GOSAT Calibration Updates and Operations toward an Optimized Observation Pattern

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Toronto

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Today’s Talk

(1) Newly released TANSO-FTS Level 1 V210

(2) GOSAT condition in orbit & 2018 plan

(3) GOSAT trend viewer

(4) Score map

One of the two solar paddles stopped its rotation. (June 2014)

(1) Metrology alignment changed
ZPD (Zero Path Difference) -position Biased interferogram (2014)

(2) Pointing mechanism switched (2015)

THERMAL AND NEAR INFRARED SENSOR FOR CARBON OBSERVATION

TANSO-CAI
UV, VISIBLE, SWIR IMAGER
Operation Summary
TANSO-FTS-Level 1, Both V201.202 and V210.210 are provided

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<td>FTS Nominal</td>
<td>5p-CT</td>
<td>3p-CT</td>
<td>1, 3 p-CT</td>
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<td>Pointing Pattern</td>
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<td>FTS Mechanism</td>
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<td>FTS interferogram</td>
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<td>800 fringes bias</td>
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<td>FTS Operation</td>
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<td>FTS L1B V161.161</td>
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<td>FTSL1B V201.202</td>
<td>Re-processing (pointing error, biased interferogram corrected)</td>
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<td>CAI L1A V130.131</td>
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May, 2018, 14th IWGGMS meeting in Toronto
Newly-Released TANSO-FTS Level 1 V210 dataset

Released March, 2018
Reprocessing of 9 year dataset was completed in April 27.

1. Update: nonlinearity correction of the TIR band (major updates)

2. O$_2$A band Extension from 13200 cm$^{-1}$ to 13250 cm$^{-1}$ for SIF

3. Update: Radiance conversion table by reprocessing prelaunch integrating sphere data

4. Glint Flag (was specular reflection only)

5. Master quality flags (was too strict for pointing and FTS timing mismatch)

6. Modification: over-corrected non-linearity correction of very bright O$_2$A such as thick clouds

\[
V_{Pamp} = -\left(\frac{V_{DC} - V_{DOffset}(t)}{g_{DC}}\right) - \frac{V_{ACC}}{g_{AC}}
\]

\[
V_{NLCorrected} = V_{Pamp} + a_{nlc} V_{Pamp}^2
\]
What is gained from the V210 TIR

A. Seamless calibrated dataset

The new dataset exhibits seamless radiometric calibration before and after cryo-cooler anomalies in May 2014 and August 2015.

Was too cold in CO₂ and CH₄ band
Was too hot for hot target in window

B. Partial column product of lower and upper troposphere (LT, UT) from simultaneous use of SWIR and TIR

Now full use of both SWIR and TIR
Minimizing the retrieved parameter for robustness: only two layers in troposphere

Kataoka et al, (submitted)
How many more years can GOSAT Operate?
2018 Operation Plan

(1) Healthy 4 batteries (low depth of discharge) at least 5 more years.
(2) Enough fuel for attitude control.
(3) Laser level for FTS mechanics is still above the critical level

A. June 21-10th OCO-2 GOSAT joint vicarious calibration campaign at Railroad Valley, NV

B. July 15-3rd inclination maneuvering control
No target observation during this period.

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long-term trend data of the selected targets, including the large point sources of methane (CH$_4$) and intensive observations of selected mega cites.

- Contents: Long term CO$_2$, CH$_4$, SIF, AOD by GOSAT
- 3 produces: NIES V02.72, ACOS B7.3 FULL, RemoTeC V2.3.8
- Trend figure & can be downloaded in csv format

Solar-Induced chlorophyll Fluorescence (SIF), Aerosol Optical Depth (AOD), Population density

Plan for 2018
Long term research product of partial column and SIF of selected targets: Mega cities, CAL&VAL, point source
Toward Optimizing Observation Pattern

GOSAT-II observation pattern can be fully customized. GOSAT has up to 1,000 target observation per day in addition to glint.

Score map for intercomparison site selection and sampling optimization for estimating global and local flux from GOSAT and GOSAT-2

(1) **GOSAT observation results and statistics** (Successful retrieval ratio ACOS L2/GOSAT L1, Surface Albedo)

(2) **Emission and uptake Sources**: EDGAR GHG inventory from different source sectors, GOME-2 SIF, ODIAC, Population density, MOPIT CO

(3) **Observation condition: wind speed, topography**

(4) **GOSAT, GOSAT-2, OCO-2, Sentinel 5P, and targetable area from GOSAT and GOSAT-2**

EDGAR CO\textsubscript{2} Inventory: total and individual source sectors
GHG Satellites Constellation

together with GOSAT, GOSAT-2, OCO-2 orbits (=TanSat), Sentinel 5P

Plan for 2018
Matched-up data set
Common database for GHG observation instruments from space:
Match up database of radiance spectra that include data quality, uncertainty, time, location of each instrument (GOSAT-OCO-2, GOSAT-AIRS, ……) will be provided.

Match-up point check tool

Kataoka’s Poster

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