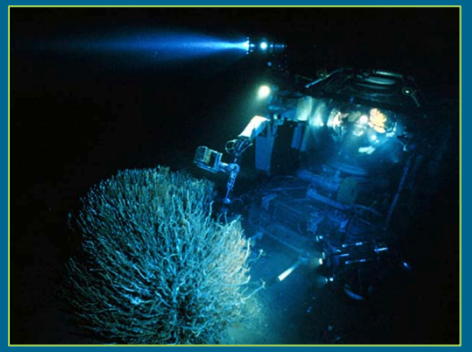
Benthic Deep Ocean Zone

By: Amanda, Alyssa, Mason, and Skai



The Benthic Zone

The darkest, deepest, and best part of the ocean

Benthic Zone Basic Info

- The Benthic Zone is located at the bottom of the ocean, at the seafloor
- The deep seafloor is called the abyssal plain, and, is about 4,000 ft below the ocean's surface.
- The deepest zone is called the hadal, below 6,000 feet.
- The deepest trenches go to below [about] 19,685 feet to 36,000 feet deep.

Benthic Zone Basic Info [cont.]

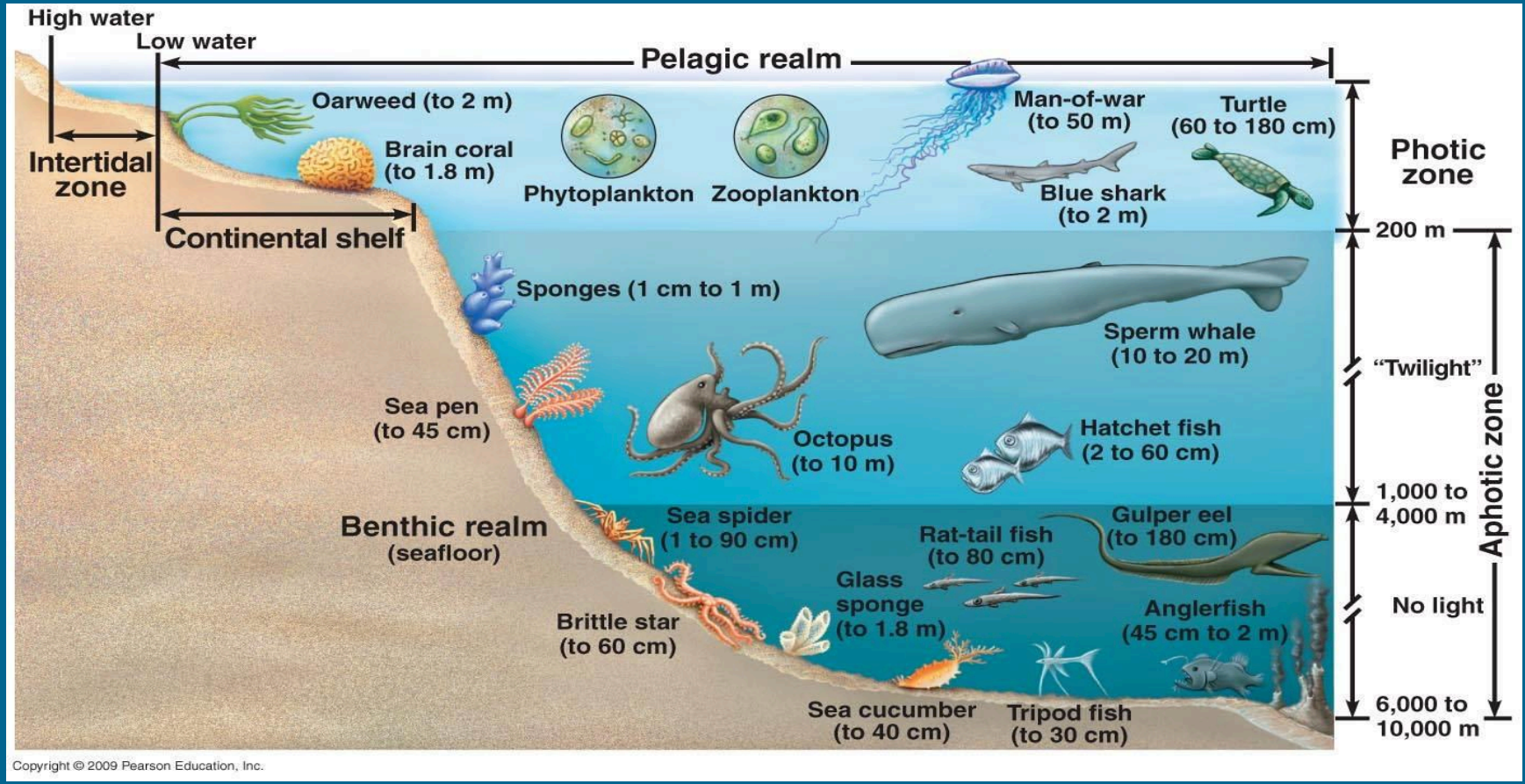
- The Benthic deep ocean zone gets very little sunlight, if any. Most of the benthic zone is in pitch darkness.
- Pressure varies with depth, but it is much greater than the pressure at sea level.
- At the deepest part of the ocean, around 36,000 feet below sea level, the pressure is more than 1,000 times greater than normal surface pressure.
- The bottom of the food chain in the deep ocean benthic zone is dead organisms that fall from the upper zones of the ocean.
- Because of the extreme pressure, pitch darkness, and lack of nutrients, few organisms live here, compared to other parts of the ocean
- Organisms that live here are specifically adapted to tolerate high pressure and near total darkness

Why is the Benthic zone important?

The Benthic zone is very important because many weird and interesting organisms live in the benthic zone, like anglerfish, frilled sharks, and tripod fish, that cannot survive or be found in any other place. The organisms here have many adaptations that allow them to live in the high pressure and darkness of the deep ocean benthic zone. They have redefined our understanding of the requirements for life.

Many organisms here have barely evolved from prehistoric times, meaning that the organisms here provide us a glimpse at what organisms here looked liked in the past, millions of years ago.

Underwater volcanoes are found here too, meaning that the benthic zone is also important because we can study volcanic eruptions here.



Benthic Zone

Animals

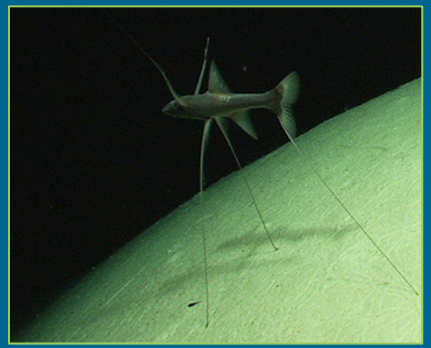
- ➔ Anglerfish
- ➔ Frilled Shark
- ➔ Deep Sea Anemone (Boloceroides daphneae)
- ➔ Tripod Fish

1

2

3

4



Plant Life

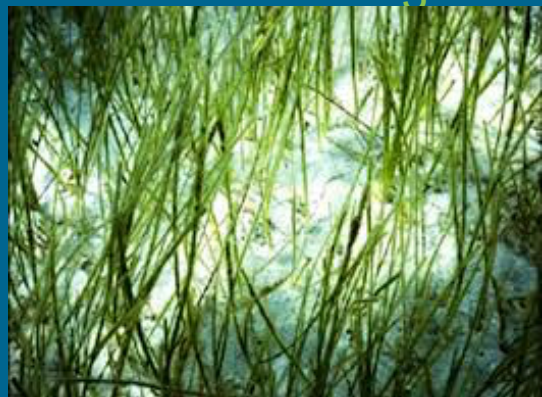
- ➔ Red Algae
- ➔ Turtle Grass
- ➔ Shoal Grass

★ **Remember, these plants can't be found deep underwater where there is no sunlight**

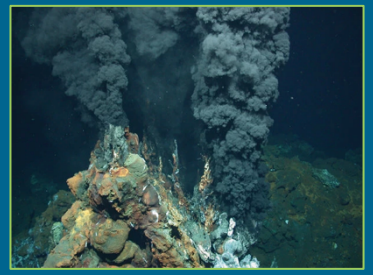
1

2

3



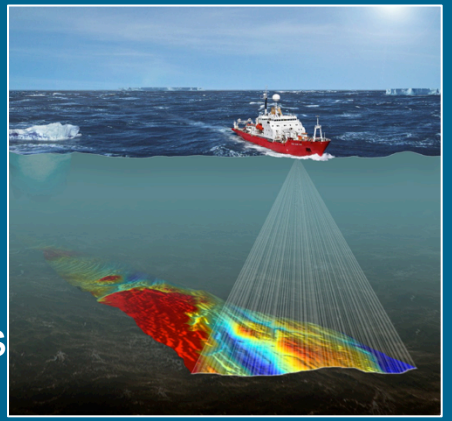
Hydrothermal Vents and Cold Seeps



A **Hydrothermal Vent** is an opening in the sea floor through which warm water mixed with minerals flow through. The vents are important because a species called Chemotrophs, which use energy and the elements in these vents as their food, are found here. They are a unique ecosystem in that the organisms found here survive even without sunlight. Organisms found in the hydrothermal vents are also changing our understanding of the requirements for life.

Cold Seeps are places on the seafloor where cold hydrocarbon-rich water escapes as hydrogen sulfide and/or methane. Cold seeps are home to some of the longest living invertebrates. They are important because, like hydrothermal vents, are a unique habitat and a lot of organisms live by cold seeps.

Sonar Waves



- Sonar [SOund Navigation and Ranging] uses sound waves
- Sonar waves are sent towards the bottom of the ocean.
- They then echo off the seafloor, and return back towards where they were sent from.
- The depth of the ocean is then calculated using how long it takes sound to move through the ocean and how long it takes the echo to return.
  - In shallow water, the echo will return quickly, while in deeper waters, the echo will take longer.

1977 dive to the Galapagos Rift

The main reason for the 1977 dive to the Galapagos Rift was to investigate the hydrothermal vents believed to be located there. This expedition was led by Richard Von Herzen and Robert Ballard of the Woods Hole Oceanographic Institution. There was the original expedition that took place in 1960s, but that group was not equipped to properly investigate the hydrothermal vents and organisms there.

We learned about single-celled bacterium that live near the vents, and use hydrogen sulfide, not sunlight to make sugar and energy. We also learned about the thriving biological communities that lived near the vents, which were thought to be lifeless..

Fun Facts

- ‘Benthic zone’ comes from the Greek word ‘benthos’ which, means the depth of the sea.
- In the deepest abyssal plains, the temperature drops to as low as 2-3°C (35.6 - 37.4°F).
- The organisms here can grow large, like anglerfish which can get up to 70 pound, or like giant tube worms, which can grow up to eight feet in length.

Beware: Random Questions

Waves that travel to the lowest point and are timed to see how long it takes them to return are called?

Hint: Slide 11

A.) ROVs

B.) Sonar Waves

C.) Benthic Sound Wave [BSW]

D.) Alvin Dive

How much sunlight does the benthic zone get?

The amount varies by depth, but overall, the deep ocean benthic zone gets very little sunlight, if any.

Why is there so little life in the deep ocean benthic zone?

(compared to other oceanic zones)

Mainly because of the lack of nutrients and producers, but also because of how far below the ocean's surface it is and because it gets very very very little sunlight.

Works Cited

https://dosits.org/people-and-sound/navigation/how-is-sound-used-to-measure-water-depth/

https://divediscover.whoi.edu/archives/expedition6/

https://en.wikipedia.org/wiki/Benthic_zone

https://www.popsci.com/hydrothermal-vents-are-way-more-important-than-we-thought

http://wwf.panda.org/our_work/oceans/deep_sea/vents_seeps/

https://oceanexplorer.noaa.gov/okeanos/explorations/ex1304/background/coldseeps/welcome.html

https://manoa.hawaii.edu/exploringourfluidearth/biological/aquatic-plants-and-algae/energy-acquisition/weird-science-hydrothermal-vents-and-cold-seeps

Works Cited [cont.]

https://www.nationalgeographic.org/media/deep-sea-hydrothermal-vents/

https://www.the-scientist.com/foundations/life-on-the-ocean-floor-1977-40523

https://microbewiki.kenyon.edu/index.php/Benthic_Zone

https://www.whoi.edu/feature/history-hydrothermal-vents/discovery/1977.html

https://oceanexplorer.noaa.gov/explorations/02arctic/background/benthos/benthos.html

Thanks for sitting through our presentation! :)