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Global retrievals of CO2 and CH4 from GOSAT observations and their sensitivity to aerosols and clouds

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With the launch of the Japanese Greenhouse gas Observing SATellite (GOSAT) on 23 January 2009, the first observations from a dedicated greenhouse satellite sensor have become available. GOSAT satellite carries a Fourier Transform Spectrometer instrument that is designed to measured reflected and emitted light in three shortwave infrared (SWIR) and one thermal-IR (TIR) channels that cover multiple absorption bands of CO2 and CH4. Total columns of CO2 and CH4 retrieved from the SWIR channels of GOSAT, can provide new insights into the global carbon cycle and they should result in much improved surface flux estimates for CO2 and CH4. However, a small bias in the retrieved columns can severely compromise the estimated surface fluxes which impose a huge challenge on the retrieval methods, specifically in their description of aerosols and thin cirrus clouds.

We will present global retrievals of CO2 and CH4 columns inferred using the OCO (Orbiting Carbon Observatory) full-physics retrieval algorithm from GOSAT SWIR observations. We will discuss the sensitivity of our retrieval to assumptions about aerosols and clouds and we will investigate the benefit of imposing additional retrieval constraints on aerosol and clouds from the GEMS ECMWF aerosol product and from information obtained from the GOSAT thermal-IR channel. We will compare our GOSAT retrievals of CO2 and CH4 with the GEOS-Chem model, focusing large-scale features such as the seasonal cycle and the inter-hemispheric gradient of which we have a reasonable quantitative understanding from other data. Differences between model and observed columns will be assessed, and potential correlations with the distribution of aerosols and clouds will be investigated.