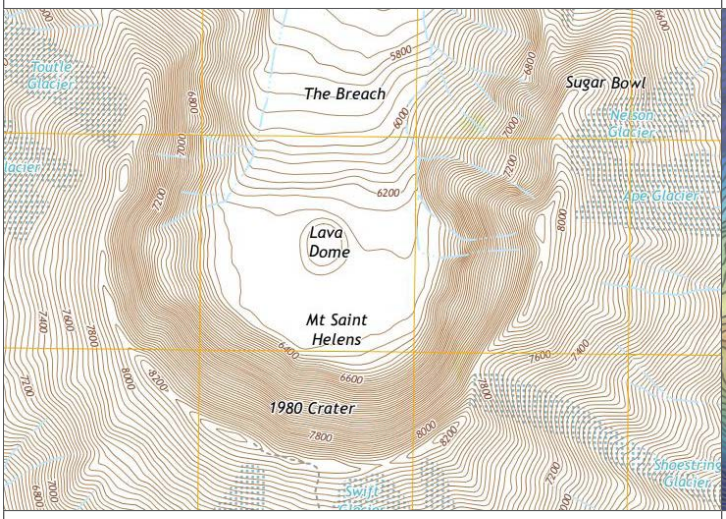
Bathymetric Maps

A map is a flat model of all or part of Earth's surface drawn to a specific scale.

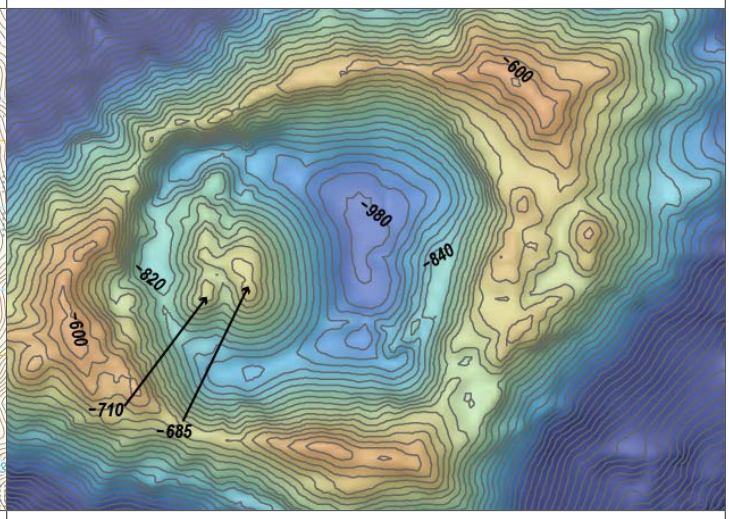
The better maps communicate information, the more effective they are as real-world models.

Topographic maps show the elevation of landforms above sea level.

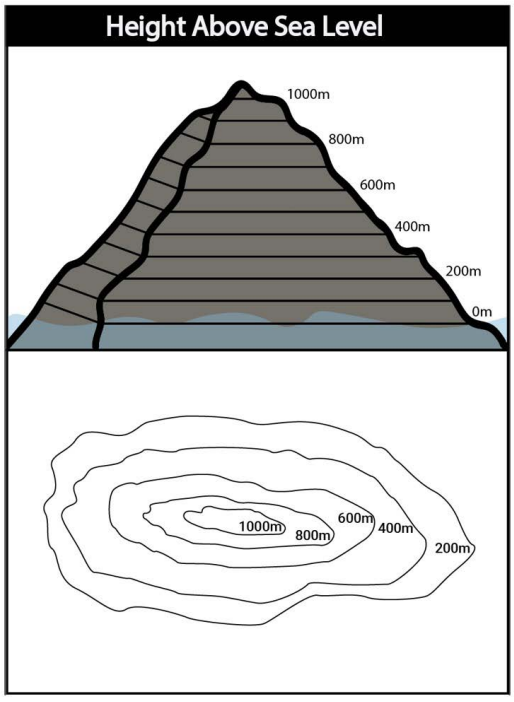


Topographic map of Mt. St. Helens, an active volcano in Washington State. *Image courtesy of USGS.*

Bathymetric maps show depths of landforms below sea level.

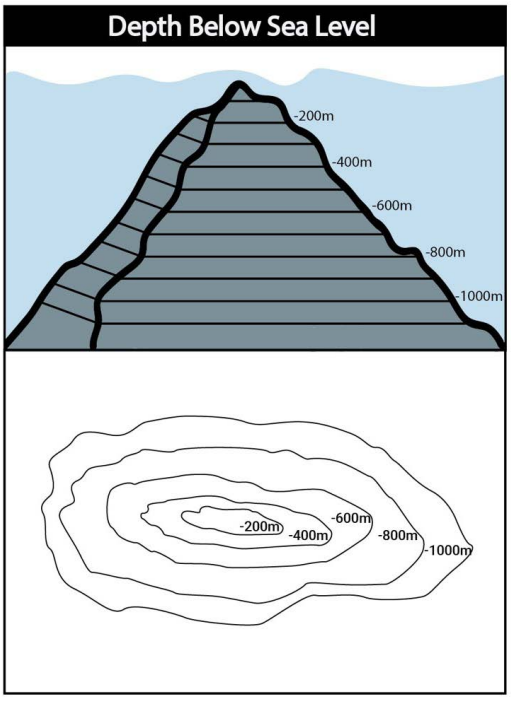


Bathymetric map of Vailulu'u Seamount, an active hotspot volcano in the Samoan archipelago. *Image courtesy of NOAA Ocean Exploration, American Samoa 2017.*



Topographic elevations and bathymetric depths are often shown on maps with **contour lines**. A contour line represents a corresponding imaginary line on the surface of the land or bottom of the ocean that has the same elevation or depth along its entire length.

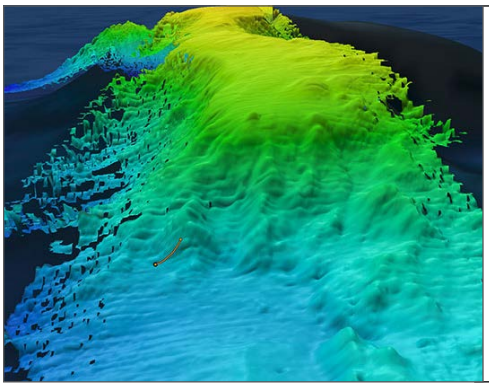
The highest elevation, or peak, of a mountain or seamount is represented by the smallest circle in the center of the contour line rings. On a mountain, the contour lines are labeled with positive numbers showing elevation above sea level. Contour lines on a seamount are negative, showing their depth below sea level.



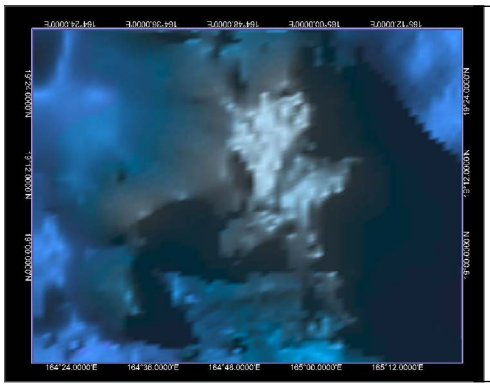
Scale and Resolution

Scale: the size of a map relative to the size of the area it covers. A map of a city is larger in scale compared to a map of a state. A map of one seamount is larger in scale than a map of an entire chain of seamounts.

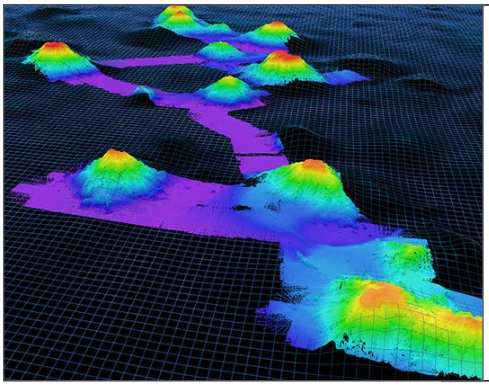
Resolution: the amount of visible detail. Altimeter data collected using satellites has been used to create maps of 100 percent of the ocean bottom, at a resolution of 1.5 kilometers (about one mile). While maps at this resolution give us a general picture of what is on the entire seafloor, they offer limited detail and can miss smaller things like volcanic craters or shipwrecks. Modern, multibeam sonar data is used to create maps at much higher resolution, providing much more detail and increasing the opportunity for discovering new seafloor features.



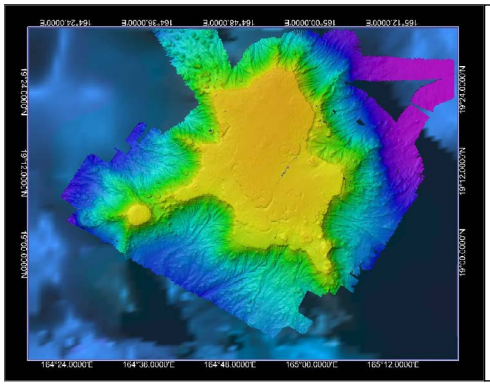
Bathymetric map of Rockaway Seamount. **Distance from left to right is approximately 22 kilometers (13.7 miles).** *This and below image courtesy of NOAA Ocean Exploration, 2021 North Atlantic Stepping Stones: New England and Corner Rise Seamounts.*



Satellite-derived bathymetric map of McDonnell Seamount in the Pacific Ocean (low resolution). *This and below image courtesy of the NOAA Ocean Exploration, Deepwater Wonders of Wake.*

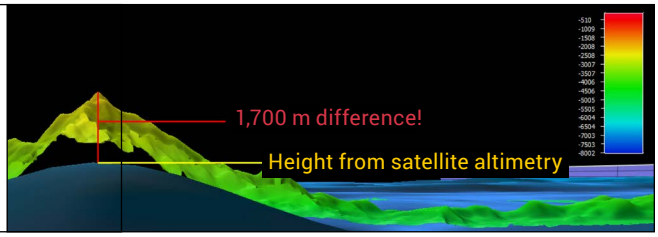


Bathymetric map of New England Seamounts. **Distance from left to right is approximately 160 km (99 miles).**



High-resolution multibeam sonar map of McDonnell Seamount in the Pacific Ocean.

This vertical image, from a multibeam sonar survey in the Pacific Remote Islands Marine National Monument, shows an approximately 1,700 meter seamount height difference when compared to previous satellite altimetry. *Image courtesy of NOAA Ocean Exploration.*



False color mapping: In high-resolution maps the color red is used to indicate the shallowest point, followed by orange, yellow, green, blue and purple, with purple being the deepest. A color scale is selected to best represent the depths across any specific range of data.

High-resolution maps of the seafloor help us to better understand and manage ocean habitats, and to identify possible marine hazards. Even with today's technology, only a small fraction of the ocean floor has been mapped with modern high-resolution technology called multibeam sonar.

More on Seafloor Mapping: Seafloor Mapping storymap

Mt. St. Helens (image): https://archive.oceanexplorer.noaa.gov/edu/materials/topo-St.Helens.jpg
Vailulu'u Seamount (image): https://archive.oceanexplorer.noaa.gov/edu/materials/bathy-vailuluu.jpg
Mountain contour lines (diagrams): https://oceanexplorer.noaa.gov/edu/materials/mtn-above-sealevel-illustration.png
Seamount contour lines (diagrams): https://oceanexplorer.noaa.gov/edu/materials/seamt-below-sea-level-illustration.png
Rockaway Seamount (map): https://archive.oceanexplorer.noaa.gov/okeanos/explorations/ex2104/gallery/welcome.html#cbpi=/okeanos/explorations/ex2104/features/recap-corner-rise/media/dive05-bathy.inc
New England Seamounts (map): https://archive.oceanexplorer.noaa.gov/okeanos/explorations/ex2104/features/mapping/media/bathymetry-hires.jpg
McDonnell Seamount (altimetry map): https://archive.oceanexplorer.noaa.gov/okeanos/explorations/ex1606/logs/aug12/media/fig5a-hires.jpg
McDonnell Seamount (multibeam sonar map): https://archive.oceanexplorer.noaa.gov/okeanos/explorations/ex1606/logs/aug12/media/fig5c-hires.jpg
Seamount in Pacific Remote Islands Marine National Monument (map): http://archive.oceanexplorer.noaa.gov/edu/images/WetMapsImageRev.jpg
Multibeam Sonar (fact sheet): https://oceanexplorer.noaa.gov/edu/materials/multibeam-sonar-fact-sheet.pdf
Seafloor Mapping (storymap): https://archive.oceanexplorer.noaa.gov/world-oceans-day-2015/

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