



# Division of Ocean Sciences

Fall 2003 Newsletter

## Ocean Observatory Science

by Alexandra Isern

Over the past several months, there has been much activity in anticipation of our ability to provide the ocean science community with a new set of tools and observational capabilities. Building on several community workshop reports and two National Academy of Sciences studies, it has been demonstrated that in order to meet data collection requirements for modern ocean science research, new types of infrastructure are needed that are capable of providing long-term, high-resolution observations of critical environmental parameters on appropriate time and space scales. Consequently, the Division of Ocean Sciences (OCE) has been working to secure funds to construct an ocean observatory network. Funds for the Ocean Observatories Initiative (OOI) are being sought through NSF's Major Research Equipment and Facilities Construction (MREFC) account. OOI infrastructure will provide the oceanographic research and education communities with new modes of access to the ocean. The OOI has three primary elements: 1) a regional cabled network consisting of interconnected sites on the seafloor spanning several geological and oceanographic features and processes, 2) relocatable deep-sea buoys that could also be deployed in harsh environments such as the Southern Ocean, and 3) new construction or enhancements to existing systems leading to an expanded network of coastal observatories.

Just as the U.S. academic research fleet is accessible to all investigators, the OOI will begin building an openly accessible network of ocean observatories to facilitate the collection of

long time-series data sets needed to understand the dynamics of biological, chemical, geological and physical processes. The primary infrastructure for components of the OOI includes both dedicated fiber-optic cables to shore and moorings capable of two-way communications with a shore station. Moorings are envisioned to be either freestanding, as for the global array of buoys, or attached to fiber optic cables to provide the capability for water column investigations. Seafloor junction boxes connected to this primary infrastructure will support individual instruments or instrument clusters at varying distances from cables as well as the moorings. These junction boxes include undersea connectors that provide not only the power and two-way communication needed to support seafloor instrumentation, but also the capability to exchange instrumentation in situ when necessary for conducting new experiments or for repairing existing instruments.



In the NSF FY 2004 President's Budget Request to Congress, the OOI MREFC request was listed as a priority new start for FY 2006. Because funds acquired through the MREFC account can only be used for specific activities related to the construction and implementation phase of the initiative (see inset circle in the diagram above), it is important to distinguish the other necessary and varied ocean observatory activities that OCE currently funds and will fund in the future (such as those activities in the outer circle in the figure). The overarching ocean observatory science activity that includes the OOI construction phase, has been named ORION (Ocean Research Interactive Observatory Networks). Included within ORION are

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Dear Colleagues,

I am writing this note from the Monterey Bay Aquarium Research Institute's (MBARI) *Western Flyer* during a 5-day cruise off the central California coast. I joined the cruise to observe first hand the capabilities that Remotely Operated Vehicles (ROVs) such as MBARI's *Tiburion* now offer ocean scientists. These impressive tools for exploring and sampling the water column and seafloor exemplify how new technologies and infrastructure are changing ocean science. OCE is developing and building new tools for ocean science in five categories: ocean drilling, deep submergence, oceanographic ships, ocean observatories and "cyberinfrastructure". Ideas for these new facilities have broad support and trace their origins back to recommendations from workshop or reports. Some projects, like new ships, are upgrades or replacements for traditional oceanographic platforms. Others, like ocean observatories, will provide new opportunities for exploring and observing the water column and sea floor. This letter provides an update to some of these important projects.



The next phase of scientific ocean drilling, the Integrated Ocean Drilling Program (IODP), begins on 1 October 2003, and will eventually be supported by two large drill ships provided by the U.S. and Japan, as well as mission specific platforms from Europe and elsewhere. The program will begin before either of the new ships are ready for drilling but both are expected to be on-line within 2-3 years. NSF has begun negotiations with Joint Oceanographic Institutions, Inc. (JOI) which, if successful, would establish JOI as its prime contractor for converting and operating a vessel for scientific drilling. Japan's new ship, *Chikyu*, is under construction and will be operated by the Japan Marine Science and Technology Center (JAMSTEC). *Chikyu* is the largest vessel ever to be constructed for ocean science. It is a vessel with riser drilling capability which means, among other things, that it can safely drill in sediments having high hydrocarbon content. The two large drill ships and the mission specific platforms will provide IODP scientists modern capabilities to collect and process samples to study the deep biosphere and subseafloor ocean, climate fluctuations and change, and solid earth cycles and geodynamics, including the seismogenic zone.

Following the publication of the Federal Oceanographic Facilities Committee (FOFC) report for academic fleet renewal in December 2001, agency plans for new ships for the academic fleet received increasing scrutiny from the UNOLS Council, its subcommittees and from many other ocean scientists. The Council and others recognize that the academic fleet is not getting any younger, and it takes many years to design and build new ships. OCE is presently involved in two projects recommended by the FOFC plan. A few years ago, OCE received funds to design the Alaska Region Research Vessel (ARRV) – an ice-strengthened ship to replace the aging *Alpha Helix*. The design was completed this year and, in August, the National Science Board approved the ARRV for consideration in a future NSF budget submission. As this is a comparatively large and expensive ship, the source of funds would be from NSF's Major Research Equipment and Facilities Construction (MREFC) account. Once completed, the ARRV will bring an impressive new capability to the Gulf of Alaska, Bering Sea and points north for studies of marine ecosystems, fisheries oceanography, the effects of changing climate on the North Pacific, and the interesting seafloor geology of the region. OCE is also moving forward with a plan to build three new Regional class oceanographic ships as called for by the FOFC plan. Last year, UNOLS hosted workshops to define science mission requirements for these vessels, and OCE engaged a marine architect this year to review those requirements as part of the initial design and costing process. If all goes as planned, early next year OCE will announce a

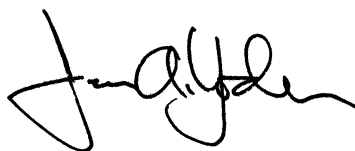
competition leading to the design and construction of regional class vessels with the goal of acquiring three vessels by the end of this decade.

Deep submergence science received a new tool in September, 2002, when *Jason-2* began operations. This new ROV has impressive capabilities including 6500m depth capability; increased power, thrust, lighting and payload compared to *Jason-1*; and powerful hydraulic manipulators with high dexterity. Last year we asked the Ocean Studies Board (OSB) to consider future deep submergence needs for research. One motivation for our request is the desire among some in the research community to replace *Alvin* with a more capable human-occupied submersible. Others argue that ROVs like *Jason-2*, *Tiburon* and similar un-manned vehicles are now so sophisticated and capable that human-occupied submersibles are no longer required. OCE will use the OSB report, anticipated this fall, to help guide future investments in deep submergence vehicles.

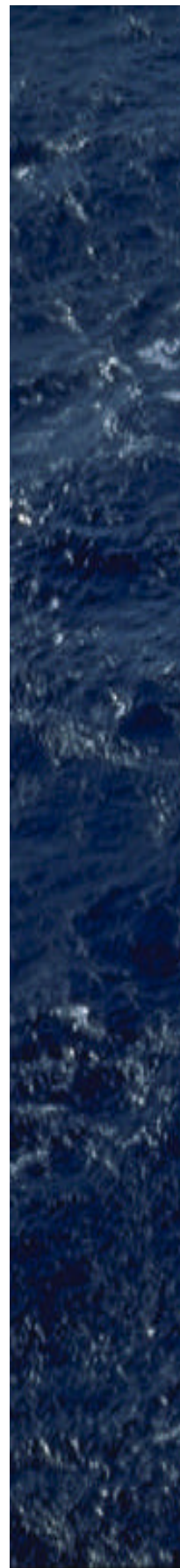
ORION is the name OCE now uses to reference NSF's Ocean Observatories Initiative (OOI) and its associated science activities (see cover article). The President's FY 2004 Budget Request to Congress indicated that OOI would be considered a priority new start in FY 2006. The goal is for full implementation by the end of the decade. ORION is an ambitious undertaking to build and operate coastal, regional and open ocean observatories for basic research. It will require considerable additional planning that will build on what has occurred to date, including a recent, comprehensive NRC report on implementation. OCE is sponsoring a large workshop in January to continue developing the preliminary science plan for ORION, and we anticipate and encourage broad participation. We also recently released an announcement requesting proposals for a Project Office. The Project Office will develop detailed plans and budgets to construct and operate the observatories, and will coordinate ORION with other NSF initiatives such as EarthScope and NEON (National Ecological Observatory Network), as well as the Integrated Ocean Observing System (IOOS).

In addition to platforms, OCE also recognizes the needs for "cyberinfrastructure" – a term that refers to the computer hardware, software and networks for calculations, data processing, data archiving and for efficient dissemination of results. NSF is planning a significant initiative, and OCE has formed a working group to identify the ocean science community needs and priorities.

From the descriptions above, one can see that OCE has many projects underway to provide new tools for ocean scientists. However, we cannot provide all of what academic oceanographers need to support their goals for research and applications. As has been true throughout the history of U.S. ocean science, we need other partners in the federal government and elsewhere to help support the high cost of modern science and its applications. A vision for the future of the field, and how the products of research will address societal needs, is also important if we are to capture and sustain federal interest and resources. A few years ago, the Directorate for Geosciences developed a plan for the future entitled, "NSF Geosciences Beyond 2000" and OCE published a companion document based on considerable community input entitled, "Ocean Sciences at the New Millenium". Much of the infrastructure that we now request is based on requirements to implement these plans. We revisit the plans periodically to make sure that the science themes reflect current thinking, and that we are on the right track for implementation. We are also working with the external community to articulate a compelling vision for ocean science, the societal benefits that will be realized as we work towards that vision, and how this quest leads to our needs for new infrastructure and other requirements. These three ingredients - a compelling vision, partnerships and plans based on community input - will help us justify the new tools we need for the future.



James A. Yoder  
Division Director



(Observatory Science continued from page 1)

research and operations support, maintenance, and mobile observational capabilities, such as floats, gliders, and drifters.

Within the past 18 months many planning activities have been underway with additional ones planned for later this year. All have been designed to better define various aspects of the ORION as the community prepares for the future appropriation of OOI funding. These activities are listed in the table below. Copies of those reports noted with an asterisk can be requested from OCE and links to electronic files of most of these reports can be found

Table 1: Listing of completed, ongoing, and future activities related to ocean observatories

Completed Activities/Reports	Dates
<i>Coastal Ocean Processes and Observatories: Advancing Coastal Research*</i>	Nov-02
NRC Report <i>Enabling Ocean Research in the 21st Century: Implementation of a Network of Ocean Observatories</i> <sup>#</sup>	Jul-03
<i>Scientific Cabled Observatories for Time Series*</i> Workshop	Jul-03
Update of the OOI brochure*	Jul-03
<i>Implementation Plan for the DEOS Global Network of Moored-Buoy Observatories</i>	Aug-03
In Progress and Future Activities	Dates
Committee assessing technical issues related to cable re-use	Sep-03
Science Planning Workshop for the Regional Cabled Observatory	Jan-04
ORION: Ocean Research Interactive Observatory Networks Workshop	Jan. 4-8, 2004

\* Reports are available online at [www.coreocean.org/DEOS](http://www.coreocean.org/DEOS) or by request to [ocepubs@nsf.gov](mailto:ocepubs@nsf.gov)

# Available in October 2003 from the National Academy Press ([www.nap.edu](http://www.nap.edu)) or by request to [ocepubs@nsf.gov](mailto:ocepubs@nsf.gov)

on the ORION website (<http://www.coreocean.org/DEOS>) or on the Division of Ocean Sciences website (<http://www.geo.nsf.gov/oce/ocepubs.htm>).

In order to better ensure that activities related to ORION are managed properly and are responsive to community needs, OCE has recently released a solicitation to establish a Project Office to Coordinate Ocean Observatory Activities ([http://www.nsf.gov/pubsys/ods/getpub.cfm?ods\\_key=nsf03576](http://www.nsf.gov/pubsys/ods/getpub.cfm?ods_key=nsf03576)). The Ocean Observatories Project Office will be expected to successfully complete the following tasks:

- Identify and facilitate committees for continued refinement of the OOI network design: An advisory structure must be established

that provides the scientific leadership required by the community to define user needs for a research observing system that includes global, regional, and coastal systems. This advisory structure will also have committees targeted to address technical and engineering issues related to the implementation of this research observing system.

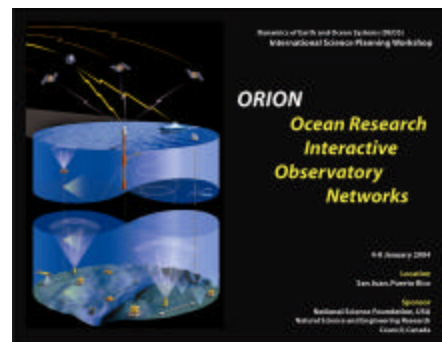
- Develop a consensus vision for the OOI organizational structure, governance, and operating plans: The Project Office will develop a Science Plan for the OOI based on input and recommendations from the advisory structure and then use this Science Plan to develop the various components of a Project Execution Plan for the construction phase of the OOI as outlined in NSF’s “Facilities Management and Oversight Guide” (see <http://www.nsf.gov/bfa/lfp/>).

- Identify and engage all constituencies of the ocean science research community in consensus-building activities: The Project Office will lead, coordinate and serve as the community focal point for research observatories in the ocean sciences and will report to NSF regarding these activities. Activities should include those that promote the development of integrated experimentation, computation, theory, and model-based simulation.

- Operate an interactive web site for communicating with the ocean science community in regards to OOI activities and planning: The Project Office will develop an interactive website that will serve as the definitive source of information about the OOI for not only the ocean science community but also for operational oceanographers, the wider scientific community, and the public.

The deadlines for proposals are: September 29, 2003 for Letters of Intent (required) and October 27, 2003 for Full Proposals.

A major activity related to ORION and the OOI is the ORION workshop to be held January 4-8 in San Juan, Puerto Rico. The goal of this workshop is to formulate science priorities and educational opportunities that can be addressed using ocean observatories. This workshop will include participants from the entire spectrum of the oceanographic community both nationally and internationally. Registration information and other details on this workshop can be found on the ORION website (<http://www.coreocean.org/DEOS>). As this will be a large workshop with many evolving activities, it will be important to periodically check this website for new information.



## Proposal Target Dates/Deadlines

### Programs

### Target Dates/Deadlines

#### **Ocean Section (OS)\***

Unsolicited proposals for Biological Oceanography, Chemical Oceanography, and Physical Oceanography Feb. 15 & Aug. 15

#### **Marine Geosciences Section (MGS)\***

Unsolicited proposals for Marine Geology & Geophysics and the Ocean Drilling Program Feb. 15 & Aug. 15

#### **Integrative Programs Section (IPS)**

Instrumentation Development/OTIC Feb. 15 & Aug. 15

Shipboard Scientific Support Equipment TBD

Oceanographic Instrumentation TBD

Ship Operations TBD

Oceanographic Technical Services TBD

#### **Crosscutting/Interdisciplinary Opportunities**

Climate Variability and Predictability (CLIVAR) Feb. 15 & Aug. 15

Ridge Inter-Disciplinary Global Experiments (Ridge 2000) Feb. 15 & Aug. 15

Earth System History (ESH) Oct. 15, 2003 (deadline)

Ecology of Harmful Algal Blooms (EU-US ECOHAB) Oct. 16, 2003 (deadline)

Integrated Carbon Cycle Research (ICCR) Oct. 22, 2003 (deadline)

Continental Margins Research (MARGINS) Nov. 3, 2003 (deadline)

Long-Term Ecological Research (LTER) Jan. 13, 2004 (deadline)

Research Experiences for Teachers (RET) Supplements contact program

#### **Other NSF programs of interest to ocean scientists**

Research Experiences for Undergraduates (REU) Program (contact research program regarding REU Supplements) Sept. 15 (deadline)

Biocomplexity in the Environment (BE) deadlines vary

Nanoscale Science and Engineering (NSE) deadlines vary

Information Technology Research (ITR) deadlines vary

Major Research Instrumentation (MRI) Jan. 22, 2004 (deadline)

Ecology of Infectious Diseases (EID) Feb. 13, 2004 (deadline)

CAREER (Faculty Early Career Development Program), Geosciences Directorate July 22, 2004 (deadline)

Opportunities for Enhancing Diversity in the Geosciences (OEDG) Oct. 18, 2004 (deadline)

\* Proposals for field programs that require the use of University-National Oceanographic Laboratory System (UNOLS) ships in the following calendar year (2005) must be submitted by the February 15, 2004, target date.

## NEW FUNDING OPPORTUNITIES!

Several new funding opportunities involving OCE have been announced recently. We encourage you to take a look at the following solicitations online at <http://www.nsf.gov/home/geo/>:

**Research Experiences for Teachers (Supplements) (NSF 03-056).** Contact relevant Program Officer and/or Lisa Rom (erom@nsf.gov) for further information.

**Cooperative Activities in Environmental Research between the National Science Foundation and the European Commission: Ecology and Oceanography of Harmful Algae (NSF 03-580)**  
Deadline: Oct. 16, 2003

**Ocean Observatories Initiative Project Office to Coordinate Ocean Observing Activities (NSF 03-576)**

Letter of Intent Due Date (required): Sept. 29, 2003

Full Proposal Deadline: Oct. 27, 2003

**U.S. Science Support Program Associated with the Integrated Ocean Drilling Program (NSF 03-586)**

Deadline: Nov. 3, 2003

**Long-Term Ecological Research (LTER) in Coastal Ocean Ecosystems (NSF 03-599)**

Deadline: Jan. 13, 2004

## Ship Time Requests – What? When? Why? How?

*by Michael Prince and Linda Goad*

Proper submission of Ship Time Requests is imperative to the successful and timely conduct of field work associated with a funded research project. The information below is intended to provide background on the scheduling process as well as helpful instructions on submitting and monitoring Ship Time Requests.

### Ship Time Request System - the heart of equal access to ocean research facilities

Ship Time Requests submitted through the UNOLS system are at the core of a system designed to provide equal access for all ocean science researchers to the appropriate research vessels and facilities.

By correctly filling out your Ship Time Request and by keeping it up to date, you enhance the ability of the schedulers and program managers to effectively schedule your project.

### Understand the timing of the scheduling process

In order to create schedules based on funded projects, NSF has determined that proposals must be submitted by the February deadline in order to be scheduled in the following calendar year. Proposals submitted later, such as for the August deadline would be approved for ship time no earlier than January of the year after the following calendar year (e.g., an August 2004 proposal, if funded, would go to sea no earlier than January 2006).

UNOLS research vessels are scheduled on a calendar year basis, with preliminary schedules created in the previous summer. Every attempt is made to finalize schedules by the end of September for the following year, but late funding decisions, changing requirements and other factors have made this increasingly difficult. Major projects requiring large ships, multiple ships and facilities, or operations in the remote regions of the world, should be submitted as early as possible and should be planned with as much flexibility as possible for the actual scheduling of field work.

### Accurately tie the Ship Time Request to proposal information

To ensure that projects are tracked correctly by program managers and schedulers and are scheduled according to approved funding levels, it is extremely important that the identifying information on the Ship Time Request is reflective of the proposal (or proposals) submitted to NSF. This is especially important for collaborative proposals. There have been several occasions in the past when a funded project was not recognized and scheduled properly because the information provided differed from that in the proposal.

Ship Time Requests should be submitted under the name of the lead PI on the proposal for which ship time will be approved. Co-PI's, collaborators and prospective Chief Scientists can be listed in the appropriate sections of the Ship Time Request but should not be listed as the PI. The request can be entered into the system by someone other than the PI with their own contact information noted, but the PI should still be listed as such for purposes of tracking the request with the proposal.

Once the proposal has been submitted through Fastlane and a proposal number has been assigned, go back and edit the Ship Time Request to show the NSF proposal number (i.e., OCE number). This cannot be done automatically under the current system. The correct proposal number helps track the request and is required by the ship operators. Temporary numbers do not help and should not be included. Institution numbers are only needed if they are useful to the PI or institution.

Include the Ship Time Request as the last page (in the supplemental documents section) when you submit your



proposal, but continue to edit the online version as changes become necessary during the review and approval process.

### **Keep your Ship Time Requests current and remove unnecessary requests**

Create a new Ship Time Request when submitting a new proposal, including resubmission of a proposal that was previously declined. If you use an existing Ship Time Request that the schedulers and facilities program managers associate with a declined project, it could get lost in the process. A new Ship Time Request will ensure that it is associated with the new proposal.

Use more than one Ship Time Request if your project requires more than one ship doing substantially different work, especially when the work area will be very different. Also, use more than one request when the number of years or cruises exceeds the limits of the form. Divide the requests in any logical way. Keep the requests up to date when requirements for timing, type of equipment or type of ship change. Remove requests from the system that are no longer required because the work has been completed or the project was not funded.

Make sure when you create a new request or make changes to an existing request that you click on the "Final Form Submission" button, which will transmit your request to the facilities program managers, schedulers and yourself. It will also enter the request into the searchable database used by schedulers. If you need to save your work and make changes before submitting the request as final, you can use the "submit as draft" button, but remember that this will not put the request in the system and make it available to schedulers. The email you receive at that point is for your records only and does not go to anyone else.

Use a password that you can easily remember so that you can return to edit your request in the future. Contact the UNOLS office if you need help with your password.

Changes are planned to enhance and improve the system to make it easier to use and a more effective tool for scheduling, cruise planning and reporting.

Over the next year, the UNOLS office, working with the Ocean Information Center (OCEANIC), will create an updated version of the Ship Time Request system. The current system has been in existence for over ten years and is based on text files and scripts. Although effective in making sure that a PI located at any institution or location can make their research vessel and facility requirements known to program managers and schedulers, the system can be awkward and difficult to use and to keep up to date.

A newer system built on an SQL relational database with a web based front end will be designed. This will allow PI's to create an account through which they can manage their Ship Time Requests and track the associated research vessel schedules by logging in with a single password. Requests will be automatically tied to the PI's contact information and to project specific information. New projects and new requests can be created by duplicating and then editing older records. Schedules will be tied directly to requests, as will reports and cruise planning information.

The committee working on this project would appreciate your input. Any suggestions that will be useful in creating the new system can be sent to the UNOLS office [office@unols.org](mailto:office@unols.org).

## **R E M I N D E R ! ! !**

All investigators submitting proposals to the Division of Ocean Sciences that include sea-going field work must also submit an electronic research ship request form and include a copy with the proposal. Electronic ship request forms are available on the UNOLS Home Page web site (<http://www.unols.org>). In addition, investigators submitting proposals that require use of a UNOLS ship to NSF programs other than Ocean Sciences must follow the same procedure.

Please note that ship time requests **must be received by the Feb. 15 target date** to be considered for ship time in the following calendar year.

## Publications Available



***An Information Technology Infrastructure Plan to Advance Ocean Sciences***  
Ocean Information Technology Infrastructure Steering Committee

For copies, please e-mail a request to [ocepubs@nsf.gov](mailto:ocepubs@nsf.gov) or go to <http://www.geo-prose.com/oiti/report.html>.

***Charting the Future for the National Academic Research Fleet: A Long-Range Plan for Renewal***  
Federal Oceanographic Facilities Committee



For copies, please e-mail a request to [ocepubs@nsf.gov](mailto:ocepubs@nsf.gov) or go to <http://www.geo.nsf.gov/oce/ocepubs.htm/>



***Ocean Observatories Initiative (OOI) Brochure***  
DEOS Steering Committee

For a copy of the brochure, please e-mail a request to [ocepubs@nsf.gov](mailto:ocepubs@nsf.gov). For more information on OOI activities, go to <http://www.COREocean.org/DEOS>.

***Ocean Sciences at the New Millennium***  
Decadal Committee,  
Peter Brewer and Ted Moore,  
co-chairs



For copies, please e-mail a request to [ocepubs@nsf.gov](mailto:ocepubs@nsf.gov) or go to [http://www.joss.ucar.edu/joss\\_psg/publications/decadal/](http://www.joss.ucar.edu/joss_psg/publications/decadal/).



***SCOTS: Scientific Cabled Observatories for Time Series***  
SCOTS Steering Committee

For copies, please e-mail a request to [ocepubs@nsf.gov](mailto:ocepubs@nsf.gov) or go to [http://www.geo-prose.com/projects/scots\\_rpt.html](http://www.geo-prose.com/projects/scots_rpt.html).

***Earth, Oceans and Life: Integrated Ocean Drilling Program Initial Science Plan, 2003-2013***

The Initial Science Plan, and additional planning information on the program, is available at <http://www.IODP.org/>.





# PROGRAM NEWS

## Crosscutting Programs

### Biocomplexity in the Environment

See Ocean Technology and Interdisciplinary Coordination (OTIC) news.

### Collaborations on Mathematical Geosciences (CMG)

The Collaborations on Mathematical Geosciences (CMG) program is a joint effort between the Directorate for Geosciences and the Division of Mathematical Sciences. The purpose of CMG is to enable (A) collaborative research at the intersection of mathematical sciences and geosciences and also (B) to encourage cross-disciplinary education through summer graduate training activities. The projects must be collaborative in nature and should include at least one geoscientist and one mathematical scientist. In the past, research topics have fallen within one of two broad themes: mathematical and statistical modeling of large, complex geosystems or representing uncertainty in geosystems. Several OCE-related research projects have been funded on topics including data assimilation, climate predictability, Lagrangian transport and horizontal convection. In addition, a summer school regarding the statistics of optical ocean observations was held in 2003. For future solicitations, we would like to encourage proposals from a wide range of OCE topics including the mathematical modeling of ecosystems. In prior years 80-95 proposals have been received with a funding rate of approximately 15-20%. The average award per PI per year is approximately \$60,000.

### Integrated Carbon Cycle Research (ICCR)

In late July, the NSF Directorate for Geosciences released the FY 2004 program announcement for the Integrated Carbon Cycle Research Program (NSF 03-582). The purpose of ICCR is to support research projects related to the U.S. Carbon Cycle Science Plan. This year's program announcement (the second in the ICCR series) specifically solicits proposals focusing on carbon cycling and carbon biogeochemistry in drainage basins and ocean margins. While study areas may be within or outside of North America, proposals should in any case demonstrate a multidisciplinary research approach. Funding may be requested for up to five years. Pending the availability of funds, the Directorate expects to recommend a total of \$5M in awards in FY 2004. The deadline for proposal submission (by FastLane of course) is 22 October 2003, 5:00 pm local time of the submitting institution.

For further information, including guidance on NSF contact personnel, please consult the full program announcement available online at: [http://www.nsf.gov/pubsys/ods/getpub.cfm?ods\\_key=nsf03582](http://www.nsf.gov/pubsys/ods/getpub.cfm?ods_key=nsf03582).

### Research Experiences for Teachers (RET) Supplements

The Division of Ocean Sciences (OCE) would like to call your attention to a new activity called Research Experiences for Teachers (RET) (see <http://www.nsf.gov/pubsys/ods/getpub.cfm?nsf03056>). PI's may now request supplements to support teachers who wish to participate in their research programs. The intent of this endeavor is to facilitate professional development of K-12 science teachers through research experience at the cutting edge of science. OCE encourages all its grantees to make special efforts to identify talented teachers for participation in this RET-supplement opportunity.

We believe that encouraging active participation of teachers in on-going NSF projects is an excellent way to reach broadly into the teacher talent pool of our nation. The goal of the RET-supplement is to help build long-term collaborative relationships between K-12 teachers of science and the NSF research community. OCE is particularly interested in encouraging its researchers to build mutually rewarding partnerships with teachers in economically disadvantaged school districts.

A request for funding of a RET-supplement should be made under an existing NSF award or within a proposal for a new or renewal NSF award. The description of the RET-supplement activity should clearly articulate in some detail the form and nature of the prospective teacher's involvement in the Principal Investigator's ongoing or proposed research. Since it is expected that the RET-supplement experience will also lead to transfer of new knowledge to classroom activities, the RET-supplement description should also indicate what sustained follow-up would be provided to help in translating the teacher's research experience into classroom practice. A brief biographical sketch of the teacher should also be included.

The duration of the RET-supplement will generally be one year and the project may be carried out during summer months, during the academic year, or both. For guidance and inquiries concerning the RET-supplement, including the application due date, the Principal Investigator should consult with Lisa Rom, ([erom@nsf.gov](mailto:erom@nsf.gov) or 703-292-8582) and the Program Director of his/her particular NSF award.

### Ridge 2000

See Marine Geology and Geophysics news.

### Sensors and Sensor Networks

See Ocean Technology and Interdisciplinary Coordination (OTIC) news.

# OCEAN SECTION

## Biological Oceanography

### EC-NSF Research on Harmful Algal Blooms

In the previous newsletter we reported on a Program-sponsored workshop to outline future collaborative efforts between the US (ECOHAB) and European (EUROHAB) harmful algal bloom (HAB) research communities. The results of this workshop have been presented at a number of national meetings and a draft of the workshop report has been posted on the Harmful Algae Page web site (<http://www.who.edu/redtide/announcements/trieste-workshop.html>). As a follow up to this workshop, NSF's Division of Ocean Sciences has announced an opportunity for funding, *Cooperative Activities in Environmental Research between the National Science Foundation and the European Commission: Ecology and Oceanography of Harmful Algae* (NSF 03-580), available online at <http://www.nsf.gov/pubsys/ods/getpub.cfm?nsf03580>. The deadline for proposals is 16 October 2003.

This solicitation invites proposals for coordinated studies between United States and European Union researchers focused on the ecology and oceanography of harmful algal blooms (US-EU ECOHAB). Because the fundamental ecological and oceanographic factors controlling harmful algal blooms are not well known, it is presently impossible to predict the occurrences of HABs, assess potential effects on ecosystems, or to develop effective mitigation strategies. This cooperative research initiative between the EU and the US will address this lack of fundamental scientific information.

### Long-Term Ecological Research

To enhance the scope and disciplinary breadth of the Long-Term Ecological Research (LTER) Network, the National Science Foundation (NSF) announces a competition for up to three new LTER sites that focus on ecological systems in the coastal ocean, which, in this context, includes ecological systems from the shoreline outward on continental shelves as well as the Laurentian Great Lakes. This competition solicits proposals to augment this nationally and internationally recognized research program, and to support long-term research in fundamental, inter-disciplinary environmental science (see <http://www.nsf.gov/pubsys/ods/getpub.cfm?nsf03599>).

This is one of a continuing series of solicitations for NSF's LTER Program and the third solicitation from the Division of Ocean Sciences in support of the Program. With an initial set of six sites selected in 1980, the National Science Foundation established the Long-Term Ecological Research Program to conduct research on long-term ecological phenomena. The present total of 24 sites

represents a broad array of ecosystems and research emphases. The LTER Program is supported at present by many parts of NSF. The research activities are supported by the Division of Environmental Biology; the Office of Polar Programs; the Division of Social, Behavioral and Economic Sciences; and the Division of Ocean Sciences. Additional support for educational and international activities is provided by the Directorate for Education and Human Resources and the Office of International Science and Engineering, respectively.

### Updated Website

Please check out the Biological Oceanography Program's website (<http://www.geo.nsf.gov/cgi-bin/geo/showprog.pl?id=35&div=oce>) if you have not visited it lately. There are many new items of information pertaining to the activities of the Program overall.

### Staffing

Changing of the watch: At the end of May, Phil Yund finished his tour of duty in the Program and returned to his position at the University of Maine. Phil brought energy, enthusiasm, humor, and insight to the rotator job, and OCE colleagues will miss him. Phil's replacement is Joseph R. Pawlik from the University of North Carolina at Wilmington where he is a Professor in the Department of Biological Sciences and a researcher at the Center for Marine Sciences.

Joe got his BS in Biology at the University of Minnesota, Twin Cities, his PhD in Marine Biology from Scripps Institution of Oceanography/UCSD, and he did post-doctoral work at Woods Hole Oceanographic Institution, Friday Harbor Labs, and the University of Alberta, Edmonton. Joe's research specialty is marine chemical ecology, particularly the chemical defenses of tropical sponges, cnidarians and tunicates. His past work has included studies of invertebrate larval ecology and settlement cues. More can be found at <http://people.uncw.edu/pawlikj/>. In addition to research background, Joe brings with him 12 years of teaching and training experience at a predominantly undergraduate institution. Joe is looking forward to the new challenges of working at NSF, learning about the broad range of research projects funded by Ocean Sciences, and helping the Biological Oceanography Program to make well-informed funding decisions.

Rotator Position in Biological Oceanography: We are seeking someone to join the program as another visiting scientist (rotator) at the end of Lita Proctor's tenure early in 2004. Please see the job announcement on the NSF webpages and talk to Phil Taylor or Dave Garrison in the Program.

Phil Taylor ([prtaylor@nsf.gov](mailto:prtaylor@nsf.gov))  
 Dave Garrison ([dgarrison@nsf.gov](mailto:dgarrison@nsf.gov))  
 Joe Pawlik ([jpawlik@nsf.gov](mailto:jpawlik@nsf.gov))  
 Lita Proctor ([lproctor@nsf.gov](mailto:lproctor@nsf.gov))  
 Gayle Pugh ([gpugh@nsf.gov](mailto:gpugh@nsf.gov))

## Chemical Oceanography

As most of you know by now, the NSF Chemical Oceanography Program has just advanced from being the primary source of funds for unsolicited research proposals in ocean chemistry to being the only source. Earlier this summer, the Office of Naval Research, for more than a quarter-century our major partner in funding basic research in marine chemistry announced that its marine chemistry program would stand down this year. Shortly after setting up the ONR Marine Chemistry Program, Neil Andersen came to NSF and did the same thing here – and stayed. The rest is history, of course, but the two programs have had an illustrious history together. We will miss our big sister, but we look back with gratitude for all the good times.

During the February 2003 proposal competition, we received the second largest number of proposals in the history of the Program – second only to the onslaught in 1996 after two other agencies that funded marine chemistry announced severe cutbacks in extramural ocean research funding. In cooperation with the Physical Oceanography and Biological Oceanography Programs, we funded three medium-sized (i.e., multi-million dollar) projects in ocean biogeochemistry about which the community is certain to hear great things. Also, the Program has funded, for the first time, three proposals for U.S. Surface Ocean - Lower Atmosphere (SOLAS) projects. We anticipate that the number of requests in such categories – medium-sized interdisciplinary biogeochemistry expeditions and U.S. SOLAS projects – is likely to increase over the next few years.

This year, the Dissertations Symposium in Chemical Oceanography (DISCO) – the archetype of the oceanography dissertation symposia – will be meeting in Hawaii as usual. But there will be a couple of innovations this time for DISCO XVIII. First, for the first time, the Symposium will be held at a small resort in Kona on the Big Island of Hawaii rather than in Honolulu. Secondly, the corresponding physical oceanography dissertations symposium (PODS) will convene there at the same time. Although the two symposia will meet separately, we plan to share a few joint social receptions, and we will have two joint field trips for the invitees – one to Mauna Kea to a close-up look at oceanic basaltic volcanism, and another to the Mauna Loa Carbon Dioxide Observatory. Remarkably, thanks to the costs of air travel and lodging, having our meeting venue on the Big Island will cost no more than our longtime usual venue on Oahu.

### Staffing

We are always interested in hearing from members of the ocean chemistry community who are interested in coming to NSF on temporary assignment as a program officer in the Program. The smooth operation of the CO Program depends heavily upon the willingness of members of the U.S. ocean chemistry research community to volunteer to come to Arlington for a two-year rotation to help us manage proposal review, award management, and sci-

entific planning. Having “rotators” in the Program provides obvious benefits to NSF, the advancement of our scientific discipline, and the community. But equally important, “rotators” invariably leave with a sense of accomplishment and a wealth of knowledge about NSF and the do’s and don’ts of proposal writing that are of immense benefit to colleagues and administrators at their home institutions. If you think you might be interested in joining us to help shape the future of ocean chemistry, please give me a call.

In closing, I want to thank Simone Metz who has devoted the past four years of her career to serving our community as Associate Program Director rotator in the CO Program. Frankly, I cannot imagine what it would have been like without her here to help manage this exciting but complex and demanding set of activities that we collectively call “Chemical Oceanography”. I invite all of my colleagues in the ocean chemistry community to wish her the best.



Don Rice (drice@nsf.gov)

### **SMALL GRANTS FOR EXPLORATORY RESEARCH**

OCE wants to be sure that the ocean research community is aware of the opportunity provided by NSF’s “Small Grants for Exploratory Research (SGER)”. SGER is a granting mechanism that can provide limited funding for a limited period of time for certain types of exploratory or high risk research. This includes providing a rapid response to opportunities that might be missed or compromised should the proposal go through the standard NSF review processes (SGER proposals are subject to internal NSF merit review only). To justify exemption from standard peer review, a compelling case must be made as to why the research should be considered particularly exploratory and high risk as well as the nature and significance of its potential impact on the field. In all cases, please contact one of the OCE program officers for guidance before submitting a request for SGER funding. The source of funds for these awards is an OCE research program appropriate to the topic of the proposal.

The maximum SGER award amount will not exceed \$200,000. Although the maximum award amount is \$200,000, the award amount usually will be substantially less than a given program’s average award amount. The project’s duration will normally be 1 year, but may be up to 2 years. Renewed funding of SGER awards may be requested only through submission of a non-SGER proposal that will be subject to full merit review. Additional information is available in NSF’s Guide to Programs.

## Physical Oceanography

### Funding highlights

The range of ocean science covered by recent proposals continues to be broad. Topics range from the nearshore dynamics to the physics of eddies and mixing to deep circulations. The November 2002 panel addressed over 100 proposals. Two young investigators, Britt Raubenheimer (WHOI) and Donald Slinn (University of Florida) received CAREER awards to pursue work on swash zone processes and nearshore circulation modeling, respectively. In addition to the three large field projects described under CLIVAR news, three other field oriented process studies were funded. One project is looking at air-sea interactions and boundary layer coupling under high wind conditions led by Ken Melville (SIO) and Carl Friehe (UCI). The second one is looking at entrainment flux in the Pacific equatorial cold tongue under the direction of R-C Lien and Eric D'Asaro at APL/UW. The other one led by Jeff Nystuen from APL/UW focuses on rainfall variability in the Mediterranean Sea using in-situ and remote sensing instruments. Other projects included two laboratory experiments on double diffusion and breaking internal waves, several theoretical and modeling studies and a few analysis projects.

### Scientific Awards

This year was a banner year for awards going to physical oceanographers supported by the program. Jeff Nystuen of the Applied Physics Laboratory, University of Washington was selected as the recipient of the 2003 Medwin Prize in Acoustical Oceanography from the Acoustical Society of America. He received the Prize for the development and effective use of measurements of underwater sound generated by rain to determine rainfall rate and type at sea. Bob Weller of the Woods Hole Oceanographic Institution was honored with the Sverdrup Gold Medal by the American Meteorological Society for his contributions to understanding the interactions between the oceans and atmosphere. Kurt Polzin, an associate scientist in the Department of Physical Oceanography at Woods Hole Oceanographic Institution, became the first U.S. recipient of the European Geophysical Society's Fridtjof Nansen Medal, one of the society's highest honors, in recognition of his pioneering contributions to the measurement of mixing in the deep ocean. Finally, Tom Rossby from the University of Rhode Island received the Walter Munk Award for Distinguished Research in Oceanography Related to Sound and the Sea at The Oceanography Society meeting held in New Orleans in June. Dr. Rossby is being recognized for "creative and pioneering developments of acoustically tracked floats, inverted echo sounders and other ocean acoustic methodologies, their innovative application to measure and understand physical oceanographic processes, and for his unselfish and dedicated efforts to freely share those developments with the international oceanographic community." Congratulations to all four!

### Physical Oceanography Dissertation Symposium

Following a successful inaugural meeting in the spring of 2002, the second Physical Oceanography Dissertation Symposium (PODS) will take place in late September on the Big Island of Hawaii in conjunction with the DISCO Symposium. This program is designed to introduce new PhD graduates to each other and the physical oceanographic community and to promote the exchange of recent research results and ideas. The meeting will feature detailed presentations from each of the new graduates intermixed with discussion sessions on topics relevant to young investigators, such as new directions of science, proposal-writing, and how to initiate research programs. For more information, see <http://www.pods-symposium.org>

### The WOCE legacy

The World Ocean Circulation Experiment (WOCE), conducted under the auspices of the World Climate Research Programme (WCRP), was designed to investigate the ocean's role in decadal climate change. Scientists from more than 30 countries collaborated during the WOCE field program to sample the ocean on a global scale with the aim of describing its large-scale circulation patterns, its effect on gas storage, and how it interacts with the atmosphere. As the data are collected and archived, they are being used to construct improved models of ocean circulation and the combined ocean-atmosphere system that should improve global climate forecasts. In November 2002, the final international WOCE Science Conference brought scientists from around the world to San Antonio to discuss the scientific achievements of the program and recognize the contribution of many individuals, some of them no longer with us. A set of two DVD discs containing not only the data collected during WOCE but also documentation of its planning were distributed at the meeting and is available through NODC ([http://www.nodc.noaa.gov/woce\\_v3/](http://www.nodc.noaa.gov/woce_v3/)).

In the coming year, as its final activity, the WOCE program will publish a series of four atlases, concentrating respectively on the hydrography of the Pacific, Indian, Atlantic and Southern Oceans. The Southern Ocean is given a separate volume because of the importance of the circumpolar flow on the transport of heat, freshwater and dissolved components. Each atlas will contain between 265 and 310 plates and approximately 1500 copies will be produced and distributed worldwide. The volumes each have three main components: Full-depth sections, horizontal maps of properties on density surfaces and depth levels, and property-property plots. The vertical sections feature potential temperature, salinity, potential density, neutral density, oxygen, nitrate, phosphate, silicate, CFC-11, d3He, tritium, <sup>14</sup>C, <sup>13</sup>C, total alkalinity and total carbon dioxide, against depth along the WOCE Hydrographic Program one-time lines.

In addition to the hard-copy versions of the atlases, each group will also prepare an electronic version of the atlas. These will contain additional parameters and levels not available in the printed version.

CLIVAR News

The PO Program continues to fund climate-related research. With the recent emergence of detailed Climate Variability (CLIVAR) implementation plans, the number of CLIVAR and CLIVAR-related proposals has steadily increased, ranging from individual investigator projects to large collaborative field projects. In terms of new activities, three projects resulting from collaboration between NSF and the National Environmental Research Council (NERC) in the UK were funded in early 2003. The first project is a continuation of the Oleander time series between New York and Bermuda under the direction of Tom Rossby and Kathy Donohue at URI to look at long-term variations in the Gulf Stream transport. The second is a project led by John Toole (WHOI) to document temperature, salinity, tracer, and velocity variations of the Deep Western Boundary Current upstream of its Gulf Stream cross-under point by maintaining a moored array over the slope south of Woods Hole, and occupying a hydrographic section along this line semi-annually. This project is integrated with a NERC-funded project led by Chris Hughes (POL) that aims at differentiating between advection and wave propagation of water mass anomalies along the western boundary. The third project led by Bill Johns (RSMAS) and Jochem Marotzke and Harry Bryden (SOC) will make direct estimates of the meridional overturning circulation and the poleward fluxes of water, salt and heat at 24N latitude in the North Atlantic.

Implementation of the Climate Process and Modeling Team concept (CPT) got underway when a joint NSF/NOAA solicitation was issued in February 2003. The response of the community has been very strong and the results of the competition will be announced in the fall of 2003. Over the past year and a half, the U.S. CLIVAR Science Steering Committee (SSC) in coordination with the Interagency Working Group has solicited and reviewed ideas for large scale CLIVAR process studies. The process involved a large fraction of the community represented by the various basin panels and working groups established by the SSC. Based on relevance to CLIVAR objectives, community interest and readiness, the SSC identified three possible studies centered on ocean processes that could be staggered in time. The first one focuses on the role of mean and eddy processes on the formation, storage and dispersal of eighteen degree water south of the Gulf Stream. Another one is a study of diapycnal and isopycnal mixing processes in the Southern Ocean and the last one would examine processes responsible for equatorial upwelling in the Pacific. Other candidate studies were asked to refine their ideas.

Staffing

After a year and a half with the Physical Oceanography Program, Dr. Theresa Paluszkiwicz has decided to rejoin the Office of Naval Research to take on the challenge of leading a newly expanded Physical Oceanography Team. We wish her all the best in her new duties. Dr. Elise Ralph will complete her rotator's assignment at the end of the calendar year and return to her faculty position at the University of Minnesota at Duluth where she was

recently awarded tenure. Consequently, the Physical Oceanography Program is actively recruiting qualified applicants interested in both a rotator's position as an IPA and/or a permanent position primarily at the Associate Program Director level. Any interested person should contact Eric Itsweire for more information.

Eric Itsweire (eitsweir@nsf.gov)

Elise Ralph (eralph@nsf.gov)

## MARINE GEOSCIENCES SECTION

### Marine Geology and Geophysics

MARGINS

In FY 2003, the MARGINS Program received a budget augmentation of over 17%, increasing from \$5.65 million in FY 2002 to \$6.65 million in FY 2003. This year's competition for funding was held in February 2003 and all four MARGINS initiatives — Seismogenic Zone (SEIZE), Subduction Factory (SubFac), Rupture of Continental Lithosphere (RCL), and Source to Sink (S2S) — competed for funding. The panel considered 33 proposals from which 12 science proposals (2 SEIZE, 5 SubFac, 3 RCL and 2 S2S), 2 workshop proposals, 1 database management proposal and the MARGINS Office were recommended for funding. The new RCL focus site of the Red Sea saw a modest though welcome beginning during this cycle. Recommendations also included awards for three post-doctoral fellows, a new feature under the MARGINS Program. The initiation of work on MARGINS' dedicated database management system, which is an integral part of the overall MG&G database management efforts is long overdue and will be welcomed by the marine geosciences community.

With these funding recommendations, all of MARGINS' focus study sites except one (i.e., Waipaoa S2S system) have now been initiated. One reason to delay the consideration of funding of the Waipaoa focus site was to allow the community to meet, brainstorm and plan a more integrated study in a workshop to be held on site along the Waipaoa dispersal system in eastern North Island, New Zealand. This workshop, which was held in May 2003 and attended by over 40 U.S. and New Zealand scientists, demonstrated the feasibility of studying a sediment dispersal system of this size from the source of the sediments in the uplands to their ultimate sink on the shelf and basin. The advantage of the Waipaoa is that it represents a relatively simple setting to model the modulation of forcing signals (climate, tectonic and human) across a near-complete spectrum of sedimentary environments. During the

next funding cycle the S2S community is planning to submit a set of proposals for an integrated study of the Waipaoa focus site.

Other activities by the MARGINS community included a U.S.-Japan workshop on the Izu-Bonin-Mariana (IBM) Subduction Factory focus site and a SEIZE theoretical institute. The former was co-sponsored by MARGINS and the Japanese Institute for Frontier Research in Earth Evolution and attended by over 100 scientists from the two countries. The objectives included summarizing the state of science and future plans for cooperative work on the IBM focus site. The SEIZE theoretical institute, attended by 78 scientists from 10 countries and including a strong educational component, focused on the state-of-knowledge of the seismogenic zones and their relationship to the subduction systems.

During 2003, the MARGINS Program was able to respond to its first "rapid response" event. On May 10, the Anatahan Volcano in the Northern Mariana Islands (NMI) erupted with force, sending skyward a column of ash that reached a height of 40,000 feet. The eruption was witnessed by MARGINS Principal Investigators that had been deploying seismic equipment on the island only days earlier as a part of an IBM SubFac project. Within nine days, David Hilton and Allan Sauter (Scripps) and Toby Fischer (New Mexico), together with a scientist from the NMI Emergency Management Office, landed on the island and deployed an additional seismometer and collected rock, ash and pumice samples. A week later, the Anatahan samples arrived to the U.S. for analyses by several MARGINS PIs. Results of this study will be shared with the U.S. Geological Survey and the NMI Emergency Management Office, and a special session at the AGU Fall 2003 meeting will be dedicated to the Anatahan eruption.

Garry Karner's term as chair of the MARGINS steering committee will end with the fiscal year. We thank Garry for providing sound leadership over the last three years, often focusing on important issues that needed to be confronted for the overall health of the Program. During his tenure the Program saw considerable growth and initiation or expansion of all four MARGINS initiatives. We are pleased that Garry will be replaced by another leader in the MARGINS community. Julie Morris (Washington University) has agreed to serve as the new chair of the MARGINS steering committee and will take over at the beginning of FY 2004.

#### Marine aspects of Earth System History (MESH)

The MESH Program received a budget increase of \$0.5 million in FY 2003 for a total budget of \$4.1 million. The FY 2003 competition focused on the topic of Holocene Climates as prescribed by the new science plan and 10 of the 25 submitted proposals were recommended for funding. We would like to remind the community that proposals involving research topics within MESH are not eligible for support in the Core Program of Marine Geology and Geophysics (MG&G). PIs will be given the choice to withdraw and resubmit to MESH or allow us to defer the proposal to the next ESH/MESH panel.

The MESH Program saw several changes this year. Dick Poore's tenure as an assignee from USGS to NSF came to an end in the Spring and he returned to the Survey. During Dick's tenure of two and half years at NSF, he was able to accomplish several important objectives. He made the MESH Program, which was heavily mortgaged when he arrived, solvent so that future commitments to its budget are now at a minimum. He also worked hard with the MESH steering committee and the paleo community to make it a more focused program with well-defined goals for the future. The MG&G Program had recognized the need for rebuilding the U.S. capability to take long, undisturbed cores for high-resolution paleo studies — a capacity we had lost some years ago and for which we had become dependent on often expensive outside sources. Dick took on this challenge and worked hard within NSF toward achieving this goal with the input from the community. Plans are now underway to correct this gap in our capabilities. We thank Dick for all his hard work on behalf of NSF and the community. The IPA position for MESH has been filled by Amos Winter from the University of Puerto Rico. Amos is a well-known coccolith and coral researcher, with wide interests in paleoceanography and paleoclimatology.

As for the MESH steering committee, the membership is changing because of rotation and because we are broadening its expertise to provide advice on the larger multidisciplinary ESH focused research efforts. We would like to thank Ed Boyle, Nick Pisias and Warren Prell for their service on the committee. The program is better off because of their efforts and valuable advice. Many excellent scientists expressed interest in serving on the Committee. After considering issues such as balance of expertise and institutional representation, four scientists were invited and have agreed to serve for a three-year term. The new members are Julie Brigham-Grette, Peter Clark, Todd Sowers, and Michael Mann. The chair of the committee and location of the Program office is also due to change next year. In order to allow for a smooth transfer of functions and to allow time to prepare a proposal for the October 2003 deadline, a successor for Bill Curry has been selected. Lowell Stott (University of Southern California) has agreed to take on the responsibility of the MESH steering committee chair. Bill Curry's tenure as chair will end in Spring 2004.

#### Ridge 2000 (R2K)

The Ridge 2000 program continues to encourage participation from the broad community and will host an open Community



Workshop on 7-8 November 2003 in Boulder, CO. The primary purpose will be to discuss the status of the Ridge 2000 program: where the program is now, where it is headed, and how the scientific community can achieve

the goals we have set. Registration for this workshop is now open on the R2K website. A second two-day Ridge 2000 workshop will

be held in Providence, RI, 1-2 March, 2004. The primary goal of this workshop is to identify a logistically viable, slow-spreading ridge segment as a candidate for a future R2K Integrated Study Site.

The panel that reviewed RIDGE in May 2001 recognized the importance of at least one of the R2K Integrated Studies Sites (ISS) making a significant advance toward R2K goals within the first six years of the program. They recommended that after three years or so the ISS efforts should be evaluated and, if necessary, one site should be given priority for funding to assure this occurs. Ridge 2000 began on October 1, 2001, and the R2K community education and implementation workshops were held in early 2002. The first R2K proposal cycle started with the August 15, 2002, target date. Proposals have been funded in each of the ISS and 2004 will be a big field season with multiple cruises at each site. More information on funded projects can be found on the R2K Web site (<http://ridge2000.bio.psu.edu>) and in the April 2003 *Ridge 2000 Events* newsletter.

Because of the timing of proposal cycles and ship scheduling, the first field season will occur in the third year of the R2K program. To assure continuity of the ISS efforts and review, Chuck Fisher has agreed to remain as chair of the Steering Committee for an additional year. The R2K office will remain at Penn State through September 2005, and the initial ISS evaluations will be held in November 2005.

Central to achieving the scientific goals of R2K is the timely submission and sharing of all metadata and data collected as part of the ISS and Time Critical Studies, as well as sharing of all relevant historical data. The Ridge 2000 data policy was designed to help facilitate data sharing, and the Ridge 2000 Open Data Exchange System (RODES) was funded in the last proposal cycle. Dale Chayes, Suzanne Carbotte, Kerstin Lehnert, and Bill Ryan are the Principal Investigators.

Ridge 2000 education and outreach (E&O) efforts are in full swing. E&O goals and potential outreach projects have been defined and posted to the community. The R2K office is actively coordinating involvement of R2K researchers in communitywide projects, as well as helping coordinate and promote researchers' independent E&O activities. One of the big efforts this year is the development of a "Student Experiments At Sea" program, which will be pilot tested during the 2003-2004 school year. Check out the ever expanding E&O pages of the Ridge 2000 Web site for updates and more information.

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## Ocean Drilling Program

The Integrated Ocean Drilling Program (IODP) is nearly here! On October 1, 2003, IODP will officially begin; the result of more than a decade of ongoing and continuous planning. Activity within NSF reflects the high tempo of preparatory and transitional work.

### IODP Participation

The biggest IODP news is that representatives from the National Science Foundation and the Ministry of Education, Culture, Sports, Science and Technology (MEXT) have signed the Memorandum regarding IODP cooperation between the United States and Japan. The Memorandum states that the U.S. and Japan will function as Lead Agencies and equal partners in the funding and management of this program. The European Consortium for Oceanographic Research Drilling (ECORD) and the People's Republic of China have both stated their commitment to contribute to the IODP, and their respective Memoranda of Participation will be negotiated in the near future. Others have expressed interest in IODP participation as well.

### U.S. Timeline

Processes leading to the identification of the U.S. IODP System Integration Contractor (SIC) have at long last come to a head. Last November, the National Science Board approved the strategy of having a SIC responsible for providing IODP science support services as well as managing and operating the non-riser drillship that would be selected after the issuance of the SIC contract. Following a delayed release of the Request for Proposal (RFP) due to late appropriation of the NSF budget, a selection was made. NSF has begun negotiations with Joint Oceanographic Institutions, Inc. (JOI) which, if successful, would establish JOI as the U.S. IODP SIC.

Based on new information indicating drillship conversion funds would not be available until FY 2005-2006, it became evident that the original timelines for program implementation would need to be altered. A three step strategy of starting the U.S. portion of the IODP was subsequently adopted to minimize the delay of initial drilling. The first step is selection of the SIC. The second involves the SIC, working with NSF, identifying an acceptable vessel for short-term use so that initial IODP non-riser drilling may occur by mid-2004. Much of the ongoing planning activities are occurring in order to allow this early drilling to take place. The third step involves the selection of the long-term non-riser drillship, to be converted in 2005-2006 for IODP program needs. It is expected that over \$90 million dollars will be available for conversion activities and scientific outfitting of the vessel.

### International Plans

The Center for Deep Ocean Exploration (CEDEX) at the Japan Marine Science and Technology Center (JAMSTEC) has been established as the IODP Chikyu riser vessel operator. Thanks to continued efforts by MEXT and JAMSTEC, funding for Chikyu outfitting now allows riser drilling to begin in 2006. In addition, ECORD has stated its intentions to drill on Lomonosov Ridge in 2004 using an "armada" of icebreakers, with a drill rig piggy-backed on an ice-strengthened vessel. Planning for this activity is ongoing.

### Central Management

The IODP Central Management Office (CMO) will have contractual scientific oversight over the platform operators, produce the IODP Program Plan, and coordinate and oversee integrative IODP activities. As such, it will fulfill a key program role. The CMO contract is expected to be awarded in early 2004. The process of establishing this CMO is well underway. A CMO Science Support Office will be located in Sapporo, Japan, while the CMO headquarters is expected to be located within the United States. NSF is supporting interim IODP planning until the CMO is operational.

### U.S. Science Support

A solicitation for part of the IODP U.S. Science Support activity has been released (see [http://www.nsf.gov/pubsys/ods/getpub.cfm?ods\\_key=nsf03586](http://www.nsf.gov/pubsys/ods/getpub.cfm?ods_key=nsf03586)). Similar to the current United States Science Support Program, it will contain funds for innovative instrumentation and tools for core analysis and borehole science, education and outreach, pre-platform activities, platform scientific participation, and post-platform activities, including analyses and measurements for initial results publication. The United States Science Advisory Committee (USSAC) Conference on U.S. Participation in IODP (CUSP) Report will provide important guidance on these activities. Proposals by potential providers for this support are due at NSF no later than 5:00 pm on November 3, 2003.

### ODP Phasedown

Amidst the IODP planning, ODP phase down planning has also occurred in earnest. The operational contract with the JOIDES Resolution will end September 30, 2003. ODP equipment, where possible, will be made available for use in the new IODP. NSF has committed to supporting international access to ODP cores, data, and publications during the transition period, with these activities to be eventually transitioned to the SIC contract.

### Staff Changes

Brad Clement completed his exemplary rotation with ODP in July and has returned as a Professor to Florida International University. In the coming weeks, the Program will welcome his replacement, Carolyn Ruppel who is currently an Associate Professor of Geophysics at the Georgia Institute of Technology.

As a final note, NSF will soon bid farewell to Paul Dauphin who will be retiring in October 2003. Paul has provided many years of service and leadership to both ODP and the planning of IODP and we are grateful for his tireless efforts. While we lament his departure, we are pleased to announce that Rodey Batiza, presently a Program Director for NSF's Marine Geology and Geophysics Program, will succeed Paul as Program Director as the new IODP begins.

Jamie Allan ([jallan@nsf.gov](mailto:jallan@nsf.gov)) on behalf of  
Paul Dauphin ([jdauphin@nsf.gov](mailto:jdauphin@nsf.gov))  
Brad Clement ([bclement@nsf.gov](mailto:bclement@nsf.gov))  
John Walter ([jwalter@nsf.gov](mailto:jwalter@nsf.gov))

## INTEGRATED PROGRAMS SECTION

### Education

#### Research Experiences for Teachers

PI's may now request supplements to support teachers who wish to participate in their research programs. The intent of this endeavor is to facilitate professional development of K-12 science teachers through research experience at the cutting edge of science. OCE encourages all its grantees to make special efforts to identify talented teachers for participation in this RET-supplement opportunity.

We believe that encouraging active participation of teachers in on-going NSF projects is an excellent way to reach broadly into the teacher talent pool of our nation. The goal of the RET-supplement is to help build long-term collaborative relationships between K-12 teachers of science and the NSF research community. OCE is particularly interested in encouraging its researchers to build mutually rewarding partnerships with teachers in economically disadvantaged school districts.

*For further information about this opportunity, please see the more complete description under the "Crosscutting Programs" heading at the front of this Program News section.*

#### Centers for Ocean Science Education Excellence (COSEE) Network

The Ocean Education program is pleased to announce the initiation of a new network that seeks to improve ocean science education across the nation. The Centers for Ocean Science Edu-



ation Excellence (COSEE) network was begun in the Fall of 2002 with the announcement of awards made to seven new COSEE centers and one central coordinating office.

### History

The COSEE network developed in response to a community 'needs assessment' workshop for ocean science educators and researchers held in Long Beach, MS May 23-26, 2000. The 69 page report from the workshop was followed by a much shorter document in 2001 outlining key priorities for implementation of the community recommendations.

### Funding

The first cohort of Centers was funded in 2002 after peer review of proposals submitted to NSF's Division of Ocean Sciences. In addition to NSF support, funding has been provided by the Office of Naval Research, the U.S. Navy, the National Sea Grant College Program, the National Ocean Service and the Office of Undersea Exploration. The last three units are part of the National Oceanic and Atmospheric Administration.

### Goals

The COSEE network has several broad goals:

- 1) to develop catalytic partnerships that link ocean science researchers and educators and add value for each group,
- 2) to improve communication and coordination among ocean science education initiatives nationwide,
- 3) to promote ocean education as an exciting vehicle to interest students in science and enhance science education, and
- 4) to foster a deeper public understanding of the ocean and its influence on quality of life and national prosperity.

### A Diverse Network

The COSEE network consists of seven regional Centers and one Central Coordinating Office (CCO) in Washington, DC. All regional Centers are partnerships that include: (1) a research institution or university ocean or environmental science program, (2) an informal education center or aquarium and (3) a formal education entity (such as a school district, community college or other educational institution). Network level coordinating and administrative services are provided by the CCO with guidance from the COSEE Council of representatives from each Center and the CCO.

The first cohort of NSF funded COSEE Centers is focused on the needs of a number of different audiences. All seven Centers seek to involve more ocean researchers in education. Five have major teacher professional development components. Two will develop or adapt new courses or curricula for undergraduate students. Three will design innovative new programs for informal educators. One focuses on African American cultural heritage

and emphasizes the importance of regional community leadership.

Diversity is an important cross-cutting theme. Four of the seven Centers involve institutions or programs with a strong minority enrollment or focus. Three are working to improve science education in large urban areas with highly diverse school-age populations.

### The Centers and Their Programs

**Central Coordinating Office (Consortium for Oceanographic Research & Education; Va. Inst. Marine Science; U. of So. Carolina).** Contact Sarah Schoedinger ([sschoedinger@coreocean.org](mailto:sschoedinger@coreocean.org)). Coordinating and administrative functions. Network website. Network-level evaluation & outreach.

**California COSEE (Lawrence Hall of Science, U. C. Berkeley; Monterey Peninsula College; Scripps Inst. of Oceanography).** Contact Craig Strang ([cstrang@uclink.berkeley.edu](mailto:cstrang@uclink.berkeley.edu)). Undergraduate 'communicating ocean sciences' course. CAREERS website. Links between researchers and educators. Whole school immersion in ocean science (K-8).

**COSEE West (U.C.L.A.; Univ. of Southern California).** Contact: Tony Michaels ([tony@usc.edu](mailto:tony@usc.edu)). Master Teacher network and lectures focused on recent discoveries in ocean science to enhance K-12 science education. Scientist-educator forums. On-line teacher workshops. Web-site with real-time data.

**Central Gulf of Mexico COSEE (U. of Southern Mississippi; LUMCON; Dauphin Island Sea Lab; Marine Science Inst. U. Texas; Florida Sea Grant).** Contact: Sharon Walker ([Sharon.walker@usm.edu](mailto:Sharon.walker@usm.edu)). Summer Teacher Institutes. Workshops for informal educators and scientists. 'Teacher at sea' programs. Internships for minority students.

**Florida COSEE (U. of So. Florida; Florida A&M U).** Contact: Paula Coble ([pcoble@marine.usf.edu](mailto:pcoble@marine.usf.edu)). Web portal to support Center activities & enhance collaborative interactions statewide. Development and testing of an Oceans Concept Interactive Curriculum model for post-secondary non-science majors.

**Southeastern COSEE (South Carolina Seagrant).** Contact: L. Spence ([lundie.spence@scseagrant.org](mailto:lundie.spence@scseagrant.org)). Regional inventories of ocean science research and education programs. Charrette to focus on effective design of programs for underrepresented groups. Regional Education Leadership Institute.

**Mid-Atlantic COSEE (Rutgers U.; Stevens Institute of Technology; Virginia Institute of Marine Science; Hampton U.).** Contact: Mike De Luca ([Deluca@imcs.rutgers.edu](mailto:Deluca@imcs.rutgers.edu)). Effective use of near-real-time data from coastal observing systems in K-12 classrooms. Exemplary Internet resources. Exhibits at public aquaria using observatory data. Middle and high school

teacher professional development. Training for graduate students and pre-service teachers.

**New England Regional COSEE (New England Aquarium, Woods Hole Oceanographic; U. Mass @ Boston).** Contact: Carolyn Levi ([clevi@neaq.org](mailto:clevi@neaq.org)). Distributed communications network for region. Experiments with different workshop models. Resource and Support Center to identify and evaluate exemplary materials.

Lisa Rom ([erom@nsf.gov](mailto:erom@nsf.gov))  
Sue Cook ([scook@nsf.gov](mailto:scook@nsf.gov))

## Ocean Technology and Interdisciplinary Coordination

### Ocean Technology

For those interested in submitting proposals to develop new ocean instrumentation, I thought that it would be useful to summarize current funding opportunities available to support this work at NSF. There are many options for obtaining funds to develop instrumentation. Within OCE these proposals are accepted by the Ocean Technology component of the Ocean Technology and Interdisciplinary Coordination (OTIC) Program. Proposed instrumentation should have broad applicability to ocean science research and should enhance the observational, experimental, and/or analytical capabilities of the ocean science research community. Current priority areas for Ocean Technology include the development of sensors and infrastructure to enable investigations at ocean observing systems, instruments facilitating time-series observations, and the development of biological and chemical sensors.

Another competition where ocean instrumentation proposals have been successful is the Instrumentation Development for Environmental Activities (IDEA) competition, which is part of the Biocomplexity Initiative. A primary theme of this competition is the development of *in situ* instrumentation or remote sensing technologies that minimize environmental impact and presence, while increasing real-time data-gathering opportunities and reducing or eliminating human attention. This development should take advantage of recent advances in microelectronics, photonics, telemetry, robotics, wireless communication, and physical and chemical sensing systems.

A new funding opportunity released this year by the Directorate for Engineering (ENG) and Directorate for Computer and Information Science and Engineering (CISE), with contributions from other groups at NSF, including the Directorate for Geosciences is the Sensors and Sensor Networks solicitation ([http://](http://www.nsf.gov/pubsys/ods/getpub.cfm?ods_key=nsf03512)

[www.nsf.gov/pubsys/ods/getpub.cfm?ods\\_key=nsf03512](http://www.nsf.gov/pubsys/ods/getpub.cfm?ods_key=nsf03512)). This solicitation has provided an excellent opportunity to submit proposals that are multidisciplinary and that may generate interest within ENG and CISE. For this first competition, three ocean sciences related proposals were funded from the large pool of proposals received.

### Instrumentation Workshop

An important recognition raised at numerous venues is the need for an expanded portfolio of chemical and biological sensors available to the oceanographic community. In particular, with the expansion of current and future ocean observing activities, there is a great need for biological and chemical sensors that are able to collect time-series measurements over extended time periods. To help address this need, a workshop was held from July 13-16 at the Woods Hole Oceanographic Institution that sought to bring together oceanographers, instrument developers, and specialists in new and emerging technologies to help provide new directions for future *in situ* oceanographic instrumentation. The primary goal of this workshop was to identify: new technologies and innovations emerging in the fields of engineering, analytical chemistry, biosensors, and molecular biology; those technologies that would be useful in addressing major outstanding scientific problems in oceanography; and the technological barriers to applying these technologies and how these can be overcome.

The first day and a half of the workshop was devoted to presentation of new and existing technologies. These talks, on technologies that included nanotechnology, sensor arrays, miniaturized complex instrumentation, automated complex chemical analyses, biosensor arrays, Laser Induced Breakdown Spectros-

### Sites of Interest

OCE	<a href="http://www.geo.nsf.gov/oce/start.htm">http://www.geo.nsf.gov/oce/start.htm</a>
GEO	<a href="http://www.geo.nsf.gov">http://www.geo.nsf.gov</a>
CLIVAR	<a href="http://www.clivar.org">http://www.clivar.org</a>
CoOP	<a href="http://www.skio.peachnet.edu/coop/">http://www.skio.peachnet.edu/coop/</a>
ECO HAB	<a href="http://www.redtide.whoi.edu/hab">http://www.redtide.whoi.edu/hab</a>
GLOBEC	<a href="http://www.usglobec.org">http://www.usglobec.org</a>
JGOFS	<a href="http://www1.whoi.edu/jgofs.html">http://www1.whoi.edu/jgofs.html</a>
JOI	<a href="http://www.joiscience.org">http://www.joiscience.org</a>
MARGINS	<a href="http://www.ideo.columbia.edu/margins">http://www.ideo.columbia.edu/margins</a>
ODP	<a href="http://www.oceandrilling.org">http://www.oceandrilling.org</a>
RIDGE 2000	<a href="http://ridge2000.bio.psu.edu">http://ridge2000.bio.psu.edu</a>
UNOLS	<a href="http://www.unols.org">http://www.unols.org</a>
WOCE	<a href="http://www-ocean.tamu.edu/WOCE/">http://www-ocean.tamu.edu/WOCE/</a>

## BROADER IMPACTS MUST BE ADDRESSED IN PROJECT SUMMARY AND PROJECT DESCRIPTION

Intellectual merit of the proposed activity and the **BROADER IMPACTS** resulting from the proposed activity must be addressed explicitly in separate statements in both the project summary and project description. While Investigators routinely address the Intellectual Merit criterion, treatment of Broader Impacts has been inconsistent. Examples of activities likely to demonstrate broader impacts can be found at <http://www.nsf.gov/pubs/2002/nsf022/bicexamples.pdf>.

NSF has begun returning without review proposals that do not separately address both merit review criteria. To avoid this fate, please make certain that both criteria have been addressed.

copy, and new high-resolution optical visualization tools, provided the backdrop for stimulating discussions within the breakout sessions. The presentations from this workshop and the soon to be completed workshop report can be found at: [http://www.whoi.edu/institutes/oli/activities/symposia\\_sensors.htm](http://www.whoi.edu/institutes/oli/activities/symposia_sensors.htm). In addition, the organizing committee is planning to publish overview papers about this workshop in *Oceanography* as well as other community journals.

### Coastal Ocean Processes Program (CoOP)

Since the last newsletter, two awards were made from proposals submitted to the Buoyancy-driven Transport Processes Announcement of Opportunity. This Announcement was developed from an open community workshop that defined the research needed to better understand processes controlling buoyancy-driven systems influenced by freshwater flows. The workshop results and Science Plan were published as the CoOP Report Coastal Ocean Processes: Transport and Transformation Processes over Continental Shelves with Substantial Freshwater Inflows (CoOP Report No. 7) and are available on the CoOP website (<http://www.skio.peachnet.edu/coop/index.php>).

The River Influences on Shelf Ecosystems (RISE) project focuses on the highly productive eastern boundary plume of the Columbia River. In particular, this study will compare biological production rates within and outside the Columbia River plume, on the more productive shelf to the north and the less productive shelf to the south of the river mouth. Results of the RISE project will clarify why a shelf with weaker upwelling winds is more highly

productive throughout the food chain than a shelf with stronger winds. RISE will integrate results from the nearby, previously funded, CoOP project Coastal Ocean Advances in Shelf Transport (COAST) as well as salmon-related regional studies by NOAA's Northwest Fisheries Center to provide new information on alteration of rates of biogeochemical processes by the unique stratification, turbidity, mixing environment and nutrients of a river plume. More information on this project can be found on the RISE website (<http://oceanweb.ocean.washington.edu/rise/>).

The Lagrangian Transport and Transportation Experiment (LATTE) project will use coordinated field and numerical experiments, to examine processes controlling the transport and fate of nutrients and contaminants in the urban Hudson River plume. In addition to field experiments that are specific to this project, LATTE will also use components of Rutgers's New Jersey Shelf Observing System. A central experiment of this project is the injection of a harmless fluorescent dye into the plume of water flowing from the Hudson. This experiment will be repeated five times over the life of the project and each time the LATTE team will follow the dye by boat as it progresses into the ocean. While following the dye, the PIs will determine how nitrogen, lead, cadmium, mercury and other substances are transported at different depths and under different conditions. By studying phytoplankton and zooplankton, the group will also study how metals and nutrients enter the base of the food chain. More information on this project can be found at: <http://marine.rutgers.edu/cool/hudson/LATTEcruise.html>.

Alexandra Isern (aisern@nsf.gov)

## Staff Changes

### Biological Oceanography



Joe Pawlik recently joined the Biological Oceanography Program as an Associate Program Director. Joe replaces Phil Yund who has finished his term and returned to the University of Maine. Joe is on leave from the University of North Carolina at Wilmington where he is a Professor in the Department of Biological Sciences and a researcher at the Center for Marine Science. Joe's research speciality is marine chemical ecology, particularly the chemical defenses of tropical sponges, cnidarians and tunicates. More can be found at: <http://people.uncw.edu/pawlikj/>.

### Chemical Oceanography

After four productive years, Simone Metz will be completing her assignment as Associate Program Director with the Chemical Oceanography program in October. We are grateful for her efforts and wish her well.

### Marine Geology and Geophysics

The Marine Geology and Geophysics Program recently welcomed Amos Winter as Associate Program Director. Amos is on assignment from the University of Puerto Rico at Mayagüez where he is a professor in the Department of Marine Sciences. Amos specializes in marine micropaleontology and his recent research focuses on intraannual to centennial climate change in the Caribbean basin. Amos replaces Dick Poore who returned to the U.S. Geological Survey after more than two years with NSF.



### Ocean Drilling Program

Brad Clement completed his rotation with ODP in July and has returned as a Professor to Florida International University. Carolyn Ruppel, an Associate Professor of Geophysics at the Georgia Institute of Technology, will replace Brad as Associate Program Director.

Paul Dauphin will be retiring from NSF in October 2003, after 12 years with the Ocean Drilling Program (ODP). We are grateful for the significant contributions he has made to ODP and to the preparations for the new Integrated Ocean Drilling Program (IODP). Prior to his time with NSF, Paul conducted research on continental margins at Oregon State University. His delightful sense of humor will certainly be missed. While we lament his departure, we are pleased to announce that Rodey Batiza, currently a Program Director of the Marine Geology and Geophysics Program, will replace Paul as Program Director as the new program begins.



### Ship Facilities and Support

Lieutenant Commander Carl Groenveld is on a part-time detail to the Ship Acquisitions and Upgrades and Shipboard Scientific Support Programs from NOAA, where he is presently assigned as Research Platform Resources Manager. Carl is providing assistance in ship inspections, development of a shipboard wench training program, and scheduling of research vessels. Carl replaces Lieutenant Commander Fred Rossmann who returned full-time to NOAA.

## OTHER NOTEWORTHY NEWS...

### Pew Oceans Commission Report

In June 2003, the Pew Oceans Commission released their report "America's Living Oceans: Charting a Course for Sea Change." Copies of the report may be requested through their website at [www.pewoceans.org](http://www.pewoceans.org).

### U.S. Commission on Ocean Policy

The U.S. Commission on Ocean Policy, chaired by Admiral James D. Watkins, currently expects to issue its final report this November. A detailed table of contents for the report, as well as other documents of interest, are available on the Commission's home page at [www.oceancommission.gov](http://www.oceancommission.gov).

### Earth Observation Summit

On July 31, 2003, the United States hosted an Earth Observation Summit. In addition to several U.S. Department and Agency heads, participants included ministers, heads of international organizations, heads of development banks and other funding agencies, and leading scientists. The purpose of the summit was to promote the development of a comprehensive and sustained Earth observation system or systems among governments and the international community to understand and address global environmental and economic challenges. Further information is available on the web site at [www.earthobservationsummit.gov](http://www.earthobservationsummit.gov).

## Vacancies in the Division of Ocean Sciences

We are presently seeking applicants for several positions within the Division. Vacancy announcements with further details about the positions listed below may be accessed on the NSF web site at <http://www.nsf.gov/jobs>.

Each of the positions entails the following duties and responsibilities: Directs (Program Director) or assists (Associate/Assistant Program Director) in the implementation, review, funding, post-award management, and evaluation of the program and contributes to the intellectual integration with other programs supported by the Division. Designs and implements the proposal review and evaluation process for relevant proposals. Selects well qualified individuals to provide objective reviews on proposals either as individuals or as members of a panel. Conducts final review of proposals and evaluations, and recommends acceptance or declination. Manages and monitors on-going grants, contracts, interagency and cooperative agreements to ensure fulfillment of commitments to NSF. Evaluates progress of awards through review and evaluation of reports and publications submitted by awardees and/or meetings at NSF and during site visits. Contributes to the responsibility for establishing goals and objectives, initiating new program thrusts and phasing out old projects. Recommends new or revised policies and plans in scientific, fiscal, and administrative matters to improve the activities and management of the Program.

Qualifications vary as follows:

**Associate Program Director, Oceanographer  
AD-3; Chemical Oceanography Program (Rotator)  
Open Until Filled**

Applicant must have a Ph.D. or have equivalent experience in chemical oceanography, marine chemistry, marine geochemistry, or related disciplinary fields, plus four or more years of research experience beyond the Ph.D. Familiarity with a broad spectrum of the ocean science research community and demonstrated administrative ability are desired. Applicants who are multifaceted and have multidisciplinary experience and capabilities are also desired.

**Associate Program Director or Program Director, Geologist  
AD-3 or AD-4, respectively; Marine Geology and Geophysics  
Program (Rotator or Permanent)**

**Closing Date: October 14, 2003**

For the Program Director level, applicants must possess a Ph.D. or equivalent experience in geochemistry, micropaleontology/paleoceanography, petrology, or related disciplinary fields. In addition, six or more years of successful research, research administration, education, and/or managerial experience pertinent to the Program are required. For the Associate Program Director level, applicants must possess a Ph.D. or equivalent

experience in geochemistry, micropaleontology/paleoceanography, petrology, or related disciplinary fields. In addition, four or more years of successful research, research administration, education, and/or managerial experience pertinent to the Program are required. In addition, a broad understanding of the current status of the relevant U.S. academic scientific community and its inter-relationship with NSF, other federal agencies, and international planning efforts is desirable for both grade levels.

**Associate Program Director, Oceanographer  
AD-3; Ocean Education Program (Rotator)**

**Closing Date: September 22, 2003**

Applicant must have a Ph.D. or equivalent experience in ocean sciences or a related geosciences or biology area. In addition, four or more years of successful research, research administration, and/or managerial experience pertinent to the program are required.

**Assistant or Associate Program Director, Oceanographer  
AD-2 or AD-3 respectively; Biological Oceanography Program  
(Rotator)**

**Closing Date: September 22, 2003**

For the Assistant Program Director level, applicants must have a Ph.D. or Master's or have equivalent experience in biological oceanography, marine ecology, or related disciplinary fields, plus two or more years of successful research, research administration, and/or managerial experience beyond the Ph.D. For the Associate Program Director level, applicant must have a Ph.D. or equivalent experience in ocean sciences or a related geosciences or biology area. In addition, four or more years of successful research, research administration, and/or managerial experience pertinent to the program are required.

**Associate Program Director or Program Director,  
Oceanographer  
AD-3 or AD-4 respectively; Physical Oceanography Program  
(Rotator or Permanent)**

**Closing Date: September 22, 2003**

For the Program Director level, applicants must possess a Ph.D. or equivalent experience in physical oceanography, geophysical fluid dynamics, or related disciplinary fields. In addition, six or more years of successful research, research administration, and/or managerial experience pertinent to the program are required. For the Associate Program Director level, applicant must have a Ph.D. or equivalent experience in physical oceanography, geophysical fluid dynamics, or related disciplinary fields. In addition, four or more years of successful research, research administration, and/or managerial experience pertinent to the program are required. In addition, a broad understanding of the current status of the relevant U.S. academic scientific community and its inter-relationship with NSF, other federal agencies, and international planning efforts is desirable for both grade levels.

The National Science Foundation (NSF) funds research and education in most fields of science and engineering. Grantees are wholly responsible for conducting their project activities and preparing the results for publication. Thus, the Foundation does not assume responsibility for such findings or their interpretation.

NSF welcomes proposals from all qualified scientists, engineers and educators. The Foundation strongly encourages women, minorities, and persons with disabilities to compete fully in its programs. In accordance with federal statutes, regulations, and NSF policies, no person on grounds of race, color, age, sex, national origin, or disability shall be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving financial assistance from NSF (unless otherwise specified in the eligibility requirements for a particular program).

Facilitation Awards for Scientists and Engineers with Disabilities (FASED) 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. See the program announcement or contact the program coordinator at (703) 292-6865.

The National Science Foundation has Telephonic Device for the Deaf (TDD) and Federal Relay Service (FRS) capabilities that enable individuals with hearing impairments to communicate with the Foundation regarding NSF programs, employment, or general information. TDD may be accessed at (703) 292-5090 or (800) 281-8749 or through FRS on 1-800-877-8339.

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