

**NORTHEAST REGIONAL MEETING
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FOLLOW-UP QUESTIONS

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1. Will NSF be addressing a strategy regarding the connection of the oceans to human health? What should the Commission do concerning this issue?

Over the past four years, NSF has worked to support the accelerating interest in the U.S. scientific research community in understanding how human health is linked to the state of the natural environment. While NSF has made hundreds of research awards in recent years to support unsolicited basic research projects with fundamental bearing on the health sciences, three special – and very new – initiatives stand out with respect to their focus on the relationship between oceanographic phenomena and human health.

For over three years now, the NSF Directorate of Geosciences has participated in an interagency funding partnership with the NOAA Office of Global Programs, EPA, NASA, and the Electrical Power Research Institute (EPRI) to sponsor an extramural initiative to fund novel research in the area of *Climate Variability and Human Health (CVHH)*. From the start, the objective of this initiative has been two-fold: (1) to support the formation of multidisciplinary research teams working in close collaboration on integrated projects to investigate the mechanisms and pathways by which climate may affect human health, and (2) to explore the potential for applying climate forecasts and predictive models for use in the public health arena. Although the total annual funding has remained less than \$2M/year, the initiative has met with enthusiastic approval in the research community.

In FY 2003, the Directorate for Geosciences and the Directorate for Biological Sciences expect to release a joint program announcement soliciting proposals for interdisciplinary research in the area of the *Ecology of Infectious Diseases (EID)* pending congressional spending authority. This initiative represents the convergence of an earlier EID initiative in the Directorate for Biological Sciences with enhanced emphasis on Natural Hazards in the Environment in the Directorate for Geosciences. The goals of EID are to support (1) discovery of general principles governing the relationships between anthropogenic environmental change and the transmission of infectious agents and (2) development of predictive models. EID research will focus on the ecological dynamics in terrestrial, freshwater, or marine environments related to disease agent transmission and infection. While this competition will focus on anthropogenic environmental changes, research on the effects of regular climate phenomena (ENSO, for example) will be considered responsive to the extent that the proposed research would serve explicitly as a model for the effects of global change on the transmission of infectious disease. The total funding for EID in FY 2003 will be approximately \$10M.

Also in FY 2003, the NSF Division of Ocean Sciences and the National Institute of Environmental Health Sciences (NIEHS) expect to inaugurate a new initiative focusing specifically on *Oceans and Human Health (OHH)* pending congressional spending authority. Like the two initiatives above, OHH seeks to foster research progress by promoting the development of interdisciplinary research teams. In this case, however, we specifically aim to encourage the formation of multidisciplinary research teams composed of physical and biological scientists traditionally supported by NSF and biomedical and public health scientists traditionally supported by the National Institutes of Health. The FY 2003 call for proposals will encourage research teams to organize into multi-institutional research centers to conduct innovative studies into the incidence and prevention of disease in humans related to harmful algal blooms and pathogens in marine environments. The initiative will also support a renewed search for candidate marine natural products with potential for development as pharmaceuticals in the treatment of acute and chronic disease. We expect to fund four or five centers with awards of approximately \$1M/year for up to five years.

Recognition of the importance of this type of research would provide valuable support to federal efforts in this area.

2. How can the NORLC (or other equivalent body) become an effective interagency coordinating entity? What specifically can the Commission recommend regarding logistics/structure, funding, time table, accountability/standards, external advisory and public participation for such an entity?

Since its inception, the NORLC has made considerable progress as a coordinating entity for agencies with significant ocean interests. Activities have been supported in many areas of common interest including oceanographic facilities, education, and data management. NOPP funding has enabled the establishment of significant new partnerships in conducting innovative research across disciplines, as well as building initial links between academic and operational interests. Emphasis is now being placed on the development and implementation of an Integrated Ocean Observing System (IOOS) to address national needs.

It is noteworthy that the NORLC comprises agencies with research missions, and the majority of member agencies have operational missions dependent on a strong national oceanographic research portfolio. NORLC responsibilities do not explicitly address operational cooperation and partnering. It is appropriate to consider expansion of NORLC responsibilities into such areas of multi-agency interest.

Structural flexibility is an important element in organizational effectiveness. As currently formed, the NORLC has sufficient flexibility to create committees or other entities to focus on specific issues, to terminate such entities when appropriate, and to engage nongovernmental partners in an advisory capacity as well as in project implementation. In many respects, this structure positions the NORLC well to improve the overall effectiveness and productivity of the ocean research and development portfolio. However, as currently structured, the NORLC operates in isolation from the development

of the nation's broader federal R&D portfolio. To enhance its effectiveness, the NORLC should be linked to the National Science and Technology Council (NSTC) construct.

The NSTC, a Cabinet-level Council, is the principal means for the President to coordinate the diverse elements of the Federal research and development enterprise and to improve the link between science and policy. One of the most important tasks that the NSTC performs is to prepare coordinated R&D strategies and budget recommendations to orient science and technology toward achieving national goals. To do so, the NSTC established five goal-oriented committees: Science; Technology; Environment and Natural Resources; International Science, Engineering and Technology; and National Security. Ocean issues cut across all of these committees. Discussion on how best to feed the deliberations of the NORLC into this construct will occur at the January 2003 meeting of the NORLC. One mechanism currently under investigation is to ask the NOPP Interagency Working Group (IWG) to serve as a Subcommittee on Oceans under both the NSTC Committee on Science and the Committee on Environment and Natural Resources. This would link the NORLC with the NSTC.

An issue to be considered would be the difficulty agencies encounter transferring funds for jointly funded projects. NOPP member agencies need an effective mechanism to transfer funds for joint projects, which may require a legal mechanism that does not now exist, but is sorely needed. Without such authority, funding of joint projects by two or more agencies entails overcoming significant administrative hurdles.

3. Should the Federal Government engage environmental NGO groups more closely in defining lines of research or in selecting research proposals for funding?

NGOs, including environmental organizations and industry, can and do play a valuable role in the context of ocean research. At present, representatives of NGOs and industry are invited to participate in the science planning and funding process at several stages.

The planning stage offers an excellent opportunity for nongovernmental representatives to contribute to the development of a new program, or refine an existing one. NGO representatives are often invited to serve on advisory committees and panels that shape research initiatives.

In recent years, research proposals across the federal government have been increasingly subjected to merit review. The nature of the research programs often dictates those qualified to provide effective merit review. Program managers seek experts, including members of NGOs, to participate in the proposal review process either as ad hoc or panel reviewers.

Federal agencies should be encouraged to continue to identify opportunities to involve NGO representatives in shaping research programs and in providing expertise related to potential impacts of research proposals. However, caution must be taken to separate

advocacy from the selection process for research proposals. Ultimately, policymakers and the public must be confident that the research results are of the highest scientific quality.

4. Should the U.S. define a "data policy" to guide public data and information distribution, for data collected with Federal funds for research and operations? What should this policy be?

Ocean Sciences is unique among scientific disciplines in the variety and complexity of the observations it collects in the context of scientific investigations. Data are collected by diverse means, across a broad range of disciplines, and by wide-ranging organizations (individual researchers, institutions, private industry, state and local agencies and government organizations) for a wide variety of purposes. These data come in many different forms, from a single variable measured at a single point to multi-variate three-dimensional and time-dependent data sets. Since the inception of the centralized national data centers, multiple new data types have evolved in ways that cannot be easily incorporated or redistributed into these archives. The growth in data categories and the many methods of data submission (some are in digital form, others consist of physical samples or specimens) taxes established archive systems that have not chosen a flexible architecture.

The challenge before us is to develop a more efficient and attractive way for people and organizations that have collected ocean data to effectively document and share their data. The old paradigm of mandating that federally-funded data collectors send their data to a limited set of national data centers has not always been effective in encouraging subsequent use of these data. Lessons learned from the past tell us that the design and implementation of data archives and distribution systems should provide the flexibility to incorporate new developments in information technology, hardware, data types, and data aggregation methods. A wealth of new data is generated by local, state and commercial enterprises that are now not submitted or linked to the national network. The architecture of the next generation data archive needs to embrace an expanded customer service concept if it is to be fully populated as an archive and used to serve the ocean community and its constituents.

Virtual, distributed systems appear promising as future archives. In the past few years (since 1997) new concepts to manage distributed data sets (e.g., the Distributed Ocean Data System and Unidata data exchange protocols) have evolved and are providing much more attractive solutions to sharing data. Funding for this software development has come from individual Federal agencies (e.g., NASA, NOAA and NSF) and this distributed data system is now being implemented under the National Ocean Partnership Program (NOPP), as Congressionally directed in the original NOPP legislation. In addition, under the NSF Information Technology Research (ITR) program, new tools for distributing, accessing, combining and analyzing heterogeneous data sets are being proposed and/or developed under the names of geoinformatics, bioinformatics and digital libraries. Again, the key concept in this new paradigm is a distributed system in which the difference between data user and provider is blurred for the scientists and simplified for the non-technical end-users. Finally, ocean scientists, through community workshops,

are working on developing much needed metadata standards that can provide potential data users the information they need to determine if a particular data set is useful for their application. Redesign or reinvention of a national archive system that utilizes many of these concepts would markedly improve the utility and robustness of a data archive and distribution system.

The availability of flexible architectures may obviate the need for a detailed national ocean data policy. However, a policy that establishes a broad set of principles and approaches would provide a valuable framework for oceanographic data. In particular, as more and more users require access to real (or near real) time data and information from the Integrated Ocean Observing System and affiliated ocean observatories, we need to move toward a full, free, immediate and unrestricted access data policy for such oceanographic observational data. Meaningful partnerships between government, academia, industry, and the public (such as those fostered under NOPP) are critical to the successful consensus development of national oceanographic data exchange standards and protocols. The standards and protocols, similar in principle to those developed in support of the Internet, should provide a flexible framework that will accommodate data provided by a variety of sources -- from an individual researcher to a national observing system. The NORLC will work with appropriate partners to further develop recommendations for an effective ocean data policy.