
CarbonTracker (TM5) at NASA Ames Research Center

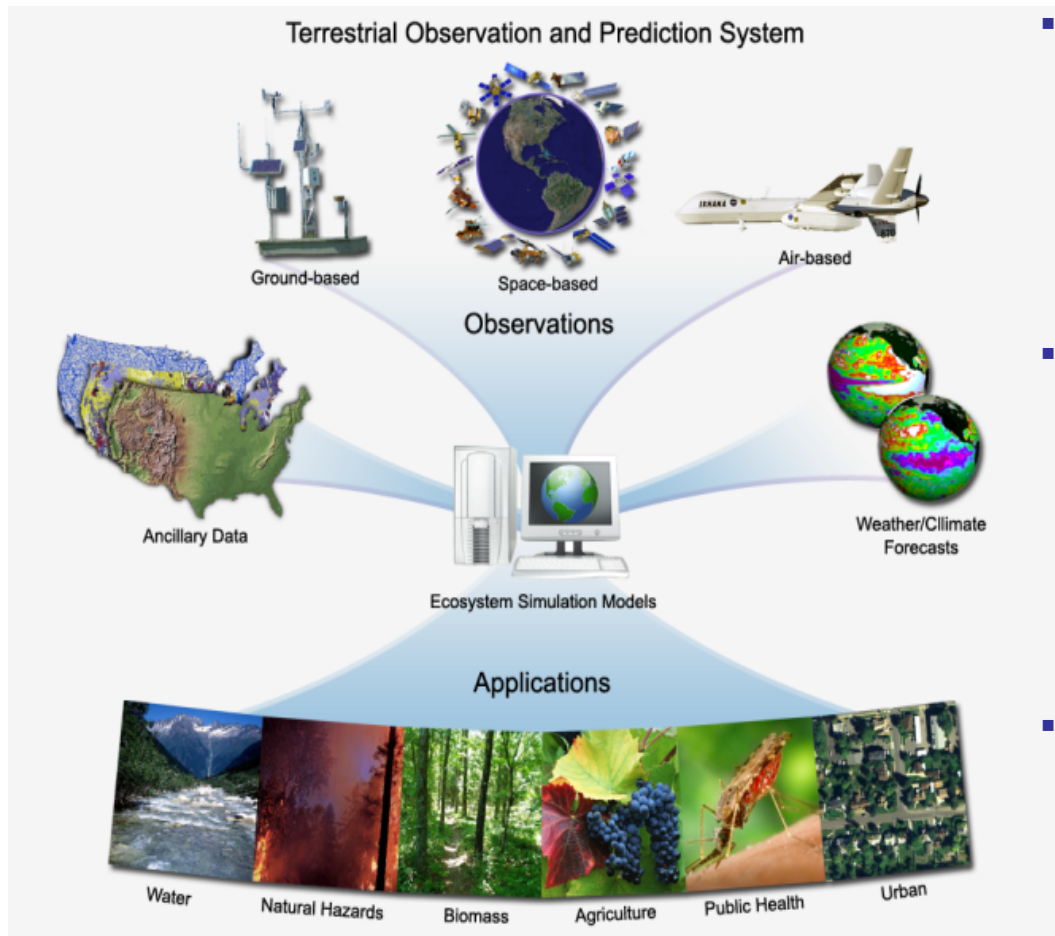
Weile Wang

**Ecological Forecasting Lab
NASA Ames Research Center
Moffett Field, California**

Collaborators:

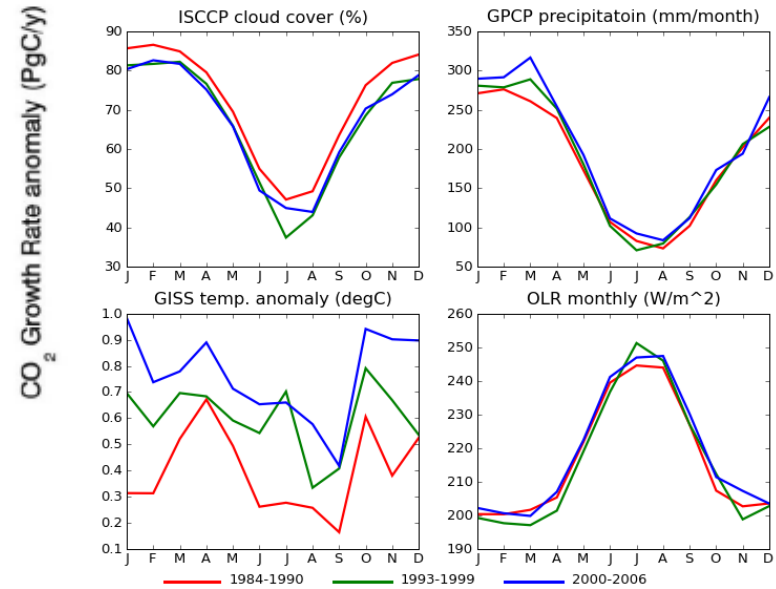
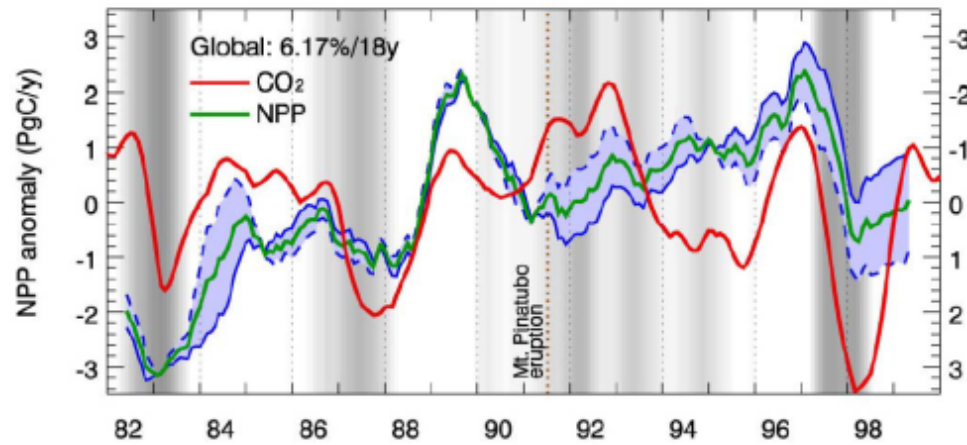
Rama Nemani, Hirofumi Hashimoto, Cristina Milesi,
Samgram Ganguly, Andrew Michaelis, Petr Votava,
Sam Hiatt, Forest Melton

Lab Introduction

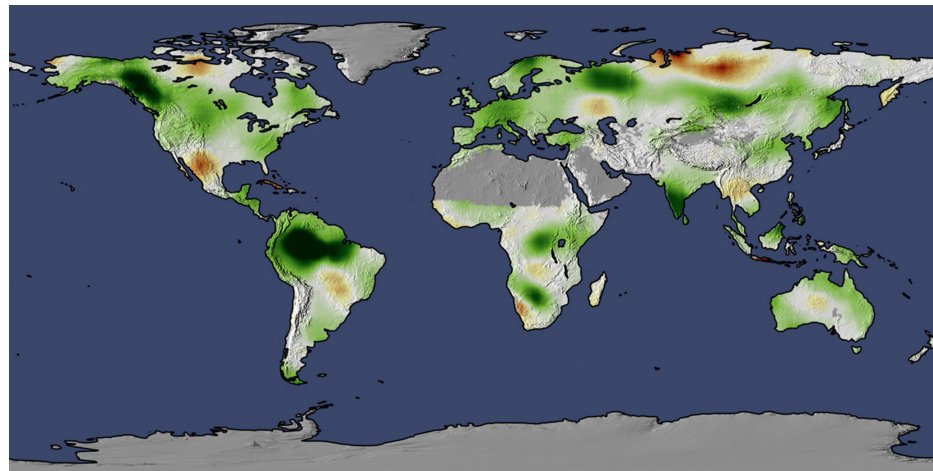


- The Ecological Forecasting lab at NASA Ames Research Center, led by Dr. Rama Nemani, is to develop capability in monitoring, modeling, and forecasting ecosystem conditions at various spatial and temporal scales (<http://ecocast.arc.nasa.gov>).
- We have built a data-model software system, the Terrestrial Observation and Prediction System (TOPS), to seamlessly integrate data from satellite/aircraft sensors and ground observations with climate and application models to produce ecological nowcasts and forecasts (Nemani et al. RSE, 2009).
- We are recently funded to develop the NASA Earth Exchange (NEX), a brand new research platform that integrates supercomputer, high data-storage, and knowledge management to encourage exploration and collaboration in the Earth Science community. (<http://nex.arc.nasa.gov>)

Research on Carbon Cycle



Possible mechanisms



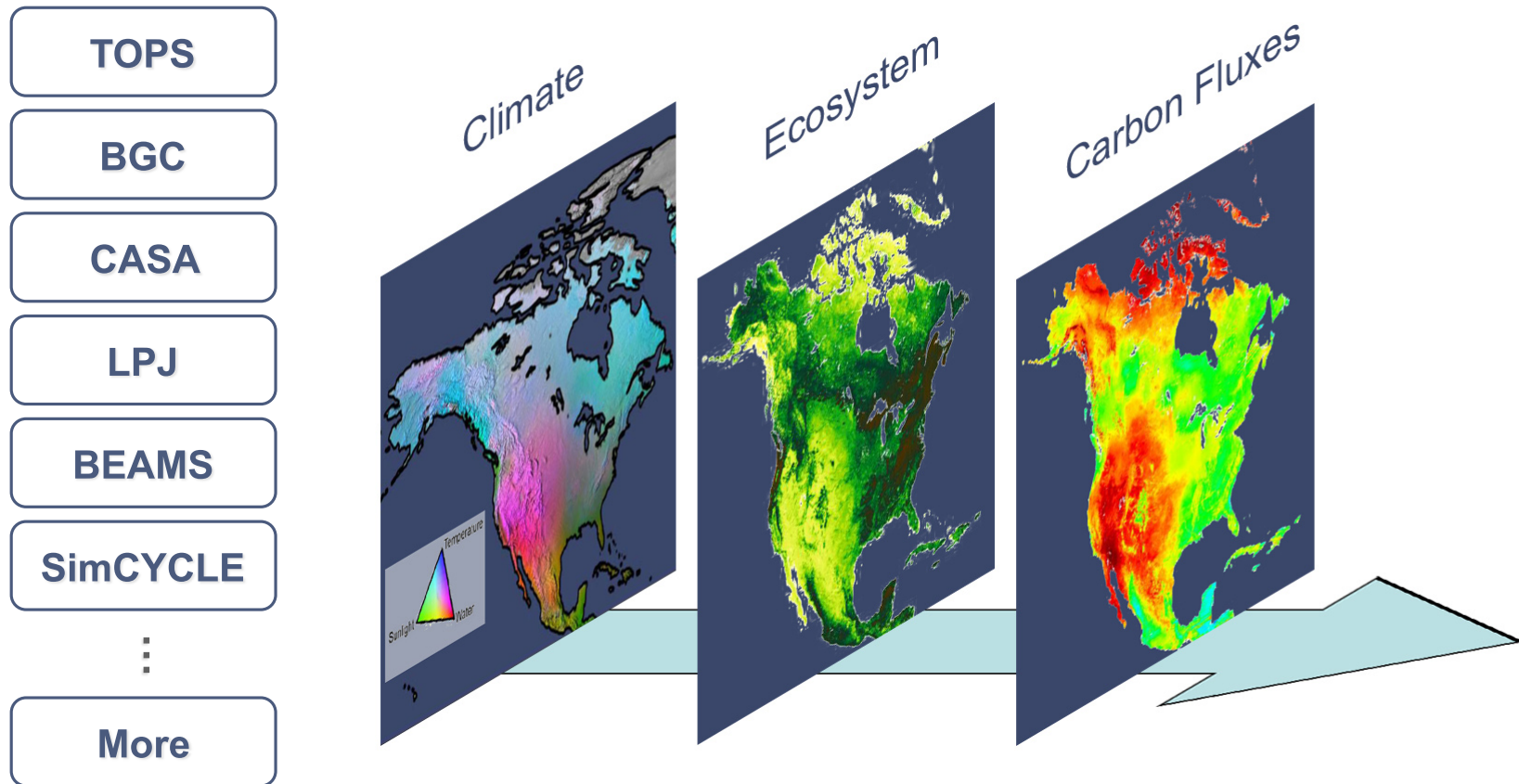
Change in NPP (Percent/Year)



Nemani et al., Science, 300 (2003)

To explain increased terrestrial net primary production (NPP) in terms of recent climate trends.

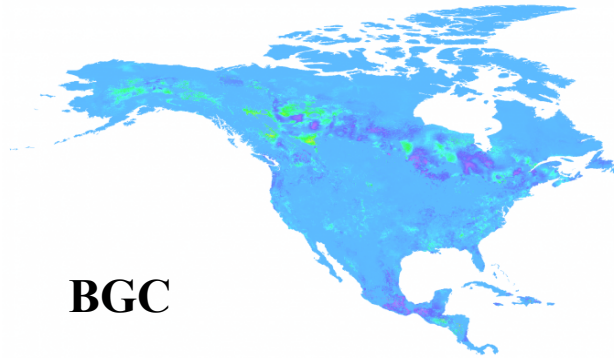
Ensemble Ecosystem Model Experiments



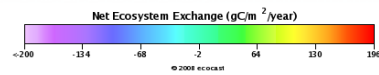
In recognizing structural uncertainties among ecosystem models, we now adopt an ensemble-modeling approach to investigate carbon/water cycles.

Example: NEE Uncertainty in Bottom-Up Models

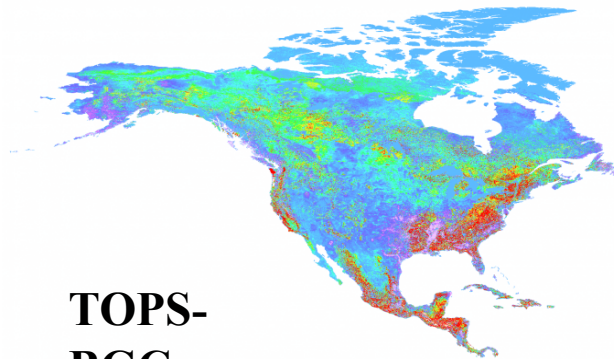
NEE North America (8 km) ANNUL-NEE



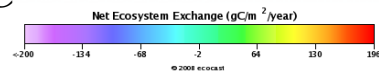
BGC



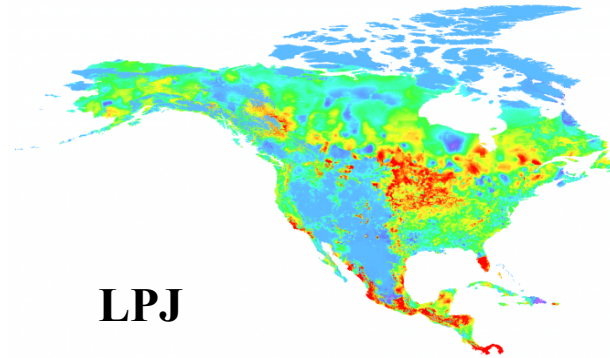
NEE North America (8 km) ANNUAL-NEE



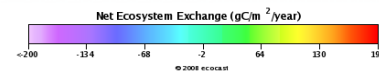
**TOPS-
BGC**



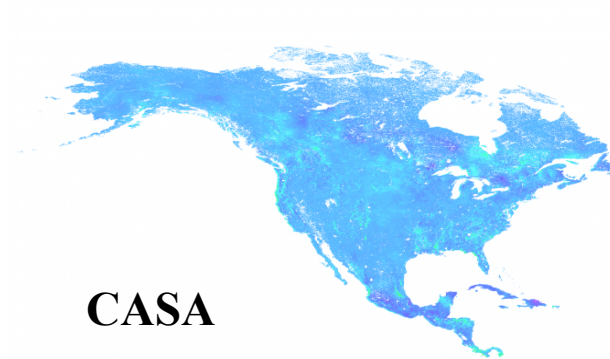
NEE North America (8 km) ANNUL-NEE



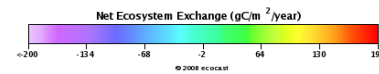
LPJ



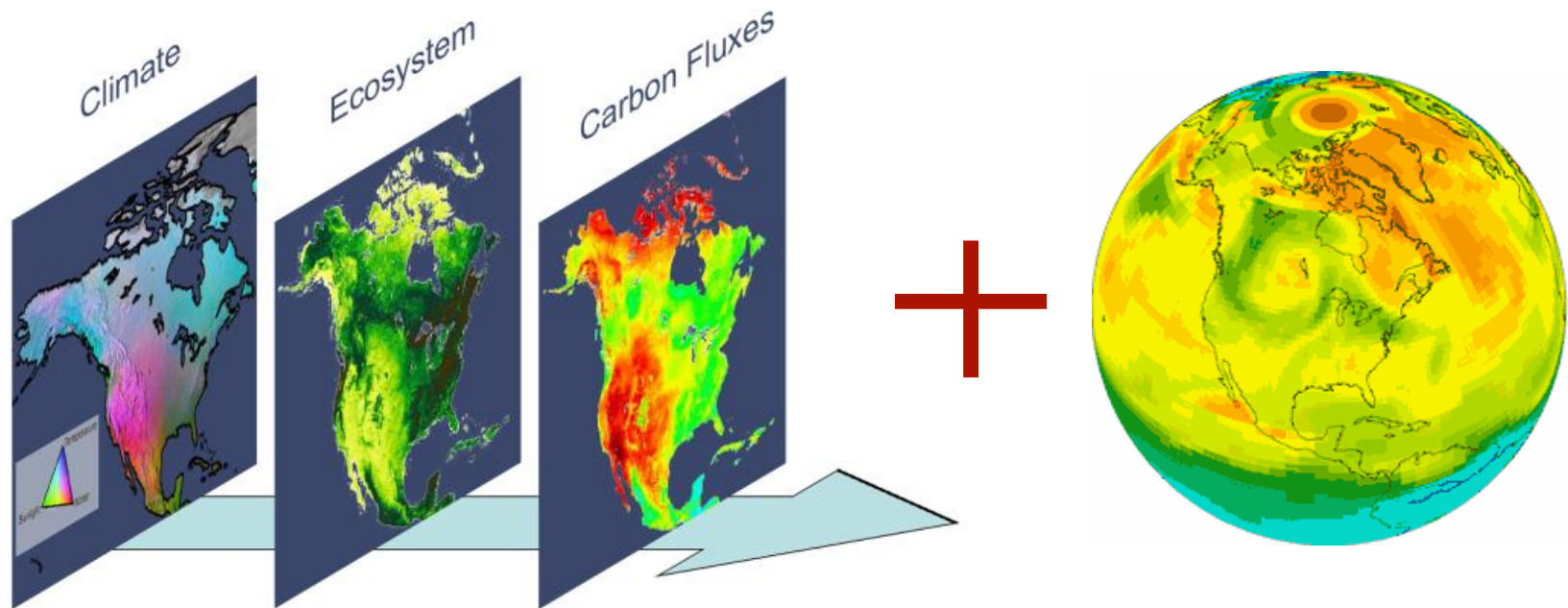
NEE North America (8 km) ANNUAL-NEE



CASA



Combine “Bottom-Up” and “Top-Down” Approaches



TOPS ecosystem models

CarbonTracker (TM5)

- To what extent can TM5 and atmospheric CO₂ measurements “correct” errors of carbon fluxes simulated by bottom-up models?
 - Will ensemble surface prior fluxes be helpful to assess uncertainties in inversion results?
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Project Status

1. Setting up CarbonTracker on TOPS/NEX - *Done*
2. Ensemble ecosystem-model runs using the CRUNCEP climate drivers - *In progress (one done, more to go)*
3. Experiments of TM5 with ensemble prior fluxes - *scheduled for the second half of 2010*

Thank You!
