

DOE National Institute for Climatic Change Research (NICCR)

Notice RFP-01

Summary: The U.S. Department of Energy (DOE) National Institute for Climatic Change Research (NICCR) hereby announces its interest in receiving research proposals. Proposed research is requested that would: (1) reduce scientific uncertainty about interactive effects of warming, changes in precipitation, increased CO₂ concentration, and/or increased tropospheric O₃ concentration on the structure and functioning of important U.S. terrestrial ecosystems; (2) evaluate and/or improve understanding and prediction of the effects of climatic change on the future geographic distribution of terrestrial ecosystems; (3) use measurements of contemporary exchanges of mass and energy between the atmosphere and terrestrial ecosystems to reduce scientific uncertainty about effects of an altered terrestrial carbon cycle and/or surface energy exchange on global and/or regional climate; and/or (4) use synthesis of existing experimental or observational data and/or modeling to better understand or forecast potential effects of climatic and/or atmospheric change on ecological systems at the regional scale.

The NICCR was formerly named the National Institute for Global Environmental Change (NIGEC). The NICCR is managed for the DOE's Office of Science through cooperative agreements with four universities: The Pennsylvania State University, Duke University, Michigan Technological University, and Northern Arizona University.

Eligibility: Colleges and universities and not-for-profit, non-governmental research institutions within the United States are eligible for support through NICCR. The Principal Investigator must be principally employed by an eligible institution. Contractors to federal facilities, including federal agency laboratories and Federally Funded Research and Development Centers (FFRDCs), are ineligible for support. Subcontracts to ineligible institutions (e.g., government laboratories/facilities and FFRDCs) will not be allowed. Questions about eligibility should be directed to Dr. Jeff Amthor (see Contact Persons below).

Projects funded through NICCR will have one Principal Investigator, except in special cases coordinated with NICCR at the preproposal stage.

Dates: Preproposals are REQUIRED. Proposals will only be accepted from applicants who: (1) submit a compliant preproposal on time and (2) are informed by NICCR that their preproposal is acceptable.

Preproposals are due 5:00 PM Pacific Time, January 18, 2006.

Proposals are due 5:00 PM Pacific Time, March 14, 2006.

Application Materials: Preproposals and proposals must be submitted electronically (uploaded) to the NICCR web site (<http://niccr.nau.edu>). Proposals should be contained within a single pdf file. The pdf file should be no larger than 3 MB. The required preproposal and proposal formats are described below in the sections Preproposal Format and Proposal Format.

Required templates for the Cover Page and Budget Page(s) are available for download at the NICCR web site.

Regional Organization of NICCR: The NICCR is composed of four regions, encompassing all 50 states and the District of Columbia.

Western Region (managed by *Northern Arizona University*): Alaska, Hawaii, Washington, Oregon, California, Idaho, Nevada, Arizona, Utah, Montana, Wyoming, Colorado, and New Mexico.

Midwestern Region (managed by *Michigan Technological University*): North Dakota, South Dakota, Nebraska, Kansas, Oklahoma, Missouri, Iowa, Minnesota, Wisconsin, Illinois, Indiana, Ohio, and Michigan.

Southeastern Region (managed by *Duke University*): Texas, Louisiana, Arkansas, Mississippi, Alabama, Florida, Georgia, South Carolina, North Carolina, Tennessee, and Kentucky.

Northeastern Region (managed by *The Pennsylvania State University*): Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland, West Virginia, the District of Columbia, and Virginia.

Contact Persons:

Research in the Western Region: Dr. George Koch, (928) 523-7150, george.koch@nau.edu

Research in the Midwestern Region: Dr. Kurt Pregitzer, (906) 487-2396, kspregit@mtu.edu

Research in the Southeastern Region: Dr. Rob Jackson, (919) 660-7408, jackson@duke.edu

Research in the Northeastern Region: Dr. Ken Davis, (814) 863-8601, davis@met.psu.edu

General information and eligibility: Dr. Jeff Amthor, (301) 903-2507,
jeff.amthor@science.doe.gov

Background: The U.S. Congress directed that DOE establish the National Institute for Global Environmental Change (NIGEC) in fiscal year (FY) 1990 at the University of California (UC), Davis. NIGEC is managed for the DOE under the terms of a cooperative agreement between DOE and the UC Office of the President. The purpose of NIGEC is to plan jointly with DOE, and to execute, through Regional Centers, a program of research in global environmental change relevant to DOE's climatic change research program. In FY 2006, DOE reorganized NIGEC by eliminating the NIGEC National Office and re-competing the Regional Center host universities. It also changed the name from NIGEC to NICCR. The NICCR web site is at <http://niccr.nau.edu>. It is expected that a fifth Regional Center will be added to NICCR later in FY 2006 to support development of methodologies and tools for the understanding and modeling of the impacts of global and regional climatic changes on riparian and coastal environmental and ecological systems throughout the nation.

The goal of NICCR is to mobilize university scientists, from all regions of the country, in support of the research goals of DOE's Climate Change Research Division (in the DOE Office of Science's Office of Biological and Environmental Research; more information is available at http://www.sc.doe.gov/ober/CCRD_top.html). DOE's climatic change research goals are based in part on the *Strategic Plan for the U.S. Climate Change Science Program* published July 2003

(see <http://www.climate-science.gov/Library/stratplan2003/final/default.htm>).

Request for Proposals: This notice solicits proposals to conduct research related to effects of climatic and atmospheric changes on terrestrial ecosystems. Proposals to initiate new experiments or observations should state clearly how they will fill important knowledge gaps that hinder regional-scale and/or national-scale forecasts of effects of climatic and atmospheric changes on important ecosystems in the United States. Proposals should state why the ecosystems to be studied are important. Criteria that could be considered are areal extent, primary production relative to total production in the region, habitat for threatened and endangered species, or ecosystem characteristics that would allow extrapolation of results to large areas or many ecosystem types.

It is expected that most projects supported by NICCR will be for individual investigators or small research teams, but coordinated, multi-investigator (collaborative) projects will be considered for funding. These collaborative projects should be clearly defined at the preproposal stage by submitting a single preproposal that begins with the heading “COLLABORATIVE PROJECT” (see Preproposal Format below). Each proposed investigator should be listed on the preproposal. Further instructions for submitting a full proposal for collaborative projects will be provided for successful preproposals. Dialog between NICCR and the investigators (to be initiated by NICCR after preproposals have been evaluated) may be required during collaborative proposal preparation. The purpose of considering collaborative projects is to allow hypotheses to be addressed that cannot be readily addressed with traditional single-investigator research projects, and to encourage synthesis activities that are integrated into observational or experimental studies; proposals should clearly state how their collaborative nature will satisfy these objectives. Proposals for networked observations or experiments, whether regional or multi-regional, should include evaluation of network design required to address project hypotheses. Multi-investigator proposals must present either evidence of past collaborative success, or a clear plan that will facilitate successful project integration.

Only proposals focusing on one of the following four focus areas will be considered for support in response to this Notice.

Focus 1: This research focus seeks projects that address effects of multiple climate-related factors on terrestrial ecosystems. Projects should determine the theoretical and/or empirical basis of whether, and how, (a) changes in temperature (annual mean values, seasonal cycles, and/or diel cycles), (b) changes in soil moisture or precipitation, (c) increases in atmospheric CO₂ concentration, and/or (d) increases in tropospheric O₃ concentration might affect the structure and functioning of important U.S. terrestrial ecosystems. This objective should be met through manipulative experiments and/or through the development and testing of models of ecosystem structure and functioning. To the extent that “model” or “constructed” ecosystems can be justified for the study of ecosystem structure and functioning, experiments using such systems will be considered for support. The magnitude of changes in the environmental factors to be studied should be clearly justified. All proposals should state briefly how the research results could or will be used to improve models of terrestrial ecosystems. Effects of factors such as human land use, introduction and spread of invasive species, and increased nitrogen

deposition on terrestrial ecosystems are of interest only to the extent that they might modify effects of the four climatic and atmospheric changes listed above on terrestrial ecosystems, not as stand-alone factors influencing terrestrial ecosystems. Research directed solely at plant or ecosystem carbon balance, or carbon sequestration in terrestrial ecosystems, will not be considered for support under Focus 1.

Experimental projects should involve controlled manipulations (in the field or the laboratory, as appropriate) of at least two of the four environmental factors listed above (i.e., (a)-(d)). Proposals to use environmental gradients as surrogates for controlled manipulations will not be supported under Focus 1. Experimental research based on underlying theory would be especially relevant. Proposed research should be directed at measurable and specified endpoints attainable within the proposed project period. Endpoints of interest would be related to: (1) adjustments at the ecosystem scale, such as changes in ecosystem processes, structures, biological diversity, and/or succession, and/or (2) adjustments at the organismal scale *that are manifested at the ecosystem scale*, including physiological, biochemical, and/or genetic changes that may facilitate (or hinder) ecosystem homeostasis.

Modeling projects should involve new empirically based science, introduce new theories into existing models, and/or critically evaluate and improve existing models with independent experimental data. Modeling that considers ecological hierarchies (i.e., modeling that considers multiple levels of biological organization in ecosystems) would be most relevant. Projects proposing to make only “simple” or regression-based predictions of ecological effects of specific environmental change scenarios, rather than developing and/or testing hypotheses about cause-and-effect relationships between environmental changes and the structure and functioning of terrestrial ecosystems, will not be considered for support under Focus 1.

Focus 2: This research focus seeks projects to improve the scientific basis for projecting changes in the geographic boundaries of U.S. terrestrial ecosystems (or biomes), and the populations of their dominant organisms (plants, animals, and/or microorganisms), in response to potential climatic changes. Climatic changes of interest are the annual mean value, seasonal cycle, and diel cycle of temperature and the annual amount, frequency, and temporal patterns of precipitation (and available soil moisture). Climatic changes during the next 50–100 years are especially relevant, and the magnitude of climatic changes to be studied should be clearly justified. The intent of this research is to reduce scientific uncertainty about how the geographic distribution of U.S. terrestrial ecosystems, and their component organisms, might be altered by future climatic changes. A particular emphasis should be placed on the relationship between geographic distributions of terrestrial ecosystems and their dominant organisms as that relationship is affected by climate. An important issue for this research is to advance the development and evaluation of models of regional, national, or global biogeography that are, or may be, used to project effects of climatic change on the geographic distribution of terrestrial ecosystems in the United States. Projects might also attempt to determine if climatic changes during the past 100 years have resulted in population and/or ecosystem movements. All proposals should state concisely how the research results will help improve or evaluate biogeographic models (or dynamic vegetation models) in order to improve projections of potential effects of climatic change on U.S. terrestrial ecosystems.

Although Focus 2 projects may have a biogeographic modeling component, it is expected that the major emphasis of the funded projects will be experimental, observational, and/or theoretical. Projects using existing models of biogeography to make predictions of effects of specified climatic change scenarios on the future distribution of terrestrial ecosystems without accompanying improvements to those models, or directed efforts at evaluating the usefulness or accuracy of those models, will not be considered for support under Focus 2.

Focus 3: This research focus seeks projects that address the measurement and analysis of contemporary exchanges of mass and energy between the atmosphere and regionally important terrestrial ecosystems or landscapes, and the use of those measurements and analyses to evaluate mechanisms that might be included in climate and carbon cycle models. The intent of this research is to reduce scientific uncertainty about the effects of atmosphere-ecosystem exchanges of mass, momentum, and energy on climate, with an emphasis on the carbon cycle.

Projects should use appropriate methods (including, but not limited to, eddy covariance) to quantify and understand ecosystem functioning relevant to the climate system, including exchanges of mass, momentum, and energy between important terrestrial ecosystems (i.e., those covering significant area of land) and the atmosphere. Proposals should state how the research will improve understanding of the role of terrestrial ecosystems in regional to global cycles of energy and mass, with a focus on biological control of carbon and water exchanges. Observational studies and analyses of specific biological processes that contribute to spatial and temporal variation in CO₂ sources and sinks would be especially relevant. Improved quantitative understanding of the importance of terrestrial ecosystem sources and sinks of CO₂, leading to an improved ability to predict how those sources and sinks might change during the coming 50–100 years, would be key endpoints of the proposed research. Integration of measurements and analyses with efforts to evaluate and/or improve models of regional, national, or global climatic change would also be appropriate.

Focus 4: This research focus seeks proposals to carry out synthesis (including, but not limited to, process modeling) activities related to effects of climatic variability and change on U.S. terrestrial ecosystems, principally with a regional focus. Projects should synthesize and advance mechanistic understanding of how climatic variability and change might influence terrestrial ecosystem structure and functioning. Projects that include an effort to identify and quantify important scientific knowledge gaps or integrate multiple sources of information (e.g., observations and experiments) are encouraged. The spatial scale of the research should be encompassed within, or up to the size of, a NICCR region.

Synthesis could involve: (1) development of new, or use of existing, databases; (2) development and/or evaluation of ecological models; (3) meta-analysis; and/or (4) other appropriate research activities focused on advancing fundamental understanding of how and why climatic variability and change and changes in atmospheric composition might influence the structure, functioning, and geographic distribution of terrestrial ecosystems. Projects might concentrate on: (a) interactions among climatic variability/change and disturbances (natural or human); (b) effects of multiple changes in climate and atmospheric composition (i.e., changes in combinations of warming, changes in precipitation, increases in [CO₂], and increases in [O₃]); or (c) detection, prediction, and/or modeling of regional-scale feedbacks between climatic change and terrestrial

ecosystem functioning, including carbon and energy exchanges. Research directed at climatic change mitigation options, including carbon sequestration in terrestrial ecosystems, will not be considered for support.

Notes for All Research Projects (Foci 1–4): All proposals should briefly and clearly describe tangible outcomes (products or deliverables) of the proposed activities, including a timetable of those outcomes.

It is expected that all data and analyses (including model codes) obtained with NICCR support will be made available to the public in a timely manner. Each proposal must state *briefly* how and when the data and analyses (including model codes) will be made publicly available and must include sufficient resources to provide this access. For example, data collected, databases synthesized, and/or codes developed might be posted to a public web site within 12 months of collection (for data) or development (for syntheses conducted and codes developed). Public access will not circumvent the rights of investigators to publish their work and/or receive proper acknowledgement for use of their research products. Established data and metadata formats should be used when they exist.

Funding: It is expected that about \$5.9 million will be available for research each year during the next 3 years, contingent on availability of appropriated funds, to be divided equally among the four Regional Centers. Out-year support will be contingent on availability of funds, progress of research, and DOE programmatic needs.

Annual budgets for individual projects are not expected to exceed \$125,000, unless there is prior approval obtained at the preproposal stage for more costly manipulative studies or larger collaborative (multi-investigator) projects.

Merit Review: Each proposal will be reviewed for technical merit by at least three independent reviewers. Reviewers will evaluate the scientific merit of the proposed research, the appropriateness of the proposed methods, the competency of the research team, and the appropriateness of the proposed budget. Proposals will also be evaluated, by NICCR, for their relevance to the terms of this Notice and with respect to the balance of research projects within NICCR (including the balance of research topics within the four NICCR regions) and the DOE climate change research program.

Preproposal Format: Preproposals are REQUIRED. The preproposal must list the proposed project title; the Principal Investigator's name, employing institution, email address, and telephone number; and names and employing institutions of any co-investigator(s). The preproposal must include a narrative concisely outlining the research project objectives, any specific scientific hypotheses to be tested, and the methods to be used to meet the objectives, including specification of the location of the research. Background material (literature review) should not be included in the preproposal. The preproposal is limited to a single page (8.5 by 11 inches), with one-inch margins all around, and no more than 51 lines of text per page (11 point font, single spacing). Preproposals should be submitted as pdf files. Preproposals should be uploaded at the NICCR web site (<http://niccr.nau.edu>) before the deadline (see Dates above).

Preproposals for multi-investigator, collaborative projects should begin with the heading “COLLABORATIVE PROJECT”.

If the project budget is expected to exceed \$125,000 per year, the preproposal should state this and give a budget estimate for each year of the project.

All preproposals will be reviewed for scientific merit and adherence to the terms of this Notice by an independent panel. Recommendations of that panel will then be reviewed by NICCR, which will make final decisions about the preproposals. Those decisions will be communicated to the applicants via e-mail as soon after the submission deadline as possible. Proposals will be accepted only from applicants who are notified by NICCR that their preproposal is acceptable.

Proposal Format: The proposal must be prepared with one-inch margins all around, and no more than 51 lines of text per page (11 point font, single spacing). Text in tables, figures, and figure legends can be more compact, but must be legible. The entire proposal should be contained within a single pdf file (maximum size of 3 MB) uploaded at the NICCR web site (<http://niccr.nau.edu>).

The proposal should include (in this order):

Cover Page

Budget and Budget Explanation

Abstract (on a page by itself)

Narrative (15 pages maximum)

Literature Cited

Biographical Sketch(es)

Other Support of Investigator(s) (including project abstracts for related projects, see below)

Annotated Bibliography of Prior NIGEC Research (if applicable; see below)

Cover Page: The required template for the cover page is available at the NICCR web site (<http://niccr.nau.edu>). It should be downloaded from the web site. All fields indicated on the cover page template must be completed, except the co-investigator block, which is optional.

Budget and Budget Explanation: The required template for the budget page (DOE F 4620.1) is available at the NICCR web site (<http://niccr.nau.edu>). It is a fill-in pdf file and should be downloaded from the web site. Budget requests should be entered in the column labeled “Funds Requested by Applicant.”

There should be one budget page for each year (12-month period) of the proposed project, and one budget page for the cumulative project period (i.e., four budget pages for a 3-year project). Because NICCR supports only research projects, there should be no costs listed in item F, “Trainee/Participant Costs,” which are costs associated with training grants.

The budget pages must be followed by a budget justification including a brief description of each budget item and a justification for their requested amounts. This should include brief descriptions of tasks to be performed by each named person and uses to be made of any

purchased items. Any travel should be described.

Any subcontracts should be sufficiently described in the budget justification. If any single subcontract exceeds \$25,000 during any year, separate budget pages and a separate budget justification must be included for that subcontract.

The budget justification must be followed by a **copy of a signed agreement that establishes the allowable rates of reimbursement entered into between the Principal Investigator's employing institution and the U.S. Government (Federally audited and approved).**

Abstract (on a page by itself): At the top of the abstract give the project title. On separate lines list the name(s) and employing institution(s) of the Principal Investigator and any co-investigator(s). The text of the Abstract should be 400 words or less. It should contain five paragraphs as follows: (1) a statement, in broad scientific terms, of the project objectives; (2) a statement of the location(s) of the research activities; (3) a list of the hypotheses (if any) to be tested; (4) a brief outline, in general terms, of the approach (methods) to be used; and (5) a statement of what the research is intended to accomplish, including expected deliverables.

Narrative: The narrative comprises the research plan for the project and is limited to **15 pages (maximum)**. It should contain enough background material in the Introduction, including review of the relevant literature, to demonstrate sufficient knowledge of the state of the science and to set the stage for the proposed research. The major part of the narrative should be devoted to a description and justification of the proposed project, including details of the methods to be used. It should also include a timeline for the major activities of the proposed project, and should indicate which project personnel will be responsible for which activities.

If any portion of the project is to be done in collaboration with another institution (or institutions), the narrative must provide information on the institution(s) and what part of the project it will carry out. Further information on any such arrangements is to be given in the sections "Budget and Budget Explanation" and "Biographical Sketch(es)."

If the Principal Investigator or co-investigator(s) are supported by another DOE program (but not NIGEC) to perform similar research, the narrative should state clearly (no more than one-half page) how this proposed project differs from the other DOE-funded research being conducted.

If the Principal Investigator or co-investigator(s) are (or were) supported by NIGEC to perform related research, a brief description of the results of that research, and the length of NIGEC support, must be included in the Narrative in a section titled "Results of Related NIGEC Research" (two pages maximum). This section of the Narrative (if included) should reference an Annotated Bibliography to be placed at the end of the proposal (see below).

Literature Cited: Give full bibliographic citations for all literature cited in the Narrative.

Biographical Sketch(es): Biographical sketches of all senior personnel must be included and are limited to two pages each. Each sketch should include, at the end, a list of all collaborators and co-authors during the past 48 months, to be used to determine potential conflicts of interest when

selecting reviewers.

Other Support of Investigator(s): For each of the senior personnel, a list of current and pending research support should be included. An abstract of any current research project (but not DOE NIGEC project) that is related to the proposed NICCR research project (in scope or location) must be included (no more than one half page per project/abstract).

Annotated Bibliography of Prior NIGEC Research (if required; see Narrative above): The annotated bibliography is a list of publications resulting from prior NIGEC research, with each citation followed by a brief—no more than 150 words—description of the publication and its scientific importance. The purpose of the annotation is to demonstrate the relevance of the previous NIGEC-funded research to the stated goals of the previous NIGEC project.