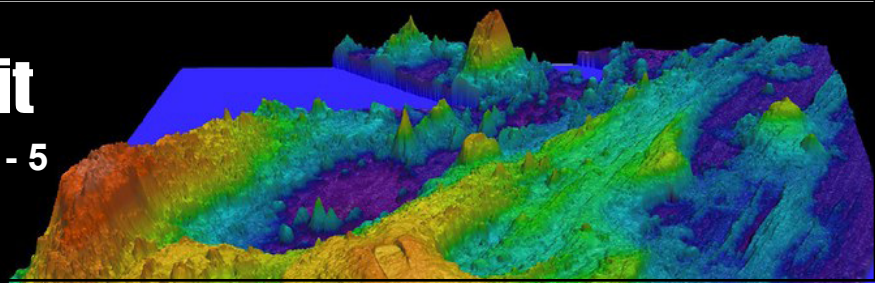
NCEI Educator Toolkit

Bathymetry in Action: Grades 4 - 5
NGSS: 4-ESS2-2, 3-5-ETS1-2



Quick Facts

For reference and incorporation into the Independent Reflection

- Bathymetry is the study of the contour of the land underneath bodies of water and shows variations in the seafloor and lakefloor depth similar to topographic maps on land.
- Early bathymetry was done using a sounding line, which was a long rope marked with a weight at the end.
- More than eighty percent of the ocean floor remains unobserved and unexplored, but the Seabed 2030 Project is a collaborative effort to map 100% of the ocean floor by 2030.
- Mapping the ocean floor can help us understand ocean circulation, how tsunami waves may spread, weather systems, and to ensure safe navigation.

- Bathymetric maps are now made through a combination of bathymetric soundings and satellite altimetry.
- Bathymetric soundings are the reflection of sound-waves off the seafloor similar to how animals use echo-location to navigate a space.
- Satellite altimetry is the measurement of time for a radar pulse to reflect off the ocean floor. The longer it takes for a signal to return, the greater the water depth.

Introduction Demonstration

Support hands-on problem-solving

Setup:

- Have one student shape the playdough into the base of the bread pan without the others seeing and tape the Grid Sheet over the top of the pan with the circles hole-punched.
- Make sure the holes are large enough for a pencil to fit through, but not large enough to see clearly inside the container.

Materials for each small group of 2 - 4 students:

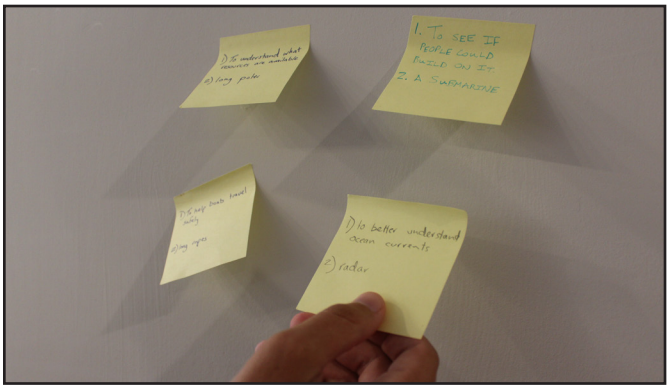
- Metal bread pan or similar-sized container
- Grid sheet with inner circles hole-punched (attached)
- Playdough
- Full-length pencils
- Ruler
- Markers
- Masking tape
- Yarn or thread
- Blank paper

Procedure:

- Give the rest of the group 15 minutes to strategize how to determine the landscape within the bread pan and to collect data without removing the Grid Sheet.
- Each group should have a string, ruler, marker, pencil, and blank paper.
- Have each group present its expectations, how it determined its data collection methods, and then reveal the landscape. Compare and discuss the methods used by each group
- Repeat if time allows.

Independent Reflection

Engage students to make the connection between the demonstration and the real-life scenario



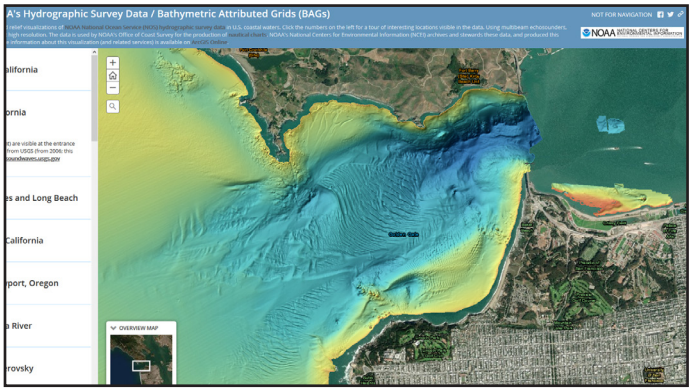
Have students individually answer each of the following question on sticky notes and put all answers on the board underneath the corresponding prompt:

- Why might it be important to know the landscape of the ocean floor?
- How might you measure the depth of a point in the ocean from a boat?

Review answers to the Independant Reflection and connect related information to the Quick Facts.

Extension Options

Additional resources for exploration



Explore NCEI's Story Maps:

- Underwater Frontiers: A Brief History of Seafloor Mapping
- Highlights from NOAA's Hydrographic Survey Data / Bathymetric Attributed Grids (BAGs)

Compare what we know from direct measurement and what we assume about the ocean floor:

- Computer-Generated Surface of the Earth
- Bathymetric Data Viewer

Scaffold up:

- Have the group graph its measurements on graph paper.
- Require the students guessing the landform to create a replica without observation with playdough.

Scaffold down:

- Include an introduction on common sea topography (ridges, trenches, continental slope) and assign the land feature to each student with a visual example before starting the demonstration.

Next Generation Science Standards

Earth's Systems 4-ESS2-2	Engineering Design 3-5-ETS1-2
Analyze and interpret data from maps to describe patterns of Earth's features.	Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.

Additional Resources:

Garrison, Tom. 2008. Enhanced Essentials of Oceanography. 4th ed. Belmont, CA: Thomson Learning, Inc.

NOAA. 2018. How much of the ocean have we explored? National Ocean Service. https://oceanservice.noaa.gov/facts/exploration.html

Grid Sheet