



Welcome to Exploring the Deep Ocean with NOAA

Exploring the unknown is fundamental to human nature. “Expeditions”—whether to the next valley or across the seas—have shaped us for millennia. Outer space, often referred to as the final frontier, is not the only frontier left for us to explore; inner space, our Earth’s ocean, is still largely unknown. While we search for water on other planets and moons, much of our own ocean remains to be explored. Satellite radar maps of the surface of Mars and the Moon have a resolution of 100 meters or better. In contrast, satellite maps of the ocean floor have a resolution of about five kilometers, which allows us to see big features, such as major ridges or trenches, but mostly leaves us in the dark about the true nature of the seafloor. What do things look like at the bottom of the ocean? What is happening in the deepest and hardest to reach parts? What types of organisms and creatures live there? How are they different from fauna in shallow waters? Are they related? These questions and many more about the ocean are in and of themselves interesting and important to science. But they are also puzzle pieces in larger questions about ocean processes. How do ocean systems affect global ocean circulation and water chemistry? How does the sea surface interact with the atmosphere? And how do these things impact humans? The answers are critical to understanding the way our ocean works and provide the building blocks on which life on this planet depends.

As NOAA explores the deep sea to fill in more and more pieces of the puzzle and attain a bigger picture, we also want to encourage our youth to become invested in this undertaking. An essential component of OER’s mission is to advance ocean science literacy and the understanding why it is important to explore our little-known ocean world. To help fulfill this mission, we offer the teacher professional development workshop **Exploring the Deep Ocean with NOAA**. It is designed to encourage educators and their students to become engaged with expeditions and discoveries made by the NOAA Ship *Okeanos Explorer* and other ships of exploration and thus inspire the next generation of ocean explorers, scientists, and engineers.

The NOAA Ship *Okeanos Explorer*. Image courtesy NOAA OER.



Ocean Exploration and Research

NOAA's Ocean Exploration Mission

The National Oceanic and Atmospheric Administration (NOAA) explores the ocean for national benefit, as America's future depends on understanding the ocean. We explore the ocean because its health and resilience are vital to our economy and to our lives. We depend on the ocean to regulate weather and climate; sustain diversity of life; for maritime shipping and national defense; and for food, energy, medicine, and other essential services to humankind.

NOAA was assigned a leadership role in developing and sustaining a national program of ocean exploration that promotes collaboration with other ocean and undersea research and exploration programs. NOAA's Office of Ocean Exploration and Research (OER) is responsible for coordinating the national ocean exploration program, conducting its own expeditions aboard the NOAA Ship *Okeanos Explorer*, and working with its many partners inside and outside of government to encourage exploration to advance our understanding of the deep ocean.

A NOAA Ship *Okeanos Explorer* mapping track, showing some of the "Mountains in the Deep." The color bar shows the depth of these features in meters. Image courtesy of the NOAA OER, Mountains in the Deep: Exploring the Central Pacific Basin. <http://oceanexplorer.noaa.gov/okeanos/explorations/ex1705/dailyupdates/media/may9.html>

As an educator attending this workshop you play an integral part in fulfilling this mission. The workshop introduces standards-based, hands-on activities and other resources that guide classroom teaching and learning, all of which are assembled for your reference in this binder. For additional information please visit OER's Education website <http://oceanexplorer.noaa.gov/edu/welcome.html> which includes a wide variety of teacher resources, lessons, and hands-on activities relating to topics aligned with our expeditions and supporting the Next Generation Science Standards <https://www.nextgenscience.org/>. The full suite of our ocean exploration *Education Materials Collection*—including Spanish translations—can be found here <http://oceanexplorer.noaa.gov/okeanos/edu/welcome.html>.

Our lives on planet Earth depend on its ocean and our understanding of it. As we explore our ocean world to expand our knowledge of it and its systems, we need to bring future generations of explorers and innovators along for the journey. We hope these materials will help them get started on that journey—it is they who will push the boundaries of human knowledge tomorrow.

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