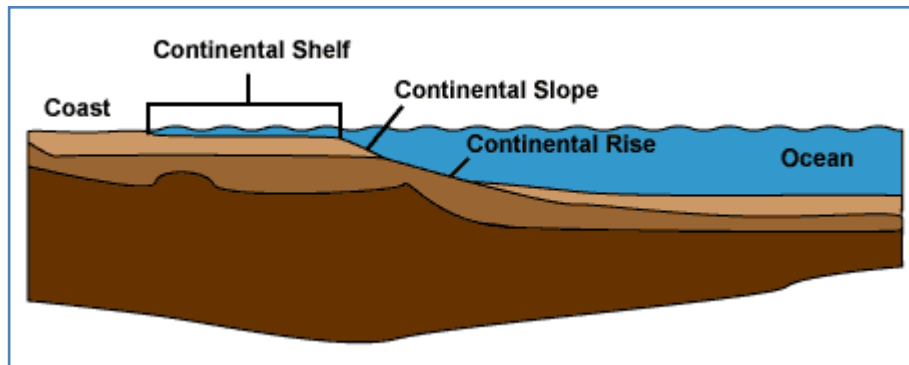


Sea Floor Structures

Continental Margins

The continental margins are the boundaries where continental crust and oceanic crust meet. These margins include the continental shelf, the continental slope and the continental rise.



The continental shelf is the shallowest part of the continental margin. Although they only make up 8% of the Earth's ocean surface area, they are the most biologically rich part of the ocean containing the majority of the sea life. The shelf is made up of continental crust and is actually just part of the continent that happens to be underwater. During Earth's history, the sea level has risen and fallen. During times of lower sea level, most of the continental shelves were not underwater. At these times, rivers and glaciers cut deep canyons into the exposed land. Once sea level rose, these canyons were submerged and gave rise to much larger submarine canyons.

The continental shelf typically extends outward varying distances (from 1/2 mile to 470 miles) at a gentle slope. At the end of this gentle slope, the shelf ends and abruptly becomes steeper. This point is called the shelf break and typically occurs at depths of 400-600 feet. It is important to note that under international law, countries have the right to control resources on their continental shelves and therefore control the land and water out to this shelf break.

The continental slope can be considered the edge of the continent. It begins at the shelf break and ends at the sea floor. At the base of the continental slope is the continental rise. Here, sediments from the continent wash down the slope and can accumulate to depths as thick as 6 miles!

Photo Attribution

Description: Cross-section of continental margin depicting the particular elements

Source: Wikimedia Commons

Ocean Basins

The deep-sea floor, or abyssal plain lies at a depth of 10,000 to 16,000 ft. It is relatively flat with a very gentle slope of less than 1 degree leading up to the mid-ocean ridges. The abyssal plain is spotted with several features such as channels, hills, and submarine volcanoes called seamounts. These seamounts can build up to create volcanic islands and over time, the islands are eroded to form flat-topped formations called guyots. Trenches can also be found along the abyssal plain. Trenches are the deepest parts of the ocean and are created where plates are pushed into the mantle. The Mariana Trench is the deepest part of the ocean, reaching a depth of 36,163 feet.

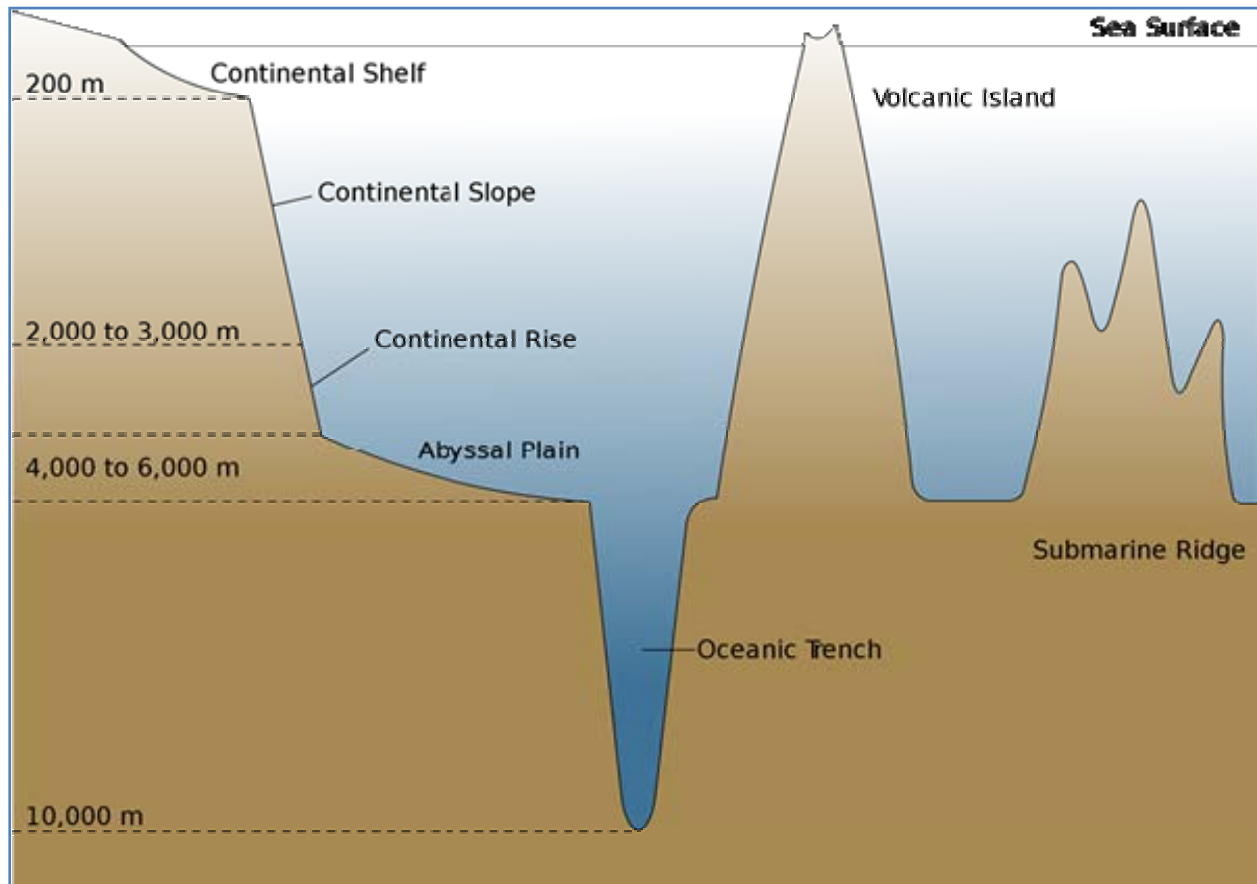


Photo Attribution

Description: Diagrammatic cross-section of an ocean basin, showing the various geographic features

Source: Wikimedia Commons

Ridges and Vents

At mid-ocean ridges, two tectonic plates are moving apart. This leaves a depression known as the central rift valley. The floor of the rift valley is covered with crevices and cracks. Seawater leaks down into these fractures and is heated by the very high temperatures of the mantle. The heated water is then forced back through the crust through hydrothermal vents or deep-sea hot springs. This water can be as high as 660 ft!

As the hot water passes through the cracks in the crust, it dissolves minerals from the surrounding rocks. One mineral in particular, sulfide, is commonly dissolved from the rocks. When this water emerges from a vent and mixes with the surrounding cold water, it cools rapidly and causes the minerals in the hot water to solidify. These minerals accumulate and build up around a vent forming a sort of chimney through which the water passes through. Depending on the minerals that are dissolved in hot water passing through the chimney, the water may appear white, black or even blue. These vents are called black smokers, white smokers or blue smokers. These vents can also be found near trenches.

Video: Hydrothermal Vents

Please click the link, [Hydrothermal Vents](#) to watch a video from YouTube of Bill Nye discuss the discovery of hydrothermal vents on the ocean's floor.