**Introduction**

TANSO-FTS onboard GOSAT and the grating spectrometer on OCO-2 use different measurement techniques to measure molecular carbon dioxide (CO2) and molecular oxygen (O2). Both instruments observe sunlight reflected from the Earth's surface in almost the same spectral range. As a first step in cross-calibrating these two instruments, we compared spectral radiances observations within the three short wave infrared (SWIR) spectral bands centered on the O2 A-band (O2A), the weak CO2 band near 1.6 microns (Weak-CO2) and 2.06 microns (Strong-CO2) bands at temporally coincident and spatially collocated points. In this work, we reconciled the different size of the footprints and evaluated at various types of the surface targets such as ocean, desert and forest. For radiometric inter-comparisons, we consider long term instrument sensitivity degradation in orbit and differences in viewing geometry and associated differences in surface bidirectional reflectance distribution function (BRDF). Measured spectral radiances agree very well within 5% for all bands. This presentation summarizes these comparisons of GOSAT and OCO-2 spectral radiances observations and associated estimates of carbon dioxide and related parameters retrieved with the same algorithm at match-up points. We will also discuss instrument related uncertainties from various target observations.

**Level1 : Spectral Radiance**

- **GOSAT** (V201201)
- **OCO2** (Science.v1)
- **GOSAT Degradation Factor**
- Match-up temporally and spatially
- Wavenumber correction
- Select homogeneous site within FOV
- w/ or w/o BRDF corr.

**Level2 : Carbon Dioxide**

- **ACOS FTS L2** B7.3 Lite (no-gainM data)
- **OCO2_L2_-_OCO2_L2_standard** v7r

**Match-up criteria**

- GOSAT has 3 days revisit cycle and 44 repeat orbits. The local equator crossing time in a descending node is 13:00 +/- 15 minutes.
- OCO2 join the international Afternoon Constellation, or A-Train. of Earth-observing satellites. A-train has 16-days revisit cycle and 227 repeat orbits. The local equator crossing time in a ascending node is about 13:30.

**Figure 1.** The schematic image of GOSAT and OCO2 match-up...

**Figure 2.** The map of GOSAT and OCO2 match-up from Sep 2014 to Sep 2016. The red plots shows the GOSAT gainM observation and blue plots are GOSAT gaint.

**Figure 3.** The flow chart of GOSAT-OCO2 inter-comparison of spectral radiance.

**Figure 5.** The map of GOSAT and OCO2 Level2 matchup parameter from Sep 2014 to Feb 2016.

Matchuped XCO2 data of GOSAT/ACOS and OCO2 are generally in good agreement with no obvious change in time. ΔXCO2 has no strong correlation with observation geometry, AOD and topography (Psurf). But some area (especially, central Asia and South of Africa) shows that GOSAT/CO2 is slightly higher than OCO2. This area corresponds to negative ΔPsurf (ACOS-OCO2) and high band1 albedo area. The negative ΔPsurf is thought to be related to high radiance level of GOSAT band1 spectra. We need to investigate the relationship between ΔPsurf and band1 radiance.