

National Forum 2014

National Aquarium, Baltimore, Maryland
12 September 2014

National Forum 2014

Introduction

Ocean Exploration 2020 was the first National Forum on ocean exploration called for under the 2009 legislation that formalized NOAA's ocean exploration responsibilities. The purpose of the legislation's requirement for periodic national forums is to "establish an ocean exploration forum to encourage partnerships and promote communications among experts and other stakeholders in order to enhance the scientific and technical expertise and relevance of the national program." Ocean Exploration 2020 set the stage for formulating a national program of ocean exploration by asking 120 ocean exploration stakeholders what characteristics a national program should exhibit by the year 2020.

The Ocean Exploration 2020 report described seven key characteristics a successful national program of ocean exploration that included clear priorities for ocean exploration, an extensive network of partnerships dedicated to ocean discovery, more ships, vehicles and other tools for exploration, new technologies, a formal role for citizen scientists and explorers, better data sharing, and a more engaged public.

This national forum focused on the connections among Ocean Exploration 2020 recommendations, ocean exploration results, and NOAA mission requirements as an environmental information services agency. Dr. Richard Spinrad, NOAA's Chief Scientist, chaired the meeting of 34 ocean exploration experts and stakeholders. Participants included ten of the 13 new Ocean Exploration Advisory Board members, to review the relationship between ocean exploration and NOAA missions and priorities, to assess the results of Ocean Exploration 2020—in particular its recommendations for ocean exploration priorities—to discuss themes for National Forum 2015, and to help put National Forum 2015 planning in the context of other activities, such as priority-setting workshops, and the activities of the new Ocean Exploration Advisory Board (OEAB).

Format

Ocean Exploration 2020 recommendations set the overall context for the meeting. Introductory remarks from Dr. Spinrad framed the agenda in terms of NOAA's environmental information services priorities. Presentations from three noted ocean explorers that focused in results from the Arctic, the Western Pacific, and the Mid-Atlantic Canyons—geographic areas of high priority for NOAA—described how ocean exploration resulted in discoveries that profoundly affected understanding of processes and systems relevant to NOAA's mission. Finally, a panel of NOAA representatives discussed linkages between NOAA mission requirements and ocean exploration results. These activities set the stage for an open discussion among National Forum 2014 participants of six questions related to advancing Ocean Exploration 2020 recommendations for a national program of ocean exploration.

NOAA and Ocean Exploration

Dr. Spinrad opened the meeting with a review of NOAA's responsibility to put actionable environmental information in the hands of people who need it. There must be a direct connection between NOAA research activities—which include its ocean exploration program—and NOAA mission requirements. Examples of such a connection include ocean exploration discoveries in the Western Pacific that shed new light on ocean acidification; recent discoveries of methane seeps in the mid-Atlantic region that may have important implications for deep-ocean fisheries habitat; the Census of Marine Life expeditions and other surveys that establish baseline conditions for the deep ocean environment; *Okeanos Explorer*

contributions to the national archive of bathymetric data; advances in data management that make ocean exploration data available quickly, and in a useful form; and new technology development to speed the pace and scope of ocean exploration.

A strong NOAA program, tightly coupled to NOAA mission requirements, is required if NOAA is to coordinate and facilitate an effective national program of ocean exploration. Given the national coordination responsibility, all of NOAA's ocean exploration activities are a *de facto* contribution to a national program. But ocean exploration—whether conducted by government agencies, private foundations, the private sector, or by academic institutions—is inherently partnership driven. There is little NOAA can do without its partners in government and non-government sectors. These partners conduct their own activities in response to their own drivers, which may or may not be aligned with the statutory requirement for ocean exploration or NOAA's mission priorities. Nevertheless, there is tremendous opportunity in a collaborative approach to a national ocean exploration program. The Ocean Exploration Advisory Board and regular national forums will help build a framework for cooperation that will benefit all sectors and serve the national interest.

Discoveries in the Western Pacific, U.S. Atlantic Canyons, and the Arctic

Recent discoveries in the Western Pacific, the U.S. Atlantic Canyons, and the Arctic have had profound implications for our understanding of deep ocean processes and systems from vents to under-ice photosynthesis. Dr. Tim Shank (Woods Hole Oceanographic Institution), Dr. Carolyn Ruppel (U.S. Geological Survey), and Dr. Chris German (Woods Hole Oceanographic Institution) reviewed these important geographic areas—all important to NOAA mission programs—by describing the state of knowledge 20 years ago, what we have learned through ocean exploration, and what ocean exploration challenges remain:

- Dr. Shank described discoveries of hydrothermal vent systems and associated chemosynthetic communities in the Western Pacific as a result of NOAA and other expeditions to the Mariana Arc in the early 2000s. He noted the relevance of these discoveries to understanding the relationship between ocean chemistry and climate change.
- Dr. Ruppel described the discovery of approximately 550 previously-unknown methane seeps north of Cape Hatteras on the U.S. Atlantic margin based on data collected on *Okeanos Explorer* expeditions in 2012 and 2013. Many of the seeps occur at water depths consistent with the breakdown of gas hydrate, a frozen form of methane and water that occurs naturally in sediments. NOAA's *Deep Discoverer* remotely operated vehicle has found ecologically diverse communities that rely on methane and sulfide at some of the seeps.
- Dr. German's 2014 expedition to the Arctic resulted in new discoveries of a hydrothermal vent system and the potential importance of through-ice photosynthesis. New under-ice remotely operated vehicle technology made it possible to measure light penetration, salinity gradients, and chlorophyll and to image algal mats that formed the basis of a surprisingly rich and complex ecosystem. Furthermore, the team was able to map the topography of the undersea ice adding a new dimension to our understanding of the relationship between sea ice and species that associate with this unique and dynamic habitat. These discoveries reinforce the need for additional exploration of the Arctic—and investment in new technologies to enable it.

Ocean Exploration and NOAA Mission Requirements

The NOAA panel discussed linkages between NOAA mission requirements and ocean exploration results that further NOAA's priorities in service to the nation. Deputy Undersecretary for Operations VADM Mike Devany, National Ocean Service Deputy Assistant Administrator Russell Callender, National Marine Fisheries Service Deputy Assistant Administrator Paul Doremus, and Senior Policy Advisor Michael Weiss, representing different aspects of NOAA's portfolio, discussed how NOAA's ocean exploration activities help the mission programs provide actionable environmental information to NOAA clients.

The panel addressed themes of ocean exploration's role in observational infrastructure and resilience, and highlighted the importance of:

- **providing ocean exploration data** quickly, in a form useable to a range of data users from scientists to decision makers, and transferring this data management model to data collectors inside and outside of NOAA;
- **collecting new data** for baseline characterizations of the deep ocean environment to improve understanding of potential resources, habitat, and associated communities; and the application of baseline characterizations to improve economic resilience;
- **contributions to understanding fast-changing Arctic systems and habitats** and the need for more platforms and technology suitable for under-ice exploration in this high-priority area. Limited capabilities in the NOAA and UNOLS fleet, limited access to the USCG vessels, and long lead times for new ice-capable ships mean international partnerships for ships and expeditions are required to meet NOAA's needs;
- **understanding resources and systems in the U.S. exclusive economic zone** (and extended continental shelf). Seamounts and canyons are known to be important to fisheries, for example, and relevant to NOAA's place-based management programs; and,
- **new partnerships** across government—including the Navy, building a new relationship with the oil and gas industry, and seeking innovative new mechanisms to support ocean exploration over the long term. Creative approaches to engage aquaria and other informal education centers, citizen explorers, indigenous peoples, and the public are also important.

For the future of NOAA's ocean exploration program, the panel suggested that OER consider using crowdsourcing to help analyze archived and new ocean exploration data, new approaches to collect and disseminate management-relevant data and information, new technology development in partnership with other NOAA programs and external partners toward "quantum improvements in the agency's ability to collect and analyze ocean exploration data, and to reinforce NOAA's observational infrastructure with a view to data requirements over the next decade.

General Discussion

Participants received six questions in advance to seed discussion about how the next National Forum can build on and advance Ocean Exploration 2020 recommendations:

1. What are the relevant drivers across sectors engaged in ocean exploration?
2. What are viable models for collaboration?
3. What products should ocean exploration expeditions produce?
4. Where are the greatest opportunities?
5. How should the next National Forum be organized?
6. And, what advice would you give to NOAA?

(See agenda, which is attached, for the full text of these questions.)

Among the observations participants made:

- Curiosity about the unknown is one of the most important motivations for ocean exploration. It is important to recognize that while understanding drivers is important, we must also allow for unpredictability and surprise as we explore because there is great value in that alone.
- Government drivers for exploration range from hypothesis driven (National Science Foundation) to pure exploration (NOAA). It is important to recognize these different drivers and ensure coordination mechanisms account for them.
- Drivers are constant—we want to know about the abundance and distribution of biology, of oil and gas, about systems and processes. It is important to set targets over the next five to seven years. Ocean Exploration 2020 is a start of a community definition of priorities; the next National Forum can continue that process.
- We need to be expansive in our definition of partners and their interests to include partners who can't explore on their own, but who are important economically and to our security interests.
- A national program is a blank slate. Ocean Exploration 2020 began to define it but we are free to be radical and experimental. Public engagement is critical to the success of a national program, and expeditions should adopt an “architecture of participation” to make the public integral to ocean exploration.
- Science, Technology, Engineering, and Mathematics (STEM) priorities are an important opportunity for ocean exploration. Tailoring expeditions to meet STEM needs both meets national education requirements and builds support.
- How we approach data management has implications for partners and drivers. A national program should not lose sight of the importance of data and data interoperability.
- National Oceanographic Partnership Program (NOPP) working groups could be a useful model for promoting a national ocean exploration program—if they could be made truly inclusive, and not just the reserve of federal agencies. NOPP's culture would also need to evolve to be more collaborative, and allow for sharing of opportunities and resources in a meaningful way. Other coordination models include the Global Ocean Observing System and the International Ocean Discovery Program.
- Both the Ocean Exploration Advisory Board and the National Forum itself are important coordination mechanisms for collaborative ocean exploration.

- For NOAA to be an effective coordinator, ocean exploration must be more visible within NOAA and more relevant to the NOAA mission. Ocean exploration must be one of the NOAA priorities—but a new vision is needed to help make ocean exploration compelling to NOAA leadership.
- Defining success is important. One metric is the “number of surprises that require us to rethink our world view.” Defining ocean exploration in terms of “value” rather than “drivers” helps demonstrate the importance of the activity as decision makers and the public understand we need more information to manage scarce resources. And it is important to be mindful of the link between ocean exploration and quality of life ashore.
- National Forum 2015 should address geographic priorities. Good candidates are the Pacific—where the Okeanos Explorer, Nautilus, and Falkor will all be operating over the next few years—and the Arctic. We should be mindful of the U.S. EEZ and ECS as important politically. But a national program can have impact through investments in new technologies that allow all ocean explorers to have greater reach and impact. New under-ice exploration technologies are critical to understand the Arctic, for example.

Discussion Outcomes

Following this discussion, the meeting participants agreed on the following points to provide as advice to the new Ocean Exploration Advisory Board and National Forum 2015 meeting planners regarding an evolving national program of ocean exploration:

- **Build the Value Proposition for a National Program:** National program stakeholders should use case studies to demonstrate the value of “knowing the unknown” and to celebrate successes to help document the importance of a national program of ocean exploration for decision makers in the Administration and in Congress.
- **Focus on and Prioritize Targets for Exploration:** The community should prioritize the U.S. Exclusive Economic Zone (including the extended continental shelf), the Arctic, newly protected areas, and Pacific Territorial Trust Areas. National program stakeholders should map these priorities to geopolitical and economic realities.
- **Execute with Attention to Visibility and Engagement:** The community should design expeditions to include an “Architecture of Participation” to ensure the public is engaged and active in ocean exploration expeditions.
- **Exploit Existing Partnerships and Programs to Build a National Program:** A national program of ocean exploration should use what works or has worked—for example, inclusive NOPP subcommittee meetings, workshops to collect community priorities and activities, and the model Ocean Exploration 2020 offers.
- **Use the Next National Forum as a Lens to Focus Ocean Exploration:** The OEAB and meeting planners should use the Baltimore meeting, workshops, OEAB meeting discussions, and other key events to build a road map to National Forum 2015.

Attachments

NOAA and the Star Spangled Spectacular
National Forum 2014 Meeting Participants
National Forum 2014 Meeting Agenda



NOAA and Maryland's Star-Spangled Spectacular



From September 10 to 16, 2014, Baltimore became the centerpiece for the Star-Spangled Spectacular, a celebration of Maryland's maritime history and commemoration of its contributions to the defense and heritage of the nation. NOAA Ship *Okeanos Explorer* took a timely break from exploring Atlantic submarine canyons to be available for the events and to provide a backdrop to highlight NOAA's leadership across ocean issues.

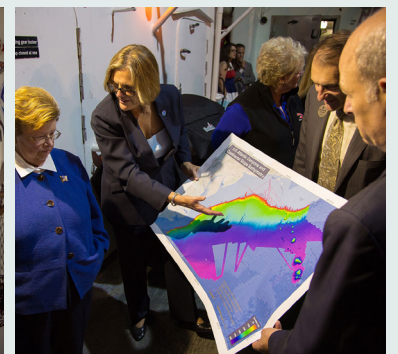
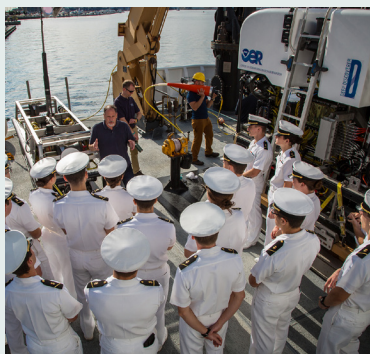
During the week-long celebration, NOAA and the National Aquarium in Baltimore co-hosted a range of events. One such event was a meeting to discuss the value and relevance of ocean exploration to NOAA and the nation. Event participants initiated planning for a 2015 National Ocean Exploration Forum to be held at the National Aquarium.



The Mid-Atlantic Regional Council on the Ocean and Maryland Sea Grant convened a workshop focused on the current and future state of science in the mid-Atlantic undersea canyons. Participants from federal, state, and academic groups discussed results of field work by NOAA and partners in the region.

Other highlights included:

- *Okeanos Explorer* tours for more than 2,000 members of the public and an additional 18 group tours for key friends in the region, including partners such as the National Aquarium, Bureau for Ocean Energy Management, U.S. Naval Academy, Mid-Atlantic Regional Council on the Ocean, and Sea Grant
- A Google+ Hangout hosted by the National Aquarium featuring NOAA Ship *Okeanos Explorer* and the Ocean Exploration Trust's Exploration Vessel *Nautilus*
- A pier-side tent with National Aquarium exhibits and activities for children, including special appearances by Captain Barnacles and Kwazi of The Octonauts



AGENDA
NATIONAL OCEAN EXPLORATION PROGRAM MEETING
12 September 2014

Knott Harbor View Room
National Aquarium, Baltimore

Purpose

To share information about how ocean exploration advances NOAA program and mission priorities, as well as catalyzes new NOAA missions that address national priorities, especially in geographies Ocean Exploration 2020 identified as important. Discuss how ocean exploration contributes to NOAA's environmental intelligence mission, and therefore contributing to national ocean-related issues. Identify ways ocean exploration stakeholders can collaborate to pursue national priorities in key geographies, and to use meeting results to prepare for the next National Forum in 2015. To develop a framework and outline for the second National Forum on Ocean Exploration to be held at the National Aquarium in Baltimore in 2015.

Background

The first National Forum on Ocean Exploration, known as Ocean Exploration 2020, was held in July 2013 at the Aquarium of the Pacific in Long Beach, California. Participants were challenged to identify a framework for a future National Ocean Exploration Program combining the expertise and resources of multiple government agencies, academic institutions, industry, and non-profit organizations. Participants identified geographic and thematic priorities, the types of partnerships required for a viable National Program, the potential role of citizen scientists, and new platforms and technologies to increase the pace of ocean exploration. The need for open data sharing and public engagement were also discussed. The Ocean Exploration 2020 report may be found here: <http://oceanexplorer.noaa.gov/oceanexploration2020>.

Approach

After opening remarks from the chair, NOAA Chief Scientist Rick Spinrad, there will be short presentations from scientists who have been involved in exploration in three areas identified as priorities by the community in Ocean Exploration 2020: the Arctic, Western Pacific, and Mid-Atlantic Canyons. The presentations will follow a similar format:

- What we thought we knew about the region 20 years ago
- What we have learned since then through exploration that has changed our understanding of the region and/or the science; and,
- Why exploration of these areas is still needed given gaps in knowledge that remain

A panel discussion will follow in which NOAA representatives will discuss the relationship between community priorities and NOAA mission priorities—and national policy with respect to geographic areas, processes, resource management, and other considerations, such as the national interest.

Dr. Spinrad will moderate a general discussion in the afternoon to address a series of questions about how a national program—and the next National Forum on Ocean Exploration in 2015—will further the NOAA mission, Administration objectives, and other stakeholder priorities by advancing the rate, scale, and comprehensiveness of ocean exploration.

Participants

Participants include explorers, scientists, and policy makers. Please see attached list.

Agenda

0900-0910	Welcome	<i>John Racanelli</i> —President and CEO, National Aquarium
0910-0915	Introduction	<i>Craig McLean</i> —Acting Assistant Administrator
0915-0935	Opening Remarks	<i>Rick Spinrad</i> —Chief Scientist, NOAA
	<ul style="list-style-type: none">• NOAA as the nation's environmental intelligence agency• Ocean exploration as a component of environmental intelligence• Expectations, requirements, and constraints related to a national program ocean exploration• NOAA vision for a national program of ocean exploration and a challenge to ocean exploration stakeholders	
0935-0945	Message from the Ocean Exploration Advisory Board Chair (recorded)	<i>Paul Gaffney II, VADM USN (ret.)</i>
0945-1000	Reflections on Ocean Exploration 2020	<i>Jerry Schubel</i> —President and CEO, Aquarium of the Pacific
	<ul style="list-style-type: none">• The purpose of Ocean Exploration 2020• What was accomplished• Considerations for the next National Forum	
1000-1015	Exploration in the Western Pacific	<i>Tim Shank</i> —Associate Scientist, WHOI
1015-1030	Exploration in the Mid-Atlantic Canyons	<i>Carolyn Ruppel</i> —Chief, USGS Gas Hydrates Project
1030-1045	Exploration in the Arctic	<i>Chris German</i> —Senior Scientist, WHOI
1045-1100	Break	
1100-1200	NOAA Panel Discussion	<i>Rick Spinrad</i> —Moderator
		<i>VADM Mike Devany</i> —NOAA Deputy Under Secretary for Operations
		<i>Michael Weiss</i> —Senior Policy Advisor, Office of the Assistant Secretary for Conservation and Management
		<i>Russell Callender</i> —Deputy Assistant Administrator, National Ocean Service
		<i>Paul Doremus</i> —Deputy Assistant Administrator, National Marine Fisheries Service

1200-1300 **Tours of the Okeanos Explorer for meeting participants**

1300-1400 **Lunch** *Buffet in KHVR courtesy of the Global Foundation for Ocean Exploration*

1400-1600 **General Discussion: Anticipating National Forum 2015** *Rick Spinrad—Moderator*

The science presentations and the NOAA leadership responses set the stage for a discussion about how NOAA and a national program should proceed, and how the next National Forum, planned for mid-2015, can advance the national interest in these three areas. Topics could include:

- Ocean Exploration 2020 identified an initial set of priorities for ocean exploration, including geographical areas and processes (such as ocean acidification). Yet academic institutions, foundations and other non-governmental organizations, and federal agencies all have different drivers. What are these drivers, how can a national program leverage them, and how can the next National Forum help create a context to address these different drives toward a national program of ocean exploration?
- Ocean Exploration 2020 described a National Ocean Exploration Program as an effort engaging multiple federal agencies, academic institutions, private organizations, and industry planning, executing, and evaluating ocean exploration activities strategically through coordinated partnerships. What are some of the most viable models available?
- One view of ocean exploration is that expedition results yield data and information that characterize a particular area (or process). This characterization provides enough information—which includes a better understanding of gaps—so that the community can decide whether to return, and/or identify science questions that merit further investigation. A national program might encourage ocean explorations to provide standard characterization products. What products should ocean exploration expeditions generate?
- What are the greatest opportunities to advance a national program of ocean exploration? (Opportunities could include planned expeditions, new technologies, new stakeholders)
- How should the next National Forum on Ocean Exploration be organized to encourage ocean exploration in the priority regions and advance collaboration among ocean exploration stakeholders?
- What advice do you have for NOAA in leading a national program of ocean exploration in this region?

1600-1630 **Summary and Closing Remarks** *Rick Spinrad*

1800-2000 **Reception: National Aquarium**

National Ocean Exploration Planning Meeting
Nation Aquarium, Baltimore
12 September 2014

<i>Last Name</i>	<i>First Name</i>	<i>Organization</i>
Austin	Jamie	University of Texas
Ausubel	Jesse	Rockefeller University/Sloan
Ballard	Bob	Ocean Exploration Trust
Batiza	Rodey	Global Foundation for Ocean Exploration
Callender	Russell	NOAA Ocean Service
Davis	Megan	Florida Atlantic University
Devany	Mike	NOAA
Doremus	Paul	NOAA Fisheries
Ferrini	Vicki	Columbia University
German	Chris	Woods Hole Oceanographic Institution
Hume	Cameron	Consultant
Dixon	Jacqueline	University of South Florida
Kendall	Jim	Bureau of Ocean Energy Management
Kreider	John	Oceaneering
Lang	David	OpenROV
Lovalvo	David	Global Foundation for Ocean Exploration
McLean	Craig	NOAA Research
Miller	Allison	Schmidt Ocean Institute
Nye	Nicolette	National Ocean Industries
Petruncio	Emil	U.S. Naval Academy
Racanelli	John	National Aquarium
Rikoski	Rick	Hadal, Inc.
Rissolo	Dominique	Waitt Institute
Ruppel	Carolyn	U.S. Geological Survey
Schubel	Jerry	Aquarium of the Pacific
Schwaab	Eric	National Aquarium
Shank	Tim	Woods Hole Oceanographic Institution
Spinrad	Rick	NOAA
Towers	Lance	Boeing
Weiss	Michael	NOAA
<i>Staff</i>		
Leonardi	Alan	NOAA
McDonough	John	NOAA
McKinnie	David	NOAA
Hammond	Steve	NOAA

National Ocean Exploration Planning Meeting
Nation Aquarium, Baltimore
12 September 2014

<i>Last Name</i>	<i>First Name</i>	<i>Organization</i>
Austin	Jamie	University of Texas
Ausubel	Jesse	Rockefeller University/Sloan
Ballard	Bob	Ocean Exploration Trust
Callender	Russell	NOAA Ocean Service
Davis	Megan	Florida Atlantic University
Devany	Mike	NOAA
Doremus	Paul	NOAA Fisheries
Ferrini	Vicki	Columbia University
German	Chris	Woods Hole Oceanographic Institution
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McKinnie	David	NOAA
Hammond	Steve	NOAA