

## Hydrothermal Vents

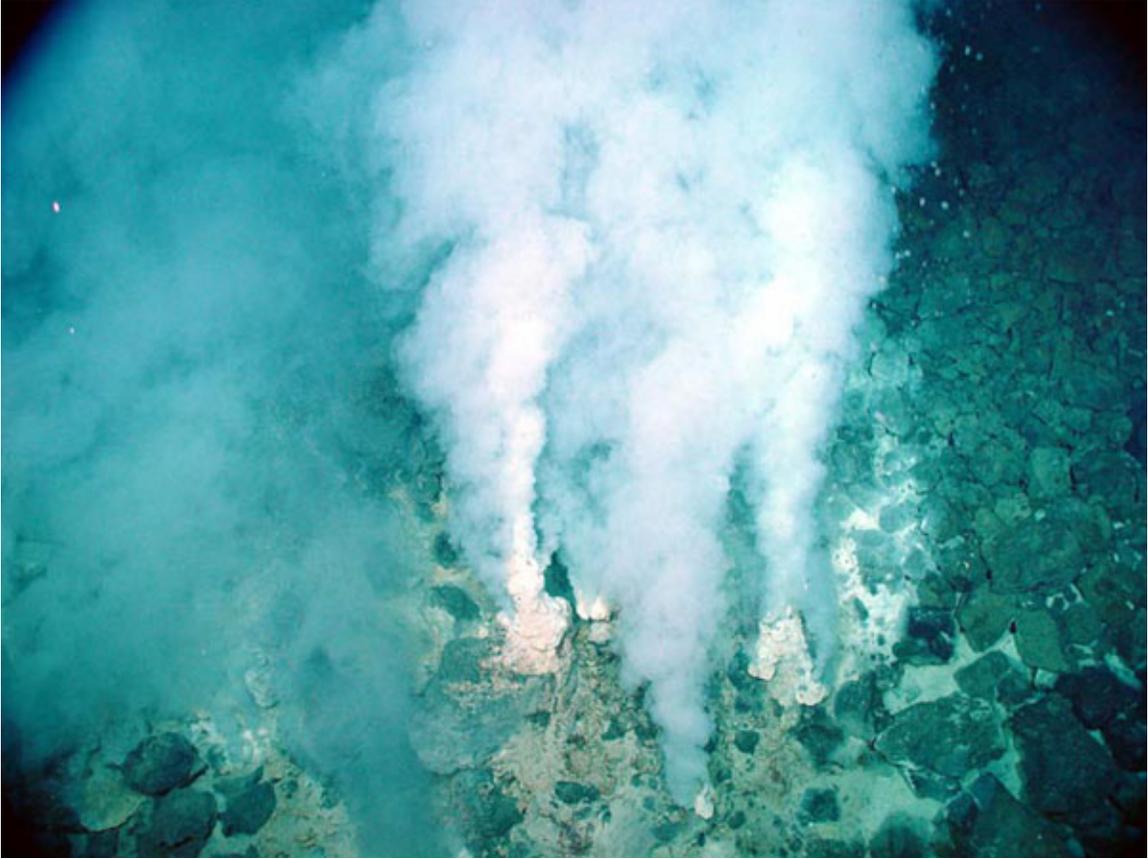
Can you imagine hot springs under water at the bottom of the ocean? In 1977, scientists discovered there are such things – and they are called “hydrothermal vents.” Way down in the deep, cold ocean water on the sea floor there are cracks in the Earth’s crust. In these cracks is hot lava, just like from a volcano. These are more than a mile deep in the ocean, where the water is very dark, and very cold – just above freezing! That is quite a contrast to have near freezing water along side extremely hot lava.

When the cold seawater gets into these cracks and meets the very hot lava, it shoots the water up like steam into the cold water surrounding the cracks in the ocean floor. This action forms smoke-like clouds in the water. These can be white smoke or sometimes black smoke. The tiny bits of minerals (such as copper and zinc) that are dissolved in the “explosion” form “chimneys” around the cracks. These can grow many feet in height; scientists have even found many that have grown taller than houses and many stories high!

When these hydrothermal vents were discovered, they were a big surprise. It was even more of a surprise that living things were there too! This is very unusual for many reasons. For one, it is very dark and usually living things need some sunlight. Also the water coming out of the vent is very hot; it can be above 600 degrees (F), which is much, much hotter than boiling water on the stove (which is around 212 degrees F).

Hydrothermal vents can also have acid and chemicals that would usually be harmful to animals. The basis for the living things around the vents is a certain kind of bacteria that uses these chemicals. The bacteria can capture energy from the chemical processes that go on around these vents. They are the basis of food for other organisms that live around the vent. They are like the foundation for the food web there.

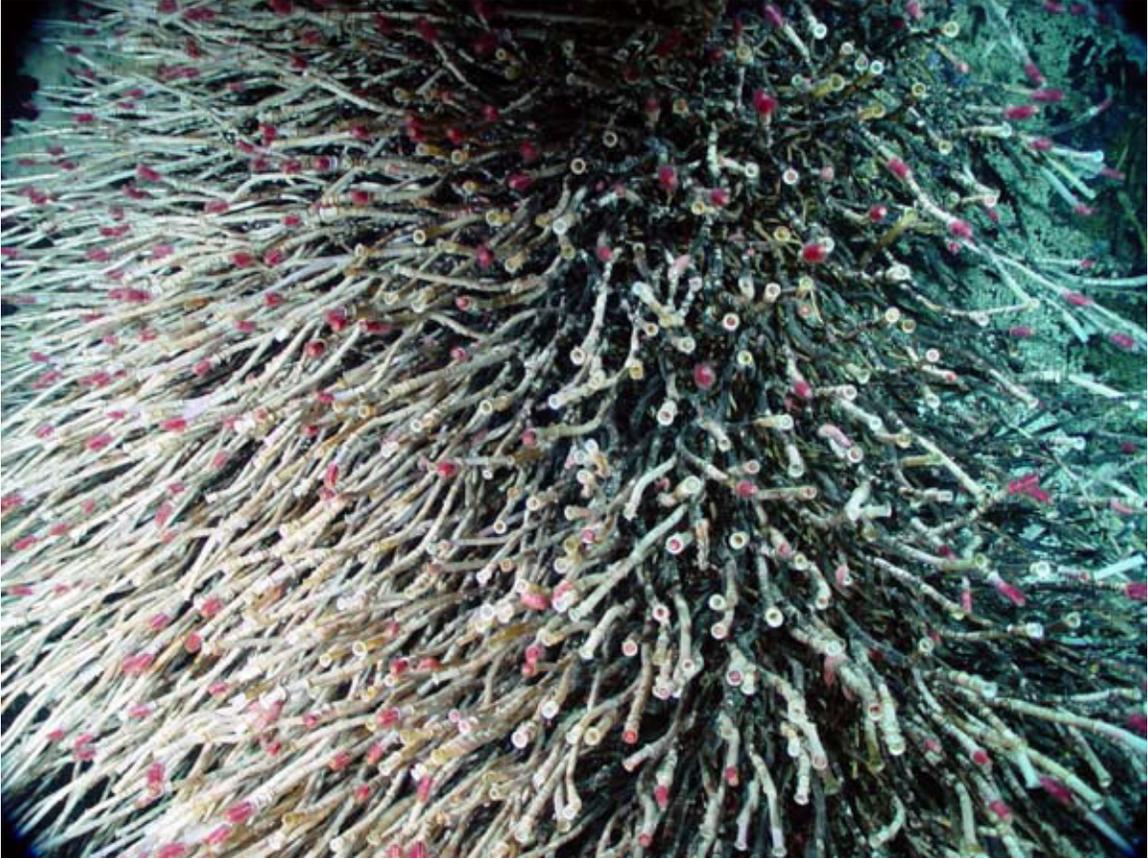
It is amazing to see the animals that have been found around the vents, such as very particular types of tube worms, mussels, crabs, shrimp, and even fish. They can survive these extreme conditions that all other animals on Earth would die from! Scientists continue to study how these animals have adapted and can survive in these extreme conditions. Hydrothermal vents have changed the way scientists think about life on Earth!



*White bacterial mats in and around the extremely gassy, high-temperature (>100°C, 212°F) white smokers at Champagne Vent. (NOAA)*



*Photograph of three small (~30-cm or 12-in tall) actively venting spires sitting on top of one of the chimneys in the Black Forest vent field. The chimneys themselves are about 7 m (23 ft) tall. The fluids here are venting at 240°C and are expelling black (mineral-rich) smoke into the ocean. (NOAA)*



*These spectacular tubeworms cover Zooarium, a lower-temperature sulfide chimney, which was given its name because of all of the lush vent animals which live near it.*