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Title:
"The impact of prior biosphere models in the inversion of global terrestrial CO2 fluxes by assimilating OCO-2 retrievals"

Abstract:
Atmospheric mixing ratios of carbon dioxide (CO_2) are largely controlled by anthropogenic emissions and biospheric fluxes. The processes controlling terrestrial biosphere-atmosphere carbon exchange are currently not fully understood, resulting in terrestrial biospheric models having significant differences in the quantification of biospheric CO_2 fluxes. Atmospheric transport models assimilating measured (in situ or space-borne) CO_2 concentrations to estimate "top-down" fluxes, generally use these biospheric CO_2 fluxes as a priori information. Most of the flux inversion estimates result in substantially different spatio-temporal posteriori estimates of regional and global biospheric CO_2 fluxes.
The Orbiting Carbon Observatory 2 (OCO-2) satellite mission dedicated to accurately measure column CO_2 (XCO_2) allows for an improved understanding of global biospheric CO_2 fluxes. OCO-2 provides much-needed CO_2 observations in data-limited regions facilitating better global and regional estimates of "top-down" CO_2 fluxes through inversion model simulations. The specific objectives of our research are to: 1) conduct GEOS-Chem 4D-Var assimilation of OCO-2 observations, using several state-of-the-science biospheric CO_2 flux models as a priori information, to better constrain terrestrial CO_2 fluxes, and 2) quantify the impact of different biospheric model prior fluxes on OCO-2-assimilated a posteriori CO_2 flux estimates. Here we present our assessment of the importance of these a priori fluxes by conducting Observing System Simulation Experiments (OSSE) using simulated OCO-2 observations with known "true" fluxes.

Key Words:
Biosphere, Atmospheric, Terrestrial

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