

# **ENVIRONMENTAL GEOCHEMISTRY AND BIOGEOCHEMISTRY**

**Research at the Interfaces of  
Geochemistry, Hydrology, Coastal  
Sciences, Atmospheric Sciences,  
Chemistry, Microbial and Molecular  
Biology, Colloid and Transport  
Engineering, and Mathematics**

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## *Solicitation*

**DIVISION OF EARTH SCIENCES  
DIVISION OF OCEAN SCIENCES  
DIVISION OF ATMOSPHERIC SCIENCES  
DIVISION OF CHEMISTRY  
DIVISION OF CHEMICAL & TRANSPORT SYSTEMS  
DIVISION OF ENVIRONMENTAL BIOLOGY  
DIVISION OF MOLECULAR & CELLULAR  
BIOSCIENCES  
DIVISION OF MATHEMATICAL SCIENCES**

**DEADLINE DATE:** *January 7, 1997*



**NATIONAL SCIENCE FOUNDATION**

## Description

The goal of the Environmental Geochemistry and Biogeochemistry activity is to enhance fundamental, interdisciplinary research on chemical processes that determine the behavior and distribution of inorganic and organic materials in environments near the Earth's surface. Of particular importance are projects that characterize chemical parameters in both perturbed and unperturbed natural systems, clarify the chemical processes or behavior observed, or combine observations and interpretations into predictive models.

One of the biggest challenges facing scientists and engineers involved in environmental research is understanding the highly interrelated physical, chemical and biological feedback loops commonly present in the Earth's natural systems. The Environmental Geochemistry and Biogeochemistry research activity addresses this challenge by supporting studies on the physical-chemical-biotic behavior of chemical substances within one environment or by emphasizing research that focuses on a common chemical theme throughout a variety of environments. Environments of interest are soils, ground waters, surface waters, coastal marine and estuarine areas, and portions of the troposphere in contact with these environments.

This research activity encourages integration of critical inquiry from the disciplines of inorganic, organic, bioinorganic, and bioorganic chemistry (reactions in complex environments), geochemistry (characterization and distribution of chemical compounds in natural systems), hydrology (flow and transport), biology (dynamic influences of microbes and other communities), colloid, interfacial, and transport engineering (including generic mechanisms in porous media), and mathematics (analytical, statistical, and computational modeling of complex systems) to address environmental problems. Research projects combining approaches from other chemically-based science or engineering fields of study with these disciplines are also appropriate. This Environmental Geochemistry and Biogeochemistry activity is not an appropriate venue for research suitable for support in existing disciplinary programs or for research having impact on a single discipline. Such proposals should be submitted to existing disciplinary programs in the various divisions. Additionally, it is not suitable for research with an epidemiological or toxicological approach.

Research supported through this activity will facilitate development of a multi-faceted perspective and predictive understanding of the complex

interactions of the geosphere, hydrosphere, biosphere, and atmosphere as they relate to chemical transport. The results will contribute to the knowledge base used by management and policy decision-makers in planning, development, pollution avoidance, remediation, and restoration activities.

Selected examples of research areas suitable for study under this interdisciplinary research activity follow:

- interactions of inorganic and organic compounds, colloids, and microbes in natural waters, soils, and sediments, and impacts on processes such as speciation and transport behavior of contaminants and nutrients at the molecular level;
- the integrated effects of physical, chemical, biological, geological, and anthropogenic factors on chemical sorption, transport, and bioavailability in natural waters, soils and sediments;
- trace and major tropospheric gases: role of soils, biota, and coastal waters as receptors and emitters; reservoir size and flux;
- modeling, including mathematical and numerical simulation, that integrates solute/suspension transport and geochemical reactions involving inorganic and organic substances and microorganisms; developing the means for extrapolating chemical observations among different space and time scales (*e.g.*, molecular and laboratory level to field and watershed level);
- holistic, interdisciplinary studies of interactions among the geosphere, hydrosphere, biosphere, and atmosphere that elucidate a natural system's response to, and recovery from, chemical perturbations caused by natural phenomena or human activities;
- national or international workshops or conferences on appropriate topics that emphasize interdisciplinary research in environmental geochemistry and biogeochemistry.

Award lists and abstracts for the FY95 and FY96 competitions are available on-line at <http://www.nsf.gov/strata/egch/envresop.htm>. For further information about the Environmental Geochemistry and Biogeochemistry research activity, contact Maryellen Cameron, Division of Earth Sciences, (703) 306-1554, [mcameron@nsf.gov](mailto:mcameron@nsf.gov); Margaret Cavanaugh, Division of Chemistry, (703) 306-1842, [mcavanau@nsf.gov](mailto:mcavanau@nsf.gov); L. Douglas James,

Division of Earth Sciences, (703) 306-1549, ldjames@nsf.gov; Ken Buesseler, Division of Ocean Sciences, (703) 306-1589, kbuessel@nsf.gov; Mike Roco, Division of Chemical and Transport Systems, (703) 306-1371, mroco@nsf.gov; Anne-Marie Schmoltner, Division of Atmospheric Sciences, (703) 306-1528, aschmolt@nsf.gov; Gaius Shaver, Division of Environmental Biology, (703) 306-1479, gshaver@nsf.gov; or Chuck Liarakos, Molecular and Cellular Biosciences, (703) 306-1441, cliarako@nsf.gov.

### **Preparation and Submission of Proposals**

Proposals submitted in response to this solicitation will be accepted from colleges, universities, and other not-for-profit institutions in the U.S. Organizations affiliated with local, state, or federal government units (including FFRDCs) are not considered eligible. Such organizations may, however, participate in research conducted by eligible organizations by means of minor subcontracts (<10% of total requested funding) in order to cover lab, field and travel, but not salary, expenses.

Award durations of two to three years will be considered. Average annual award levels are anticipated to be approximately \$50,000 to \$100,000 per senior investigator. The total funding requested for each project, for all investigators, must not exceed \$500,000. The number of awards will depend on a variety of factors, including quality of proposals submitted and linkages with other NSF activities and programs. In FY 1997, NSF expects to make awards totaling approximately \$ 5.1 million for this activity, depending on availability of funds.

Proposals submitted in response to this solicitation **must be received no later than 5:00 pm EST on January 7, 1997** and must meet all guidelines (except for the length and deadline noted herein) specified in the NSF Grant Proposal Guide (GPG), NSF 95-27. The GPG is available in most university offices of sponsored research. It contains the forms needed to prepare the proposal and instructions for filling them out. Single copies of this brochure are available at no cost from:

NSF Publications and Supplies Unit  
4201 Wilson Boulevard  
Room P-15  
Arlington, VA 22230  
Telephone (703) 306-1130, or  
via e-mail from Internet: pubs@nsf.gov

The normal 15-page limit specified in the GPG will be strictly enforced. For group proposals involving three or more PIs/co-PIs the page limitations described in GPG, section II.D.12.b, are superseded by the following: up to 10 pages may be used for the project description plus up to 2 pages per person for description of progress under prior NSF awards.

Group and collaborative proposals involving more than one institution **MUST** be submitted as a single administrative package from one of the institutions involved. Multiple submissions will not be accepted. (These single packages may be split into separate proposals for each institution if the project is recommended for support.) The package should include one project summary, one table of contents, one project description, one section for references, and one copy of special information and appendices as specified in GPG section II.D.10-11. Additionally, the package should include, for each university and its PIs/co-PIs, a signed cover sheet, budget pages and explanation, results from prior NSF support (up to 2 pages per person), biographic sketches (up to 2 pages per person), current and pending support for each PI/co-PI, and facilities and other resources unique to each institution.

The Environmental Geochemistry and Biogeochemistry (EGB) name and solicitation number should be referenced in the upper left corner of the proposal cover sheet. Twenty stapled copies of each proposal/proposal package, including one copy bearing original signatures from all institutions, should be mailed to:

Solicitation No. NSF 96-152  
National Science Foundation  
Room P60 - PPU  
4201 Wilson Blvd.  
Arlington, VA 22230

### **Proposal Review:**

Proposals will be evaluated by ad hoc mail review, panel review, or a combination of the two in accordance with established Foundation procedures and the four general criteria described in the GPG. An additional criterion in the evaluation process will be the potential interdisciplinary synergism among the various research components. It is anticipated that each review panel will have expertise in the fields of chemistry, geochemistry, atmospheric chemistry, hydrology, oceanography, biology, engineering and mathematics.

Review and processing of proposals require approximately six months.

### ***Grant Administration:***

Grants awarded as a result of this solicitation will be administered in accordance with the terms and conditions of NSF GC-1 or FDP, **Grant General Conditions**. Copies of these documents are available at no cost from the NSF Publications and Supplies Unit, phone (703) 306-1130, or via e-mail pubs@nsf.gov (Internet). More comprehensive information is contained in the **NSF Grant Policy Manual** (NSF 95-26, July 1995), for sale through the Superintendent of Documents, Government Printing Office (GPO), Washington, D.C. 20402. The telephone number at GPO is (202) 783-3238 for subscription information. If the submitting institution has never received an NSF award, it is recommended that appropriate administrative officials become familiar with the policies and procedures in the NSF Grant Policy Manual which are applicable to most NSF awards. If a proposal is recommended for an award, the NSF Division of Grants and Agreements will request certain organizational, management, and financial information, including a certification of civil rights compliance. These requirements are described in Chapter V of the NSF Grant Policy Manual. One copy of the Grant Policy Manual will be provided free of charge to any new grantee.

### ***Related disciplinary programs:***

NSF disciplinary programs supporting research related to Environmental Geochemistry and Biogeochemistry include:

Division of Earth Sciences (703-306-1550)

Geology and Paleontology  
Hydrologic Sciences  
Petrology and Geochemistry

Division of Chemistry (703-306-1840)

Analytical and Surface Chemistry  
Environmentally Benign Chemical Synthesis and Processing  
Experimental Physical Chemistry  
Inorganic, Bioinorganic, or Organometallic Chemistry  
Organic Synthesis and Dynamics

Division of Molecular and Cellular Biosciences (703-306-1440)

Biomolecular Processes

Genetics  
Cell Biology  
Biomolecular Structure and Function

Division of Environmental Biology (703-306-1480)

Ecological Studies  
Systematic and Population Biology

Division of Bioengineering and Environmental Systems (703-306-1320)

Bioengineering  
Environmental and Ocean Systems

Division of Chemical and Transport Systems (703-306-1371)

Chemical Reaction Processes  
Fluid, Particulate and Hydraulic Systems  
Interfacial, Transport and Separation Processes

Division of Civil and Mechanical Structures (703-306-1360)

Geomechanical, Geotechnical and Geo-Environmental Systems

Division of Atmospheric Sciences (703-306-1528)

Atmospheric Chemistry

Division of Ocean Sciences (703-306-1580)

Biological Oceanography  
Chemical Oceanography  
Coastal Ocean Processes  
Marine Aspects of Earth System History  
Marine Geology and Geophysics

Division of Mathematical Sciences (703-306-1870)

Applied Mathematics  
Computational Mathematics  
Statistics and Probability

### ***Other related programs & activities:***

Arctic Systems Science - Office of Polar Programs (703-306-1033)

Earth System History (703-306-1527)

Long-Term Ecological Research (703-306-1480)

Land-Margin Ecosystem Research (703-306-1480)

NSF/EPA Partnership for Environmental Research (703-306-1480)

Terrestrial Ecology (TECO) and Global Change (703-306-1479)

Water and Energy: Atmospheric, Vegetative, and Earth Interactions (703-306-1549)

The National Science Foundation (NSF) provides awards for research in the sciences and engineering. The awardee is wholly responsible for the conduct of the research and preparation of the results for publication. The Foundation, therefore, does not assume responsibility for such findings or interpretations.

The Foundation welcomes proposals on behalf of all qualified scientists and engineers, and strongly encourages women, minorities, and persons with disabilities to compete fully in any of the research and research-related programs described in this document.

In accordance with Federal statutes and regulations and NSF policies, no person on grounds of race, color, age, sex, national origin, or disability shall be excluded from participation in, denied the benefits of, or be subjected to discrimination under any program or activity receiving financial assistance from the National Science Foundation.

Facilitation Awards for Scientists and Engineers with Disabilities (FASSED) provide funding for special assistance or equipment to enable persons with disabilities (investigators and other staff, including student research assistants) to work on NSF-supported projects. For more information see GPG, the program announcement, or contact the program coordinator at (703) 306-1636.

Upon completion of the project a Final Project Report (NSF Form 98A), including the Part IV Summary, will be required. Applicants should review this form prior to proposal submission so that appropriate tracking methods are included in the proposal plan to ensure that complete information will be available at the end of the project.

The Foundation has TDD (Telephonic Device for the Deaf) capability, which enables individuals with hearing impairment to communicate with the NSF Information Center about NSF programs, employment, or general information. The telephone number is (703) 306-0090; for FIRS, 1-800-877-8339.

Activities described in this publication are in categories 47.076, Education and Human Resources; 47.050, Geosciences; 47.041, Engineering; 47.049, Mathematical and Physical Sciences; and 47.074, Biological Sciences in the Catalog of Federal Domestic Assistance (CFDA).

**PRIVACY ACT AND PUBLIC BURDEN STATEMENTS:** The information requested on proposal forms is solicited under the authority of the National Science Foundation Act of 1950, as amended. It will be used in connection with the selection of qualified proposals and may be disclosed to qualified reviewers and staff assistants as part of the review process; to applicant institutions/grantees; to provide or obtain data regarding the application review process, award decisions, or the administration of awards; to government contractors, experts, volunteers and researchers as necessary to complete assigned work; and to other governmental agencies in order to coordinate programs. See Systems of Records, NSF-50, "Principal Investigator/Proposal File and Associated Records," and NSF-51, 60 Federal Register 4449 (January 23, 1995), "Reviewer/Proposal File and Associated Records," 59 Federal Register 8031 (February 17, 1994). Submission of the information is voluntary. Failure to provide full and complete information, however, may reduce the possibility of your receiving an award.

Public reporting burden for this collection of information is estimated to average 120 hours per response, including the time for reviewing instructions. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing the burden, to:

Herman G. Fleming	and/or to	Office of Management and Budget
Reports Clearance Officer		OIRM - Paperwork Reduction
Contracts, Policy and Oversight		Project (3145-0058)
National Science Foundation		Washington, DC 20503
4201 Wilson Boulevard		
Arlington, VA 22230		

OMB 3145-0058

**NSF 96-152**

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