Hydrothermal Vents Encyclopedia Article

Hydrothermal Vents

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Hydrothermal Vents

A hydrothermal vent is a geyser that is located on the floor of the sea. The first such vent was discovered in 1977 on the floor of the Pacific Ocean. Since then, vents have been discovered at a variety of locations in the Pacific and Atlantic Oceans.

The vents tend to be located deep in the ocean. For example, in the Atlantic ocean, some 7000 feet beneath the surface, hydrothermal vents are associated with underwater mountain chain called the Mid-Ocean Ridge. This ridge is geologically active with an upwelling of hot magma and volcanic activity. The tectonic plate movements cause faulting and seawater that then enters the cracks is superheated by the molten magma. The superheated water and steam and spews out through hydrothermal vents.

Some vents, known as "black smokers," spew out a black-colored mixture of iron and sulfide. "White smokers" spew out a whitish mix of barium, calcium, and silicon.

This eruption through the hydrothermal vents is continuous, in contrast with the sporadic eruptions of surface geysers. The material that emerges from hydrothermal vents is extremely hot (up to 750° F [398.89° C]) and is very rich in minerals such as sulfur. The minerals can precipitate out of solution to form chimneys. The construction of a chimney can occur quickly. Growth of 30 feet in 18 months is not unusual. The tallest of these chimneys that has been measured was the height of a 15 story building.

A vibrant community of **bacteria**, tubeworms that are unique to this environment, and other creatures exists around hydrothermal vents. The entire ecosystem is possible because of the activity of the bacteria. These bacteria have been shown, principally through the efforts of the **Holger Jannasch** (1927-1998) of Woods Hole Oceanographic Institution, to accomplish the conversion of sulfur to energy in a process that does not utilize sunlight called chemosynthesis. The energy is then available for use by the other life forms, which directly utilize the energy, consume the bacteria, or consume the organisms that rely directly on the bacteria for nourishment. For example, the tubeworms have no means with which to take in or process nutrients. Their existence relies entirely on the bacteria that live in their tissues.