9th IWGGMS:

Level1 Algorithm for TANSO-FTS on GOSAT: Calibration and Correction of four years data

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Level 1 processing

- Updates history and corrections

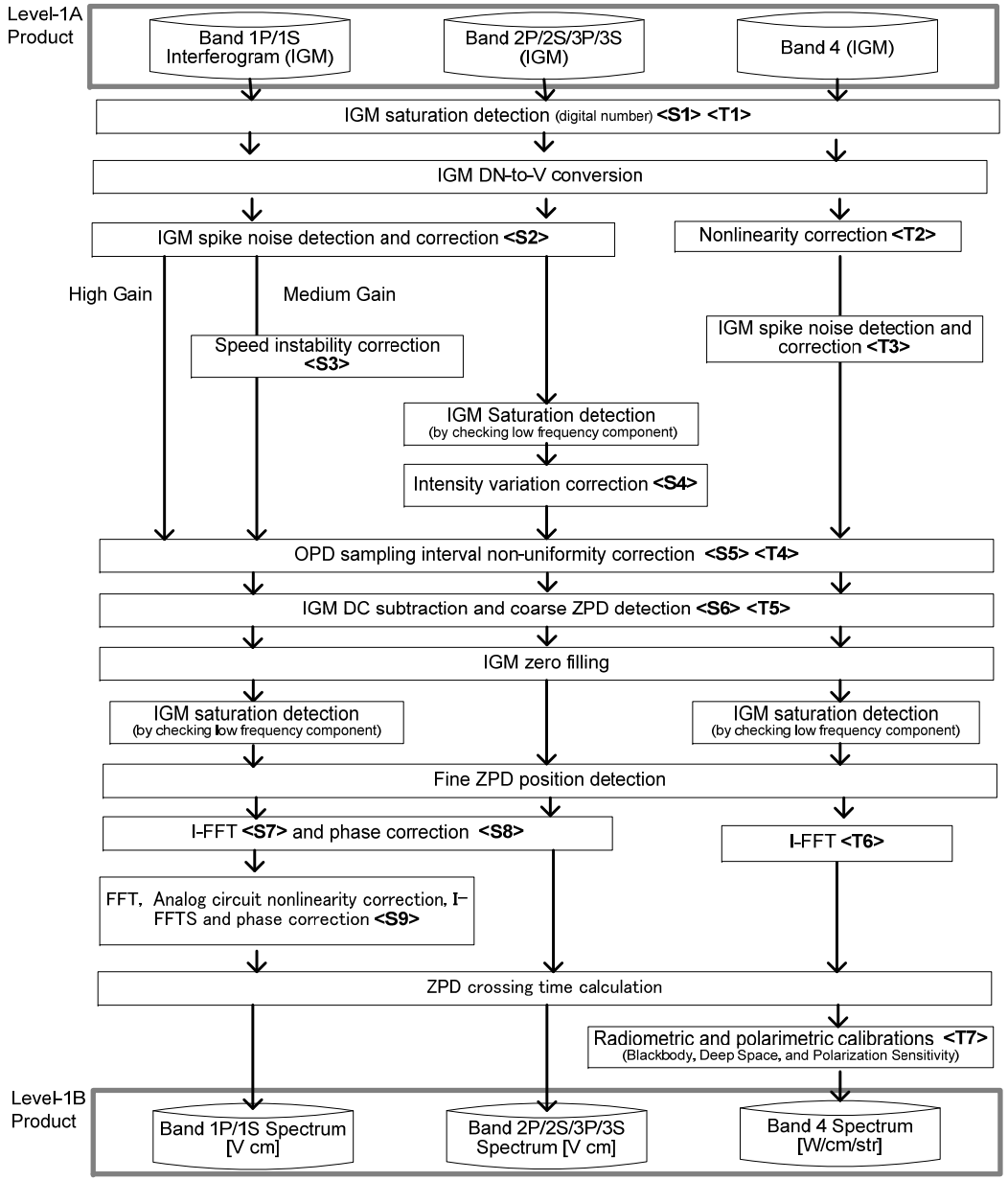
Level 1B processing:

Too many corrections confuse users

Version	Major Updates
V006	The first version
V007	SWIR Optimization of phase correction
V050	SWIR Low frequency and optical vignetting correction
V080	Quality flag correction
V100	TIR Polarization and radiometric correction
V110	TIR Detector non- linearity correction O_2A Speed instability correction (Gain M)
V130	O_2A ADC non-linearity correction TIR Deep space view obscuration correction
V150	O_2A non-linearity correction Non uniformity correction of laser sampling intervals
V160	Optimize TIR correction parameters
V170(Plan)	Fine non-linearity correction

Level 1 processing flow

Becomes more and more complicated



Corrections (no corrections after I-FFT)

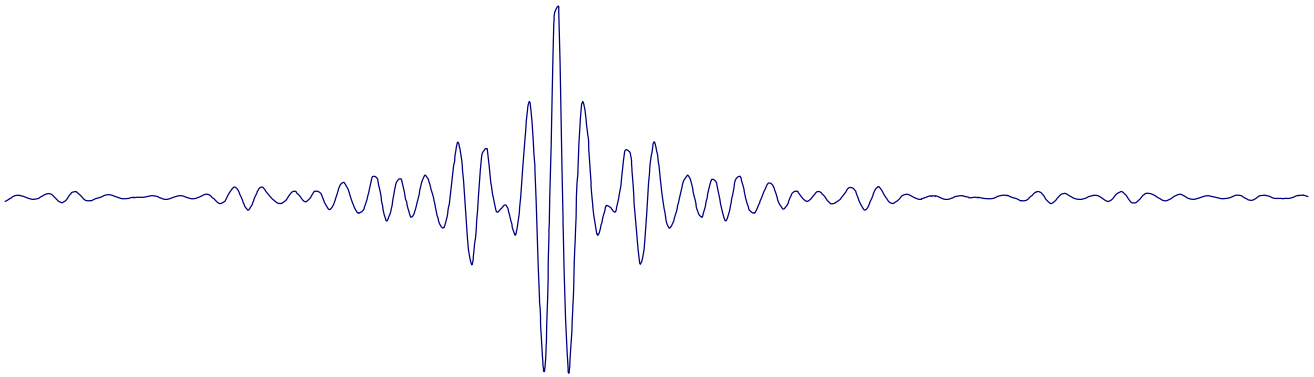
-interferogram is everything-

Y-AXIS

Intensity variation (Low frequency) component correction

Detector (B4) and amplifier (B1) Non-linearity Correction

ADC non-linearity (not corrected, V130 issue)



X-AXIS (Re-sampling)

FTS mechanism scan speed instability correction (2 sinusoidal sources)

Sampling interval non-uniformity correction (not corrected V150 issue)

Doppler shift due to IMC (forward to backward viewing) (not corrected yet)

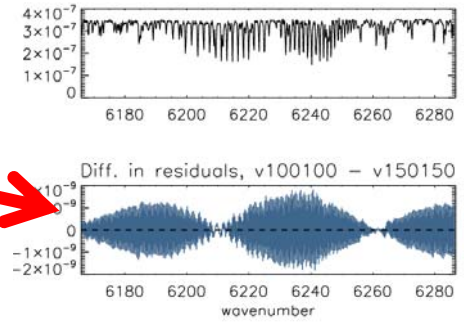
Interferogram truncation (no ZPD shift effect)

What was done in V160.160 from May 16
To do in V170.170

V150.151

SINUC (Sampling interval non-uniformity correction) applied

Improper edge process of interferogram



V160.160

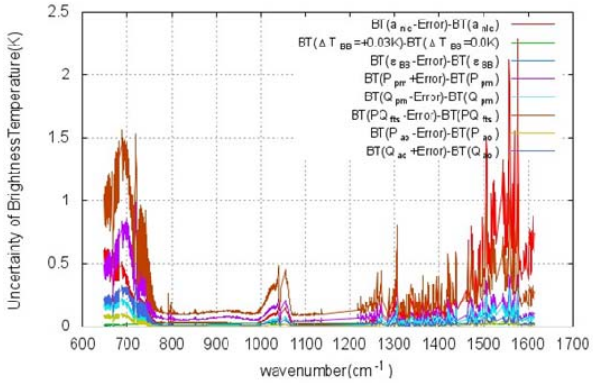
(1) no SINUC

(2) Spike noise (pointing instability) quality flag criteria

The criteria using IGM differential was too strict.

(3) More detailed TIR radiometric correction

Polarization, Blackbody emissivity BG radiation .



V170.170

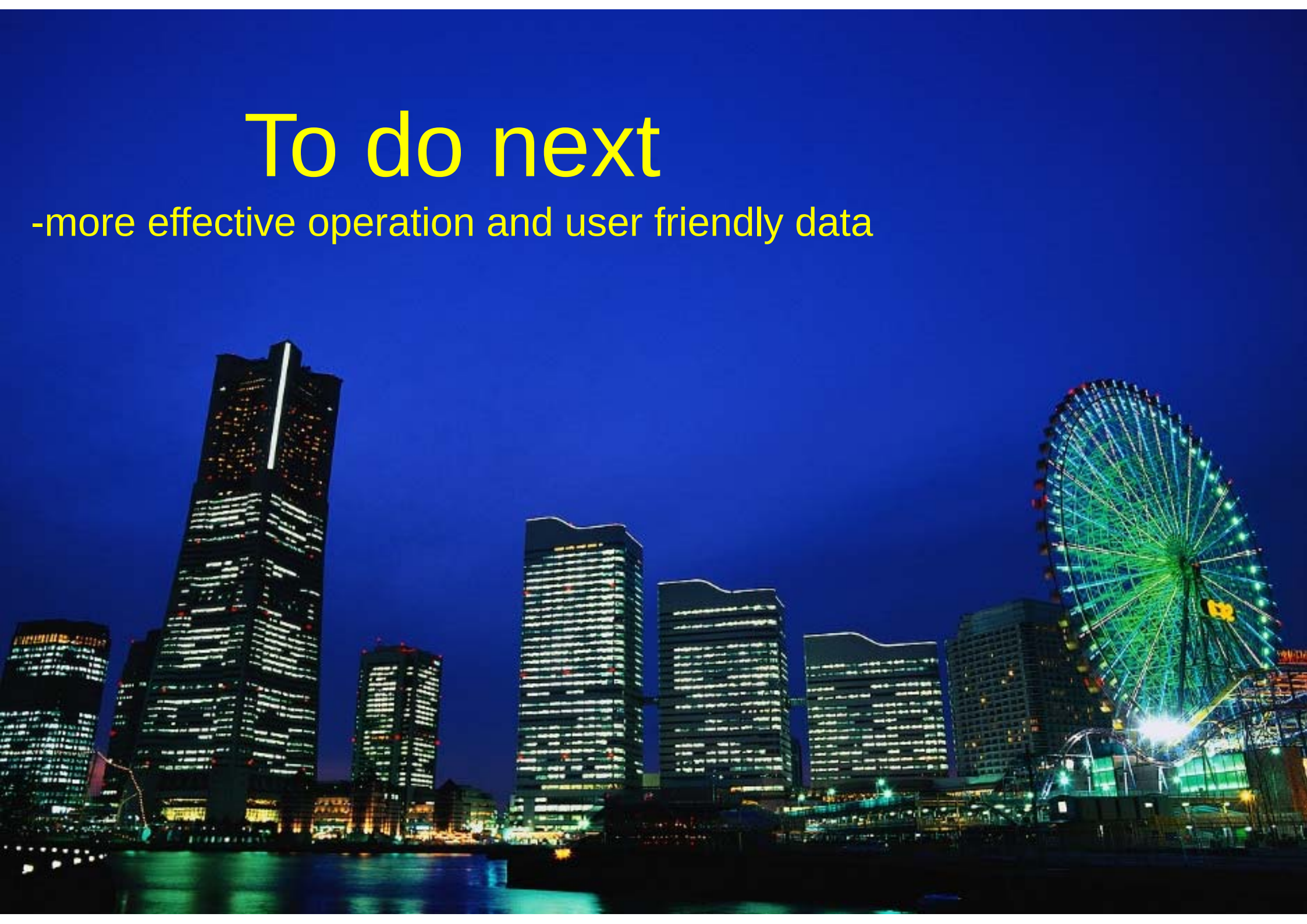
(1) Proper SINUC (Proper edge process

(2) Band 1 analogue circuit non-linearity correction

(amplifier and its power supply, consistency between gains H and M)

To do next

-more effective operation and user friendly data



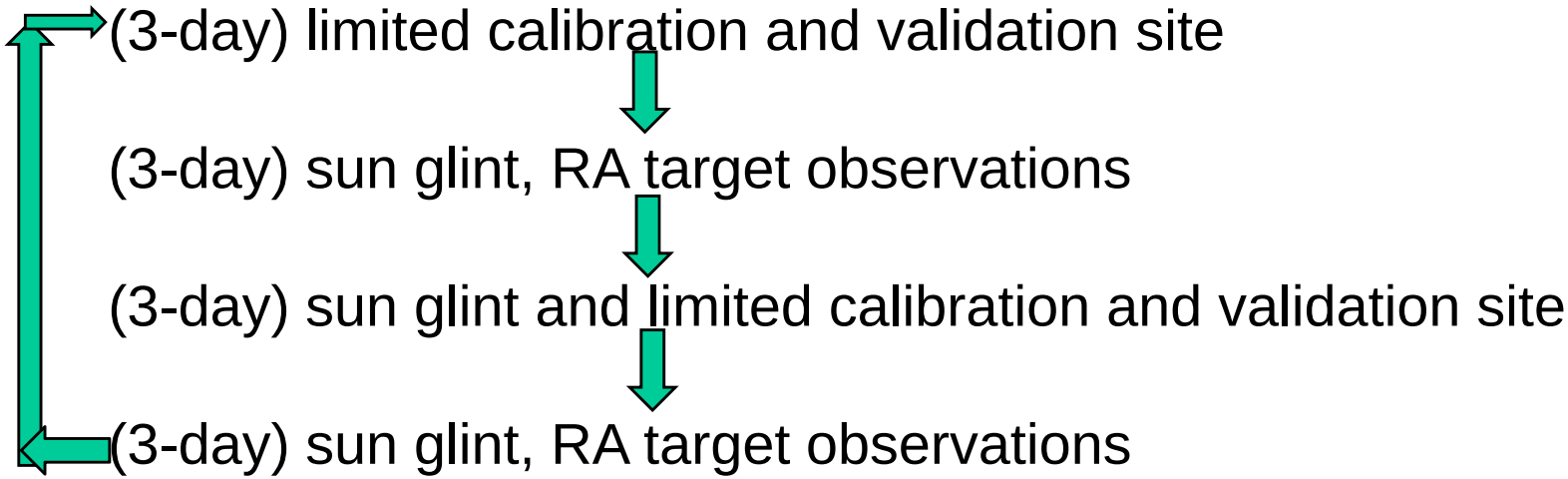
How to improve consistency and yield rate
Region-by-region customized plan

	Characteristics	Customized Plan
Validation site, Nevada	High albedo, low AOD	Permanent target
Lamont	TCCON site	Permanent target
Amazon	Fractional clouds	Scramble
South America (east coast)	Non-flat	(avoid non-flat) Target the coast
Central Africa	Thick AOD	Multi angle
Sahara	High albedo, thick	Multi angle
Southeast Asia	Island, cloudy	(avoid dark ocean)
Ocean	Glint (Lambertian or not)	Different Patterns (IMC or track glint point)
	Dark target for aerosol retrieval	Multi angle
Australia	Little CO_2 variation	Gain H and M consistency
Mega City, Volcano	Point emission source	Vent + reference

Question: How to categorize background and high density targets

Target Classification

-in case of too many target modes



Up to 1,000 target points per day

Target Classification to identify high bias or background

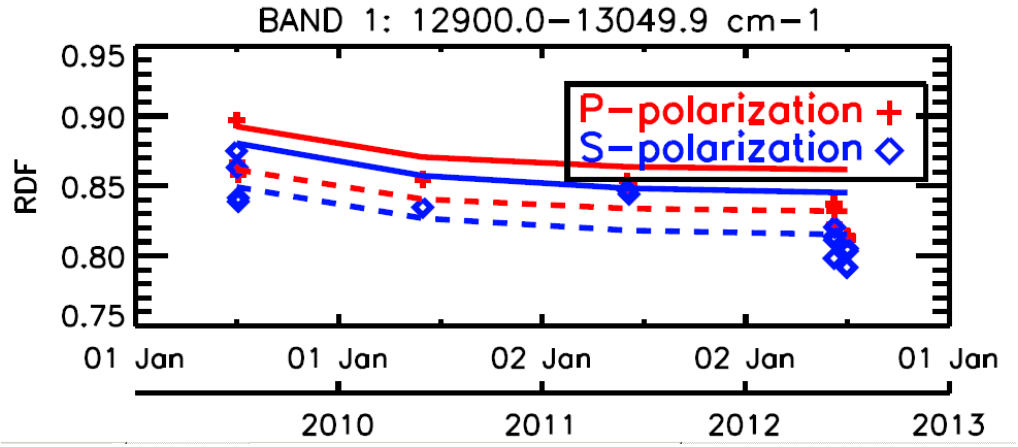
CAL (Nevada) & VAL (TCCON, Contrail) site

Mega city (downtown and reference)

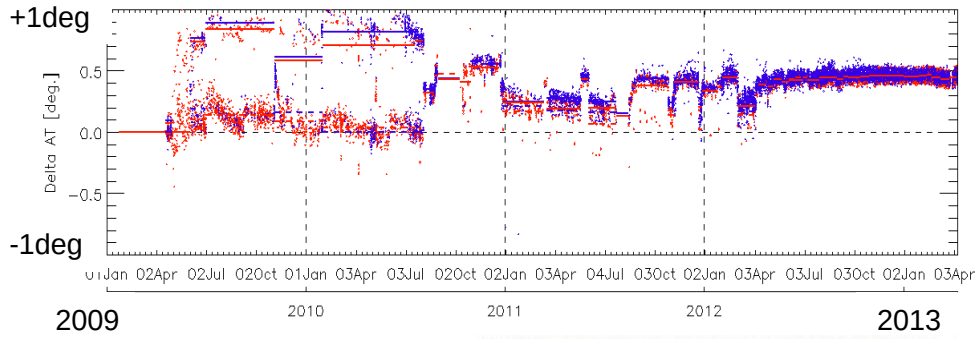
Power plant (plume and reference)

Volcano (vent and reference)

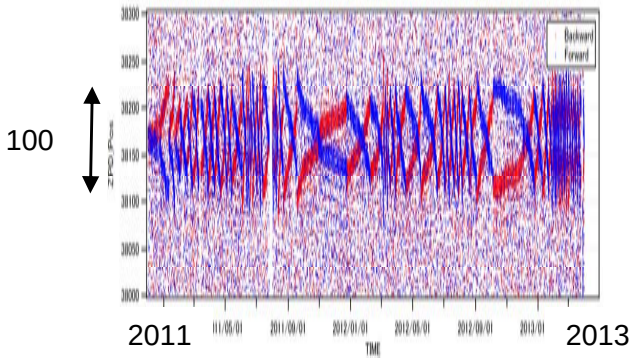
GOSAT data becomes stable
-degradation, pointing offset, ZPD shift



Radiance degradation factor
diffuser calibration + vicarious calibration



AT pointing offset
Grid observation
Target Mode



ZPD shift
< +/- 50 fringes

Advanced L1 product with best estimate calibration -5years package, scrap-and-build

(1) Raw spectra (V/cm-1) + best estimate radiance after degradation correction <radiometric>

(2) Raw geometry data + best estimate after pointing error correction <Geometric>

(3) Geometry (Scattering phase angle), surface BRDF and aerosol

(4) Mueller matrix <Polarimetric>

(5) Quality flag (Real anomaly only: pointing)

(6) Target point classification

(7) Truncated IGM and exactly uniform MOPD for 5 years

(8) Finite-angle effect correction (TIR only)

(9) Correction Wavelength shift due to laser gradual misalignment (probably no need) <Spectrometric>

Conclusion

Suggestions and requests from L1 and L4 users are welcome

- L1 format and contents
- Operations
- Target classification

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