Office of Science
Financial Assistance
Funding Opportunity Announcement
DE-PS02-09ER09-25

Biological Systems Research on the Role of Microbial Communities in Carbon Cycling

The Office of Biological and Environmental Research (BER) of the Office of Science (SC), U.S. Department of Energy (DOE), hereby announces its interest in receiving applications for research that supports the Genomics:GTL research program (http://www.genomicsGTL.energy.gov). In this Funding Opportunity Announcement (FOA), applications are solicited for: i.) Systems-level studies on regulatory and metabolic networks of microbes and microbial consortia involved in biogeochemical cycling of carbon, ii.) Development of metatranscriptomic, metaproteomic, and other genome-enabled approaches to understand how shifts in environmental variables impact microbially-mediated carbon cycling processes in terrestrial ecosystems, and iii.) Development of methods and techniques for imaging and analysis of microbially-mediated carbon cycling processes in terrestrial ecosystems.

PREAPPLICATIONS

Potential applicants are **required** to submit a brief preapplication, referencing **Funding Opportunity Announcement DE-PS02-09ER09-25 for receipt by DOE by 4:30 p.m., Eastern Time, August 25, 2009.** Preapplications will be reviewed for conformance with the guidelines presented in this FOA and suitability in the technical areas specified. A response to the preapplications encouraging or discouraging formal applications will be communicated to the applicants by September 16, 2009. Applicants who have not received a response regarding the status of their preapplication by this date are responsible for contacting the program to confirm this status.

Only those preapplicants that receive notification from DOE encouraging a formal application may submit full applications. **No other formal applications will be considered.**

Potential applicants **must** submit a brief preapplication that consists of no more than three pages of narrative stating the research objectives, describing the technical approach(s), and identifying the proposed team members and their expertise. The intent in requesting a preapplication is to save time and effort of applicants in preparing and submitting a formal project application that may be inappropriate for the FOA. Preapplications will be reviewed relative to the scope and research needs as outlined in the summary paragraph and in the SUPPLEMENTARY INFORMATION. The preapplication should identify, on the cover sheet, the title of the project, the institution or organization, names of the principal investigator, telephone number, fax number, and e-mail address. No budget information or biographical data need be included, nor is an institutional endorsement necessary.

Preapplications referencing **Funding Opportunity Announcement DE-PS02-09ER09-25** should be sent as a text file or single PDF file attachments via e-mail to: genomicsGTL@science.doe.gov with "Preapplication DE-PS02-09ER09-25 Lastname and Institution" as the subject. No FAX or mail submission of preapplications will be accepted.

APPLICATION DUE DATE: November 9, 2009

Formal applications submitted in response to this FOA must be received by November 9, 2009, 8:00 p.m. Eastern time, to permit timely consideration of awards. **APPLICATIONS RECEIVED AFTER THE DEADLINE WILL NOT BE REVIEWED OR CONSIDERED FOR AWARD.**

ATTENTION - CHANGE IN SUBMISSION REQUIREMENT EFFECTIVE August 4, 2009:

Applications submitted to the Office of Science must be submitted electronically through Grants.gov to be considered for award. The Funding Opportunity Number is DE-PS02-09ER09-25 and the CFDA Number for the Office of Science is 81.049. Applicants must follow the instructions and use the forms provided on the Grants.gov website.

Registration Requirements: There are several one-time actions you must complete in order to submit an application (e.g., obtain a Dun and Bradstreet Data Universal Numbering System (DUNS) number, register with the Central Contract Registry (CCR), register with the credential provider, and register with Grants.gov). See http://www.grants.gov/GetStarted. Use the Grants.gov Organization Registration Checklist at http://www.grants.gov/assets/OrganizationRegCheck.doc to guide you through the process. Designating an E-Business Point of Contact (EBiz POC) and obtaining a special password called an MPIN are important steps in the CCR registration process. Applicants, who are not registered with CCR and Grants.gov, should allow at least 14 days to complete these requirements. It is suggested that the process be started as soon as possible.

GENERAL INQUIRIES ABOUT THIS FOA SHOULD BE DIRECTED TO:

Scientific/Technical Program Contact:

Program Manager: Dr. Joseph Graber
Phone: 301-903-1239
E-Mail: Joseph.Graber@science.doe.gov

SUPPLEMENTARY INFORMATION:

DOE-BER's Genomics:GTL program supports basic research aimed at achieving systems level understanding of plants, microbes, and microbial communities relevant to DOE missions. One of the most daunting challenges facing science in the 21st century is to predict how Earth's ecosystems will respond to global climate change. The global carbon cycle plays a central role in regulating atmospheric carbon dioxide (CO2) levels and thus Earth's climate, but our understanding of the interlinked biological processes that drive the global carbon cycle remains limited. The effects of changing climate conditions on these processes may heavily influence the

total amount and long-term stability of organic carbon stored in ecosystems. Advancing our knowledge of biological components of the global carbon cycle is thus crucial to predicting potential climate change impacts and assessing the viability of potential adaptation and mitigation strategies.

Understanding and predicting some aspects of the global carbon cycle will require new research approaches aimed at linking global-scale climate phenomena, biogeochemical processes of ecosystems, and specific functional activities encoded in genomes of organisms. In particular, the role of microbial communities in mediating many critical carbon cycle processes remains poorly understood. In many cases, microbially-mediated processes are only minimally represented in carbon cycle models, which may limit their predictive capability and scale of resolution. Elimination of these so-called "black boxes" will require innovative approaches aimed at linking structural and functional characterization of microbial communities with quantitative measurement of carbon cycle processes.

Applications are solicited for basic research on the contribution of microbes and microbial communities to carbon cycling processes in the following areas:

- **Systems-level studies on regulatory and metabolic networks of microbes and microbial consortia involved in biogeochemical cycling of carbon.** Proposed studies should focus on systems biology research using environmentally relevant model microbes or microbial consortia. Applications are encouraged that examine impacts of shifts in environmental variables such as temperature, CO2 concentration, and availability of water and nutrients on microbial carbon processing. Model systems should be carefully chosen to facilitate development of metabolic and regulatory network models that could ultimately inform larger-scale biogeochemical models of microbial processes in the environment. Interdisciplinary collaboration is encouraged to link laboratory studies of the chosen model system with environmentally relevant conditions.
- **Development of metatranscriptomic, metaproteomic, and other genome-enabled approaches to understand how shifts in environmental variables impact microbially-mediated carbon cycling processes in terrestrial ecosystems.** Applications should address the adaptation of genome-enabled techniques to the interrogation of terrestrial environments, either in situ or using model micro- or mesocosms. Applications are encouraged that target key microbially-mediated carbon cycling processes in terrestrial systems to predict responses to shifts in temperature, CO2 concentration, nutrient availability, etc. Applications are also encouraged that use genome-enabled techniques to identify and predict the impact of potentially beneficial associations of microbes and microbial communities (both prokaryotic and eukaryotic) with plants on overall ecosystem productivity.
- **Development of methods and techniques for imaging and analysis of microbially-mediated carbon cycling processes in terrestrial ecosystems.** New approaches are needed for high-resolution characterization of microbial community structure and function in soils and other terrestrial environments. Applications are encouraged that will enable in situ analysis of functional processes of microbial communities and characterization of physical and chemical microenvironments at interfaces between microbes and biotic or abiotic surfaces (i.e. plant cells, soil aggregates, etc.).

Applications requiring genomic, transcriptomic, metagenomic, or metatranscriptomic sequencing of microbes or microbial communities must provide a plan describing how sequencing will be accomplished and where sequencing fits within the overall project timeline.

Further information on DOE-BER objectives in this area of research can be found in the DOE report "Carbon Cycling & Biosequestration: Integrating Biology and Climate Through Systems Science". The report is available at: http://genomicsgtl.energy.gov/carboncycle/

Information and Data Sharing Policy:

The Genomics:GTL information-sharing policy requires that all publication related data and information be made available 3 months after publication. All Principal Investigators (PIs) within the GTL program will be required to construct and implement an Information and Data-Sharing Plan that ensures this accessibility as a component of their funded projects. As a element of an Information and Data Sharing plan, BER will require that all publishable information resulting from GTL funded research must conform to community recognized standard formats when they exist, be clearly attributable, and be deposited within a community recognized public database(s) appropriate for the research conducted. All experimental data obtained as a result of GTL funded research must be kept in an archive maintained by the Principal Investigator (PI) for the duration of the funded project. Any publications resulting from the use of shared experimental data must accurately acknowledge the original source or provider of the attributable data. More detailed information the data and information sharing policy is available at: http://genomicsgtl.energy.gov/datasharing/index.shtml

The Genomics:GTL program supports a combination of large, well integrated, multidisciplinary research centers and smaller, focused research projects. This FOA will support smaller, focused research projects by single investigators or collaborative research teams to develop new technologies, research strategies, or research resources needed by the Genomics:GTL program.

Information on the research projects currently funded by the Genomics: GTL program and a description of project goals and overall program organization can be found at: http://genomicsgtl.energy.gov/).

Merit Review

Applications will be subjected to scientific merit review (peer review) and will be evaluated against the following evaluation criteria listed in descending order of importance as codified at 10 CFR 605.10(d):

1. Scientific and/or Technical Merit of the Project
2. Appropriateness of the Proposed Method or Approach
3. Competency of the Research Team and Adequacy of Available Resources
4. Reasonableness and Appropriateness of the Proposed Budget.

The evaluation will include program policy factors such as the relevance of the proposed research to the terms of the announcement and the agency's programmatic needs. It should be noted that external peer reviewers are selected on the basis of their scientific expertise and the

absence of conflict-of-interest issues. Non-federal reviewers may be used, and submission of an application constitutes agreement that this review process is acceptable to the investigator(s) and the submitting institution.

PROGRAM FUNDING:

It is anticipated that up to $12 million total will be available for multiple awards to be made in FY 2010 for *Biological Systems Research on the Role of Microbial Communities in Carbon Cycling*. The number of awards will be contingent on satisfactory peer review, the availability of appropriated funds, and the size of the awards. Multiple year funding is expected. Applications may request project support for up to three years, with out-year support contingent on the availability of funds, progress of the research, and programmatic needs. Annual budgets are expected to range from $250,000 to $1,000,000 in total costs. DOE is under no obligation to pay for any costs associated with the preparation or submission of an application. DOE reserves the right to fund, in whole or in part, any, all, or none of the applications submitted in response to this FOA.

The Catalog of Federal Domestic Assistance (CFDA) number for this program is 81.049, and the solicitation control number is ERFAP 10 CFR Part 605.

Posted on the Office of Science Grants and Contracts Web Site
July 1, 2009.