ORION

The Newsletter of the Ocean Research Interactive Observatory Networks

Fall 2004
Volume 1, Number 2

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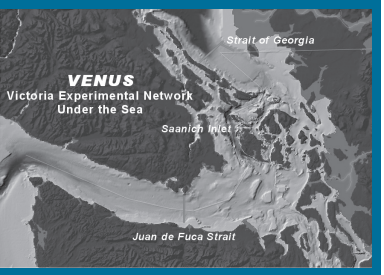

The ORION Education Plan

EDUCATORS AND SCIENTISTS WORKING TOGETHER TO BRING OBSERVATORY SCIENCE INTO THE CLASSROOM AND THE COMMUNITY

by SUE COOK,
CORE Education Director

As the new Education Director at the Consortium for Oceanographic Research and Education, it will be a refreshing change of pace for me to work with the ORION Program Office, the Executive Steering Committee (ESC) and the broader community to craft an integrated education and outreach plan for ORION. In the current tight funding climate, the challenge will be to identify strategic, cost-effective pathways to our goal. To insure a broad perspective, an Education subcommittee will be created under the umbrella of the ESC with Blanche Meeson as lead. Leslie Peart, the new Education Coordinator at the Joint Oceanographic Institutions, will also be involved. We seek to draw on the expertise of colleagues in educational research, Earth systems education, program evaluation, and the care and feeding of collaborative partnerships to develop an education and outreach plan that effectively serves a wide audience.

Several workshop reports and programs that will be part of the framework for the plan are described in this article. As the ORION education effort evolves, both the list of resources (see table) and the level of detail will expand. Over time, we will create an inventory of high quality resources that will help all of us – from scientists and engineers affiliated with observatory systems of all types to observatory technical and operational staff to educators who work with multiple (K to gray) audiences.

The ORION workshop in Puerto Rico broke new ground by viewing education and outreach as a cross-cutting theme from the outset and NOT as an 'afterthought.' More than 40 individuals with various flavors of educational and outreach expertise attended as both 'double agents' and 'change agents' - participating in the science working groups to help researchers see how and why their science can be charismatic and also serving as members of a separate 'cross-cutting' education task force. As I sat in on various discussions in Puerto Rico, several concerns and recommendations resonated with me. These ranged from the value of using observatory data to engage communities of all ages in scientific discovery (of both episodic and continual events) to specific 'hot ocean topics' to innovative designs for

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The VENUS Project

by DEBBIE SMITH and
VERENA TUNNICLIFFE,
University of Victoria

The Victoria Experimental Network Under the Sea, or VENUS Project, is a Canadian cabled seafloor observatory off the coast of British Columbia that consists of three powered fibre-optic cable lines and six seafloor installations. Full funding of $10.3M (Cdn) was awarded to the University of Victoria (UVic) in the fall of 2002 by the Canada Foundation for Innovation, the British Columbia Knowledge Development Fund, and partners from industry and government. VENUS is funded to build an infrastructure that will offer two-way high speed communication access and interaction in 24 hour real-time from the ocean floor and water column to a land based location. Once installed, the observatories will support new oceanographic experiments for long-term studies in our coastal waters. With an expected life of at least 20 years, each cable line will have a unique set of instrument suite combinations selected by participating researchers to study environmental processes. A sample of the planned sciences for the VENUS Project includes salmon tracking, whale monitoring, delta dynamics studies in Vancouver, and seafloor community studies.

The first VENUS cable will be laid in Saanich Inlet in the fall of 2004. The Strait of Georgia and Juan de Fuca

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'education incubators' to help us better understand how to convey interdisciplinary knowledge more effectively. From my perspective, three key messages are 1) the strong level of support from scientists who were delighted to have educators at the table, 2) the need for both electronic resources and person-to-person efforts to help others use the resources, and 3) the value of educational research on how people learn and how observatory data can best be presented to students, teachers and the public. A unified set of recommendations is being compiled by Blanche Meeson for posting on the web.

The Integrated Ocean Observing System (IOOS) – Coastal Ocean Observing System (COOS) Education Workshop, held in Charleston, South Carolina on March 22-24, was a more tightly focused effort to develop recommendations and strategies for education associated with IOOS. The workshop engaged 63 key individuals who can serve as the nucleus for an IOOS education network and immersed them in discussion and a collaborative review of existing websites relevant to observing system networks. Invitees were drawn from observing system personnel, four existing education networks, agencies and professional societies, the IT community, and a wide range of educational practitioners. One theme of particular interest to workshop participants was workforce needs for future regional observing networks. Descriptive material on the workshop is already on the web (see sidebar) with recommendations to be added shortly.

As we are starting to plan for ORION education, several pilot programs are underway in conjunction with observatory activities. Two are associated with basic science focused programs (the COOL! (Coastal Ocean Observing Laboratory) Classroom website and the Mid Atlantic Center for Ocean Science Education Excellence (MACOSEE) – sponsored "Taking the Pulse of Our Changing Planet" middle school program; the Education and Research: Testing Hypotheses (EARTH) project). Two are set in the context of more applied data streams (education modules associated with Portal to Ocean Research for Teachers (PORTS) and South East Atlantic Coastal Ocean Observing System (SEACOOS); teacher resources being developed and pilot-tested by a partnership involving the Gulf of Maine Ocean Observing System (GOMOOS) and the University of New Hampshire). A fifth uses real-time data in a graduate level online course for teachers sponsored by the American Meteorological Society. Future newsletter articles will focus on these efforts and others that involve the use of real and near-real time data in the geosciences.

"We seek to draw on the expertise of colleagues in educational research, Earth systems education, program evaluation, and the care and feeding of collaborative partnerships to develop an education and outreach plan that effectively serves a wide audience."

In our review, we will also examine the wealth of resources developed by educators at various marine laboratories, aquaria and other facilities around the country. Programs that seem particularly relevant to ORION are the 'Research and Education: Volcanoes, Exploration and Life' (REVEL) project, Extreme 2000-2004 webcasts from DSV Alvin dives, the U.S. Navy's Teacher at Sea program associated with the Central Gulf of Mexico COSEE, K-12 lessons developed by the National Oceanic and Atmospheric Administration's (NOAA) Office of Ocean Exploration, the JASON Project, the Dive and Discover website at Woods Hole Oceanographic Institution (WHOI) and student–designed experiments on Ridge program cruises.

In drafting an education and outreach plan for presentation to the ORION community, we will align the plan with community needs and build on existing programs. Staff and Education committee members will work together to set priorities and look for themes and approaches that resonate with both the scientific and educational communities. Program goals will be specific and measurable and evaluation procedures will be built in from the start to help us identify the processes and 'best practices' most likely to help us reach our goals.//

THE AUTHOR Dr. Susan B. Cook has recently joined CORE as the organization's new Education Director after service as an Associate Program Director in the Division of Ocean Sciences at the National Science Foundation and as a Senior Scientist at Harbor Branch Oceanographic Institution. Dr. Cook received her Ph.D. from Duke University and has 20 years of experience in designing and managing ocean education programs ranging from postdoctoral and graduate fellowship programs to K-12 and informal education.

WORKSHOPS	
ORION Workshop	www.orionprogram.org
IOOS-COOS Education Workshop	www.ocean.us/documents/eduworkshop.jsp
PILOT PROGRAMS	
MACOSEE: Taking the Pulse of the Planet - Resources & Professional Development for Middle School Teachers	www.macosee.net
EARTH; Monterey Bay Aquarium Research Institute	www.mbari.org/education/earth
PORTS, Univ. of South Florida; real-time data through USF's Making Waves website	http://waves.marine.usf.edu
GoMOOS; Univ. of New Hampshire	www.cooa.unh.edu www.gomoos.org
DataStreme Ocean; American Meteorological Society	www.ametsoc.org/amsedu/ds-ocean
EXPEDITIONARY OCEAN SCIENCE PROGRAMS AND ASSOCIATED WEB RESOURCES	
REVEL; Univ. of Washington	www.ocean.washington.edu/outreach/revel
SEAS (Student Experiments at Sea) in association with RIDGE, Penn State Univ.	http://ridge2000.bio.psu.edu/
EXTREME 2004 On-Line Expedition; Univ. of Delaware	http://www.ocean.udel.edu/expeditions/
Dive and Discover; WHOI	www.divediscover.whoi.edu
Ocean Voyagers, Navy Teacher at Sea, Univ. of Southern Mississippi	http://cosee-central-gom.org/ovweb
JASON, Institute for Exploration	www.jason.org

Meet the ORION Director for Ocean Observing Activities: Peter Milne

Since March 2004, the ORION Project Office and the planning process for the Oceans Observatory Initiative (OOI) have been located within the Joint Oceanographic Institutions (JOI). Dr. Peter Milne has joined JOI as Director of Ocean Observing, as of July 2004. Together with Dr. Ken Brink, members of the ORION Steering Committee, and his colleagues at JOI, he is looking forward to working with a broad cross section of the oceanographic and related geosciences communities on such a transformative project as OOI is shaping up to be.

After obtaining his undergraduate degree in organic chemistry from the University of Melbourne (Australia) Peter completed his Ph.D. at the University of Miami's Rosenstiel School of Marine and Atmospheric Science, graduating in 1989. He joined the research faculty of the Division of Marine & Atmospheric Chemistry at U. Miami, RSMAS in 1991. His research interests include organic chemistry and photochemistry of marine dissolved organic matter, the chemistry of hydrocarbons in remote marine and urban atmospheres, and the application of spectroscopic techniques to characterizing environmental chemical systems and problems. He has been involved in oceanographic field work in the Bahamas, coastal South Florida including the Florida Keys, the Southern Ocean and the east Australian coast as well as having taken part in several coordinated atmospheric field campaigns out of Bermuda and a number of U. S. cities on the eastern seaboard.

Peter has a strong interest in science that challenges traditional disciplinary boundaries. In addition to his position as Research Associate Professor at RSMAS, he holds a secondary appointment at the Bascom-Palmer Eye Institute, Dept. of Ophthalmology at U. Miami's Jackson Memorial Hospital. He came to JOI after spending time at the National Science Foundation's (NSF) Geosciences Directorate, in the Oceanographic Science and Atmospheric Sciences Divisions. While at NSF, as Associate Program Director in Chemical Oceanography, he was involved with the inception of a joint NSF-National Institute of Environmental Health Sciences (NIEHS) Oceans and Human Health Initiative. As Program Coordinator in Atmospheric Sciences, he assisted with large infrastructure planning and operation, such as the HIAPER (High-Performance Instrumented Airborne Platform for Environmental Research) project, a new aircraft facility for the atmospheric and geosciences community. He looks forward to listening and working with you all over the coming months and can be reached at pmilne@joiscience.org.

"... looking forward to working with a broad cross section of the oceanographic and related geosciences communities on such a transformative project as OOI is shaping up to be."

OOI Science Plan Update

The Oceans Observatories Initiative (OOI) Science Plan will be available in the coming months for comment on the ORION website.

The OOI is the ORION component responsible for design, prototyping, testing and installation of the Ocean Observatory infrastructure. It is the OOI specifically that is scheduled to receive funds through the National Science Foundation Major Research Equipment and Facilities Construction account beginning in Fiscal Year 2006.

The OOI Science Plan is meant to explain the rationale for building a curiosity-driven Ocean Observatory system, to sketch out what is involved in the system, and to relate the system's rationale to its overall design. The final document is meant to serve scientists, educators and NSF decision makers. A summary document will serve as a useful outreach tool. Comments on any and all aspects of the Science Plan document will be welcome and seriously considered in creating a revised text during the 1-2 months following its web posting.

The Science Plan is not meant to contain specific information about exactly how and where ORION/OOI assets will be deployed. That level of specificity about the Ocean Observatory design will appear in an upcoming Implementation Plan document that will be completed, after community input and review, during mid-2005. See the article by Bob Spindel in this issue (page 6) for information about the process for creating the Implementation Plan.

Please submit comments about the OOI Science Plan -

WE NEED YOUR HELP!

Visit ORION at the AGU Fall Meeting!

Make plans now for ORION activities in San Francisco:

- Town Hall Meeting is scheduled for Thursday, Dec. 16, 6:30-8 p.m. in the Moscone Center.
- Session: Ocean Observatory Science and Technology (Date, time TBA; check the ORION website for updates)
- Booth #317, Dec. 14-17

Plugging In at the Martha's Vineyard Coastal Observatory

by JIM EDSON, SCOTT GALLAGER, ERIC HINTSA, ROB OLSON, JIM PREISIG, HEIDI SOSIK, PETER TRAYKOVSKI, and JOHN TROWBRIDGE, Woods Hole Oceanographic Institution

Coastal processes are of crucial societal and environmental importance. Engineers and planners are concerned with coastal protection, particularly in heavily populated areas where wave attack, set-up, and shoreline erosion threaten coastal structures. Geologists are struggling to understand how the variety of coastal geological features form and evolve in response to nearshore processes. Biologists struggle to understand how plankton biomass, production, and community composition are regulated in coastal environments. Coastal meteorologists are only now beginning to investigate physical processes that are unique to the coastal environment, including the adjustment of the near-surface flow to extreme changes at the land-sea interface.

In recent years, teams of researchers from around the country have made a concerted effort to develop coastal observatories and observing systems to improve our ability to investigate coastal processes. A few of these efforts involve the construction of cabled observatories providing unprecedented access to the marine environment through their real time data and power transmission capabilities. As part of these efforts, a team of scientists and engineers from Woods Hole Oceanographic Institution (WHOI) built the Martha's Vineyard Coastal Observatory (MVCO) on the south shore of Martha's Vineyard in the coastal waters of the Atlantic Ocean with support from the National Science Foundation (NSF). The MVCO provides a natural laboratory to study nearshore hydrodynamics, sediment transport, biological and benthic processes, gas transfer, aerosol physics, and coastal meteorology.

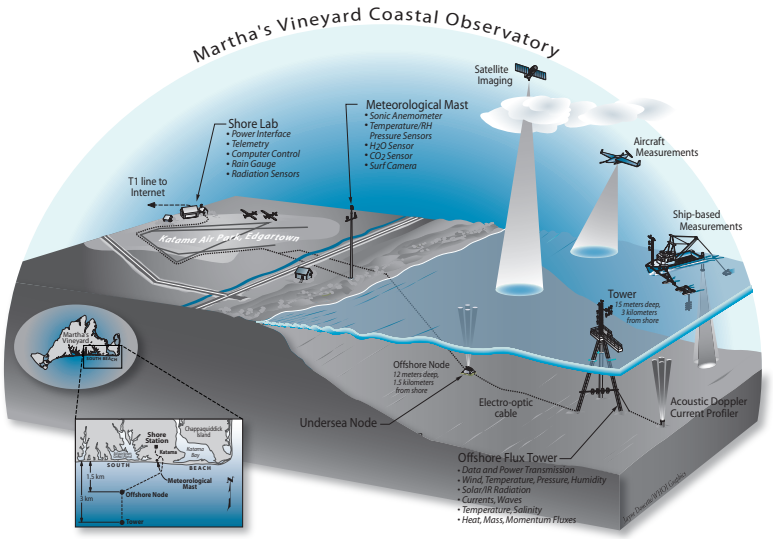

Figure 1. A schematic of the Martha's Vineyard Coastal Observatory including ASIT.

The initial phase of the MVCO was completed in July 2001 and involved the construction and deployment of a small shore lab located 1.5 km inland, a 10-m meteorological mast (metnode) at the ocean's edge, and a subsurface node (seanode) mounted on the bottom in 12-m water depth, 1.5 km offshore. The core sensors at the metnode and seanode are connected directly to the shore lab via embedded electro-optic-power cables. The core set of instruments at the metnode measure wind speed and direction, temperature, humidity, pressure, solar and IR radiation, and precipitation. The core sensors at the seanode measure current profiles, waves, temperature, salinity, and tides. These data are freely available from http://www.whoi.edu/mvco/.

Figure 2. The setup used on ASIT during the CBLAST main experiment.

The second phase of construction involved the design, construction, and deployment of the Air-Sea Interaction Tower (ASIT) using support from the Office of Naval Research (ONR). The ASIT is located 3 km south of Martha's Vineyard in 15 m of water and extends approximately 22 m into the marine atmosphere. This phase of the project was completed when the ASIT was directly connected to the MVCO with its own fiber-optic cable in October 2002. The ASIT was specifically designed to make turbulent flux measurements in the ocean and atmosphere for the ONR's Coupled Boundary Layers and Air-Sea Transfer (CBLAST) program. The MVCO plans to maintain instrumentation at the ASIT and merge this data with the continuous data stream coming from the metnode and seanode.

The cables and the attached nodes act as "extension cords" into the coastal environment and allow investigators to plug in their instruments to take full advantage of the real time data and power. Once plugged in, investigators can return home and collect their data over the Internet and gain access to the sea under all weather conditions (without getting seasick). The MVCO and ASIT have supported a range of interdisciplinary and multi-institutional research projects including:

• **CBLAST** (Coupled Boundary Layer/Air-Sea Transfer; ONR): The main experiment took place in the summer of 2003. Ongoing data analysis and modeling studies are expected to improve the predictive capabilities of coupled ocean-atmospheric models. A significant achievement of this experiment was the first direct measurement of momentum and heat fluxes directly beneath ocean waves.

• **SPACE** (Surface Processes and Acoustic Communications; ONR): The experiment studied the formation and evolution of bubble clouds in breaking waves and how surface conditions and bubble clouds impact the propagation of acoustic signals. The experiment was a first of its kind in that it combined simultaneous high-resolution measurements of surface waves and

See **MVCO**, Page 7, Column 1

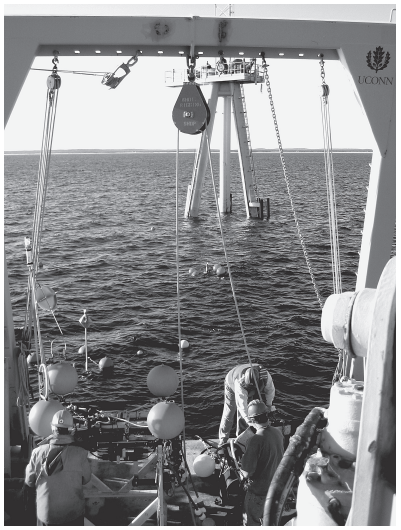

Figure 3. Deploying instrumentation around the ASIT during the CBLAST main experiment.

"Once installed, the observatories will support new oceanographic experiments for long-term studies in our coastal waters."

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Strait cables will be installed approximately one year later in 2005. If all permitting is approved, we hope to install at the same time as the Monterey Accelerated Research System (MARS) array in Monterey Bay, California. The first of a series of proposals to extend the southern cable across Juan de Fuca Strait into U.S. waters has been submitted to the U.S. National Science Foundation by David Martin, Associate Director for Program Integration. This strait – the busiest marine waterway in North America – has a distinct two-way flow straddling the border, presenting a unique opportunity for cabled observatory measurements.

Excitement is growing with the approach of the cable installation in Saanich Inlet this fall. The cable will extend more than 2 km from the shore station on the dock at the Institute of Ocean Sciences to a depth of 100 m. Instruments will branch from a terminal VENUS node at the end of the cable. This VENUS laboratory will be the first in a network of instruments dedicated to examining oceanographic processes in our marine environment. This first installation will test many aspects of cabled observatories soon to emerge for the North-East Pacific Time-Series Undersea Networked Experiment (NEPTUNE) and MARS, from engineering designs to data protocols to researcher engagement.

In May 2004, the VENUS Project selected a combined bid from Global Marine Systems Ltd. and OceanWorks International Inc. as the industry partner for the underwater infrastructure. The parties are negotiating the contract for the design, engineering, manufacture, assembly, and testing of the underwater infrastructure, shore stations, and network operations centre. Global Marine is one of the world's largest submarine cable maintenance and installation companies with a ship and a cable depot in Victoria. OceanWorks, located in North Vancouver, is a leading international supplier of specialized sub-sea work systems. UVic has more recently awarded a contract to Barrodale Computing Services to conduct a joint VENUS/NEPTUNE Oceanographic Database desktop study. The study will focus on the instruments that have been proposed for VENUS/NEPTUNE and examine the data transfer implications to assist in the development of a data management and archive system. In addition, the study will examine current practices, proposed developments in oceanographic databases and database developments in other disciplines that may prove applicable to VENUS/NEPTUNE. The results of this study will be included in the development framework for the Data Management and Archive System.

The VENUS Project is working closely with an emerging group of scientists who are guiding instrument selection, location, and policies. We interact through frequent workshops, a quarterly VENUS Newsletter, and a growing website. The Project has an Advisory Group, which examines progress, policies, and external relations.

Looking back, it does not feel like it has been almost two years since we were granted funding approval but we have been very busy. To date, we have purchased 73 km of cable, held workshops, acquired all Saanich Inlet permits, negotiated partnerships and contracts, acquired bathymetric and substrate surveys, acquired seafloor video using the Remotely Operated Vehicle ROPOS, hired personnel, moved into a new building, displayed exhibits for industry and the public, and had many (yes, many) meetings. We have discovered that we are pioneers in numerous areas. Although breaking new ground can be intensely challenging, there is always an underlying sense of the enormity of the potential opportunity for cabled ocean observatories. We are quite sure that VENUS is fostering a new era of oceanography.//

"... the planned sciences for the VENUS Project includes salmon tracking, whale monitoring, delta dynamics studies in Vancouver, and seafloor community studies."

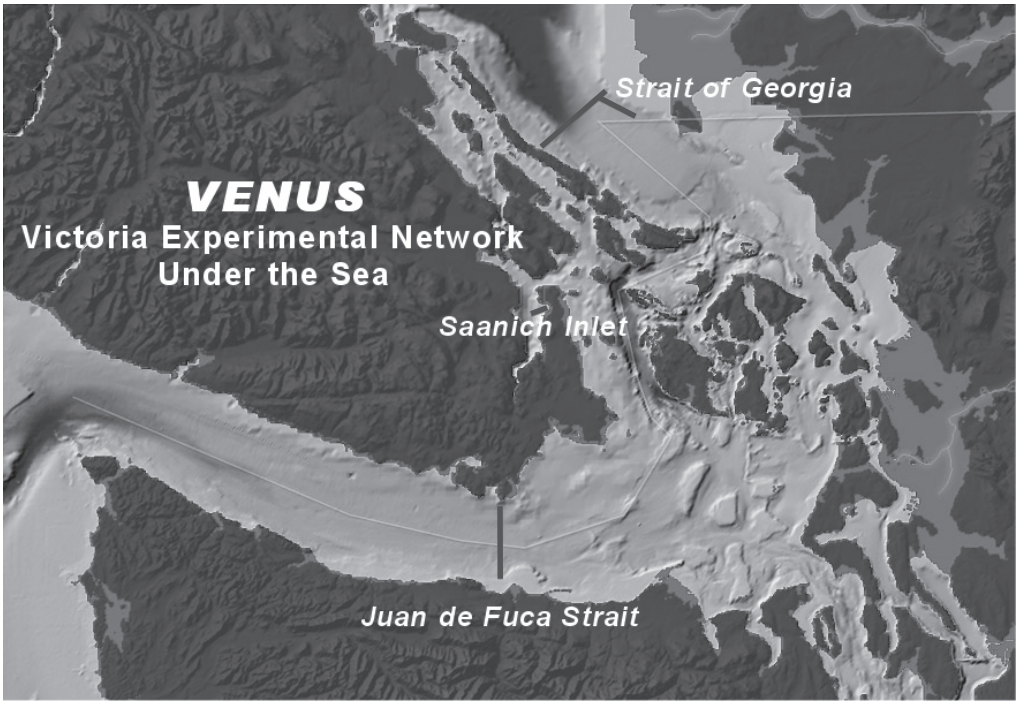

Figure 1. Location of the three VENUS fibre-optic cable lines in the Strait of Georgia, Saanich Inlet, and the Juan de Fuca Strait.

The VENUS Office

VENUS Staff are located in the new Technology Enterprise Facility at the University of Victoria. VENUS has been co-located with the NEPTUNE Canada Team since moving into the new building in January 2004.

VENUS Team:
Verena Tunnicliffe, Project Director
Adrian Round, Project Manager
Richard Dewey, Science Coordinator
Deborah Smith, Project Coordinator
Paul Macoun, Instrument Engineer
Ruthy Yahel, PDF

For more information on VENUS, contact:
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or call (250) 472-5366.

ORION Executive Steering Committee Activities

by ROBERT SPINDEL,
ORION ESC Chair

The Executive Steering Committee (ESC) is the senior advisory committee to ORION, and its membership represents a range of scientific and technological expertise needed for leading the creation of an Ocean Observatory system. The committee membership was chosen from broad-based nominations to a nominating committee that in turn had its slate considered and approved by the 1201 Group Board of Managers. I find the existing committee a pleasure to work with and I am impressed with its vision for the oceanographic community.

The ESC has met twice, in April and July, both times at the CORE/JOI offices in Washington, DC. The next meeting is scheduled to take place in Seattle during late October. Minutes from all ESC meetings are available at the ORION website.

Although the ESC has addressed a number of points in its discussions, a few subjects are especially worth summarizing.

• **OOI Science Plan**: An Ocean Observatories Initiative (OOI) Science Plan is prerequisite to the implementation phase of the program. This document must explain why the ORION Ocean Observatory system is needed and what the approach will be. This science plan needs to inform oceanographers as well as NSF officials. The draft science plan will be available on the ORION website for public comment in the coming months. The ESC urges you to read and comment on this document, and I can assure you that all feedback will be considered carefully. See the article on page 3 for more information.

• **ORION advisory committees**: The ESC recognizes that it does not have the expertise required to address all ORION issues. Thus, it will name ad hoc or standing committees to address specific information needs as they arise. Besides bringing more expertise to the table, committees are an excellent way to broaden the community of people involved in ORION planning. All committees will be reviewed each year to see if they have completed their mission, if their terms of reference need modification, or if other changes are needed. The first committee formed is the Sensors Committee, chaired by Kendra Daly of the University of South Florida. The charge and membership of this committee will be available on the ORION website. I expect that one or two other committees will be named in the coming months. If you are interested in serving on an ORION committee, or wish to suggest a possible new committee, please contact Ken Brink (kbrink@whoi.edu) or me (spindel@apl.washington.edu). We need your help.

"In order for the OOI effort to be a success, it must express the needs and motivations of the ocean science and education community. I urge you to take part in this process ...."

• **OOI Implementation Plan**: The greatest challenge facing the ESC is the need to develop an Implementation Plan that will define and justify the system to be built and specify where permanent assets will be located. It is absolutely critical that the ocean science and education community be involved in the decision process, as these decisions will affect the shape of our science for decades. To this end, we have begun the process of soliciting your help and input as noted below.

Our approach to achieving an Implementation Plan based on the broadest possible community input is as follows. First, the ESC has prepared a "prospectus" that lays out thinking, constraints and results to date that are relevant to Ocean Observatory design. This document is based on the many workshops and reports in the last several years devoted to various aspects of ocean observatory science. (Many are available on the ORION website.) The document is accompanied by two requests for information. One is a set of questions about how you plan to use Ocean Observatory assets, and what sort of capabilities you will require. Some questions are relatively general, while others are very specific about system parameters such as bandwidth, data rates, power, etc. Second, we ask for brief planning information for studies that you might perform using the Ocean Observatory infrastructure. Taken together, this information will be extremely useful to us in terms of understanding scientific drivers and technological needs. Once responses have been received, the ESC will use the community information, as well as engineering and budgetary estimates, to draft an Implementation Plan that will allocate assets, define required common use elements (most notably cyberinfrastructure and education), and explain the rationale behind the decisions. This document will be available for public comment, and will ultimately undergo a formal review process. We expect this process to be completed by mid-2005.

Our plan is to have the prospectus with requests for input on the ORION website in the near future. When it is available, it will be widely announced. I urge you to take the time to respond as fully as you can.

In order for the OOI effort to be a success, it must express the needs and motivations of the ocean science and education community. I urge you to take part in this process and to contact us if you have thoughts about how we can better make this happen.//

Specifying the Infrastructure for Ocean Observatory Instruments

HIGHLIGHTS FROM A RECENT WORKSHOP

The NSF Oceanographic Technology and Interdisciplinary Coordination Program recently sponsored a workshop to address the specification of the instrumentation software infrastructure needs of cabled ocean observing systems. The workshop, hosted by MBARI (Monterey Bay Aquarium Research Institute), was held Sept. 13-15 in Moss Landing, California.

The workshop, the first of two scheduled meetings on the subject, had as its overall goal discussion and identification of the common instrument infrastructure and software needs that will be required to interface a wide range of instrumentation onto the cabled backbone of ORION observatory components.

Based in large part upon the requirements arising from cabled observatory test-beds such as MARS (http://www.mbari.org/mars/), and the Canadian VENUS experimental network (http://www.venus.uvic.ca), the extension of these design features to other cabled ocean observing elements, such as MOOS (http://www.mbari.org/muse/), and moored buoy systems were also considered.

A workshop report discussing the issues, results and recommendations will be generated and posted at the workshop website shortly (http://www.mbari.org/rd/sensors/2004workshop.htm). Many of the individual participant presentations are to be found at the same website.

Workshop Reports Available

Reports from the ORION (Jan. 2004) and NEPTUNE Canada (May 2004) Workshops are now available. Visit www.orionprogram.org for links to these downloads.

The ORION Newsletter needs YOU!

Submissions and feedback are welcome. Send your suggestions and address changes to orion@joiscience.org

ORION
The Newsletter of the Ocean Research Interactive Observatory Networks

Executive Editors: Kenneth Brink
Peter Milne
Managing Editor: Emily Griffin
Asst. Editor: Matthew Niemitz

The *ORION Newsletter* is published quarterly by the ORION Project Office and is available free of charge.

The 1201 Group LLC, a partnership between the Joint Oceanographic Institutions (JOI) and the Consortium for Oceanographic Research and Education (CORE), manages the ORION Project Office. Funding for ORION is provided through a cooperative agreement with the National Science Foundation (NSF).

Any opinions, findings, conclusions, or recommendations expressed in this publication do not necessarily reflect the views of NSF, JOI, or CORE.

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"...cabled observatories...provide unprecedented access to the marine environment through their real time data and power transmission capabilities."

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subsurface bubble clouds with measurements of the propagation of acoustic signals through the same volume.

• **Plankton Dynamics** (NSF & NASA): A long-term study of plankton dynamics is being undertaken with data from the FlowCytobot and Autonomous Vertically Profiling Plankton Observatory (AVPPO). FlowCytobot is a laser-based system to monitor and characterize microscopic plankton, at the individual cell level. The AVPPO carries a Video Plankton Recorder and conducts repeated profiles of the water column with a buoyant sensor package and a bottom-mounted winch. Long-term deployment of these systems is only possible with the type of infrastructure at MVCO.

• **Sediment Transport** (ONR): An ongoing experiment to investigate the processes driving the morphology of the ocean bottom at MVCO. This experiment has taken advantage of the seanode to deploy a rotary side-scan sonar and ADV. These instruments are connected to the node from a 100 m cable to investigate bedform migration of the coarse sand that makes up a large fraction of the seafloor in the region. A related project is investigating the processes that bury objects (e.g., mines) on the ocean floor.

• **Ozone Chemistry** (NSF): An ongoing investigation to quantify the deposition of ozone from the atmosphere to the ocean. This project took advantage of the ASIT to deploy a fast-response sensor capable of directly measuring the flux together with a highly accurate system to measure the mean ozone concentration.

• **OHATS** (Ocean Horizontal Array Turbulence Study; NSF): An air-sea interaction experiment designed to look at the effect of waves on the subgrid-scale parameterizations used in numerical models and large eddy simulations. The experiment has used the ASIT to deploy 2 levels of 9 sonic anemometers (i.e., 18 total) at 5 and 5.5 m above the ocean surface.

As with most coastal environments, the region around the MVCO is complex and characterized by significant variability over time and space. The research team at the MVCO is particularly interested in becoming part of a truly integrated coastal observing system that encompasses fixed, mobile, and remotely sensed measurements as well as numerical models. Such a system would provide much needed information about the environment surrounding our piece of the coastal ocean. We look forward to working with the ORION program office to make this a reality.//

"The research team at the MVCO is particularly interested in becoming part of a truly integrated coastal observing system that encompasses fixed, mobile, and remotely sensed measurements as well as numerical models."

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For more information about ORION, visit:
www.orionprogram.org

Job Announcement: Systems Engineer for Ocean Observatories

The ORION project office (www.orionprogram.org) seeks an experienced systems engineer to lead development efforts required for planning for the purchase, installation and maintenance of a high reliability, long term science-driven ocean observatory network. The network includes instrument interface subsystems, buoyed and cabled ocean observing networks, satellite and optical telemetry, submarine installation tools, techniques and processes and the development of scientific cyber infrastructure. Initial project tasks will include completion of user requirements, development of system requirements, architectural and engineering design of the system, preliminary cost estimates, development of a project execution plans and execution of formal requirements and design reviews in collaboration with research scientists and engineers. The ability to work constructively with research scientists and engineers to define a system that will meet the unique science and research needs of the academic ocean research community will be a key trait of the successful applicant.

The successful candidate will possess excellent leadership and interpersonal skills critical for successful collaboration, a degree in engineering, a minimum of 5 years experience as a systems engineer involved in large projects, and demonstrated success in the development of complex multi-sensor systems. A familiarity with scientific ocean observing activities or other complex submarine system development is desirable.

Review of applications for the position will begin on October 1, 2004 and continue until the position is filled. For consideration, please forward your letter of interest, resume and four references from whom JOI may solicit recommendations, to The HR TEAM: hr@thehrteam.com; or fax 410-964-6484. JOI is an Equal Opportunity Employer.

Meetings Calendar

Sept. 13-15 **NSF Sensors Workshop 2004**, Moss Landing, CA
ORION/MARS Instrument Software Infrastructure
http://www.mbari.org/rd/sensors/2004workshop.htm

Sept. 27-29 **NEPTUNE Canada,** Victoria, BC
Ocean Observing Systems Workshop
http://www.neptunecanada.ca/workshops/sept2004workshopInfo.htm

Nov. 1-3 **GoDAE,** St. Petersburg, FL
2nd Symposium, Global Data Assimilation Experiment
http://www.bom.gov.au/bmrc/ocean/GODAE/Symposium%20II/index.html

Dec. 13-17 **AGU Fall Meeting,** San Francisco, CA
http://www.agu.org/meetings/fm04/

If you are aware of upcoming meetings of interest to ocean observing please contact the ORION Project Office with the details: orion@joiscience.org.