Abstract and Introduction
Progress in better determining CO2 sources and sinks will almost certainly
result in additional measurements and intensified monitoring efforts. Use of
remote sensing data, including those from satellite based sensing, can help
mitigate some of the gaps in understanding. This paper describes
progress made in achieving to the present in understanding of some of the
CO2 related processes.

Parameterized Chemistry/Transport Model (PCTM)
- Meteorological data from the Goddard Global Modeling and Assimilation
  Office (GMAO), version GISS-5.3
- 3-hour averages from analysis used in off-line transport
  (FluxSim) using longitude-time transport algorithm (Jun and Baidahl, 1999)
- Model Grid: 2° x 2° x 24 levels to 0.4 mbar, hybrid terrain-following
  coordinates
- Parameterized convergence and PBL diffusive transport in Biosphere
- Global scale output hourly, plus interpolation to selected site locations
- Runs for year 1996-2004
- Model evaluation using co-located CO2 fluxes in Kawa et al, JGR, 2001 and Baidahl et al., 2004

CO2 Surface Fluxes
- Monthly global/continents fluxes at 1° for 1996-2004 generated from
  CASA using monthly mean GEOS-4 analyzed meteorology (T and
  surface solar radiation, and precipitation) and monthly NCEP NDV1
- 3-hourly fluxes produced using 3-hourly analyzed radiation and temperature in
  the method of Chen and Randerson, JGR, 2004

CASA Flux Evaluation

ATMOSPHERIC CO2 VARIABILITY

CO2 Mixing Ratio Comparisons

Frontal Passage

Toward Carbon Data Assimilation
The results of these modeling studies will help to improve the accuracy of satellite
CO2 and other data in a multi-disciplinary carbon data assimilation system for
analyzing and predicting carbon cycle changes and carbon/nuclide interactions.

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