Geophysical Research Abstracts
Vol. 12, EGU2010-11045-2, 2010
EGU General Assembly 2010

Validation and Inter-Comparisons of Atmospheric CO2 and CH4 Retrieved from GOSAT

Austin Cogan (1), Hartmut Boesch (1), Robert Parker (1), Tatsuya Yokota (2), Yokio Yoshida (2), Andrey Bril (2), Andre Butz (3), Christopher O'Dell and the ACOS Team (4), TCCON Science Team (5,6)

(1) Earth Observation Science, University of Leicester, Leicester, UK (ajc48@le.ac.uk), (2) National Institute for Environmental Studies, Tsukuba, Japan, (3) Netherlands Institute for Space Research, Utrecht, The Netherlands, (4) Colorado State University, Colorado, USA, (5) California Institute of Technology, California, USA, (6) Centre for Atmospheric Chemistry, University of Wollongong, Wollongong, Australia

Satellites observations, if acquired with high accuracy and precision, have the potential to overcome the limitations of in-situ ground-based measurements by providing globally densely-sampled datasets of column CO2 and CH4. The first observations of greenhouse gases from a dedicated satellite sensor are now available with the launch of the Japanese Greenhouse gas Observing SATellite (GOSAT) on 23 January 2009. GOSAT provides global measurements of total column CO2 and CH4 from its shortwave infrared (SWIR) bands and of mid-tropospheric sub-columns from its thermal-infrared bands.

Observations of total column CO2 and CH4 are well suited to improve our knowledge of greenhouse gas surface fluxes. However, inferring the surface fluxes from these total columns requires stringent levels of measurement precision and accuracy, representing a major challenge for trace gas retrieval algorithms mainly due to spectroscopy and spectral interference from atmospheric aerosols and clouds.

Here we present retrievals of CO2 and CH4 columns from the GOSAT SWIR channels using an optimal estimation retrieval algorithm and their validation with column observations from ground-based Fourier Transform Spectrometer measurements of the Total Carbon Column Observing Network (TCCON) sites at Parkfalls/Wisconsin, Lamont/Oklahoma, Darwin/Australia and Wollongong/Australia. We investigate the affects of different aerosol approaches on our retrievals and the sensitivity to clouds. Furthermore, we show an inter-comparison of the CO2 columns obtained from different retrieval algorithms to provide a characterization of the uncertainties introduced by different retrieval approaches.