

An Annual 'Check Up' for Land and BGC components of CCSM

- **What:**

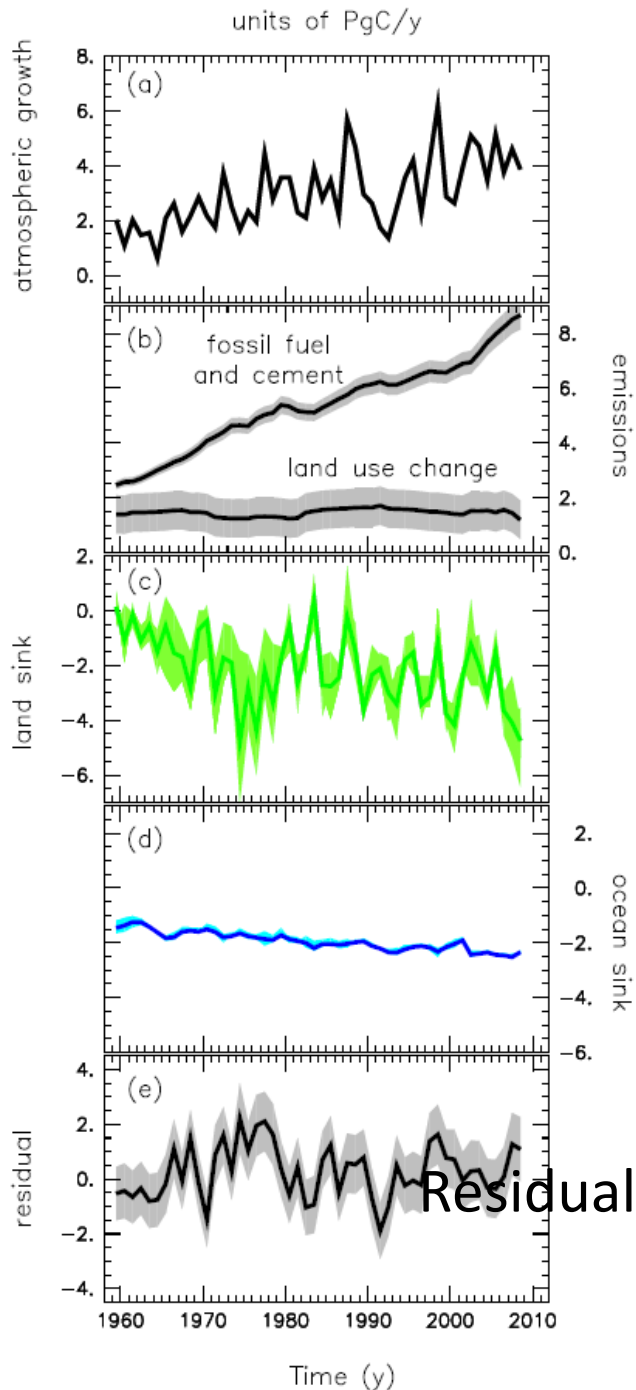
- An annual set of offline transient simulations from the 18th century to the present forced offline with the best available datasets
- Once per year, extend the analysis through the end of previous year with a ~6 month lag.

- **Why:**

- Will allow CCSM to contribute to synthesis activities such as:
 - The Global Carbon Project
 - IPCC
 - Future reincarnations of the U.S. CCSP SAP Reports (e.g., SOCCR)
- Enable more formal benchmarking and evaluation of proposed changes to the model
- Transient simulations crucial for testing the DGVM
- May speed model development – as Land and BGC become integrated, crucial to make assessments of model function on long time scales.

- **Issues/challenges:**

- Significant time investment (particularly in the first year or two)
- We do not yet have a complete set of driver datasets or a way to update them annually

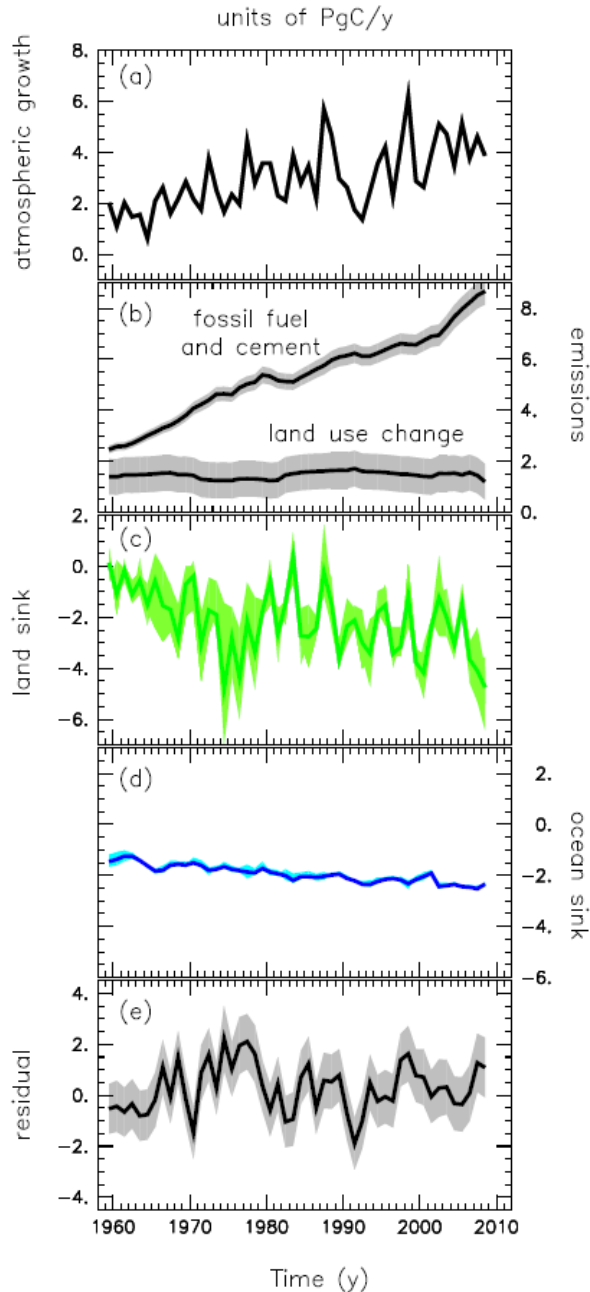


The Global Carbon Project is leading two types of synthesis:

Annual carbon cycle updates

RECCAP – Regional carbon cycle analysis project

Recent Changes in the Global Carbon Cycle



Conway and Tans

Marland

Houghton, van der Werf, and Randerson

Prognostic land models: Orchidee, LPJ, Hyland, TRIFFID, and SDGVM

Prognostic ocean models: BEC, PICES, BLING, etc.

Residual

Le Quere et al., 2009
Nature Geosciences

GCP- Land trends: modelling protocol

- Stephen Sitch (s.sitch@leeds.ac.uk) and Pierre Friedlingstein
- Goal: To investigate the trends in NBP over the period 1980-2008
- Participating models
- JULES, LPX, ORCHIDEE, HyLand, SDVGM, others eg. USA ?
- Model simulations
- Models can have dynamic vegetation but all will use observed cropland and pasture distribution (supplied). The models will be forced over the 1860-2008 period with changing CO₂, climate and land use according to the following simulations.
 - S1: CO2 only
 - S2: CO2 and climate
 - S3 (optional): CO2, climate and land use
- Dataset provided
- Climate forcing: CRU+NCEP historical forcing (1901-2008). Spatial resolution: 0.5°x0.5°, time resolution : 6hours
- Global atmospheric CO2 from ice core+NOAA annual resolution (1860-2008)
- Land use change from Hurtt database. Spatial resolution: 0.5°x0.5°, annual resolution (1860-200X)

Toward an internally-consistent transient model driver dataset

- **Short term** – Should we use the dataset developed by ORCHIDEE based on CRU temperature and precipitation?
 - Advantages – readily available
 - Disadvantages – how do we update year by year?
- **Long-term**
 - Develop a new approach !??
 - Key elements – it must capture the full range of temperature and PPT changes during ~1880-present
 - Nitrogen deposition – **complete** – Lamarque et al.
 - Atmospheric CO₂ – **complete**
 - Land cover change – **complete** - Hurtt et al. transformed by Lawrence
 - Temperature, precipitation, and Rh monthly mean adjustments during 1880-present (GISS, CRU, or Dai??) to NCAR reanalysis? – **no clue**
 - Solar radiation (including diffuse light from aerosols and clouds) – **no clue**
 - Longwave downwelling (make consistent with PPT and Rh) – **no clue**