

Modeling and Synthesis Thematic Data Center (MAST-DC) Support for North American Carbon Program Interim Syntheses



North American
Carbon Program

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Introduction

The North American Carbon Program (NACP) is designed to quantify the magnitudes and distributions of carbon sources and sinks, explain the processes controlling them, and produce a consistent analysis of North America's carbon budget. To accomplish these ambitious goals, NACP requires an integrated data and information management system that will enable researchers to access, understand, use, and analyze large volumes of diverse data at multiple thematic, temporal, and spatial scales.

The Modeling and Synthesis Thematic Data Center (MAST-DC) supports NACP by providing data products and data management services needed for modeling and synthesis activities. MAST-DC is working with the Synthesis Task Force to quantify and understand interannual variations of the continental carbon budget of North America since 2000 by synthesizing and intercomparing NACP observations and models.

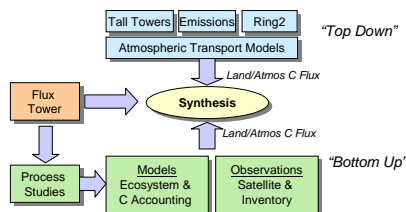
Based on NACP requirements, MAST-DC provides data products and services in a central location, in consistent and uniform grids, with common and co-registered spatial projection, in easily convertible formats.

NACP Interim Synthesis: Model-Data Comparison

MAST-DC is currently organizing a Model-Data Intercomparison Activity to quantify and understand spatial and temporal distributions of carbon sources, sinks, and inventories from 2000 - 2007 by synthesizing NACP data and models, from sites to regional / continental scales. This is an Investigator-led (grass roots) effort and is open to all investigators studying C-cycle in North America.

Synthesis Questions

1. What is the magnitude, spatial distribution, and interannual variability of carbon sources and sinks during the period 2000 - 2005?
2. Do the model results and observations show a consistent impact of the 2002 drought?
3. How do carbon sources and sinks and our understanding of the underlying processes vary across scales (site - region, region - continent)?

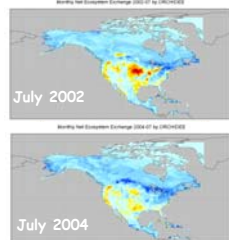


Schedule of Activities for Site-Based and Regional-Continental Interim Synthesis

Fall 2008	-Invited participants
Fall 2008	-Synthesis Protocols prepared
Fall-Winter 2008	-Observations and model results sent to MAST-DC
January 2009	-Analysis and intercomparison of observations and model output
Winter-Spring 2009	-Model-Observation Intercomparison Workshop
February 2009	-Write papers and Workshop Report
Spring 2009	-Present results at 2 nd NACP All-Investigator Meeting
Spring 2009	-Submit papers

Regional - Continental Synthesis: Mac Post and Andy Jacobson, leads

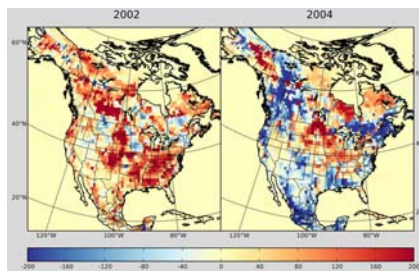
The objective of this activity is to use observations and existing results from inverse and ecosystem models at the regional and continental scale



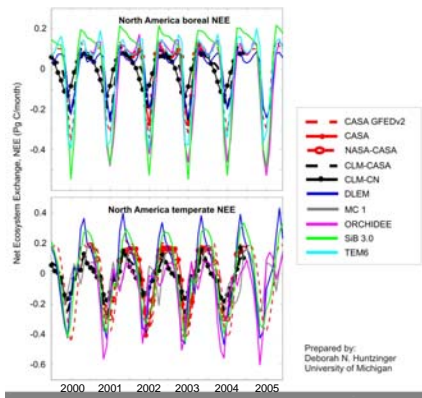
ORCHIDEE Ecosystem Model
Net Ecosystem Exchange (kg C/m2/month)

For the Interim Synthesis, ~13 inverse modeling groups and ~23 ecosystem modeling groups will contribute existing model results for the synthesis. Most modeling groups have provided results for 2000 - 2005.

Modeling groups as well as ~12 groups providing observation and measurement data, including biomass inventories and remote sensing based production estimates, will work together to develop descriptive evaluation and comparison metrics.



CarbonTracker Inversion Model, Net Terrestrial Summer Flux (gC/m2/yr)
www.esrl.noaa.gov/gmd/ccg/carbontracker/



Model-Data Intercomparison

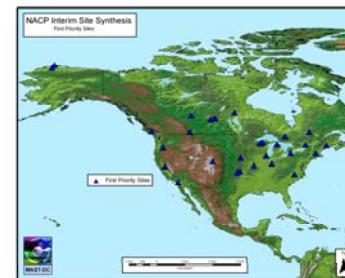
Preliminary model-observation intercomparison for Net Ecosystem Exchange for boreal regions and temperate regions of North America. Model results are courtesy of the Regional and Continental Interim Synthesis group.

Prepared by:
Deborah N. Huntzinger
University of Michigan

Site-Based Interim Synthesis: Peter Thornton, Kevin Schaeffer, and Ken Davis, leads

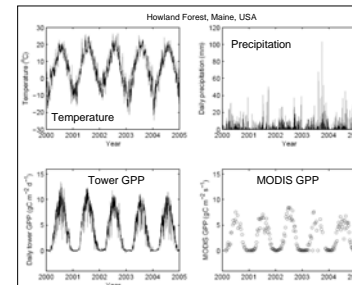
The objective of this activity is to establish a quantitative framework that allows NACP investigators to answer the question:

- Are the various measurement and modeling estimates of carbon fluxes at individual sites consistent with each other - and if not?
- Improve quantification of uncertainty for forward models and site-based measurements
- Identify strengths and weaknesses in models and measurements
- Migrate new knowledge up-scale in coordination with regional and continental-scale efforts.



Gap-Filled Meteorological Data

For the Site-Based Interim Synthesis, gap-filled meteorological data will be developed and used as driver data for bottom-up models.



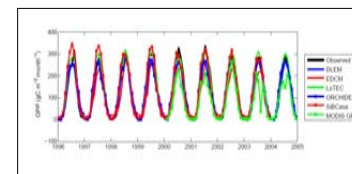
The Howland tower data are provided courtesy of AmeriFlux and Dave Hollinger, USDA, Forest Service.

Gap-Filled Flux Tower Data

For the Site-Based Interim Synthesis, gap-filled flux data meteorological data and other observations (MODIS GPP) will be used to compare to model results.

Model-Data Intercomparison

Preliminary model-observation intercomparison for Howland tower. Model results are courtesy of the Site-level Interim Synthesis group.



Mid-Continent Intensive Interim Synthesis: Stephen Ogle, Scott Denning and Ken Davis, leads

The MCI Interim synthesis activity will compile, diagnose, and reconcile estimates of land-atmosphere carbon dioxide fluxes from atmospheric inversions and bottom-up inventories (both measurement and model based inventories, including process-based modeling). This Interim Synthesis, which is part of the larger, ongoing MCI activity, will hold a workshop in Spring 2009. Contact Stephen Ogle for details.

For more information:

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<http://nacc.ornl.gov/mast-dc/>