Interesting Facts on Ecosystems, the Abyssal Zone, and Hydrothermal Vents
(supplement to Become a Researcher Activity)

- Different areas of the ocean can be classified as different types of marine ecosystems. An *ecosystem* is defined as a community and the interactions of living and nonliving things in an area.

- Many parts of the ocean remain unexplored and much still remains to be learned about marine ecosystems.

- Marine ecosystems have distinct organisms, with distinct characteristics that result from the unique combination of physical factors that create them.

- Marine ecosystems include: the abyssal plain (areas like deep sea coral, whale falls, and brine pools), polar regions such as the Antarctic and Arctic, coral reefs, the deep sea (such as the community found in the abyssal water column), hydrothermal vents, kelp forests, mangroves, the open ocean, rocky shores, salt marshes and mudflats, and sandy shores.

- The average depth of the ocean is 4000m (about 2.5 miles), making the Abyssal Zone the largest living environment on Earth. It covers over 300,000,000 square km (115,000,000 miles)–about 83% of the ocean's total area and 60% of Earth's surface. http://www.untamedscience.com/biology/biomes/deep-sea-biome/

- The deeper you go in the ocean, the more intense the pressure. At the surface, there is one atmosphere of pressure; for every ten meters you go underwater, the pressure increases by one atmosphere.

- One way some animals have adapted to this pressure is that they have no air spaces in their body.

- The deep sea has extremely low temperatures. In fact, the beginning of the Abyssal Zone is conveniently defined as the area where water plummets to 4 degrees Celsius. At the ocean's average depth of 4000m, the average temperature is 2 degrees Celsius.
http://www.untamedscience.com/biology/biomes/deep-sea-biome/

- The abyssal plain at the bottom of the ocean contains pockets of life that are spread far apart from one another. Some marine ecosystems, like the deep sea, are in constant darkness where photosynthesis cannot occur. Other ecosystems, like rocky shores, go through extreme changes in temperature, light availability, oxygen levels, and other factors on a daily basis. The organisms that inhabit various marine ecosystems are as diverse as the ecosystems themselves. They must be highly adapted to the physical conditions of the ecosystem in which they

live. For example, organisms that live in the deep sea have adapted to the darkness by creating their own light source—photophores are cells on their bodies that light up to attract prey or potential mates.

- Animals here must withstand pressures of up to 11,000 psi. They tend to be grey or black (for camouflage) and unstreamlined (for energy conservation). Many are blind, and they are thought to reproduce very slowly. Some examples of deep sea life here are the tripod fish, anglerfish and giant squid. http://www.untamedscience.com/biology/biomes/deep-sea-biome/

- Hydrothermal vents are fissures, or openings in the ocean floor that release hot, mineral rich water. They are found in both the Pacific and Atlantic Oceans at a depth of about 2,100 meters. (7000 feet).

- There are two known types of hydrothermal vents – black smokers and white smokers.

- Black smokers are the hottest of the vents. Black smokers spew a black smoke composed mainly of iron and sulphide.

- Giant tube worms, located in the hydrothermal vent ecosystem at 2,499 meters (8,200 feet) below the surface, have long, white bodies and no eyes, mouth, or stomach. The worms use a special part of their body, "the trophosome", to soak up chemicals from the hydrothermal vent to feed to the bacteria living inside them. In return, the bacteria make food for the tube worm. (Julie Brown, National Geographic Society)

- The deep sea is a noisy place, recordings of sound in the deepest part of the ocean included whale and dolphin sounds, as well as motor sounds and far off earthquakes. http://www.noaa.gov/seven-miles-deep-ocean-still-noisy-place

- Scientists are just beginning to understand how animals and microorganisms have adapted to the extremely hot, toxic environment of the hydrothermal vents. This information may help them understand how life started on Earth, and whether life on other planets is possible.

- "Some biologists have gone so far as to suggest that a vent-like environment was the place where life on Earth likely got its start. And if such a miracle could have occurred here on Earth, why not on other planets that have the necessary ingredients, including heat, water, and the right mix of chemicals? In the end, there may indeed be a harsher place to live than hydrothermal vents. But again, it hasn't been found. Yet." from Life in the Abyss, by Peter Tyson: http://www.pbs.org/wgbh/nova/nature/life-in-the-abyss.html