



## **Atmospheric CO<sub>2</sub> budget analysis over East Asia with satellite sensing and GEOS-Chem**

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There is growing interest in CO<sub>2</sub> budget analysis since space-born measurements of global CO<sub>2</sub> distribution have been conducted (e.g. GOSAT project). Here we simulated global CO<sub>2</sub> distribution to estimate individual source/sink contributions over East Asia. The chemical transport model (GEOS-Chem) was used in order to simulate global CO<sub>2</sub> distribution with updated global sources/sinks with 0.5°x0.666° horizontal resolution. In addition, 3-D emissions from aviation and chemical oxidation of CO are implemented. The model simulated CO<sub>2</sub> amounts were compared with the GOSAT column averaged CO<sub>2</sub> column (SWIR L2 & L3 data) from April 2009 to December 2010. The seasonal cycles of CO<sub>2</sub> concentration were compared. The regional patterns of CO<sub>2</sub> distribution are explained by the model and seasonal variation of CO<sub>2</sub> over East Asia. The GEOS-Chem CO<sub>2</sub> concentrations are comparable to the in-situ measurements (e.g., GLOBALVIEW) data with reasonable agreement but discrepancies in seasonal variability need more accurate sources and sinks information over this region. We further estimated the sources/sinks contributions to the CO<sub>2</sub> budget over East Asia through 9 tagged CO<sub>2</sub> tracers (fossil fuels, ocean exchanges, biomass burning, biofuel burning, balanced biosphere, net terrestrial exchange, ship emissions, aviation emissions, and oxidation from carbon precursors) over the last 5 years (2005 ~ 2009). Global CO<sub>2</sub> concentration shows 2.1 ppbv/year in which the human fossil fuel and cement emissions are main driving force (5.0 ppbv/year) for the trend. Net terrestrial and oceanic exchange of CO<sub>2</sub> are main sinks (-2.1 ppbv/year and -0.7 ppbv/year, respectively). Our model results show the regional atmospheric CO<sub>2</sub> budget in recent years and suggest the regional mitigation target.