# Multi-Scale Synthesis and Terrestrial Biospheric Model Intercomparison Project (MsTMIP)

**Deborah Huntzinger (Science PI)** 

Anna Michalak (PI)

MsTMIP

Team:

Kevin Schaefer

Andrew Jacobson

Mac Post; Robert Cook; Yaxing Wei

University of Michigan

NSDC, Univ. of Colorado

NOAA, Univ. of Colorado

Oak Ridge National Lab

**Collaborators** 

Peter Thornton, Forrest Hoffman, Rama Nemani, Weile Wang, Josh Fisher, Philippe Ciais, Nicolas Viovy, Philippe Peylin

# What is driving the variability seen in the model estimates?

#### Terrestrial Biospheric Modeling Inputs

#### **Consistent boundary conditions**

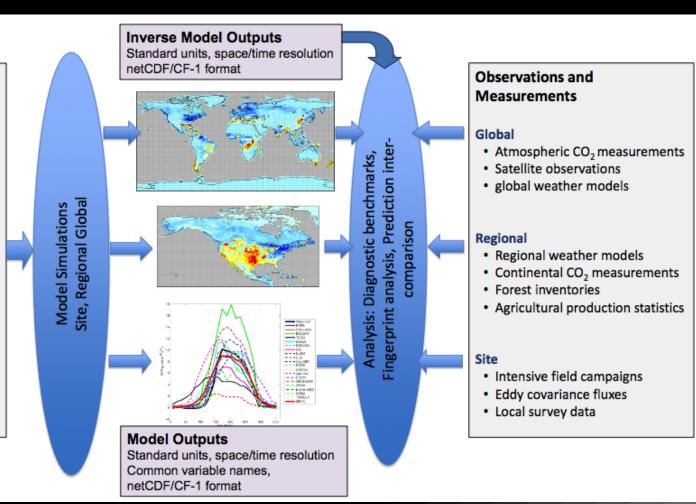
- Soil properties
- · Vegetation type
- Land management
- Elevation

#### Consistent forcing data

- · Daily weather
- CO<sub>2</sub> concentration pathways
- · N-deposition history
- Land-use/land cover changes

#### Common implementation protocol

- · Spin-up procedures
- · Ensemble generation
- · Factorial model experiments



### **MsTMIP Overview**

- Three scales of estimation
  - $\overline{- \text{Global } (0.5^{\circ} \text{ by } 0.5^{\circ})}$
  - Regional (North America) (0.25° by 0.25°)
  - Site level with regional meteorology
- Consistent driver data
- Formal protocol
- Model evaluation framework built off of C-LAMP (now iLAMB)
- Model team support (mini-grants)

### **Baseline Simulations**

Domain	Simulation Name	Simulation Period	Climate Forcing	Land-Use & Disturbance History	Atmospheric CO <sub>2</sub>	Nitrogen Deposition
Global (0.5° x 0.5°)	BG1	1901-2008	CRU+NCEP	Time-varying	Time-varying	Time-varying
North America (0.25° x 0.25°)	BR1	1980-2008	NARR <sup>1</sup>	Time-varying	Time-varying	Time-varying

Provide a model's best attempt at representing the spatial and temporal distribution of land-atmosphere carbon flux as influenced by:

Climate, land-use / disturbance, and nutrient deposition

## **Sensitivity Simulations**

				Land-Use &		
	Simulation	Simulation	Climate	Disturbance	Atmospheric	Nitrogen
Domain	Name	Period	Forcing	History	CO <sub>2</sub>	Deposition
Clabal	SG1			Constant	Constant	
Global (0.5° by 0.5°)	SG2	1901-2008	CRU+NCEP	Time-Varying	Constant	Constant
	SG3			Time-Varying	Time-Varying	
North	SR1			Constant	Constant	
America	SR2	1980-2008	NARR <sup>1</sup>	Time-Varying	Constant	Constant
(0.25° by 0.25°)	SR3			Time-Varying	Time-Varying	

Help to partition observed NEE among processes such as climate variability, CO<sub>2</sub> fertilization, nitrogen limitation, current land management, and the recovery from historical land use and disturbance