

What are Hydrothermal Systems?

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About Hydrothermal Systems:

- Hydrothermal systems **occur in areas with high heat fluxes, both on continents, near convergent plate boundaries, and on the ocean floor, near the mid-ocean ridges.**
- Their **formation requires** the existence of three important components: **fluids, heat, and permeability through rocks** so that fluids can circulate.
- These systems are **often found near mid-ocean ridges**, where tectonic plates diverge and new seafloor is created.
- **How hydrothermal systems work?**

o Hydrothermal systems **occur when seawater percolates down** through fractures in the **oceanic crust, heating up** as it nears the earth's hot interior.

- o Descending seawater **interacts with the oceanic crust, removing chemicals from the rocks** as it heats to 350-400 degrees Celsius, about four times hotter than boiling water (the extreme pressure in the ocean's depths prevents fluids from boiling).
 - o This interaction of seawater and crust **produces hydrothermal fluid**, chemically modified slurry of gases and dissolved elements, including metals.
 - o The **superheated fluid** is then **ejected back up to the seafloor** and promptly **chilled by near-freezing ocean bottom waters**.
 - o **Chemicals dissolved** in the fluid **precipitate at the vent, forming chimney-like deposits**.
 - o **These deposits support deep-sea chemosynthetic communities**—organisms that rely on chemicals rather than photosynthesis to fuel their metabolism
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Q1: What is the mid-ocean ridge?

The massive mid-ocean ridge system is a continuous range of underwater volcanoes that wraps around the globe, stretching nearly 65,000 kilometers (40,390 miles). The majority of the system is underwater, with an average water depth to the top of the ridge of 2,500 meters. They occur along divergent plate boundaries, where a new ocean floor is created as the Earth's tectonic plates spread apart. As the plates separate, molten rock rises to the seafloor, producing enormous volcanic eruptions of basalt. The speed of spreading affects the shape of a ridge – slower spreading rates result in steep, irregular topography while faster spreading rates produce much wider profiles and more gentle slopes.

Source: [Major 'magnetic anomaly' discovered deep below New Zealand's Lake Rotorua](#)

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