Geophysical Research Abstracts
Vol. 13, EGU2011-3863, 2011
EGU General Assembly 2011

Improving Carbon Flux Estimates with Diurnal Profiling of Greenhouse Gases from Geostationary Orbit

Annmarie Eldering, Stanley Sander, Jean-Francois Blavier, David Rider, John Worden, Kevin Bowman, Jessica Neu, and Vijay Natraj

JPL/Caltech, Earth Atmospheric Sciences, Pasadena, United States (Annmarie.Eldering@jpl.nasa.gov)

CO2 concentrations are impacted by the dynamics of the boundary layer and the uptake and release of CO2 from sources and sinks. These factors result in diurnal variations in the concentration of CO2, especially in layers near the surface. Flux estimates that are derived from CO2 measurements are sensitive to the vertical gradients on CO2 (as reported in Stephens et al. 2007). Transport and vertical mixing characterization errors are the largest contributors to errors in CO2 flux estimates. To improve flux estimates, measurements are needed with higher temporal resolution and with the ability to differentiate the boundary layer gradient from the free troposphere. In addition to these improved CO2 measurements, the simultaneous measurement of other tracers gases with variations in lifetime and sources, such as CH4, CO, HDO, and O3, could provide powerful additional constraints on the CO2 flux estimates.

We present a remote sensing concept for measuring CO2 and other greenhouse gases as well as dynamic tracers about once an hour over the CONUS region. With a panchromatic FTS instrument, measuring from the infrared through the near-infrared, located in a geostationary orbit, the measurements of greenhouse gases and dynamical tracers can be made with roughly hourly resolution. The panchromatic approach combined the infrared (15 micron) and near-infrared (1.6 micron) bands, and will allow unprecedented vertical resolution during daylight hours, and nighttime measurements with less vertical sensitivity. Clouds will obscure some fraction of samples, but hourly measurements will drastically increase the likelihood of a clear measurement at a given location.

We will present the science motivation, instrument concept, and sensitivity characteristics of our concept.