Geophysical Research Abstracts
Vol. 17, EGU2015-8167-4, 2015
EGU General Assembly 2015

Contribution of the GOSAT observations to understanding natural and anthropogenic fluxes of carbon dioxide and methane in 2009-2012

Shamil Maksyutov (1), Hiroshi Takagi (1), Heon-Sook Kim (1), Rajesh Janardanan (1), Kazuo Mabuchi (1), Akihiko Ito (1), Makoto Saito (1), Tomohiro Oda (2), Dmitry Belikov (1,3), Vinu Valsala (4), Alexander Ganshin (5), Ruslan Zhuravlev (5), Johannes W. Kaiser (6), Masako Senda (1), Isamu Morino (1), Yukio Yoshida (1), and Tatsuya Yokota (1)

(1) CGER, NIES, Tsukuba, Japan (shamil@nies.go.jp), (2) USRA, GSFC, Greenbelt, MD, USA, (3) NIPR, Tokyo, Japan, (4) IITM, Pune, India, (5) CAO, Dolgoprudny, Russia, (6) MPI for Chemistry, Mainz, Germany

Greenhouse Gases Observing Satellite (GOSAT) Level 4 products – monthly regional surface CO_2 and CH_4 flux estimates by inverse modeling from GOSAT column-averaged dry-air mole fractions and ground-based observational data by Globalview and WDCGG - have been updated recently to cover the 3-year period starting in June 2009. Update was made using NIES GOSAT SWIR Level 2 product v. 02.11 for CO_2 and v. 2.21 for CH_4. The temporal product extension was made using recent version of EDGAR methane emission inventory dataset and extension of GFED v3.1 fire emissions dataset. The extended product provides better look at the interannual flux variability including events of CO_2 and CH_4 emissions from a large-scale climate anomalies and forest fires in Russia and Amazonia in 2010. CO_2 fluxes for North Eurasia estimated using GOSAT data show better correlation with NDVI anomalies than those estimated with ground-based observations only.

GOSAT column-averaged CO_2 dry-air mole fractions (X_{CO2}) observations in 2009-2012 were analysed for presence of large point source signatures by estimating X_{CO2} abundance at each observation location relative to a background air. The analysis was applied to selected observations where high resolution transport model simulated significant (above 0.1 ppm) enhancement in fossil X_{CO2}. 0.1° resolution surface CO_2 fluxes were prepared to match resolution of the flux footprints simulated with FLEXPART transport model and the size of GOSAT field of view. Background X_{CO2} was estimated by averaging for each month and each 10x10 degree grid box all GOSAT-observed data where simulated fossil X_{CO2} was less than 0.1 ppm. Close to linear relationship was found between observed and simulated X_{CO2} enhancement once observations are binned according to concentration enhancement levels simulated by high resolution transport model. Good correlation between modeled and observed enhancements was obtained for the global domain and large continental regions. Statistically significant enhancements were observed for several megacity areas.