

DIVE DEEPER!

This eight-page resource guide is designed to serve as a brief introduction to the deep sea and hydrothermal vents. Additional information including photos, video clips, journals, and other news from the Extreme 2008 expedition can be found on our Web site: www.expeditions.udel.edu/extreme08.

The following list of suggested classroom activities and resources may help expand your deep-sea learning experience. Use it as a starting point to your own voyage of discovery!



Extreme 2008 A DEEP-SEA ADVENTURE

RESOURCES

Many excellent resources were used to develop this guide and may help you in your search for more information.

Web Sites

The Bridge — Sea Grant Ocean Sciences Education Center
www.vims.edu/bridge

Jones & Bartlett Publishers — *Invitation to Oceanography* by Paul Pinet
www.jbpub.com/oceanlink/4e/

"Deep Sea Vents: Science at the Extreme"
www.nationalgeographic.com/ngm/0010/feature6

"Neptune's Web: Get the Facts on Oceanography"
www.navmetoccom.navy.mil/educate/neptune/neptune.htm

NOAA Ocean Explorer
oceanexplorer.noaa.gov

Nova Online — "Into the Abyss"
www.pbs.org/wgbh/nova/abyss

Smithsonian Institution's "Ocean Planet"
seawifs.gsfc.nasa.gov/ocean_planet.html

Smithsonian's Sant Ocean Hall
ocean.si.edu/ocean_hall/

U.S. Geological Survey — *This Dynamic Earth: The Story of Plate Tectonics* by W. J. Kious and Robert Tilling
pubs.usgs.gov/publications/text/dynamic.html

U.S. Naval Historical Center
www.history.navy.mil/index.html

Woods Hole Oceanographic Institution
"Dive and Discover" Expeditions
www.divediscover.whoi.edu

Books & Magazines

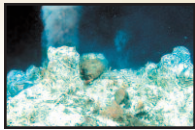
Greene, Thomas F. 1998. *Marine Science*. New York: Amsco Publications.

Lemonick, Michael D. "The Last Frontier." *Time*, Aug. 14, 1995, 52–60.
www.time.com/time/magazine/article/0,9171,983295,00.html

Nouvian, Claire. 2007. *The Deep: The Extraordinary Creatures of the Abyss*. University of Chicago Press.

Thomson, C. Wyville. 1877. *The Voyage of the 'Challenger'*. Macmillan & Co. Presented online by NOAA in 2007.
celebrating200years.noaa.gov/rarebooks/challenger/welcome.html

Van Dover, Cindy Lee. 2000. *The Ecology of Deep-Sea Hydrothermal Vents*. Princeton University Press.



GEOLOGY

Word Definition

Here are some terms to define:

continental shelf
continental slope
deep ocean basin
hydrothermal vent
mantle

Mid-Ocean Ridge
plate tectonics
seafloor spreading
subduction
"Ring of Fire"

Math Activities

Let's test your knowledge of the metric system. Convert the British units of measure in the "How Deep Is the Ocean?" article in the Geology section to metric units.

Can you calculate what the atmospheric pressure is at the Earth's deepest known point, at the bottom of the Mariana Trench?

Extra-Credit Essay Topics

Why are hydrothermal vents important?

How does Old Faithful geyser work? Compare it to a hydrothermal vent.



BIOLOGY

Word Definition

Here are some terms to define:

Archaea
biocomplexity
chemosynthesis
genomics
microbe

photosynthesis
sulfur
symbiosis
tubeworm
virus

Go Fish!

Many deep-sea fish look monstrous! Your mission is to find pictures and descriptions of at least five different deep-sea fish. What special adaptations do these fish have for living in their demanding environment?

Extra-Credit Essay Topics

Compare and contrast photosynthesis and chemosynthesis.

The HMS *Challenger* expedition covered nearly 70,000 miles at sea and discovered many new marine organisms. Tell us about the expedition and some of its key findings.

TECHNOLOGY

Word Definition

Here are some terms to define:

bathyscaphe
bathysphere
fiber optics
HMS *Challenger*
"Jim suit"

ROV
scuba
sonar
submersible
Trieste



Design a Submersible

A new *Alvin* is now under construction. If you could design a submersible, what would it look like and what special capabilities would it have? Sketch it!

Extra-Credit Essay Topics

Jason is used in deep-sea research. Do some research and tell us all about it.

What other scientific tools are revolutionizing our study of the ocean?

ACKNOWLEDGMENTS

Funding for this educational guide was provided by the National Science Foundation to the University of Delaware as part of "Extreme 2008: A Deep-Sea Adventure" — the latest in the University of Delaware's award-winning series of online expeditions to engage students and the public in cutting-edge research and the process of scientific discovery.

This guide was produced by the University of Delaware Office of Communications & Marketing: David Barczak, senior art director; Pamela Donnelly, production coordinator; Tracey Bryant, editor and associate director. Contributing writer: Karen Romano-Young.

To learn more about the Extreme 2008 program and expeditions to other locales around the world involving University of Delaware scientists, dive in to www.expeditions.udel.edu.

For more information about the University of Delaware's ocean-related courses and degree programs, research, public events, and educational materials, please visit the

University of Delaware College of Marine and Earth Studies and the Delaware Sea Grant College Program online at www.ocean.udel.edu/.



Visit us at www.expeditions.udel.edu/extreme08