

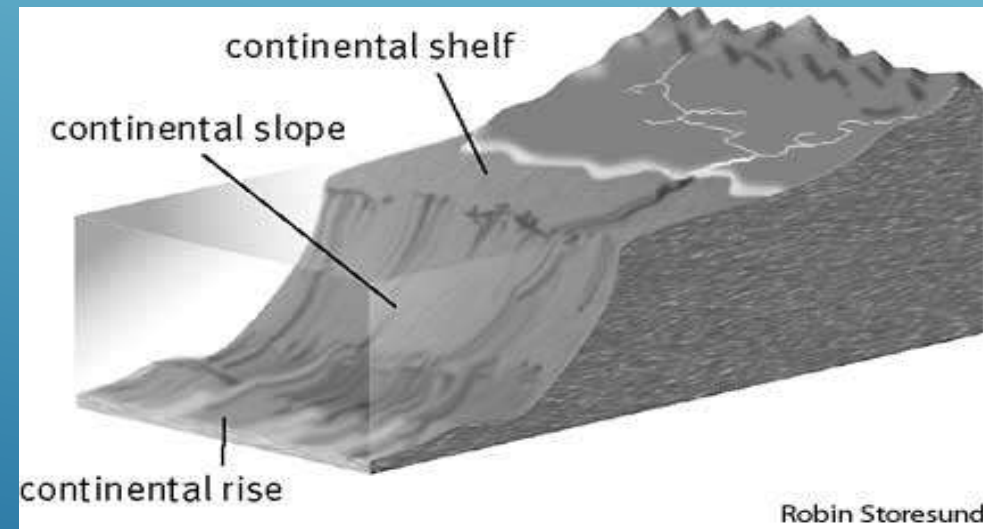
SCIENCE SOL 5.6 OCEANS

Mrs. Scott

OCEANS

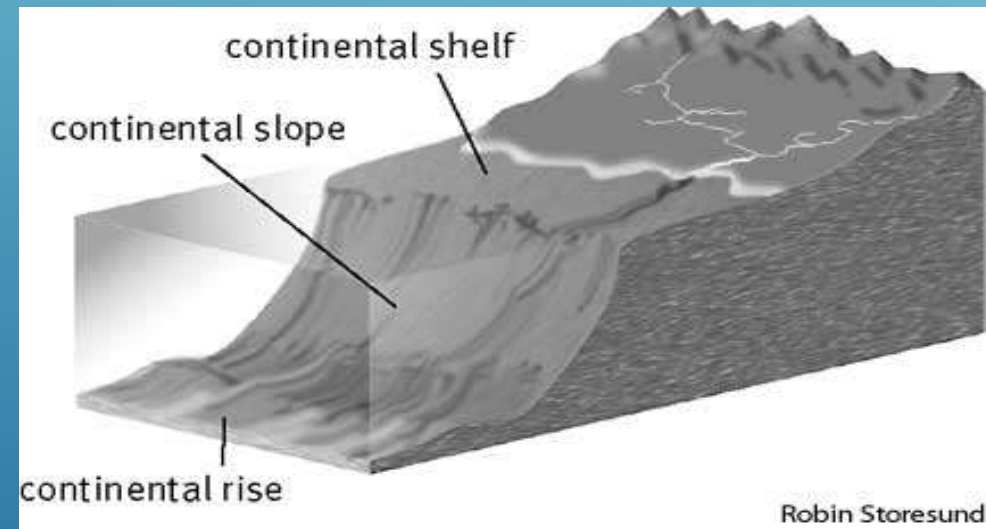
Just like the land features of geographic regions, oceans also have features on the **ocean floor.**

- ▶ **Continental Shelf:** a border of a continent that is underwater and slopes gradually and extends to the continental slope. The width of the continental shelf varies from only a few miles up to more than 900 miles, but the worldwide average is about 45 miles wide. It has many little hills, ridges, terraces, and canyons, but the water is never very deep here. When you are standing in the ocean at the beach, you are standing on the highest part of a continental shelf.



OCEAN FEATURES

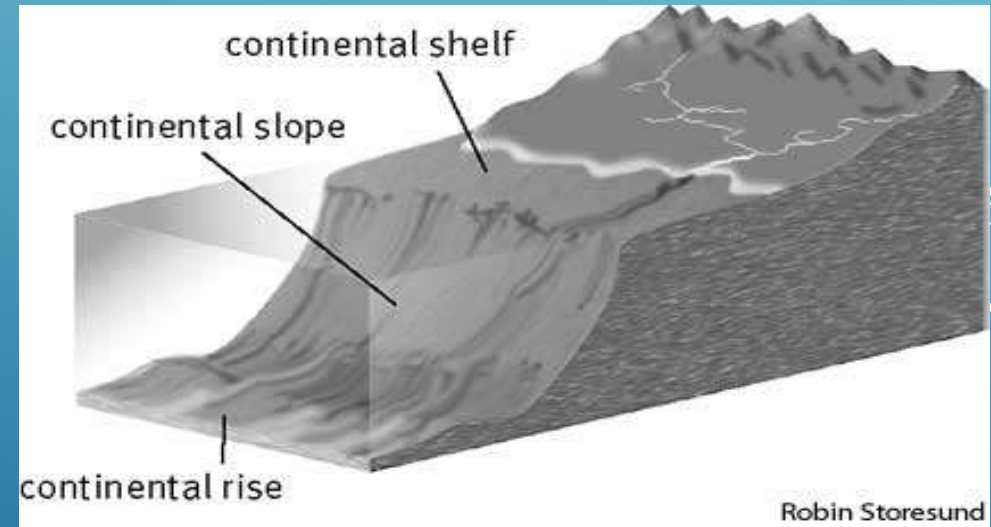
- ▶ **Continental Slope:** connects the continental shelf and the abyssal/seafloor plain. It begins at the end of the continental shelf where the bottom sharply drops off into a steep slope. It begins at the end of the continental shelf where the bottom sharply drops off into a steep slope. It usually begins at a depth of 430 feet (130 meters) and can be up to 20 km wide.



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- ▶ **Continental Rise**: the area past the continental slope where sediment is deposited from the currents. These sediments accumulate (gather) to form the large, gentle slope of the continental rise.

OCEAN FEATURES



- ▶ **Mid Ocean Ridges:** mountain ranges located on the ocean floor. All ocean floors contain these mountain ranges except the North Pacific Ocean. Many of these mountain ranges are higher than Mt. Everest. The largest mountain chain in the ocean is the Mid-Atlantic Ridge.
- ▶ Much of the deep ocean floor, especially in the Pacific, is a deep ocean basin, which is about 2.5 to 3.5 miles deep and covers about 30% of the Earth's surface. It somewhat resembles the surface of the moon with its features such as the abyssal plain, deep-sea trenches, & seamounts.

OCEAN FEATURES



- ▶ **Abyssal Plain**: (seafloor plain) the flat, deep ocean floor. At is almost featureless because a thick layer of sediment has covered hills and valleys found in it.
- ▶ **Deep Sea Trenches**: the deepest parts of the ocean. The deepest one, the **Marianas Trench** in the South Pacific Ocean, is more than 35,000 feet, or almost 6.6 miles, deep. A Navy-owned submarine, the Trieste, still holds the record for diving to the bottom of the deepest part of the Marianas Trench, the Challenger Deep, on January 23, 1960.



OCEAN FEATURES



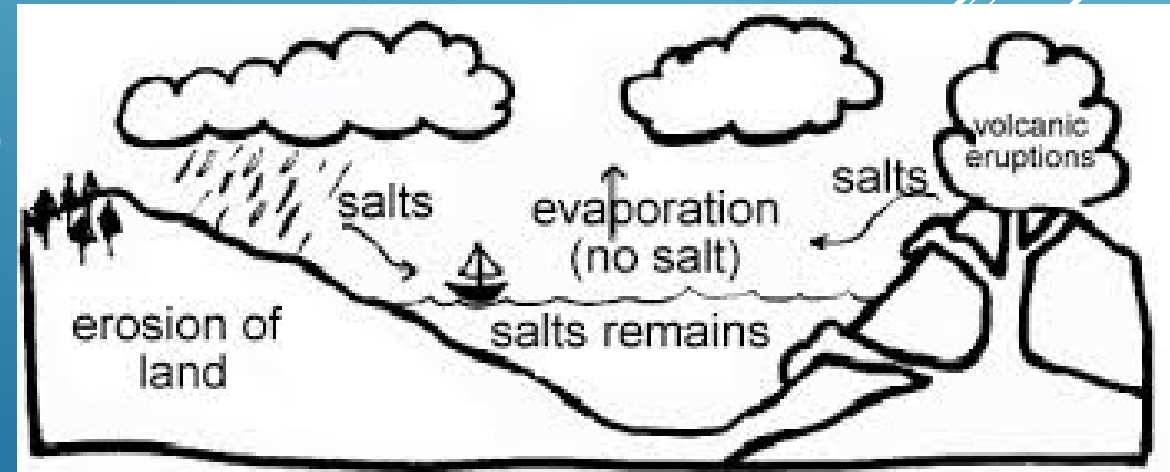
- ▶ The depth of the ocean varies. Ocean trenches are very deep, and the continental shelf is relatively shallow.
- ▶ Oceans cover about 70% of the surface of the Earth.

OCEAN FEATURES



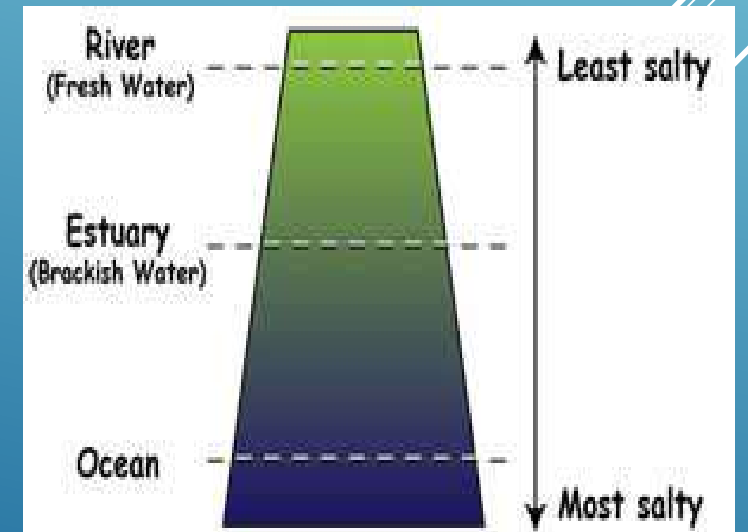
- ▶ Salt in the ocean comes from minerals in the rocks on earth. Moving water carries minerals within sediment, including salts to the oceans.
- ▶ The **salinity** of ocean water varies in some places depending on rates of evaporation and runoff from nearby land.
- ▶ Warmer temperatures result in quicker evaporation, resulting in saltier conditions.
- ▶ The ocean water is a complex (having many parts) mixture of gases (air) and dissolved solids (salts, especially sodium chloride).

HOW DOES SALT GET INTO THE OCEAN?



- ▶ Marine (living in the water) organisms are dependent upon these dissolved gases (oxygen, nitrogen, and carbon dioxide) for survival.
- ▶ The salinity of the ocean water changes depending on the location, amount of rainfall, air temperature, and geography of land around it.
- ▶ Some ocean water is very diluted by the fresh water that runs off into it (rivers).
- ▶ Brackish water is part fresh water and part salt water. Estuaries where fresh river water runs into the ocean is an example of brackish water. The Chesapeake Bay is an excellent example of an estuary.

HOW DOES SALT GET INTO THE OCEAN?



▶ Currents

▶ Waves

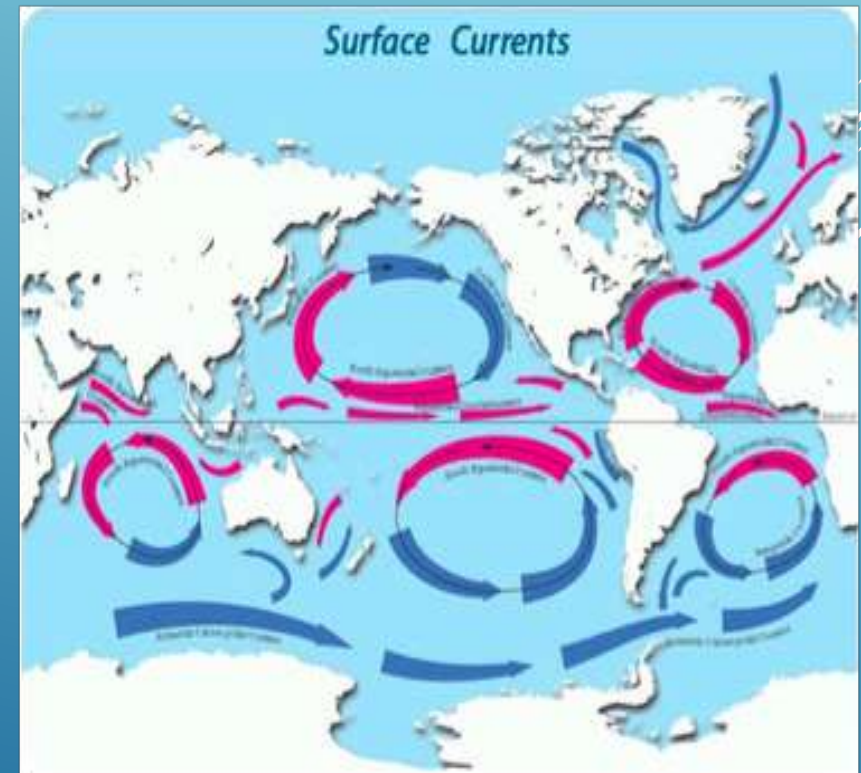
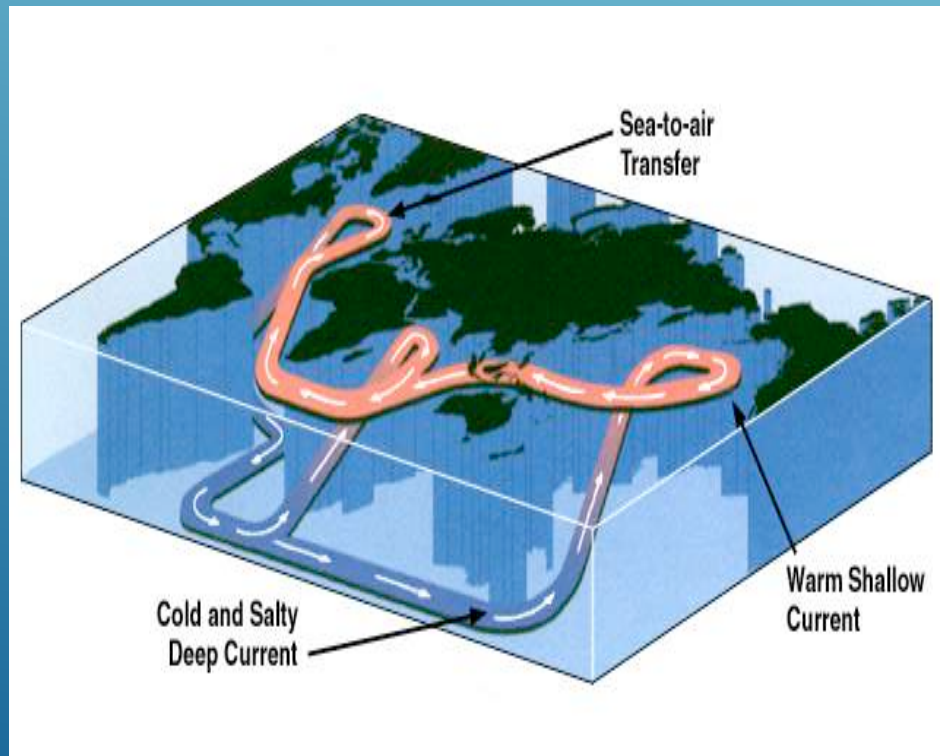
▶ Tides



BASIC MOTIONS OF OCEAN WATER

- ▶ Global ocean currents help to regulate the world's climate and have important effects on marine life. They are composed of **deep ocean currents** and **surface currents**.

CURRENTS



- ▶ **Current**: refers to the motion of the water and is like a river within the ocean, flowing from one place to another. These currents are caused by differences in water temperatures, differences in water density, and by wind. Currents are responsible for a vast amount of movement of water found in the Earth's oceans.

CURRENTS



- ▶ **Ocean Currents**: (including the Gulf Stream) are caused by wind patterns (surface current) and the differences in water densities (deep ocean currents due to salinity and temperature differences). Ocean currents travel in a circular pattern and affect the mixing of ocean waters. This can affect plant and animal populations and navigation routes.
- ▶ Migration routes of animals rely upon currents.
- ▶ Ships need to detour around currents so they do not have to go against their force.
- ▶ -Colder water sinks because it is denser (particles are closer together) and flows as deep ocean currents.

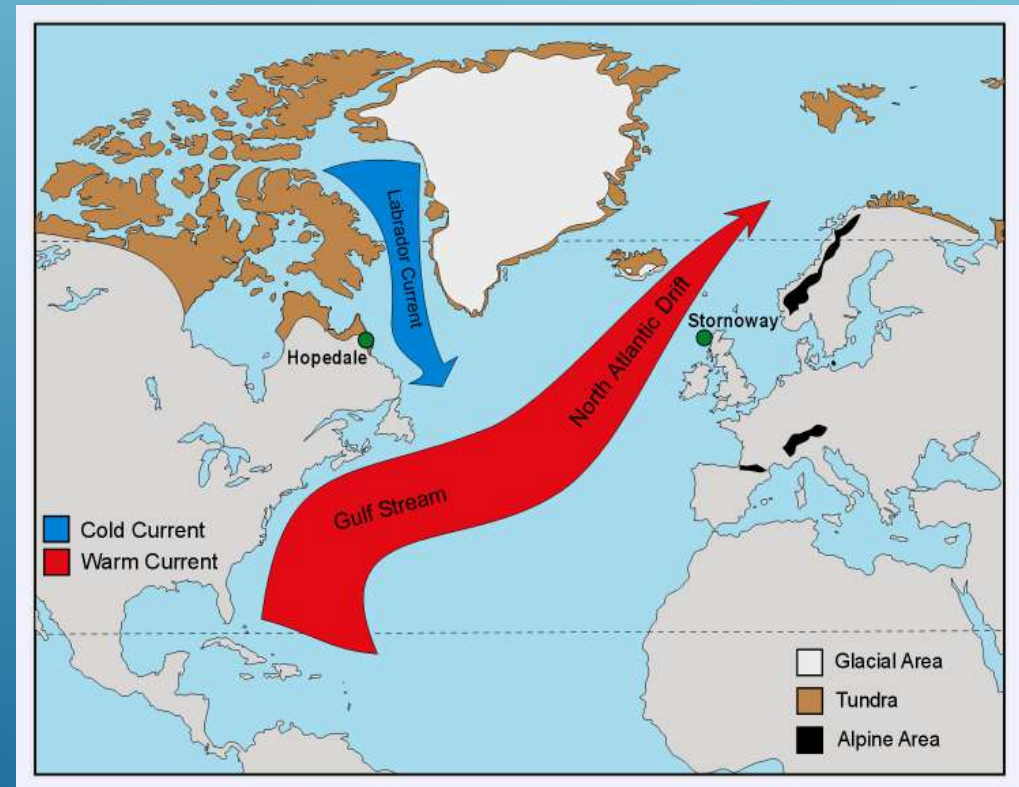
CURRENTS

- ▶ **Deep Ocean Currents**: are created by differences in water density. Saltier (denser) water sinks and displaces water that is warmer and less salty and dense. The deep, dense water moves slowly across the ocean floor and eventually rises in warmer latitudes. These currents are connected, and are sometimes called the ocean “conveyor belt”. One circuit can take 1,000 years to complete.
- ▶ **Surface Currents**: are driven by wind. Depending on the seasons and on climate fluctuations, the exact position of the surface currents varies. Warm water near the equator is pushed by normally strong winds toward the poles and begins to cool. In a few regions, such as the North Atlantic, cold, salty water sinks to the ocean floor. This water then travels in the deep ocean.

CURRENTS

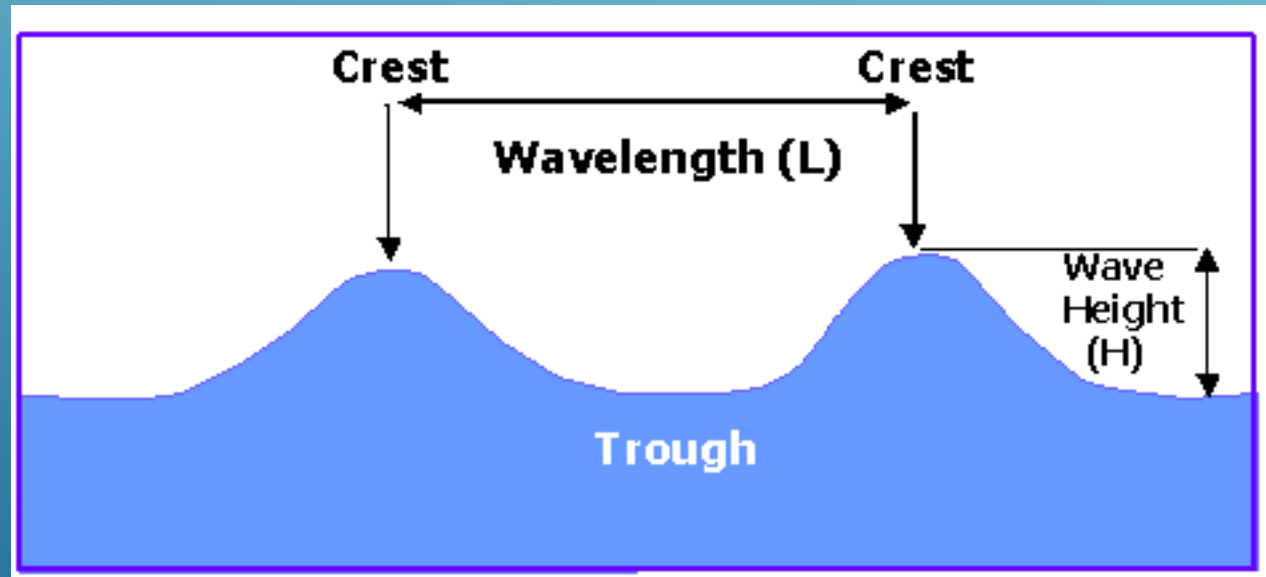
- ▶ **The Gulf Stream:** a powerful warm current that flows in the Atlantic from the tip of Florida, up the coast of the United States, and then over to Europe. The Gulf Stream has a large impact on the climate of the eastern U.S. and Western Europe. It makes Western and especially Northern Europe warmer than they otherwise would be.

CURRENTS



- ▶ Draw the parts of the wave and label the following:
Crest, trough, wave length, and wave height

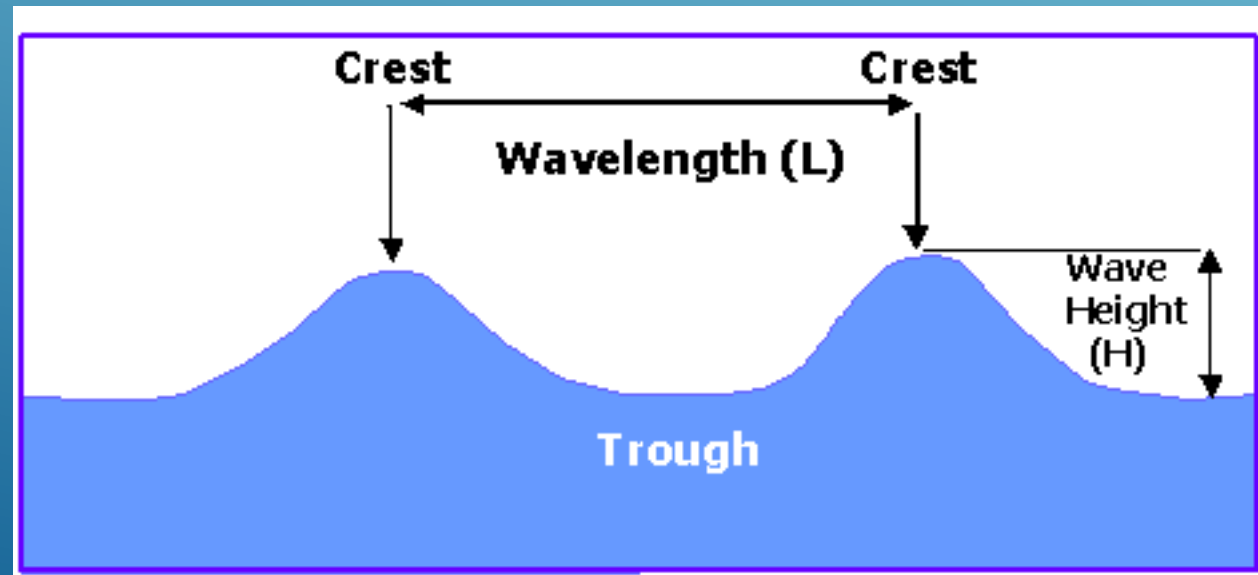
WAVES



- ▶ **Crest**: the highest point on a wave
- ▶ **Trough**: a valley between 2 waves
- ▶ **Wave length**: the horizontal distance, either between the crests or troughs of 2 consecutive waves
- ▶ **Wave height**: a vertical distance between a wave's crest and the next trough

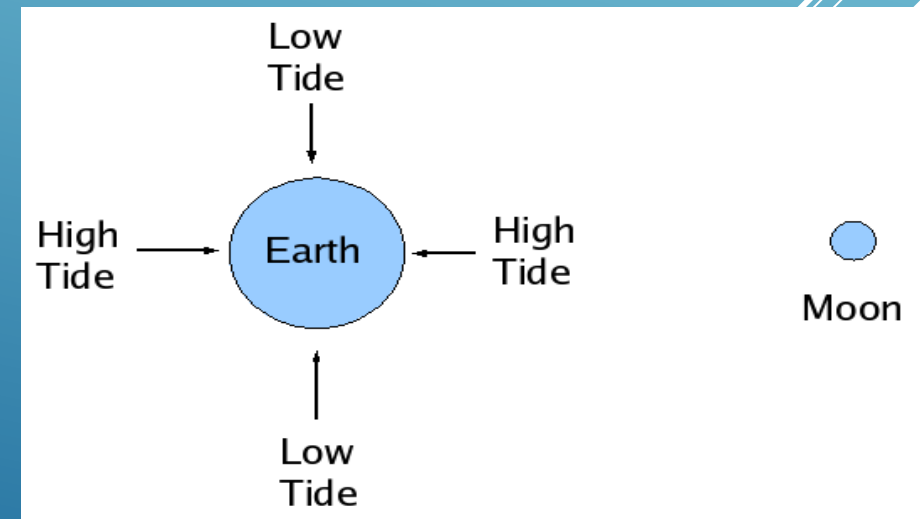
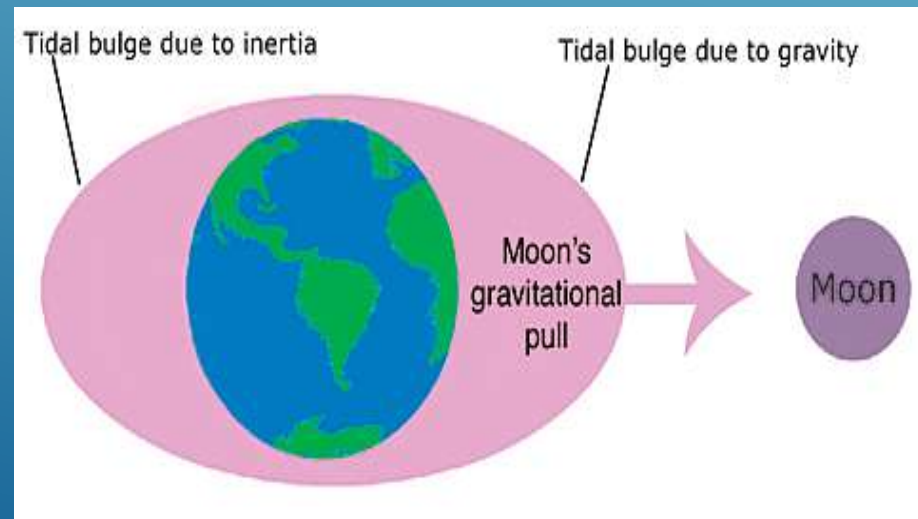
- ▶ Waves are caused by the energy of the wind.
- ▶ The stronger the energy of the wind, the larger the wave.
- ▶ Waves move in an up and down motion.
- ▶ It is the energy of the wind and not the water that moves forward. The water rotates in a circular motion remaining near its starting point.

WAVES



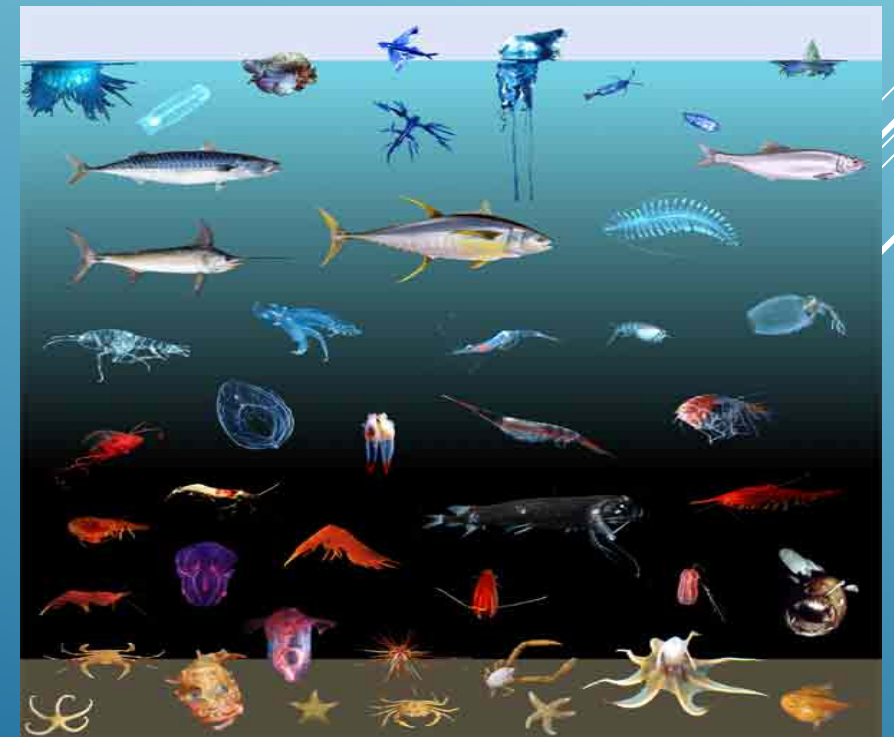
- ▶ Tides are the rise and fall of the water in the ocean due to the gravitational pull of the moon. Tides occur approximately every 6 hours, 2 high tides and 2 low tides.

TIDES



- ▶ 1. Sunlight Zone
- ▶ 2. Twilight Zone
- ▶ 3. Midnight Zone
- ▶ As the depth of ocean water increases, the temperature decreases, the pressure increases, and the amount of light decreases. These factors influence the type of life forms that are present at a given depth.

THREE LIGHT ZONES OF THE OCEAN



1. Top layer of the ocean.
2. Sunlight penetrates for plants to go through the process of photosynthesis.
3. Warm temperatures at the surface (colder as the depth increases.)
4. Small amount of water pressure (increases with depth.)
5. About 0-600 feet deep.
6. More than 90% of all marine life lives in the sunlight zone.

SUNLIGHT ZONE

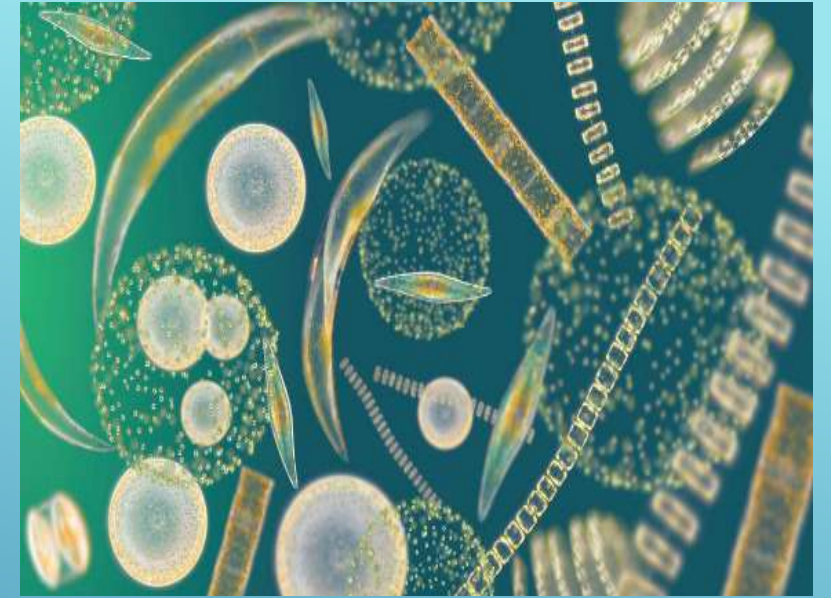


- ▶ Plankton are tiny free-floating organisms that live in water. Plankton may be animal-like or plant-like.
- ▶ Zooplankton and Phytoplankton live here
- ▶ a. **Zooplankton** are animal-like plankton
- ▶ -most are single-celled
- ▶ -often the beginning of the marine food web

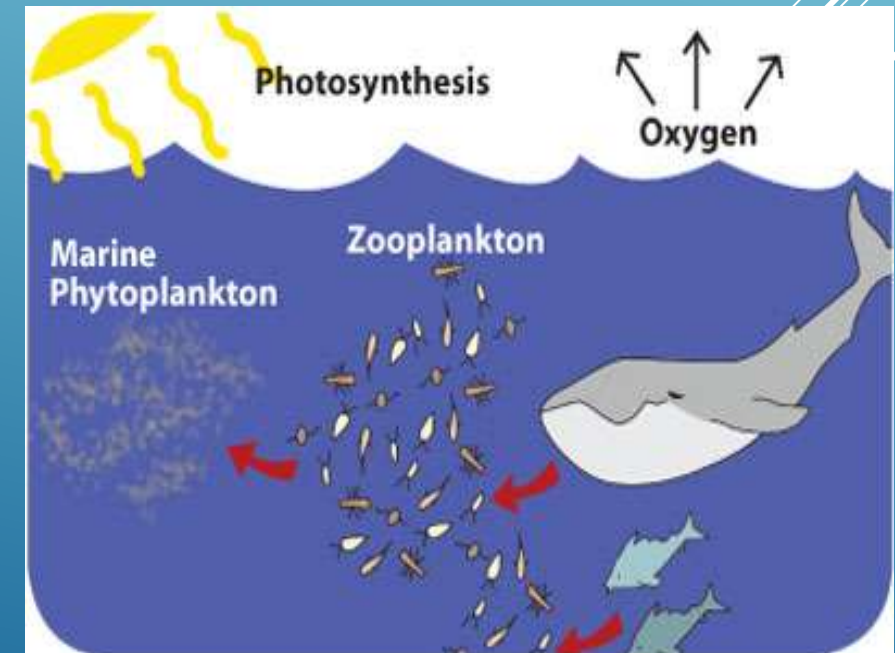


SUNLIGHT ZONE

- ▶ b. **Phytoplankton** are plant-like plankton.
- ▶ -most are round and single-celled
- ▶ -use photosynthesis for energy
- ▶ -the base of the ocean's food web and food source for Zooplankton
- ▶ -proves much of the Earth's oxygen and serve as the base of the ocean food web. (The sun is the original/main source of all food chains.)
- ▶ -Plankton live best in areas where nutrient rich water upwells from the deep. Phytoplankton are eaten by animal-like plankton, swimming organisms, and those things that live on the ocean bottom.



SUNLIGHT ZONE



- ▶ 1. Middle layer of the ocean
- ▶ 2. Only a small amount of light reaches this zone (not enough for photosynthesis.)
- ▶ 3. Water temperature is getting colder with depth.
- ▶ 4. Water pressure is increasing with depth.
- ▶ 5. Up to about 600-3,000 feet deep.
- ▶ 6. No plants grow here (not enough sunlight.)
- ▶ 7. Animals such as octopus, firefly squid, hatchet fish, lanternfish, and viperfish live here.
 - ▶ a. They do not stalk their prey; they wait for it to swim by.
 - ▶ b. They have large eyes and bioluminescence, the ability to make their own light.
 - ▶ c. They are dark colors to blend in with the dark water.

TWILIGHT ZONE



- ▶ 1. Bottom layer of the ocean.
- ▶ 2. No sunlight reaches this zone (completely dark.)
- ▶ 3. Very cold water temperature (near freezing.)
- ▶ 4. Water pressure can reach as much as 2 tons per square inch.
- ▶ 5. From 3,000 feet to reaching depths close to 36,000 feet.
- ▶ 6. No plants live here.
- ▶ 7. Not many animals live here and the ones that do don't have eyes (it is impossible to see.)
 - ▶ a. Organisms often live near cracks in the crust where it is warmer.
 - ▶ b. Special bacteria use minerals to make food.
 - ▶ c. All other living things are nourished by this bacteria.
- ▶ -Examples: Anglerfish, tripod fish, sea cucumber, opossum shrimp, black swallower, dumbo octopus, giant tubeworms, and vampire squid.

MIDNIGHT ZONE



DISTANCE SUNLIGHT TRAVELS IN THE OCEAN

sea level



sunlight (euphotic) zone
Sunlight rarely penetrates beyond this zone.

200 meters



twilight (dysphotic) zone
Sunlight decreases rapidly with depth.
Photosynthesis is not possible here.

1000 meters

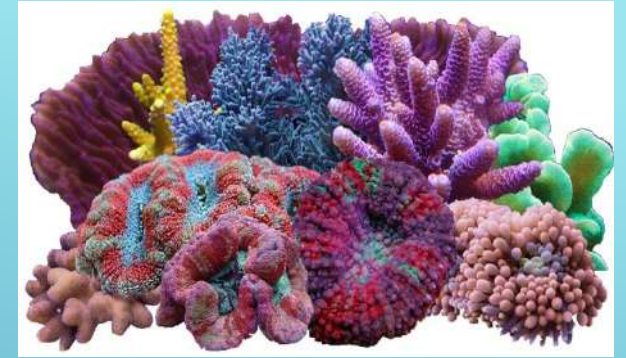


midnight (aphotic) zone
Sunlight does not penetrate at all.
This zone is bathed in darkness.



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- ▶ Coral look like plants, but are really animals that cannot move or swim.
- ▶ They shoot out tentacles to capture zooplankton that float in the current.
- ▶ A coral reef is an enormous living and growing community.
- ▶ Millions of individual coral skeletons accumulate year after year.
- ▶ The oldest reef began to grow around 25 million years ago.
- ▶ Coral come in all shapes and colors.
- ▶ They take in calcium carbonate from ocean water and secrete a limestone cup-like structure around its body.



CORAL



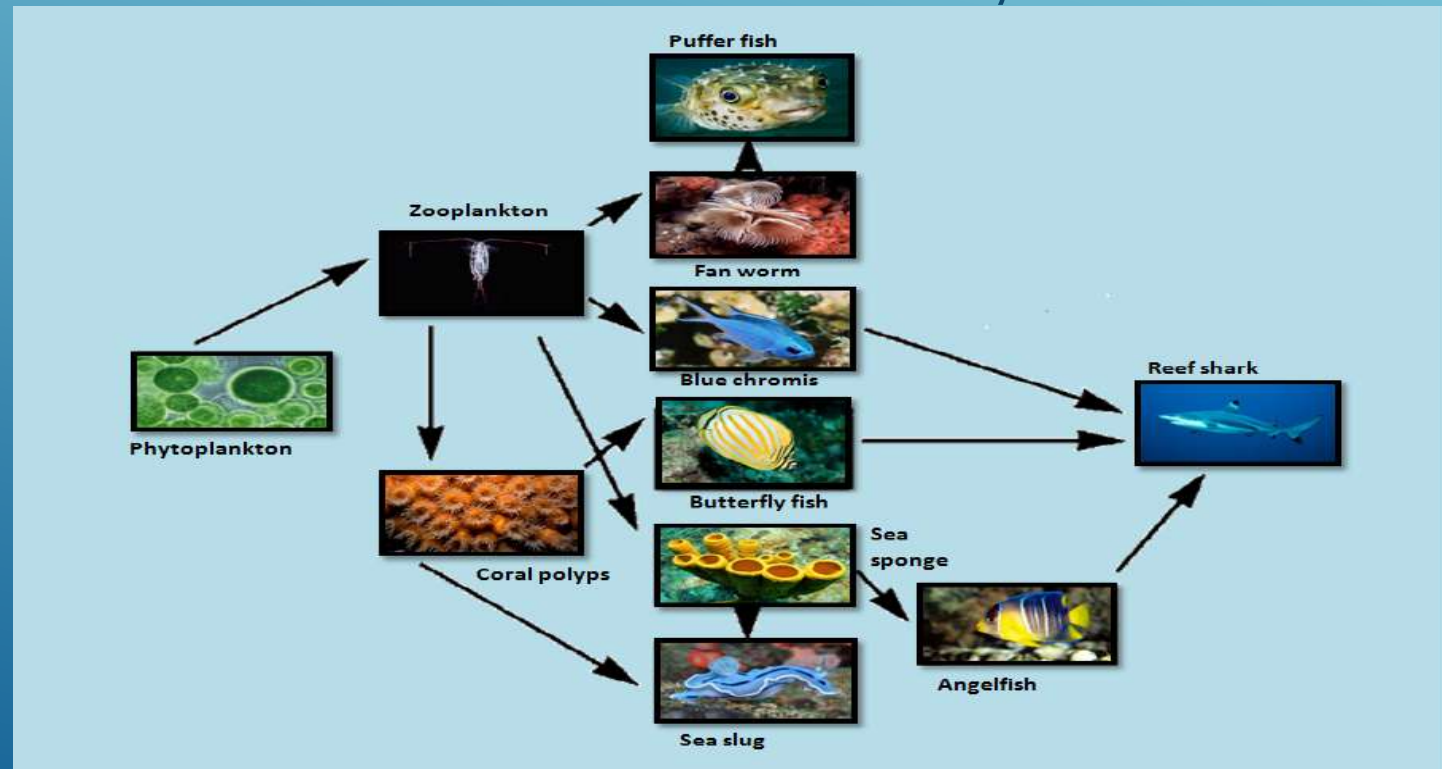
- ▶ They grow only in water that is clean, clear, and shallow enough for light to penetrate to the bottom, salty, and warm (around 70-85 degrees Fahrenheit).
- ▶ The largest coral reef is off the coast of NE Australia, The Great Barrier Reef. It is over 1,250 miles long and can be seen from space.



CORAL



- ▶ Examples of animals that live in the coral reef habitat:
 - ▶ a. sponges
 - ▶ b. jellyfish
 - ▶ c. crustaceans (crabs, shrimp, lobsters)
 - ▶ d. sea snakes
 - ▶ e. mollusks (octopus, nautilus, clams)
 - ▶ f. sea stars (including the destructive Crown of Thorns)
 - ▶ g. anemones
 - ▶ h. turtles
 - ▶ i. snails
 - ▶ j. nudibranchs
 - ▶ k. fish



CORAL

- ▶ Coral reefs are in danger of dying out due to water pollution, dredging, careless collections of specimens, and deposition of sediments. The water is muddied and this prevents light from reaching the algae on which the coral feed.

CORAL



- ▶ Humans impact the ocean environment through their everyday activities. Responsible public policy decisions include improved monitoring of marine populations, placing bans on hunting or harming certain marine mammals, placing limits on catches of stressed populations, and greater emphasis on pollution prevention.



CORAL

