

Relief of [Sea floor](#)

[Introduction](#)

A sequence of major bathymetric ([sea floor](#)) regions can be identified in the and it extends seaward from the coast. These include the continental shelf, [continental slope](#), [continental rise](#), abyssal plains, abyssal hills, ocean ridges and ocean trenches. Additionally, numerous minor features are recognized within these regions such as submarine canyons, submarine fans, knolls and **seamounts**.

Continental Shelf: The nearly flat plains, or terraces, at the top of the sedimentary wedge beneath the drowned edges of the continents are continental shelves. They average about 60 kilometers in width. Local and regional variations , ranging from more than 1,000 kilometers in the Arctic. Ocean to a few kilometers along the Pacific coasts of North and South Africa are common. The continental shelf bottom, slopes gently seaward at an angle of about 0.5 degrees. This is very slight and impossible to detect with the naked eye. Continental shelves end on the ocean side as the shelf break where the sea bottom steepens appreciably. Continental shelf breaks occur, on a water depth of about 130 meters , but can be found deeper than 200 meters.

Continental slope

Seaward side of the continental shelf is the steeper **continental slope**, which is inclined at an average angle of 4 degrees. Its base lies at water depths of 2 to 3 kilometers. As with the continental shelf, an enormous pile of mud and sand eroded from the continental slope lies underneath the continental slope. Huge submarine canyons are cut into the sedimentary deposits of many continental slopes. These canyons have steep sides, V-shaped profiles, and topographic relief of up to 2 kilometers, making them one of the most deeply incised landforms anywhere on the [earth](#). Submarine canyons serve as passageways for the transfer of sediment from the continental margins to the deep-ocean basins by a variety of transport processes.

Continental rise

The continental rise is a layer of sediment from the base of the slope that forms a dip between the foot of the [continental slope](#) and the deep [ocean floor](#). At the base of many continental slopes, the ocean bottom flattens out to a mere gradient of one degree. This broad underwater plain of sediment is called the **continental rise**. Some of the ocean basin is the vast depression in the [earth](#)'s surface bordered on all sides by continents and filled with a continuous body of saltwater, the ocean. Present-day oceans have overflowed the basin and flooded the edge of the continents to a depth of about 200m. The ocean basin and associated submerged continental edges are not flat. They display numerous features varying from submerged mountain chains to deep trenches that extend several kilometers below the adjacent [sea floor](#).

Locally, deep submarine canyons have been eroded into the shelf, slope and rise by turbidity currents, density currents of sediment laden water that flow rapidly down-slope under the force of gravity. Deposition of sediments at the mouth of the canyons may form enormous fan-shaped accumulations called **submarine fans**. Submarine fans form part of the continental rise.

Abyssal plain:

Outward from the continental rise is the abyssal plain, a relatively flat featureless area where sediments have buried most of the [sea floor](#) irregularities. Isolated hills may protrude through

the sedimentary cover. They are called **knolls** if less than 100m high or **seamounts** if higher than 1000m. The number of knolls and seamounts increases towards the exposed oceanic ridge. They become the dominant feature in the abyssal hills because sedimentary is too thin to completely bury the flank of the oceanic ridge.

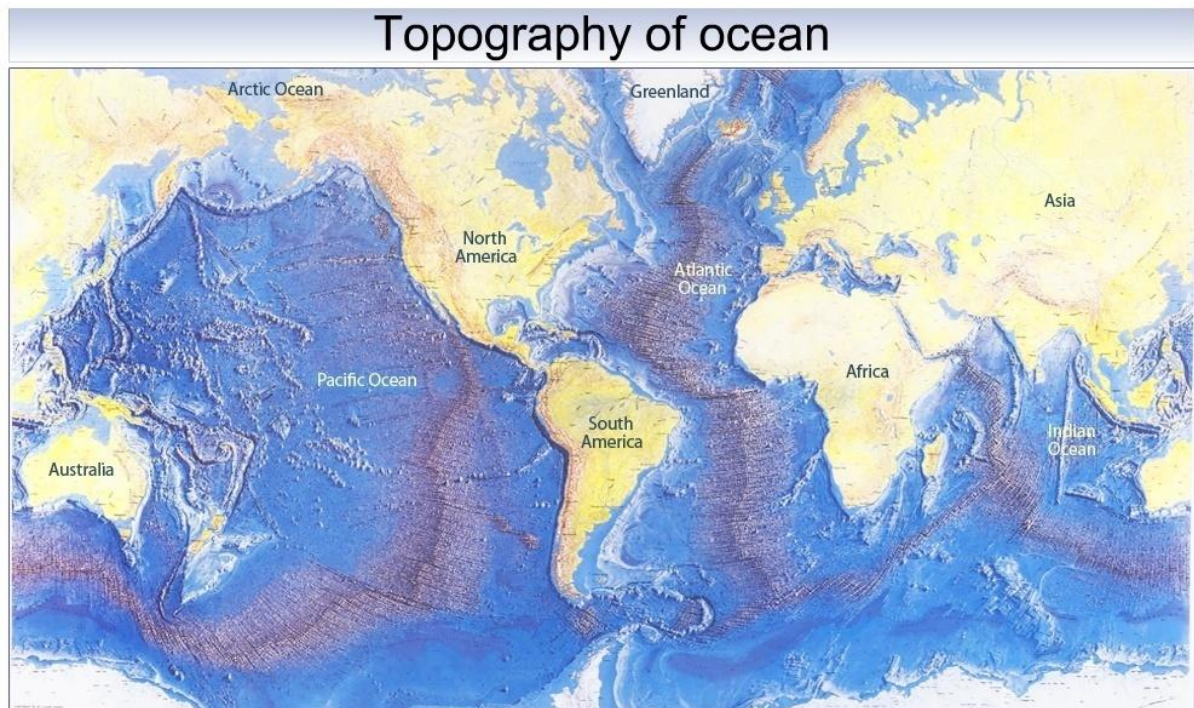
Oceanic ridges

Oceanic ridges are volcanic in origin. They form mountain chains that extend the length of the ocean basins. Although the ridges extend from continent to continent., the outer edges usually are buried under the sediments of the abyssal hills and abyssal plains. The highest peaks generally are near the axis of the ridge.

Transform faults are located between the offsets in the oceanic ridges. Along these faults rocks periodically break and slide past each other. Fracture zones are the inactive extensions of the transform faults beyond the lateral offsets of the ridge, where segments of the [sea floor](#) are moving in the same direction. The transform faults together with the fracture zones appear as gashes or scars extending across the [sea floor](#), except where buried by sediment, and are aligned almost perpendicular to the oceanic ridge.

Oceanic trenches

Oceanic trenches are very deep, long, narrow, relatively steep-sided depressions in the ocean basin. They usually occur adjacent to the continents, but may form anywhere within the ocean basin.

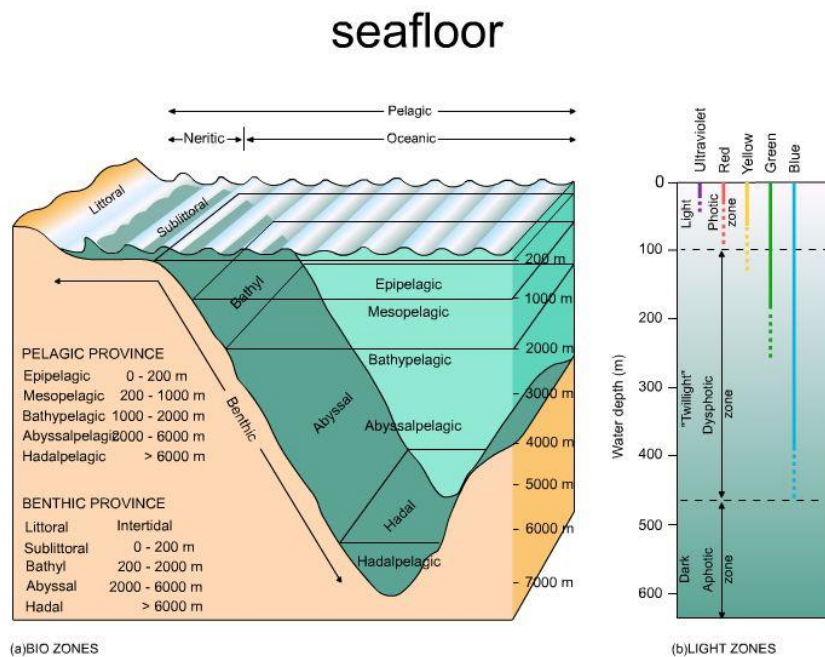


Tabular representation of [relief of sea floor](#)

Feature	Width	Relief	Water Depth	Bottom Gradient
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Continental Shelf	<300 km	< 20 m	<150 m	<1:1,000(~0.5°)*
Continental slope	<150km	Locally > 2km	Drops from 100 +2000+m	~1:40(3-6°)
Continental rise	<300km	<40km	1.5-5km	1: 1,000-1:700(0.5°-1°)
Submarine canyon	1-15km	20-2,000m	20-2,000m	<1:40(3-6°)
Deep-sea trench	30-100km	>2km	5,000-12,000m	---
Abyssal hills	100-100,000m(100km)	1-1,000 m	Variable	---
Seamounts	2-100km	>1,000km	Variable	---
Abyssal plains	1-1,000km	0	>3km	1:1,000-1:10,000(<0.5°)
Midocean ridge	500-1,500km	<1km	>3km	----
Midocean ridge crest	500-1,000km	<2km	2-4km	----

- A bottom gradient of 1:1,000 means that the slope rises 1m vertically across a horizontal distance of 1,000m.



Chapter 5: [Terminologies](#)

Terminologies

Aphotic zone: That portion of the ocean where light is insufficient for photosynthesis.

Bar: Offshore ridge or mound that is submerged at least at high tide.

Barrier beach : Bar parallel to the shore whose crest rises above high water.

Barrier reef : Reef that is separated from a landmass by a lagoon, usually connected to the sea through passes (openings) in the reef.

Basalt fine: Graned igneous rock, black or greenish black rich in iron, magnesium, and

calcium.

Basin : Large depression of the [sea floor](#).

Bank: Large elevation of the [sea floor](#); a submerged plateau.

Bathymetry: Mapping of the ocean bottom. Beach seaward limit of the shore (limits are marked approximately by the highest and lowest water levels).

Beach seaward: limit of the shore (limits are marked approximately by the highest and lowest water levels).

Benthic: that portion of the marine environment inhabited by marine organisms that live permanently in or on the bottom.

Biogenous: Sediment containing at least 30% by volume of skeletal remains of organisms.

Conduction: Transfer of energy through matter by internal particle or molecular motions. Continental climate characterized by cold winters and hot summers where the prevailing winds come from large areas.

Continental climate: climate characterized by cold winters and hot summers where the prevailing winds come from large areas.

Continental rise: Gentle slope with a generally smooth surface, rising toward the foot of the [continental slope](#).

Coastal ocean: shallow portion of the ocean (generally over-lying the continent shelf).

Coastal plain: estuary estuary in coastal plain

Deep Water: [Waves](#) water [waves](#) whose depth is greater than one-half the average wavelength.

Deep zone: Waters below the pycnocline.

Density mass: Per unit volume of a substance, usually expressed in grams per cubic centimeter. Density is numerically equivalent to specific gravity.

Fracture zone: elongate zone of unusually irregular topography of the [ocean floor](#) characterized by seamounts, steep-sided or asymmetrical ridges, troughs, or long, steep slopes.

Fringing reef : Reef attached directly to the shore of an island or continental landmass. Its outer margin is submerged and often consists of algal limestone, coral rock, and living coral. Front marked change in water properties.

Lagoon shallow: shallow, pond or lake, generally separated from the open ocean by a barrier beach.

Outer Lithosphere: Solid portion of the [earth](#) which includes [the crust](#) and part of the upper-mantle.

Littoral drift : Sand moved parallel to the shore by wave and current action.

Neritic ocean : Environment shallower than 200 meters.

Ocean basin: [Ocean floor](#) that is more than about 2000 meters below sea level.

Oceanic crust : Mass of basaltic material, typically seven kilometers thick, that lies under the ocean basins.

Oceanography: Scientific study of the ocean.

Ooze: Fine grained, deep-ocean sediment containing at least 30% (by volume) undissolved sand- or silt-sized, calcareous or siliceous skeletal remains of small marine organisms, the remainder usually being clay-sized material.

Pelagic deposits deep-ocean sediments that have accumulated by setting out of the ocean particle-by-particle.

Photie zone or euphotic zone: Near surface layer of water that receives ample sunlight for photosynthesis which exceed respiration.

Sea-floor: Spreading process by which lithosphere is generated at midocean ridges. Adjacent lithospheric plates are moved apart as new material forms.

Seamount : Elevation rising 900 meters or more from the ocean bottom.

Sediment : Particulate organic and inorganic matter that accumulates in a loose, unconsolidated form. It may be chemically precipitated from solution, secreted by organisms, or transported from land by air, ice, wind, or water and deposited.

Shallow sill : Portion of the [ocean floor](#) that partially restricts water flow; may be either at the mouth of an inlet, fjord, or similar structure, or at the edge of an ocean basin-for example, the Bering Sill separates the Pacific and Arctic portions of [the Atlantic Ocean](#).

Tectonic estuary: Estuary occupying a basin formed by mountain buildings.