SEA-FLOOR EXPLORATION
Google Earth Exploration

Introduction:
During this WebQuest you will take on the role of an oceanographer as you travel the Earth’s oceans making observations about the shape of the sea floor. As you explore, you will use Google Earth tools to trace paths along certain ocean floor features. You will then compare the ages and magnetic properties of the rocks that make up the ocean floor. After exploring the oceans you will draw conclusions about the driving force of tectonic plate movement.

Launching Instructions:
1. Go to the science shared folder on Google Drive.

2. Open the Earth Science folder. Next, open the Google Earth folder. Locate the Google Earth file named Sea-Floor Exploration and open it. This file will open in the desktop version of Google Earth.

3. Click on Tools in the Google Earth tool bar. Select Options. On the 3D view tab find Units of Measure and select Meters, Kilometers. Find Terrain and set the Elevation Exaggeration to 2.

4. Click Apply then OK.

Folder 1 – Sea Floor Features

Instructions:
1. Click on the radio button (the square-shaped, white button) next to Inv 2: Sea Floor Spreading. Open and read the Introduction placemark balloon. Then close the balloon.

2. Expand Folder 1: Sea Floor Features. The arrow (or plus sign) expands the folder. Open and read the Description placemark balloon. Then close the balloon and examine the Atlantic Ocean sea floor to see the features described in the balloon.

3. Open the Transect overlay (in the Places panel) to see a transect line that has been drawn across the South Atlantic Ocean. Right click on Transect in the Places panel and click on Show Elevation Profile. Examine the elevation profile. Sketch the elevation profile in the space provided in your field journal. Label the features identified in your field journal.

4. Open the “My Seafloor Features” folder. Use your path tool to trace the scar-like feature as far as you can across the globe. One has already been started for you (click the check box next to Mid-Atlantic Ridge to see a white line between N. America and Africa). THE INSTRUCTOR WILL PROVIDE VERBAL INSTRUCTIONS FOR HOW TO USE THE PATH TOOL. If it branches, add another path to follow that branch. Look carefully for other similar features elsewhere on the globe and add paths for each one. Make all of your paths white with a width of 5.0. Save your paths in your “My Sea Floor Features” folder.

*Hint: Some of these features are very faint! You will need to make multiple paths.

5. Once you are done making all of your paths, sketch the scar-like feature that runs between North and South America and Africa in your Student Field Journal. Include any other prominent “scars” you drew a path for.

6. Answer observation questions #1 - #5
Folder 2 – Undersea Volcanoes

Instructions:
You just mapped what is called the mid-ocean ridge system. The mid-ocean ridges are the most extensive mountain ranges on Earth. Most of them are far below the ocean surface. But in a few spots, such as Iceland, they reach the surface.

1. You will now watch a short video clip of an underwater eruption. Jot down observations from the video in the space provided and be prepared to discuss your observations with the class.

2. Find and click on the yellow pin called Mid-ocean Ridges in the Places menu. A web page will open. Read the information about Mid-Ocean Ridges.

3. Answer the observation questions.

Folder 3 – Seafloor Age

Instructions:
1. Expand Folder 3: The Hypothesis and click on the radio button. Open the Description placemark balloon and read the information.

2. Go back to Folder 1 (Sea Floor features). Click on your My Sea Floor Features folder and drag and drop it into the Evidence folder in Folder 3: The Hypothesis. Turn this folder on so that the ocean-ridges you traced appear. Click the white check box next to Sea Floor Age.

3. Examine the overlays to see how sea floor age relates to the mid-ocean ridges. Use the legend to see what the colors mean.

4. On the elevation profile you drew for Folder 1, label where the youngest rocks could be found and where the oldest ocean rocks could be found. Do this on BOTH SIDES of the mid ocean ridge.

4. Click on the Paleomagnetism check box and open the link in Google Earth. Read the article titled Paving the Sea Floor – Brick by Brick.

5. Use your observations to answer the Investigation question.
Folder 1 – Sea Floor Features

Elevation Profile of S. America – Africa Transect Line

*Be sure to include the following labels on your diagram: S. America, Africa, the elevation of the S. American coast (in meters), the elevation of the African coast (in meters), the elevation of any underwater features of interest, label the youngest section of ocean floor, label the oldest section of ocean floor

Scar-like Features (Between North & South America, and Africa; any other prominent “scars”)
Observation Questions
1. Is the scar-like feature in the middle of the sea floor a ridge or a trench? What is the difference between a ridge and a trench?

2. Where are the scar-like features located within the oceans?

3. Are the scar-like features located between continents that have moved apart? Which continents?

4. Which landmasses are completely surrounded by the scar-like features?

5. The scar-like features are in certain places in the ocean. You were able to connect many of them. Look at your map above. What do you think the scars show? (Make a prediction! It is okay if you don’t know with absolute certainty what the scars actually are. Make an educated guess.)

Folder 2 – Undersea Volcanoes
Video Observations:

Observation Questions
1. Define: Mid-ocean ridge

2. Why do mid-ocean ridges form? At what type of tectonic plate boundary do mid-ocean ridges form?

3. Where does most volcanic activity on Earth occur?

4. What is formed at mid-ocean ridges?
Folder 3 – Seafloor Age

1. How can Earth’s magnetic field help us determine how old a rock is?

2. Where is the youngest sea floor found in relation to the mid-ocean ridges you mapped?

3. Where is the oldest sea floor found in relation to the mid-ocean ridges you mapped?

4. What are magnetic “zebra stripes”? What do black stripes represent? What do white stripes represent?

5. Why are magnetic “zebra stripes” on either side of a mid-ocean ridge symmetrical?

6. How does the map of sea floor age support the sea floor spreading hypothesis?