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Comparison between IASI and GOSAT retrievals in the thermal infrared

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GOSAT (Greenhouse Gases Observing SATellite) is a satellite dedicated to the study of greenhouses gases. It carries an infrared Fourier transform spectrometer (The Thermal and Near Infrared Sensor for Carbon Observation Fourier-Transform Spectrometer or TANSO-FTS), which acquires spectra in 4 bands, located in the Near-Infrared (NIR), ShortWave Infrared (SWIR) and Thermal Infrared (TIR). An imager (CAI: Cloud and Aerosols imager) enables to gain information on clouds and aerosols, and this information is used to improve the quality of CO_2 and CH_4 retrievals.

IASI (Infrared Atmospheric Sounding Interferometer) designed by CNES for Eumetsat is carried by the MetOp-A satellite. It is used for operational meteorology and is also interesting for greenhouse gases as well as for atmospheric chemistry and climate.

We looked for close spatial and temporal coincidences between IASI and TANSO-FTS nadir spectra. Due to the respective orbits of MetOp-A and GOSAT, this is only achieved at high latitudes. We compared the surface temperature, CO_2, CH_4, N_2O and O_3 mixing ratios retrieved from TANSO-FTS and from IASI spectra. We used the [940;980] cm^{-1} window for CO_2 (laser band), [1240;1320] cm^{-1} for CH_4, [1140;1200] cm^{-1} for N_2O, and [980;1100] cm^{-1} for O_3. Since IASI is considered as a reference for radiometric calibrations, we compared the surface temperatures retrieved by GOSAT and IASI in these different windows to assess the GOSAT radiometric calibration. The GOSAT/IASI comparison is done on surface temperature rather than on raw radiances because the different instrumental noise and spectral resolution of these instruments make a direct comparison of the radiances more difficult. The use of different spectral windows enabled us to explore the spectral dependence of the TANSO-FTS radiometric calibration. Cloud-free and spatially homogenous fields of view (IFOVs) were selected using CAI images.

Finally, we will show the potential to further improve the results using the synergy between measurements in the TIR and the SWIR spectral domains.