Geophysical Research Abstracts
Vol. 14, EGU2012-11112, 2012
EGU General Assembly 2012

CO_2 flux estimation from GOSAT measurements of CO_2 for 2009 – 2010

S. Basu (1), S. Houweling (1), S. Guerlet (1), and A. Butz (2)

(1) SRON Netherlands Institute for Space Research, Earth & Planetary Science, Utrecht, Netherlands, (2) Institute for Meteorology & Climate Research, Karlsruhe Institute of Technology, Karlsruhe, Germany

Multiple atmospheric inverse modeling schemes exist for inferring global carbon dioxide (CO_2) fluxes from surface layer measurements of CO_2, including operational products such as CarbonTracker. We present here an extension of those schemes by the addition of satellite measurements of CO_2 from the Japanese satellite GOSAT, which has now been operational for more than two years.

We retrieve total column CO_2 from GOSAT's TANSO instrument using the RemoTeC algorithm developed at SRON and KIT. We use a 4DVAR inversion scheme to assimilate the retrieved CO_2 and the surface CO_2 measurements used in CarbonTracker to show that the addition of GOSAT measurements in the assimilation yields a global CO_2 field that is closer to upper tropospheric CO_2 measurements such as HIPPO and CONTRAIL than a surface flask-only inversion. We also show that assimilating GOSAT measurements increases the estimated growing season carbon uptake over the northern temperate latitudes, compared to a surface flask-only inversion. And finally, we find that the land-sea and north-south balance of CO_2 sources and sinks is significantly impacted by GOSAT measurements, owing to the different spatial coverage of the GOSAT instrument compared to surface flask samples.

We compare these conclusions – drawn from the assimilation of GOSAT CO_2 measurements – with the existing state of knowledge about CO_2 fluxes stemming from other inverse modeling products, and examine the robustness of our conclusions in cases where they differ significantly from existing surface flask-based CO_2 inversions.