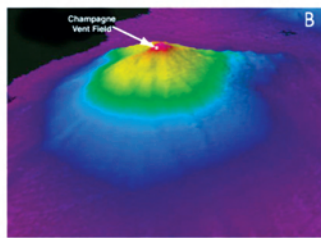
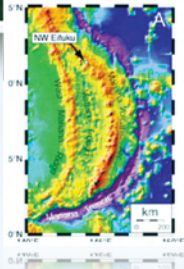
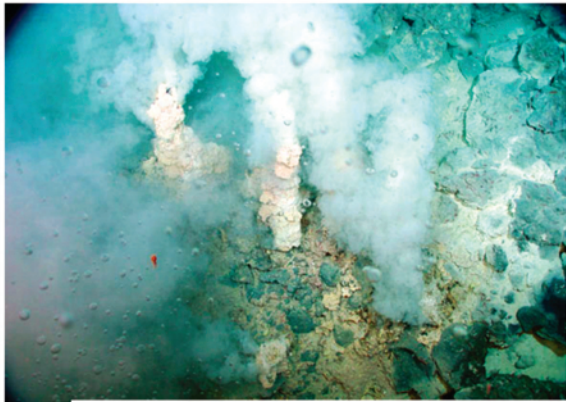


## The Ocean as Laboratory: Undersea Vents as Models for Ocean Acidification, Carbon Capture, and the Unknown



***“We were just going from one incredible event to the next, seeing things we had never witnessed before.”***

*Bill Chadwick, volcanologist, OAR’s Cooperative Institute for Marine Resources Studies at Oregon State University.*

**Ocean exploration is discovering the unknown. The ocean is a vast resource full of unidentified organisms, which might produce a cure for cancer or a biotechnology that can be harnessed for alternative fuel production.**

Like champagne bubbles rising from the sea floor, liquid carbon dioxide (CO<sub>2</sub>) was identified by OAR scientists and colleagues during a 2004 voyage to the Submarine Ring of Fire – volcanoes lying along the Marianas Arc in the western Pacific. Located approximately one mile below the surface, the pressure of the water column is so great that the gas forms a liquid. Researchers with OAR’s Pacific Marine Environmental Laboratory (PMEL) and Office of Ocean Exploration and Research (OER) had found a natural laboratory where the effects of carbon dioxide on marine organisms could be studied.

### ***Impact***

**Tapping the potential of previously unknown ocean resources**

The significance of this liquid CO<sub>2</sub> discovery relates to changes in ocean chemistry resulting from climate change. About one-third of the world’s carbon dioxide is absorbed by the ocean, which has led to ocean acidification. PMEL researchers and colleagues asked how their underwater liquid CO<sub>2</sub> discovery could help them understand and possibly predict the effects of ocean acidification.

Using special technology deployed from a robotic submersible, the scientists collected samples. The Champagne Vent field, where the liquid CO<sub>2</sub> was found, also spews out hot gas-rich fluid. Back in the lab, the scientists found that the vent was a high carbon flux system, rich in CO<sub>2</sub>. Not only is this finding important for studying ocean acidification in a natural state and the ocean’s role in carbon cycling, but it also may be an important model for studying carbon sequestration, a method for taking excess carbon from the air and storing it in the ocean’s depths.

The expedition has been called “path finding” by many in the ocean community, and underscores the fact that there is so much to learn about one of the Earth’s most important features – the ocean.

*Images, top to bottom: A champagne vent, where bubbles of liquid CO<sub>2</sub> escape from the white chimneys and surrounding seafloor; bathymetry of Eifuku in the Marianas Arc where liquid CO<sub>2</sub> vents were found.*

### **Learn More:**

<http://oceanexplorer.noaa.gov/explorations/04fire/welcome.html>