of Band 4. The AT=+15deg forward observation of that had biases around -0.5K in high-temperature, in 1300 cm^{-1} of Band 4. Whereas, these biases have been almost eliminated and improved later than V220220. The FTS-2 observed the Railroad Valley playa US, a vicarious calibration site, where is homogeneous in the FTS-2 large FOV, with multiple AT view angles from forward +20 deg to backward -20 deg. The relation between AT forward and backward view radiances showed relatively better symmetry in 680 cm^{-1} of Band 5 later than V220220.	/SoundingData/Radiance /SoundingData/Radiance_finiteFOVcorr (L1B TIR)
3.	The geometric accuracy has been evaluated to be 230 m absolute accuracy by evaluation of the FOV monitor camera and inter-band registration of 0.01 FOV by evaluation of the lunar calibration later than V101101.	/SoundingGeometry (L1B SWIR/TIR)
4.	The wavenumber step has been changed since July 13, 2019 after changing the sampling laser temperature.	/SoundingData/WavenumberInfo (L1B SWIR/TIR)

Table 2-2 Changes in the products of GOSAT-2 TANSO-FTS-2 Level 1A and Level 1B products

No.	Information	Dataset
1.	Update of the interferometer delay value SWIR instrument function Calibration revealed sidelobes with an intensity of about 0.3% of the main signal. The sidelobes were predicted to be due to frequency modulation, and the intensity was found to be adjustable with the interferometer delay value. From the instrument function calibration conducted in 2021, the delay value that minimizes the sidelobe was obtained and updated.	/SoundingData/Interferogram (L1A SWIR/TIR) /SoundingData/Rawspectrum /SoundingData/Rawspectrum_outband /SoundingData/Radiance /SoundingData/Radiance_finiteFOVcorr /SoundingData/Radiance_outband (L1B SWIR/TIR)
2.	Updates of the non-linearity correction, the internal optical transmittance and the pointing mirror reflectance for TIR The TIR parameters were re-adjusted in V220 because it was confirmed that the variance of radiometric differences compared with other satellites became smaller, especially in low-temperature targets, by changing the interferometer sampling delay as mentioned above. The polarization properties parameters obtained from synchronous observations between other satellites up to V210 were expanded for use in optimization, and TIR pointing mirror reflectance and optical transmittance were updated by comparison with other satellite data, mainly AT direction slant viewing observations. And the pointing mirror reflectance was also revised for variations in the wavenumber direction.	/SoundingData/Radiance /SoundingData/Radiance_finiteFOVcorr /ScanMirror/Reflectivity (L1B TIR)
3.	Fixing of the laser wavelength indication value The sampling laser wavelength was calculated by the equation as a function of the laser temperature. It could change due to fluctuations in the thermometer or ADC sampling. However, the laser temperature was actually stable, so that a fixed laser wavelength was adopted in V220. Before July 2019; Laser wavelength=1310.1496 nm, Wavenumber spacing=0.19943082 cm^{-1} After July 2019; Laser wavelength=1309.9406 nm, Wavenumber spacing=0.19946264 cm^{-1}	/SoundingData/FringeInfo/deltaOPD (L1A SWIR/TIR) /ScanMirror/Reflectivity /ScanMirror/WavenumberInfo /SoundingData/WavenumberInfo/beginWN /SoundingData/WavenumberInfo/deltaWN /SoundingData/Rawspectrum /SoundingData/Rawspectrum_outband /SoundingData/Radiance /SoundingData/Radiance_finiteFOVcorr /SoundingData/Radiance_outband /QalityInfo/SNR (L1B SWIR/TIR) *Only products that have varied from nominal state due to fluctuations in thermometer or ADC sampling will be affected.

No.	Information	Dataset
4.	Change of the zero-path-difference (ZPD) position search in the uniform optical-path-difference conversion The range of the ZPD position search was changed from +/- 1000 fringes to +/- 100 fringes around the center fringes determined by statistical observation data analysis in V220. The ZPD was detected as an inappropriate position in wider fringe range, because the extracted and processed spectrum was distorted in dark scene observation of the SWIR DCAL and BCAL in V211.	/SoundingData/FringeInfo/beginFringe /SoundingData/Interferogram (L1A SWIR) /QualityInfo/ /SoundingData/RawSpectrum (L1A SWIR DCAL,BCAL)
5.	Correction of the problem case that one sounding data defects due to the status of L0 data In case of executing the L1 process, the processor reads the L0 data for the target lap 10 seconds longer as a margin. If this margin area contains data with the same sounding ID and operation mode as the previous lap, the L1 processing adopts the previous time as the time of this sounding. Then, one sounding data was defected in 4 cases as shown below. 　Jul. 17th 2019　Rev.3876 (DCAL) 　May 15th 2022　Rev.19199 (DCAL) 　Jun. 11th 2022　Rev.19635 (DCAL) 　Jun. 13th 2022　Rev.19636 (DCAL)	Products of the scene shown left. (L1A/B SWIR/TIR)

3. Version-up History

The version-up history of GOSAT-2 TANSO-FTS-2 Level 1A, 1B product is shown in Table 3-1 and Table3-2.

Table 3-1 Version-up history of Level 1A

Release	Version	Date	Major Updates
R2019-A3	002.004	Apr. 2019	Preparation for initial calibration version (L+6M)
R2019-A5	100.100	Jul. 2019	After initial calibration version (L+9M)
R2019-A6	101.101	Sep. 2019	Bug fixes
R2020-A1	102.102	May 2020	Adding attributes Bug fixes
R2020-A2	200.200	Oct. 2020	Data format change for adding calibration supplemental information
R2021-A1	200.201	Mar.2021	Private version
R2021-A2	201.201	Aug. 2021	Change in TIR calibration formula (non-linearity correction in spectral domain)
R2021-A3	202.202	Nov. 2021	No change other than the version number increment
R2021-A4	210.210	Jan. 2022	Adjustment for the ZPD position misalignment Correction for the discontinuous data of the satellite location
R2022-A0	211.211	Jan. 2023	Update of the interferometer sampling delay value Prototype version
R2023-A1	220.220	Apr. 2023	Fixing of the laser wavelength indication value Change of the ZPD position search range in the uniform optical-path-difference conversion Correction of the problem case that one sounding data defects due to the status of L0 data

Table 3-2 Version-up history of Level 1B

Release	Version	Date	Major Updates
R2019-A3	002.004	Apr. 2019	Preparation for initial calibration version (L+6M) Released to RA users
R2019-A5	100.100	Jul. 2019	After initial calibration version (L+9M) Released to General users
R2019-A6	101.101	Sep. 2019	Bug fixes
R2020-A1	102.102	May 2020	FCE correction and complex sensitivity calibration algorithm correction (TIR) Updates of the radiance degradation factor and the radiance conversion factor (SWIR) Adding Attributes Bug fixes
R2020-A2	200.200	Nov. 2020	Adoption of polarization correction for TIR calibration equation Data format change for adding calibration supplemental information
R2021-A1	200.201	Mar.2021	Private version
R2021-A2	201.201	Aug. 2021	Change in TIR calibration formula (non-linearity correction in spectral domain) Change in TIR scan mirror reflectance calculation formula
R2021-A3	202.202	Nov. 2021	Update of the non-linearity correction for TIR Update of the pointing mirror reflectance for TIR Update of the radiance conversion factor for SWIR Prototype version

Release	Version	Date	Major Updates
R2021-A4	210.210	Jan. 2022	Adjustment for the ZPD position misalignment Correction for the discontinuous data of the satellite location
R2022-A0	211.211	Jan. 2023	Update of the interferometer sampling delay value Update of the pointing mirror reflectance for TIR Prototype version
R2023-A1	220.220	Apr. 2023	Updates of the non-linearity correction, the internal optical transmittance and the pointing mirror reflectance for TIR Fixing of the laser wavelength indication value Change of the ZPD position search range in the uniform optical-path-difference conversion Correction of the problem case that one sounding data defects due to the status of L0 data