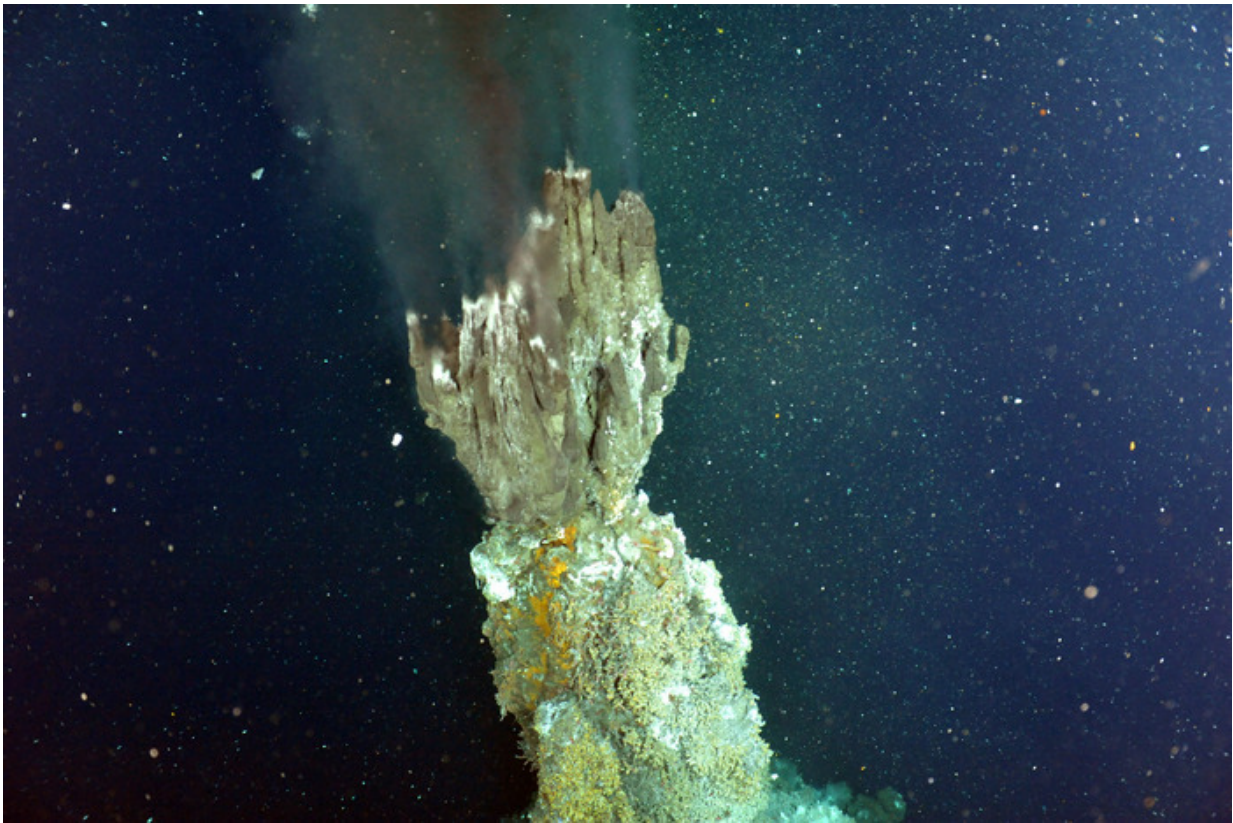


Oceanographer publishes atlas of seafloor volcanoes and deep-ocean life

May 20 2015, by Hannah Hickey



Near-boiling fluids jet from the tip of a black smoker known as El Guapo, photographed in 2013 off the Oregon coast. Credit: NSF-OOI/UW/CSSF

A University of Washington oceanographer has helped create the first full-color photographic atlas of the ocean floor. "[Discovering the Deep:](#)

["A Photographic Atlas of the Seafloor and Ocean Crust"](#) (Cambridge University Press, 2015) was almost a decade in the making and contains more than 500 original illustrations and color photos, and access to online educational resources and high-definition videos.

Its pages contain a history of deep-sea science and a global tour of the volcanoes, hot springs, rocks and animals that exist in extreme environments in the [ocean](#) depths.

"This book lets people see parts of the Earth that most of them have never seen or thought about before, and the processes that form fundamental parts of our planet—and it does it in a very illustrative way," said co-lead author Deborah Kelley, a professor in the UW School of Oceanography.

The book comes with endorsements from ocean explorer Robert Ballard; Kathy Sullivan, the head administrator of the National Oceanic and Atmospheric Administration; and filmmaker James Cameron.

"This is the book I wish I'd had on my eight deep-ocean expeditions, to better understand the wonders I was gazing upon," Cameron writes. He calls it "a must-own for anyone in the ocean sciences, and for those simply curious about what lies down there in the most remote realm on our planet."

The book covers the history of exploration of the deep sea, and the geology and biology of the roughly 40,000-mile mountain chain of underwater volcanoes that cross the world's oceans.

Kelley was lead author of the chapter on hydrothermal vents, including the black smokers venting metal-rich fluids of more than 700 F that she has studied for decades. Local examples include the Endeavour vent fields and Axial Seamount, off the Pacific Northwest coast.

Also described is the Lost City vent field, a completely distinct type of hot spring environment in the Atlantic Ocean that Kelley helped discover in 2000. There, limestone chimneys tower 180 feet above the [seafloor](#) hosting bizarre lifeforms she and her students have since studied.

"The life in these systems is very diverse, and in many ways we've just touched the tip of what's down there," Kelley said.

Other authors are Jeffrey Karson of Syracuse University, Michael Perfit of the University of Florida, and Daniel Fornari and Timothy Shank of Woods Hole Oceanographic Institution.

A veteran of the deep sea, Kelley has traveled to the seafloor more than 50 times to depths of more than 2 miles (4 kilometers) in the specialized submersible called Alvin, built to protect passengers from the bone-crushing pressures and near-freezing temperatures of the abyss.

She has seen ocean imaging technology evolve from grainy images to the high-definition photos contained in the book, and the HD video available on an accompanying website.



A Dumbo octopus on lava about 1 mile deep on the Juan de Fuca ridge off Washington's coast. Credit: D. Kelley, J. Delaney / UW

"When I was first going to sea, we were still using 35 mm cameras, and one of my first jobs at sea was processing film on a rolling ship," Kelley said. "Where we are now, the technology is exponentially increasing."

Kelley is part of a current National Science Foundation project that recently wired the largest underwater volcano off Washington's coast and surrounding areas of the seafloor. More than 100 instruments will use Internet and high-voltage power to observe these dynamic environments in real time.

The entire ocean circulates through the seafloor every 8 to 10 million years, and so the seafloor composition is closely connected to the waters above.

Jeffrey A. Karson,
Deborah S. Kelley,
Daniel J. Fornari,
Michael R. Perfit,
and Timothy M. Shank



DISCOVERING
THE
DEEP

A Photographic Atlas of the Seafloor and Ocean Crust

“Discovering the Deep” is now available for pre-order.

It is not yet known how volcanic eruptions on the seafloor affect the life and chemistry of the oceans, and how the biological communities of the [deep sea](#) originate and evolve. The unexpected discovery of life on seafloor volcanoes, that survive off toxic gases instead of sunlight, has raised questions that have yet to be answered.

"These systems have really changed how we think about the oceans, and life on Earth and on other planets," Kelley said.

Provided by University of Washington

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