

Global Carbon Cycle (GCC)

FY 2004 Information Sheet

Information on proposal submission procedures, contact information, etc. can be found in the 2004 Climate and Global Change announcement
<http://www.ogp.noaa.gov/grants/2004/index.htm>

Background

Global Carbon Cycle (GCC): The U.S. Interagency Carbon Cycle Science Program (CCSP) seeks to answer two overarching questions:

1. How large and variable are the dynamic reservoirs and fluxes of carbon within the Earth system, and how might carbon cycling change in future years, decades, and centuries?
2. What are our options for managing carbon sources and sinks to achieve an appropriate balance of risk, cost, and benefits to society? For more detailed information on interagency priorities, science planning and agency roles, please consult the Internet at <http://www.carboncyclescience.gov>.

NOAA's participation in the U.S. program focuses on three main goals:

1. Quantifying spatial patterns and variability of carbon sources and sinks on global to regional scales;
2. Documenting the fate of anthropogenic CO₂ in the atmosphere and oceans; and
3. Improving future climate predictions by incorporating a dynamic understanding of the carbon cycle into models.

To achieve these goals, the NOAA GCC program focuses on oceanic and atmospheric observations, large-scale process-oriented field studies, and modeling. Information and current project abstracts can be found on the Internet at <http://www.ogp.noaa.gov/mpe/gcc/index.htm>.

FY2004 Summary:

For FY2004, GCC is soliciting projects in support of these goals in three theme areas:

- A. Global Distribution and Dynamics of Carbon Sources and Sinks
- B. Carbon Budgets for North America, Adjacent Coastal Margins and Open Ocean Basins

C. Synthesis, Modeling, Interpretative Studies, and Human Dimensions Tasks for FY2004

Theme areas:

A. Global Distribution and Dynamics of Carbon Sources and Sinks

A variety of atmospheric, oceanic, and terrestrial data has shown that the ocean and the terrestrial biosphere currently take up and store a significant portion of the carbon released to the atmosphere as a result of human activities. Preliminary progress has been made on locating sources and sinks of carbon on a regional basis and characterizing their magnitude and behavior over time.

In FY2004, GCC is seeking to augment the observational network in the ocean and atmosphere to fill in critical spatial and temporal gaps. For example, atmospheric observations of CO₂, δ13C of CO₂, and O₂/N₂ ratios will continue to play a vital role in determining and predicting the fate of anthropogenic CO₂. Measurements of additional atmospheric species (i.e. δ18O in CO₂) will also be included in any attempt to understand the global carbon cycle. Proposals that seek to improve the quality of existing measurements, develop new or expand existing observational networks, and support technological development are encouraged. Further details can be obtained from the "Large-Scale Carbon Dioxide Observational Plan (LSCOP)", available on the web at <http://www.ogp.noaa.gov/mpe/gcc/co2/observingplan/toc.htm>.

B. Carbon Budgets for North America, Adjacent Coastal Margins and Open Ocean Basins

One region of uncertainty in the global carbon cycle is the role of ocean margins in the global carbon cycle. These regions are the active interface between terrestrial and marine environments, interact directly with terrestrial air masses, and are likely to be sensitive to climate change. River dominated margins and coastal upwelling regions merit special attention due to their dominant role in coastal carbon budgets.

In FY2004, GCC is soliciting proposals of intensive, short-term coastal process studies to understand better the role of the coastal zone in the global carbon cycle. Research in this topic area is encouraged to prepare for future long-term observations using coastal transects and buoys with autonomous sensors as proposed in the North American Carbon Program (NACP: <http://www.carboncyclescience.gov>). Areas of focus should include those processes that are important to establishing large-scale patterns of carbon uptake or release such as : air-sea fluxes of CO₂, carbon burial and export to the open ocean, the biological pump in coastal environments, development of coupled

physical-biogeochemical models for different types of continental margins, and the development of autonomous measurement systems for platforms, buoys and research vessels.

C. Synthesis, Modeling, Interpretive Studies, and Human Dimensions

In FY2004, GCC is seeking studies using empirical data and synthesized datasets, existing models, data assimilation techniques, and theory to advance the ability to quantify spatial patterns and variability of carbon sources and sinks at global to regional scales; document the fate of anthropogenic CO₂ in the atmosphere and oceans; and/or improve future climate predictions by incorporating a dynamic understanding of the carbon cycle into models. Pilot studies examining the needs of decision-makers for carbon cycle information are also encouraged.

Areas of focus could include, but are not limited to: Methods for constraining ocean-atmosphere or land-atmosphere carbon fluxes at regional scales; Atmospheric transport model improvement; Ocean circulation model improvement; Gas exchange parameterization development; Pilot oceanic or atmospheric CO₂ data assimilation efforts; Large-scale carbon cycle network design studies (ocean and atmosphere); and Investigations into the causes of observed variability in interannual atmospheric CO₂ growth rate.

Human Dimensions: Proposals are encouraged to conduct a rigorous survey grounded in social science methodology to identify synergies and gaps between the science outlined in the Carbon Cycle Science Plan and the needs of U.S.-based decision-makers. Priority will be given to projects that identify the synergies and gaps between decision-maker needs and scientific plans for the following subset of topics discussed in the Carbon Cycle Science Plan.