

Ocean Floor Mapping

(Activity #25)

Purpose

Create a profile map of a contrived (artificially designed) "ocean floor" and relate the process to ocean floor mapping.

Background

Through the use of various technologies, scientists have been able to create profiles of the oceans' floors. Sonar technology is often used to gather data about the ocean basin. Ships that are used to map the sea floor do so by sending a signal, or energy wave, from a ship's bottom to the ocean floor. A receiver on the ship records the amount of time it takes for the signal to be reflected and travel back to the ship. With knowledge about the velocity of the energy waves the distance to the bottom is calculated and plotted. The process is repeated for many locations until the shape of the structures becomes evident.

How did people tell what the land under water was shaped like before there was sonar technology?

Famous American author Samuel Langhorne Clemens' choice of pseudonym, Mark Twain, was inspired by his experience as a Mississippi River steamboat pilot. The Mississippi River is a notoriously muddy one, and it is generally impossible to assess its depth with the naked eye. The river depth varies, necessitating a method for measuring the distance from the boat bottom to the river bed. For safe navigation, steamboats required a distance of at least twelve feet from the bottom of the boat to the riverbed. To ensure this depth, a crew member would drop a line into the river. If the water passed the two-fathom (twelve foot) mark on the line, the crew member would yell "by the mark, twain!" Not only did this rudimentary technology provide Samuel Clemens with his nom de plume, it formed the early basis for mapping ocean basin topography.

For the better part of human history, sea floor topography has been of little interest. Although the ocean basin makes up 70% of the Earth's crust, little was understood about it prior to the nineteenth century. Most people believed the sea floor to be relatively featureless. What little was known of the ocean floor was the result of leadline measurements, similar to those made by Mark Twain's ilk. A lead-weighted line was dropped from the side of a boat. When the line struck a surface, researchers would note the distance from the ocean surface to the end of the line. A series of measurements was conducted over a small area, which, once aggregated, provided a simple picture of a small area of the ocean basin. A portion of a large ocean ridge known as the global mid-ocean ridge was discovered using this method.