NSF GK-12 Graduate Fellows Program
Award # DGE-0139171
University of North Carolina at Wilmington

Modeling Earthquake Data

Activity Instructions

Adapted from http://www.geosociety.org/educate/LessonPlans/RealEvidence-SubductingPlate.pdf

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Earthquake Data Activity

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Objectives:
- 3.02 Evaluate evolutionary theories and processes: Geological
- 3.03 Examine evidence that the movement of continents has had significant global impact: Major geological events
- 3.04 Evaluate the forces which shape the lithosphere: Earthquakes

Time required: Two 50-minute class periods

Materials needed: (per team)
- Posterboard with lat/long map either photocopied or glued on
- Table of earthquake data
- 22 beads of 3 different colors
- Small pieces of tape
- Heavy thread/string
- cm ruler
- Heavy needle to poke holes through posterboard
- Pen/marker to mark string

Procedure: Students should work in groups of 3-4, with each team having a different regional map and earthquake data table, as well as the materials listed above.

1. Students should plot each earthquake epicenter on their map using the latitude and longitude coordinates, and label each point with its corresponding number.
2. To "plot" the focus of each epicenter, beads of different colors will be used to represent different depths (white = 0-99km; yellow = 100-299km; red = >299km). Alternately, the different color beads may represent different magnitudes.
3. For the first data point, an appropriately colored bead should be tied to the end of a piece of string. The string should then be measured from the bead to the correct depth (as listed in the table of earthquake data), using a scale of 1cm = 50km., and marked with pen. It should be cut several cm longer than the mark.
4. A hole should then be punched through the corresponding epicenter point marked on the map. The string with the bead should be threaded up through the hole until the pen mark is reached, then the loose end of the string should be taped to the side of the map so that the pen mark is at the posterboard hole.
5. All remaining data points should be plotted both two-dimensionally (lat/long) and three-dimensionally (with bead and string) following the procedure as above. When all points have been plotted, students should present the results of their region to the class, and comparisons should be made. Students should then answer follow-up questions.

Follow-up questions:

1. What information does an epicenter provide about an earthquake?

2. What is the difference between the focus and the epicenter of an earthquake?

3. What is happening at the focus of an earthquake?

4. How does the depth of the focus of the earthquakes you plotted change with longitude?

5. According to your model, what appears to be happening to the two plates that meet, causing all the earthquakes?

6. What type of plate boundary do you think is shown by your data?

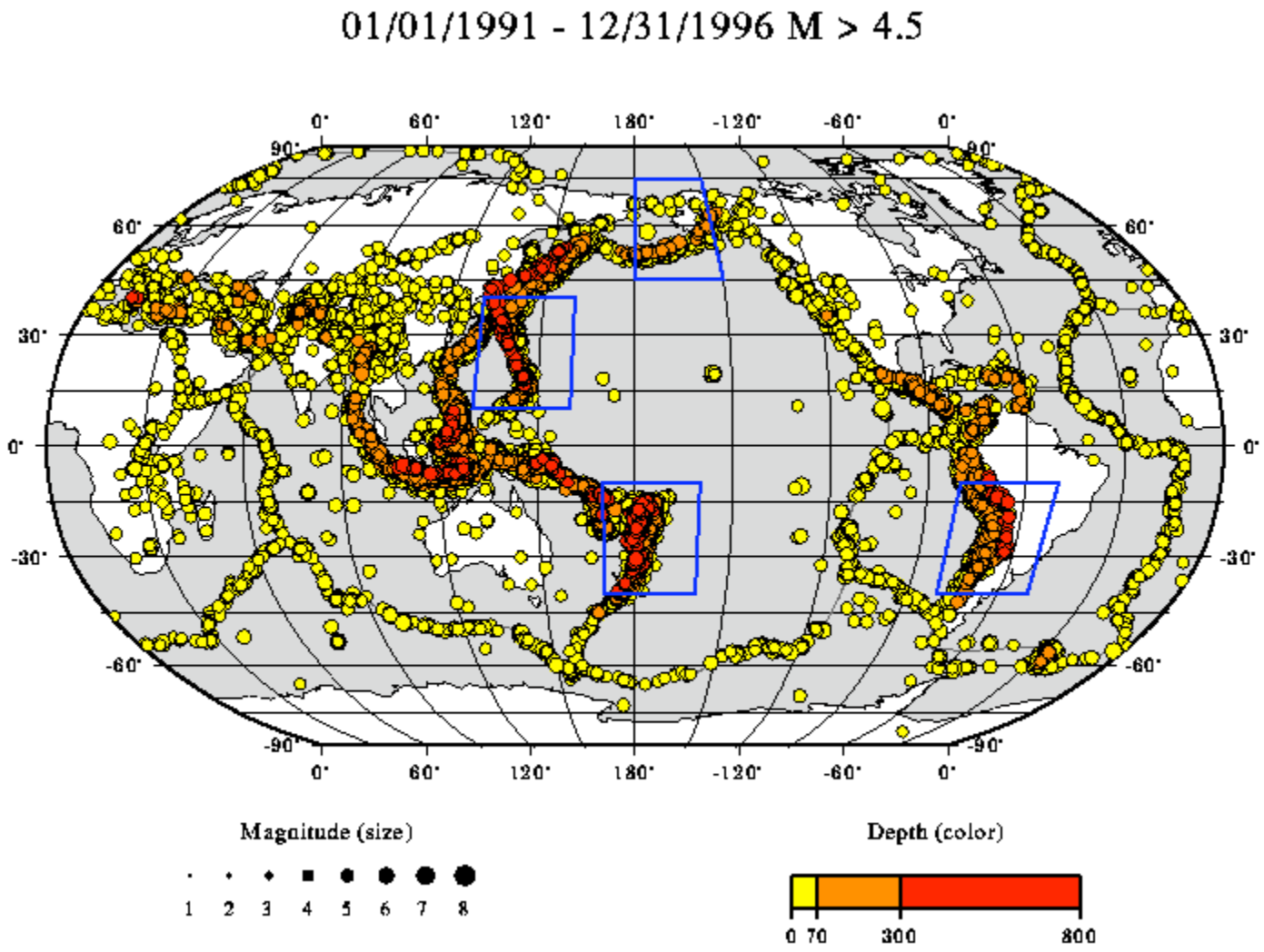
7. Draw and label a diagram showing what is happening to the two plates, as you described it in question 5.

This map of world seismicity illustrates 5 years of earthquakes. Most of the plate boundaries are illuminated, along with diffuse regions of seismicity, such as in central Asia. This Web page is designed to provide some sense of the depth distribution of earthquakes. in this figure, the different colors indicate the different depths at which these earthquakes have occurred:

- 0 - 70 km: **yellow**
- 71 - 300 km: **orange**
- 300 - 800 km: **red**

You can see the distribution of these earthquakes with depth at any of the regions marked in blue. Either click in the box or see the table below.

For each figure, a close-up view of the particular region is provided. The area of the cross-section is marked in green, with the end points **a** and **b** identified. Below the map view is the cross-section plot. These figures plot the depth of the earthquake along the projected line. The final figure is a histogram of the number of earthquakes as a function of depth from the cross section.



South America lat/long map can be printed in pdf format from:
http://www.geosociety.org/educate/LessonPlans/RealEvidence-SubductingPlate.pdf