

Lesson Overview

The Island (Geology overview)



Objective

Students will create an island, that is randomly placed on a plate boundary somewhere on Earth. They will have to create the landforms on the island based upon what type of plate boundary that the island is placed. They will also need to create a topographic map of their island and what the future of the island will look like in 100,000 and 1 million years, based on weathering and erosion.

Overview

Students will first have their island placed on a map of Earth at one of many locations along various plate boundaries. The teacher should choose a dozen or so places around Earth that represent a variety of the three types of plate boundary: convergent, divergent and transform. Then students will create their island based on the type of boundary that it is located on. They will then create a 2-D and 3-D topographic map of their island.

Suggestions

It is suggested that students have completed the investigation “discovering plate boundaries” from Rice University. I have added to this investigation a fourth map that shows plate motion so students can determine what the various boundaries are around Earth. You can find an example of that here. I also use the same map as the map where students can see the possible location for their island. This map matches the “student map” located in the resources of the Rice University investigation.

Materials

Map of Earth with plate boundaries and locations for islands

Butcher paper for students to create maps

Materials (either plywood, cardboard or foam) for students to make 3-D topographic maps

Glue for cardboard, foam or plywood

Colored pencils/markers

Procedures

- Introduce the project
 - Have a theme (mine is that there has been the development of a device that can create whole islands for humans to deposit more people, livestock or fields)
 - Create groups for students to work in
 - Create students jobs
 - Team Lead
 - Materials Manager
 - Cartographer
 - Notetaker
 - Create a list of what they already know (from a pre-test) and what they need to know. The need to know list should include the following:
 - Convergent boundary and the landforms it creates
 - Divergent boundary and the landforms it creates
 - Transform boundary and the landforms it creates
 - Topographic map
 - Contour line, contour interval and index contour

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- How the proximity of contour lines on a topographic map changes the slope of the land
 - Satellite imagery and what it is used for
 - Weathering, erosion and deposition and how it changes landforms
- Students must first research the types of plate boundaries to collect information that would be vital to the design of their island, depending on their island's location. This should be done as a research day and be noted under "knows" and "need to know"
 - Have the students randomly pick one of the locations on the map (this can be done through online randomizer sites like "Wheel Decide")
 - Students will then start designing their island according to the information that they collected about plate boundaries. They need to decide on the size of the island, its shape and what landforms are present due to the plate boundary upon which it is located. This can be created as a simple outline and then the placement of mountains, volcanoes and other landforms as either map symbols or pictorial representations. This map will be the basis upon which their topographic map will be created.
 - Once students have an initial design of the size, shape and various landforms on their island, they will proceed to start making a topographic map of their island. Students will need to create a minimum of the following parameters:
 - Have the contour interval and a key for identifying major map features
 - Have at least three index contours
 - A minimum of two mountains
 - A minimum of two river valleys
 - A railroad track
 - A small town
 - 5 roads
 - Two more of any map symbol from [topzone](#)

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- Now that the students have created their topographic map, they will need to build a 3-D version of it.
 - For this, either plywood, foam or cardboard can be used
 - Starting from the lowest elevation, students should cut out a each contour line from the material, stacking them so that they form the terrain that it described by the contour lines on the map
 - Students should then compare and analyze the 2-D and 3-D maps to determine where are the steepest parts, where are the flattest parts and where water would flow
 - Students must then predict what their landforms on their island would look like in 500,000 years, 1 million years and 10 million years, based upon what they know about weathering and erosion.

Extensions (or extra credit if done well :)

Here are additional, cross-curricular components that you can add

- Have students create a political map of the island. Is it a country? A state? What would the flag look like? Are there smaller representative bodies (like states, counties)? What type of government is in place? What does the 2020 census look like for this island?
- Create a travel brochure/website for the island. What type of attractions does it have? National parks? Vacation rentals? White sandy beaches or snow covered mountains?

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- Create a map with more detailed landforms. Maybe the island has a myriad of various landforms. There could be canyons, glaciated valleys, hoodoos, mesa, butte, plateau, inlet, sound, cape, delta, sand dunes or a lake.
 - Create a map that you would see on ARCGIS. This could be a map that highlights vegetation, populations, growth, deforestation, urban sprawl.
 - A poem written about the island and its inhabitants?
 - Write a manifesto of the islands inhabitants and what they foresee the future being like.

Conclusions

For this part of the project, students must create a conclusion display that will tie together their map, model and relevant information about their model. Here is a suggested outline of what should be part of their display.

- The display should include the map of the island and the 3-D topographic map.
- Its size should be no greater than the two items mentioned above.
- Students should use some type of 3-D formatting to explain the various parts of their island and the conclusions that follow
- The students should identify the steepest and flattest part of their island
- Students should identify key objects that include: mountain, valley, river
- Students should compare their island and how it was formed and how it would be different if it was formed on a different plate boundary from the one they received
- Students should describe how they think their island will look in 100,000 years and 1 million years, based on their understanding of weathering, erosion and deposition

