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One year of global CH4 observations from GOSAT: Validation and model comparison

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GOSAT provides global measurements of total column CO2 and CH4 from its shortwave infrared (SWIR) bands. These observations of total column CO2 and CH4 are well suited to improve our knowledge of the surface fluxes of both greenhouse gases. However, inferring the surface fluxes from these total columns requires stringent levels of measurement precision and accuracy, representing a major challenge for the trace gas retrieval algorithms mainly due to spectral interference from atmospheric aerosols and clouds.

The results presented here use a modified "proxy" method where the retrieved CO2 acts as a proxy for the light-path to allow a CH4 column to be retrieved, largely independent of the interference from aerosol and clouds. Although scattering effects are small on the proxy CH4 retrieval, our retrieval still includes scattering in the forward model to further improve the accuracy.

Here we will present retrieved "proxy" CH4 columns measured globally between August 2009 and July 2010. Validation of the retrieved CH4 columns is performed by comparison to Total Carbon Column Observing Network (TCCON) ground-based observations for six sites.

The "proxy" CH4 column retrieval is then compared to calculations of the GEOS-Chem model taking into account scene-dependent instrument averaging kernels. The main focus here is on large-scale spatial atmospheric features. Overall, we find a very good agreement for the seasonal cycle and the north-south gradient between the GEOS-Chem model and the GOSAT retrievals on a global scale. Good agreement is found for specific regions of interest although some differences are found for strong source regions such as wetland and rice cultivation regions, which suggest the potential for improvement to these emission inventories through the use of GOSAT data.