Minutes

23nd Meeting of the Ocean Exploration Advisory Board
April 25 - 26, 2023, In-person Meeting

Notification and Availability of Meeting Materials
The 23rd meeting of the Ocean Exploration Advisory Board (OEAB) was announced to the public through the *Federal Register* and on the OEAB website. Background materials and presentations prepared for this meeting are posted on the OEAB website.

Ocean Exploration Advisory Board Members in Attendance
- Vicki Ferrini, Columbia University, Chair
- Peter Girguis, Harvard University
- Kevin Hand, Ocean Worlds Lab, NASA Jet Propulsion Laboratory
- Eric King, Schmidt Ocean Institute
- Veronique Le Roux, Woods Hole Oceanographic Institution
- Justin Manley, Just Innovation Inc.
- David Millar, Fugro USA
- Frank Muller-Karger, College of Marine Science, University of South Florida
- Mark Moline, School of Marine Science and Policy, University of Delaware
- Clara Smart, Johns Hopkins University Applied Physics Laboratory
- Lesley K. Iaukea, Director, Indigenous Knowledge & Environmental Convergent Science Program

Ocean Exploration Advisory Board Members in Absentia
- Ellen Prager, Ph.D., President, Earth2Ocean, Inc.

Designated Federal Officer for the OEAB
- David Turner, NOAA Ocean Exploration
- Joanne Flanders, NOAA Ocean Exploration (alternate)

NOAA Ocean Exploration Staff in Attendance
- Jeremy Weirich, Director
- Amanda Netburn, Deputy Chief Science and Technology Division
- Aurora Elmore, Program Manager, Ocean Exploration Cooperative Institute (OECI)
- Logan Kline, Knauss Fellow
- Gregory Zwicker, IT Liaison

Observers
A number of individuals from the public, NOAA and other organizations observed the meeting at various points.

Executive Summary

1. **Open Meeting.** Designated Federal Officer (DFO) David Turner opened the meeting on April 25, 2023 in Silver Spring, Maryland.

2. **Chair Opening Remarks.** Chair, Dr. Vicki Ferrini reviewed the meeting agenda and welcomed the newly appointed members to the Board. She expressed her enthusiasm for the opportunity to collaborate with both the Board and NOAA.

3. **Introductions: New Board Member.** The Chair welcomed the OEAB's newest member, Dr. Lesley K. Iaukea.

4. **Remarks by the Leadership of the National Marine Sanctuary Foundation:** Allison Alexander, Vice President Program Operations, and Veronica Ali, Vice President of Finance, with the National Marine Sanctuary Foundation (NMSF) discussed their organization's work in advocating for protected waters and collaboration with communities. They highlighted ongoing efforts in education and outreach and called particular attention to the use of Machine Learning and Artificial Intelligence to better understand and manage sanctuaries. They shared their ongoing initiatives and partnerships, as well as their efforts in education and outreach.

5. **Remarks from Dr. Steve Thur, Assistant Administrator for NOAA Research:** Overall, Dr. Thur, Assistant Administrator for NOAA Research, emphasized the importance of collaboration, addressing climate challenges, promoting the New Blue Economy, achieving equity, engaging globally, making a societal impact, and establishing partnerships with communities to further NOAA Research's goals and objectives.

    a. *Collaboration and Connective Tissue*: Dr. Thur highlighted the need for better collaboration and the establishment of connective tissue among the 16 units within NOAA Research. He emphasized the importance of understanding how these units can work together to address higher-level issues.

    b. *Climate, Blue Economy, and Equity*: Dr. Thur identified climate as a top priority for the administration, along with the New Blue Economy and equity. He emphasized the connections between these priorities and the Office of Education (OE) and the need to fill knowledge gaps in areas such as methane seeps, air-sea interface, and green solutions.

    c. *Global Engagement and Partnerships*: Dr. Thur acknowledged the importance of global issues in climate research and highlighted the potential for international partnerships in NOAA Ocean Exploration. He emphasized the exportability of technology development and the need to explore and understand not only domestic waters but also international waters.

d. *Societal Impact and Talent Recruitment*: Dr. Thur stressed the importance of scientific research having a societal impact and driving change. He mentioned the need to identify societal challenges, change how funding is requested, recruit the right talent, and establish new external partnerships.

e. *Services, Collaboration with Communities, and Engagement*: Dr. Thur discussed the provision of services by NOAA, particularly related to climate and health, and the importance of collaboration and partnerships with communities. He highlighted the need for appropriate release of data and engaging communities about scientific operations.

6. **Ocean Exploration Cooperative Institute (OECI): Regulations, Operations, and Projects:** Dr. Aurora Elmore, OECI Program Manager, and Jeremy Weirich, Director of NOAA Ocean Exploration, led a discussion that shed light on the funding structure, operational aspects, project themes, and the collaborative efforts of OECI within the context of NOAA mission goals and objectives. The OECI is a collaborative partnership between NOAA and a consortium of academic and research institutions. The OECI was established to conduct research, provide expertise, and contribute to NOAA Ocean Exploration's mission in specific focus areas.

    a. The OECI operates under a 5-year period of performance, is one of 19 Cooperative Institutes within NOAA, and recently completed a 5-year science and administrative review (results should be received by the end of the calendar year). The OECI is an independent entity - not an extension of NOAA.
    b. The OECI focuses on four main themes:
        i. Operational Exploration: OECI conducts expeditions and exploratory missions, utilizing various technologies and vehicles to explore and study the ocean. This theme involves conducting fieldwork, collecting samples, and acquiring data to advance understanding of the marine environment.
        ii. Exploration Data: OECI emphasizes the management, analysis, and dissemination of exploration data. They contribute data to NOAA's archives and prioritize making it accessible and usable for scientific research, education, and other purposes.
        iii. Ocean Technology: OECI develops and advances ocean technologies to enhance exploration capabilities. This includes the design and deployment of specialized instruments, sensors, and platforms for data collection, as well as the development of data processing and analysis tools.
        iv. Education and Engagement: OECI is committed to promoting education and engagement initiatives related to ocean exploration. They aim to inspire and educate the public, particularly underrepresented groups, about the importance of ocean science

through internships, outreach programs, educational materials, and collaborations with educational institutions.

7. **Review of Changes in the FY23 National Defense Authorization Act (NOAA Ocean Exploration and OEAB Reauthorization and NOMEC Authorization)**
    a. Dr. Amanda Netburn, Deputy Chief for the Science and Technology Division, and Jeremy Weirich, Director of NOAA Ocean Exploration, provided an overview of the changes in the FY23 National Defense Authorization Act (NDAA) related to the reauthorization of the Office of Ocean Exploration, the Ocean Exploration Advisory Board (OEAB), and the authorization of the National Ocean Mapping, Exploration, and Characterization (NOMEC) program.
    b. Dr. Netburn explained the history of the earlier Authorization, which resulted from the merger of the National Undersea Research Program (NURP) and NOAA Ocean Exploration in 2007.
        i. The reauthorization of OER and the establishment of NOMEC indicate the ongoing efforts to consolidate and streamline ocean exploration and mapping activities.
    c. The reauthorization of NOAA Ocean Exploration includes provisions to update and expand educational programs. A new fellowship program at NOAA for Minority-Serving Institutions and Historically Black Colleges and Universities (MSI/HBCUs) was established to promote diversity and inclusion in the field of ocean exploration. The importance of codifying and updating the program's functions and activities was emphasized.
    d. The reauthorization highlights the need for improved data management. Identifying Best Practices for data management was emphasized, including the development of a data management plan.
        i. Dr. Netburn stressed the importance of involving diverse stakeholders, including academia, industry, tribal partners, nonprofits, and commercial groups, in the decision-making processes related to data management.
    e. The NDAA authorized NOMEC as a standing body with responsibility for a national program of ocean exploration. The strategy and implementation plan for NOMEC include coordinating interagency efforts, exploring and characterizing priority areas of the Exclusive Economic Zone (EEZ), developing new technologies, and building public and private partnerships.
        i. The importance of balancing resources between mapping and other programs was highlighted, with the need to integrate data from various sources and standards. The tension between open data concepts and monetization/profit from data was discussed, particularly in relation to surveys conducted for offshore wind projects. The need to include variables beyond bathymetry in ocean mapping, such as fauna, was emphasized.

f. Engaging the public on NOMEC was emphasized, with plans to develop a biannual newsletter and conduct conference talks and town halls. The complexities of data aggregation, including sensitivity issues with Navy data and the collection of mapping data by the University-National Oceanographic Laboratory (UNOLS) fleet, were discussed. The importance of strategic connections was also discussed.

8. Working Session: Sub-Committees and NOAA Engagement

a. *Improved Communication and Engagement*: The members emphasized the need for more frequent interactions and improved communication among board members. They recognized the importance of understanding the purpose of discussions and their connection to NOAA Ocean Exploration. They expressed their desire to provide input on both NOAA Ocean Exploration activities and the broader national ocean exploration program.

b. *Long-Term Vision and Subcommittees:* The members discussed the long-term vision for a national ocean exploration program and explored the idea of establishing subcommittees focused on specific topics. They highlighted the need to be strategic and thoughtful in leveraging their collective expertise to contribute effectively to NOAA Ocean Exploration and the national program.

c. *Working Methods and Communication Channels*: The members deliberated on their working methods and suggested using platforms like Slack or Discord for ongoing dialogues between meetings. They recognized the value of networking opportunities within the board and emphasized the importance of interactions between different sectors, such as industry and academia.

d. *Clear Rules and Structures:* The need for clear rules and structures to facilitate more frequent conversations was discussed. Google Spaces was suggested as an immediate tool for communication. The members recognized the importance of sharing news items and updates to ensure they do not get buried.

e. *Review of Goals and Charter:* The Board members questioned whether they had collectively agreed upon the overarching goals of the OEAB. They proposed reviewing the OEAB charter to ensure alignment with their current objectives and responsibilities. Providing feedback and commentary to NOAA Ocean Exploration and the larger ocean exploration program was acknowledged as valuable.

f. *Accomplishments and Funding:* The Board reflected on their accomplishments, including a memo regarding a dedicated vessel and their involvement in industry events. They discussed grant-related matters and explored ways to facilitate budget growth. They emphasized the need for intentional discussions regarding objectives, milestones, and goals.

g. *Inclusion and Diversity Conversations*: The members agreed to focus on inclusion and diversity in a subsequent meeting. They suggested inviting appropriate speakers to navigate these conversations effectively. They emphasized the importance of taking inclusion and diversity seriously within the federal agency and the field of ocean exploration.
h. *Dr. Spinrad's Challenge:* The members discussed Dr. Spinrad's challenge to take ocean exploration to new heights and emphasized the need for creativity, challenging existing thinking, and pushing boundaries. Addressing risk and fostering a safe-to-fail environment were highlighted as important for innovation and progress.
    i. **Radically taking Ocean Exploration to a place it has not been before**:
        1. Encouraging creative and challenging thinking
        2. Pushing for innovation and risk-taking in the Ocean Exploration program
    ii. **Overcoming structural impediments:**
        1. Addressing research project barriers, such as high costs and bureaucratic limitations
        2. Identifying and addressing obstacles to data interoperability and infrastructure
    iii. **Data management and interoperability:**
        1. Ensuring proper data management, archiving, and processing standards
        2. Overcoming challenges related to data infrastructure and accessibility
    iv. **Market barriers to development and commercialization:**
        1. Identifying and eliminating barriers that hinder the development and commercialization of ocean exploration technologies and solutions
        2. Addressing issues related to intellectual property, contractual rules, and data standards
    v. **Connecting the Ocean Exploration community to broader goals and relevance:**
        1. Establishing the connection between Ocean Exploration and climate change
        2. Fostering partnerships and collaborations that enhance the impact and relevance of ocean exploration
    vi. **Exploring the role of OE in the New blue economy and its contribution to sustainable practices**
i. *Major Challenges*: Scalability, relevance, survivability, and structural impediments were identified as major challenges for ocean exploration. The significance of data interoperability and infrastructure was recognized, with a focus on the need for long-term investment in data infrastructure. The OEAB discussed ways to contribute to addressing these challenges.

j. *Role in Addressing Data Problems*: The members deliberated on their role in moving the needle on data problems. They explored the potential of creating programs or projects to solve acute problems and increase engagement with industry and government agencies. They emphasized leveraging resources in terms of funding and time.
k. *Focus Areas for NOAA and Ocean Exploration:* The members contemplated inviting a guest speaker from NASA to discuss how they are adapting to private spaceflight. They discussed the focus areas for NOAA and OAR/NOAA Ocean Exploration in their efforts to advance exploration and innovation.

9. OEAB Working Session

a. Fellowship Program and Internship Opportunities:
   i. The OECI fellowship program provides opportunities for undergraduate students in ocean exploration.
   ii. Potential internships with MSI-HBCU can be explored to enhance diversity and inclusion in the field.

b. Board Activities:
   i. OEAB should be responsive to requests and consider potential future requests for their expertise.
   ii. Exposure to emerging issues is important for the Board's understanding and decision-making.
   iii. Building a strong relationship with the Ocean Exploration Director and establishing a pseudo board of directors can enhance collaboration and guidance.
   iv. Recommendations from other reviews can provide valuable insights.
   v. Exploring the relationship between OEAB and the Ocean Policy Committee (OPC) can facilitate coordination and impact.

c. Funding and Programs:
   i. The Inflation Reduction (IR) Act and the American Recovery Act present potential funding opportunities for OECI and related programs.
   ii. Leveraging the CI program can support various initiatives within NOAA.
   iii. Exploring potential funding recipients and understanding the IR Act's implications is important for strategic planning.

d. Strategic Planning and Themes:
   i. Future meetings should focus on themes such as tech and infrastructure, exploration activities, and DEIA to ensure a comprehensive approach.
   ii. The OER Strategic Plan aligns with climate change concerns, ocean carbon cycling, and addressing ocean acidification.
   iii. OEAB's contributions to NOMEC and collaborations with Hydrographic Services Review Panel (HSRP) can provide valuable guidance and input.

e. Data Management and Infrastructure:

i. Effective data management, archiving, and processing standards are crucial for the success of ocean exploration efforts.
ii. Accessible and standardized data infrastructure is needed to capitalize on the vast amount of collected data.
iii. Overcoming challenges and barriers in data sharing and infrastructure should be a priority.
iv. Leveraging data for innovation and research can lead to new discoveries and insights.

f. *Partnerships and Commercialization:*
i. Establishing partnerships with industry, small businesses, and DEIA initiatives can foster innovation and resource sharing.
ii. Identifying and addressing barriers to commercialization and business models can drive the new blue economy forward.
iii. Engaging with private industry and leveraging their expertise can enhance collaboration and project outcomes.

g. *Metrics, Impact, and Performance:*
i. Developing meaningful metrics and tracking impact is essential for evaluating the success of the OECI program.
ii. Indicators of success and relevant metrics should be clearly defined and communicated.
iii. Effective communication of impact to stakeholders is crucial for demonstrating the program's value.
iv. Tracking publications, presentations, and achievements can provide insights into the program's progress.

h. *Engagement with Tribal Communities and Alaska Natives:*
i. Engaging tribal communities and Alaska Natives is important for inclusive and culturally sensitive ocean exploration initiatives.

10. Meeting in Review

a. *Goals:*
i. Create a calendar plan for key outcomes.
ii. Review suggested speakers for future meetings.
iii. Identify potential speakers on DEIA, tribal connections, privatization of spaceflight, diverse partnerships, data infrastructure/fusion, and day-to-day exploration.
iv. Reflect on presentations and determine next steps.

b. *Opportunity and Awareness:*
i. Articulate the opportunities that exist within the ocean exploration community.
ii. Explore the potential of the CI mechanism for solicitation and participation.
iii. Utilize Notice of Funding Opportunities (NOFO) and the CI portal to engage industry and expand participation.
iv. Increase awareness of OECI and its opportunities within the community.

c. *Connective Tissue and Silos:*
i. Discuss the theme of breaking down silos and improving collaboration.

ii. Explore how to best utilize the NOFO and ensure its effective management.
iii. Recapitalize the NOAA fleet and consider vessel options for deep-water work.
iv. Enhance cooperation with industry and improve operational support.
v. Explore the future of uncrewed exploration and the role of technology.

d. *Risk and Innovation:*
i. Consider the balance between risk and reward in exploration.
ii. Discuss the importance of introducing more risk and creating a safe-to-fail environment.
iii. Evaluate the return on investment in terms of data, products, and lessons learned.
iv. Examine the reauthorization for clarity on safe-to-fail environments and expanding exploration efforts.
v. Explore the risks associated with partnerships, industry engagement, technology investment, and working with new groups.

11. **Public Comment Period.** A commenter noted that the new Ocean Digital, Data and Research Institute at NOAA focused on ambitious challenges and opportunities to support its mission and invent the future. NOAA Ocean Exploration is in a good space to take advantage of new technologies

12. **Next Meeting.** There was general agreement for an in-person OEAB meeting to be held in early to mid October 2023. Two weeks were identified, **Oct 2-6, Oct 16-20,** the DFO is coordinating with the NOAA Administrator's Office to identify possible dates.

13. **Meeting Close.** The Designated Federal Officer closed the meeting at approximately 4:05 PM on April 26, 2023.

Vickie Ferrini

Dr. Vicki Ferrini, Chair
Ocean Exploration Advisory Board