## **Ocean Floor Feature Activity—Background Information**

The Earth is made of solid land. Some of the land is located above Earth's water and some is located below the oceans. However, there are similarities and differences between the landforms found on the continents and those found on the ocean floor.

Continental and Oceanic Landforms		
Description	Continental	Oceanic
Low land between hills or mountains	Valley	Rift
Deep valley with high steep sides	Canyon	Trench
An underwater volcano	Volcano	Seamount
Land which rises high above the ground	Mountain	Ridge
Wide, flat areas of land	Plains	Abyssal plains

Scientist use tools to map or survey the ocean floor. **LIDAR** is an aircraft-based sensor that uses a laser to bounce light off land. LIDAR stands for **LI**ght **D**etection And **R**anging. LIDAR sends laser light from the bottom of an airplane to the sea floor. The light reflects back to the airplane. LIDAR measures the time it takes for the reflections to return to the airplane.

[Left image: <u>http://lms.seos-project.eu/learning\_modules/marinepollution/images/lidar-spill.png;</u> right image: <u>http://walrus.wr.usgs.gov/pacmaps/images/lt-shd.jpg</u>]







**SONAR** systems send sound waves from the bottom of a ship to the bottom of the ocean. These sound waves bounce off the sea floor and back up to the ship. SONAR stands for **SO**und Navigation And Ranging. Two types of mapping the ocean floor are single-beam sonar and multi-beam sonar. [Image: <u>http://www.nauticalcharts.noaa.gov/mcd/images/nNTC\_Hydro.jpg</u>]



Leadline Surveys

Single Beam Echo Sounder Surveys

Multibeam Full Bottom Coverage

*Single-beam SONAR* uses a transceiver (transducer/receiver) mounted to the hull, or sidemount, to the ship and measures the water depth directly beneath the research vessel. The hull-mounted transceiver transmits a high-frequency acoustic pulse in a beam directly downward into the water column. Acoustic energy is reflected off the sea floor beneath the vessel and received at the transceiver. *Multi-beam SONAR* uses a swath out to each side to get full coverage of the ocean floor, with much greater detail than the lines of depth seen by single-beam sonar. [Left image: http://woodshole.er.usgs.gov/pubs/of2006-1008/images/f3\_6.jpg; right image: http://www.racerocks.com/racerock/maps/racerocksplan.jpg]





Education and Research: Testing Hypotheses