3D Contour Maps

Background

Contour maps are representations of part of Earth's surface that use contour lines to show either elevation above sea level or depth below sea level. This activity uses a two-dimensional contour map of Brothers volcano, location of IODP Expedition 376, and extrapolates the information into a three-dimensional model.

Summary

Students will learn how to read a contour map of Brothers volcano, and then create a 3D model out of designated supplies.

Florida State Social Studies Standards

SS.6.G.1: Understand how to use maps and other geographic representations, tools, and technology to report information
SS.6.G.1.4: Utilize tools geographers use to study the

Florida State Science Standards

SC.6.N.1.4: Discuss and compare methods used, results obtained, and explanations among groups of students conducting the same investigation
SC.6.N.1.5: Recognize that science involves creativity, not just in designing experiments, but also in creating explanations that fit evidence

Target Audience

Grades 6-7

Time Required

Approximately 60 minutes.

Contents and/or Materials

-copies of contour map of Brothers volcano
-Fine-point markers
-Scissors (or Xacto knife)
-Materials for 3D model: corrugated cardboard, foam sheets, foam board
-Clay
-Paint and/or markers
-Glue

3D Contour Maps

Background:

Contour maps are frequently presented as two-dimensional representations of part of Earth's surface. These maps use *contour lines* to show either elevation above sea level (i.e. mountains & hills) or depth below sea level (i.e. submarine volcanoes & trenches). This activity will focus on a contour map of Brothers volcano, the site of JOIDES Resolution Expedition 376.

A *contour line* is an imaginary line that connects points of the same elevation (or depth of the seafloor). The intervals between the contour lines will be equal on the map, though they may change from one map to another. Contour lines will (most likely) either be labeled with the elevation/depth, or be color-coded.
When looking at the overall map, take a look at the spacing between the contour lines- this will tell you about the slope of the terrain. Contours that are widely spaced indicate gentle slopes (large distances from one elevation/depth to the next); while contours that are closely spaced indicate steep slopes.

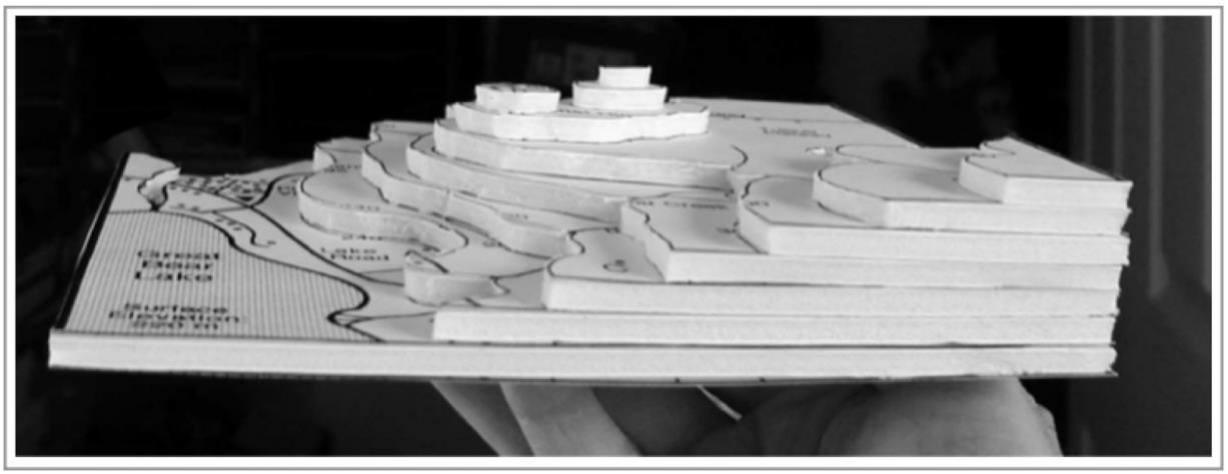
In this lesson, students will learn how to read a contour map of Brothers volcano, and then "translate" the contour mad into a three-dimensional model. Brothers volcano has been extensively mapped, using technology such as satellite altimetry, remotely operated vehicles (ROVs), autonomous underwater vehicles (AUVs), and manned submersibles in order to develop a clear picture of the area.

Materials (per group):

- 2 copies of contour map of Brothers volcano
- fine point markers (for tracing contours)
- scissors or X-acto knife
- materials to construct 3D model: corrugated cardboard, foam craft sheets, foam board
- clay
- paint or markers
- glue

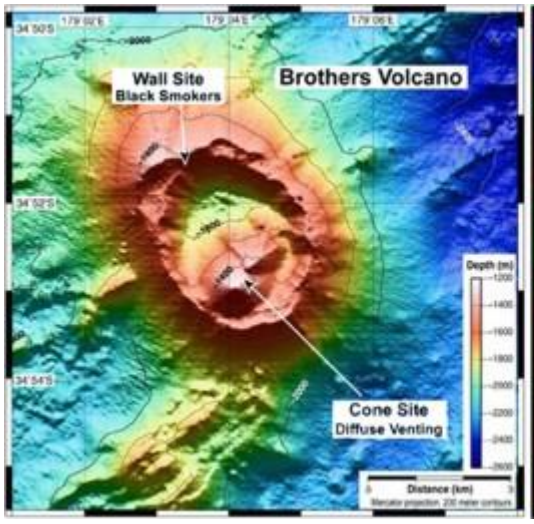
Procedure:

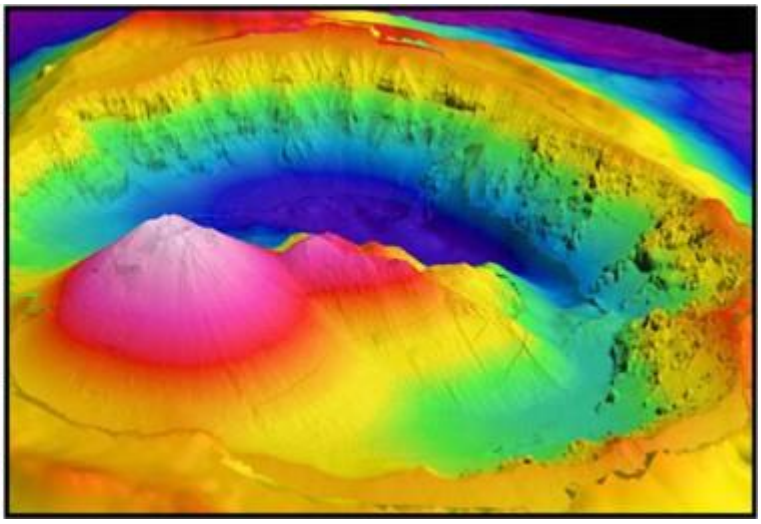
1. Pass out 2 copies of the contour map to each student pair. One map will be cut into pieces, while the other may be used as a reference.
2. Following the 1900 meter depth contour, cut along the contour line on one of the maps. Be sure to follow the curves with as much detail as possible.
3. Lay the piece you just cut onto your foam/cardboard, and trace it using the fine point marker. Be sure you trace as much detail as possible (curves, etc.) onto the foam. Refer back to the intact original map if needed.
4. Cut out this 1900 meter depth figure from the foam/cardboard, and label with the depth.
5. Repeat this process with each contour line (depths of 1800m, 1700m, 1600m, 1500m, 1400m, and 1300m): cutting from the map, tracing onto the foam/cardboard, and cutting the foam/cardboard.
6. Using the intact Brothers volcano map as a guide, stack and glue the cut pieces into layers, from the deepest to most shallow points.

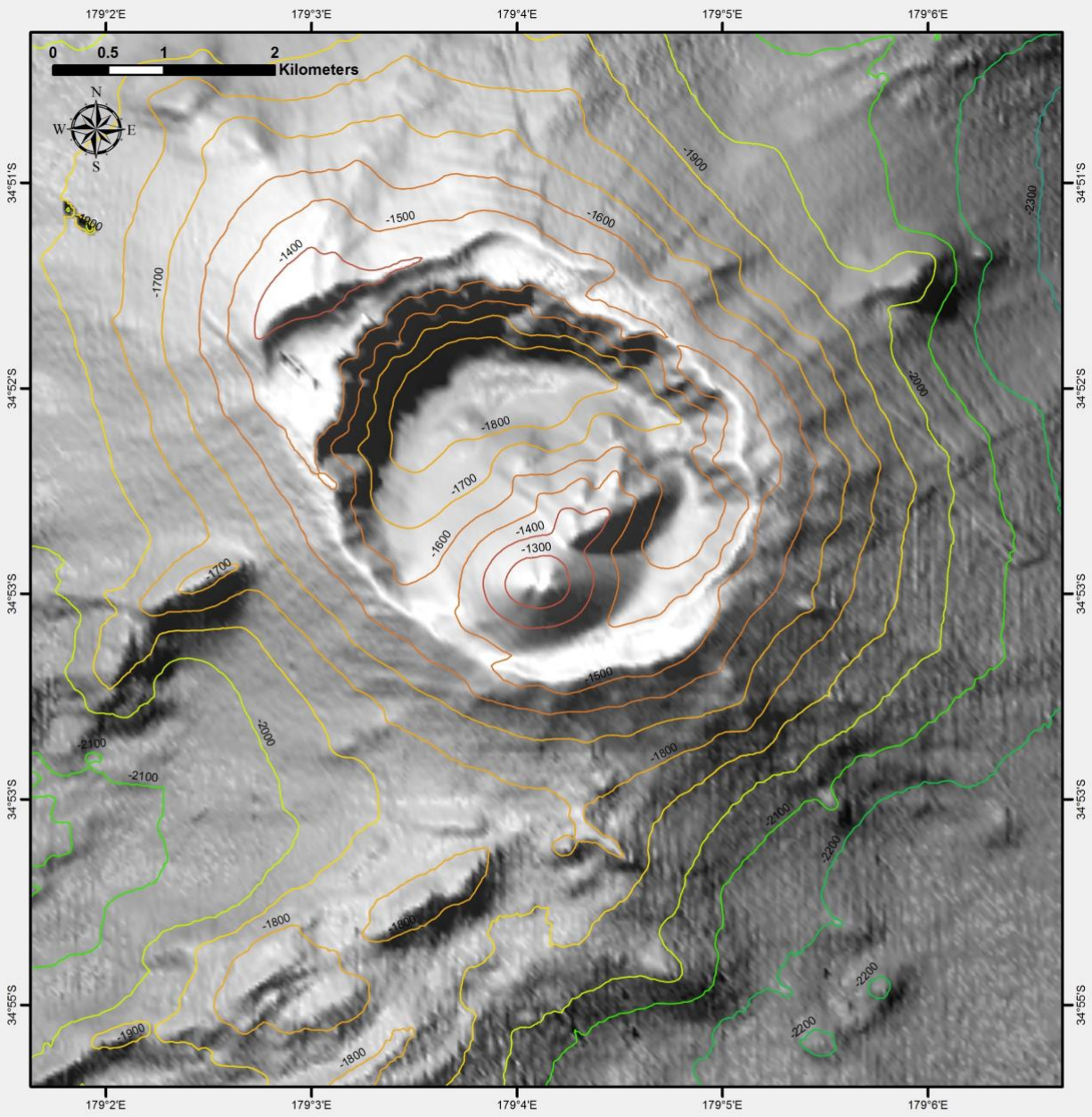


Possible Discussion Questions:

1. Compare your 3D model to other models- how do they stack up? What might account for the differences?
2. If lava erupted out of the upper cone site (1300 meters depth), what direction do you think the lava would flow down the sides of the cone? Why?
3. What side of Brothers volcano has the steepest slope? What's your evidence?
4. Brothers volcano is characterized by a high rim surrounding a depressed area called a *caldera*. How do you think the caldera & rim formed? Watch this video from Karen Strehlow, a volcanologist on Expedition 376, for a demonstration of caldera formation.



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