

The Big Picture: Tectonics, Time and Tierra del Fuego

- I. World Wind Sets the Stage: A virtual fieldtrip to anywhere in the world (15 minutes)
- II. Plate Tectonics Game; Global/Tierra del Fuego tectonic maps (1 hour)
- III. Human Geologic Timescale (scaled model showing the geologic time scale and major events in Earth's past) (outside --- 30 minutes)
- IV. Scales in Science: internet research, Group project: Student derived scaled model, which could be the timescale, or the Earth's layers, or any other system that they can think of; Students will work in groups of 2 or 3 to come up with a creative way to showing the immense time or distance encompassed by their geologic system (stack of paper, nickels stacked on top of each other, food, etc). (30 minutes)
- V. Human Earthquake Wave activity (outside --- 30 minutes)
- VI. Computer Tutorial (a crash course --- students can explore, do activities on own time, if desired)
 - a. Seismic Wave Software Intro/Tutorial (15 minutes)
 - b. Seismic Eruption Software Intro/Tutorial (30 minutes)
 - c. Jules Verne Voyager Mapping Activity (30 minutes)
- VII. Summary of Tierra del Fuego Geology
- VIII. ArcGIS and the LandSat Imagery of the Lago Fagnano Region (1 hour)

Seismic Eruption:

What sort of pattern does earthquake distribution exhibit 1) Globally, 2) on the seafloor, and 3) along some continental margins? Be descriptive. Draw a picture, if desired.

Select two locations on earth that would consider visiting. Compare the earthquake size, magnitude, recurrence interval (amount of time elapsed between subsequent events of equal magnitude) at those locations. Would this change your plans to visit there?

You have been assigned the task of assessing the hazard posed by seismic events in a particular location. What information would you want to gather before making an assessment?

Play around with the program. Check out the options for 3D mapping of earthquakes. Think about the 3D array of earthquakes along different plate boundaries and what it means for the ideas of plate tectonics.

Seismic Waves:

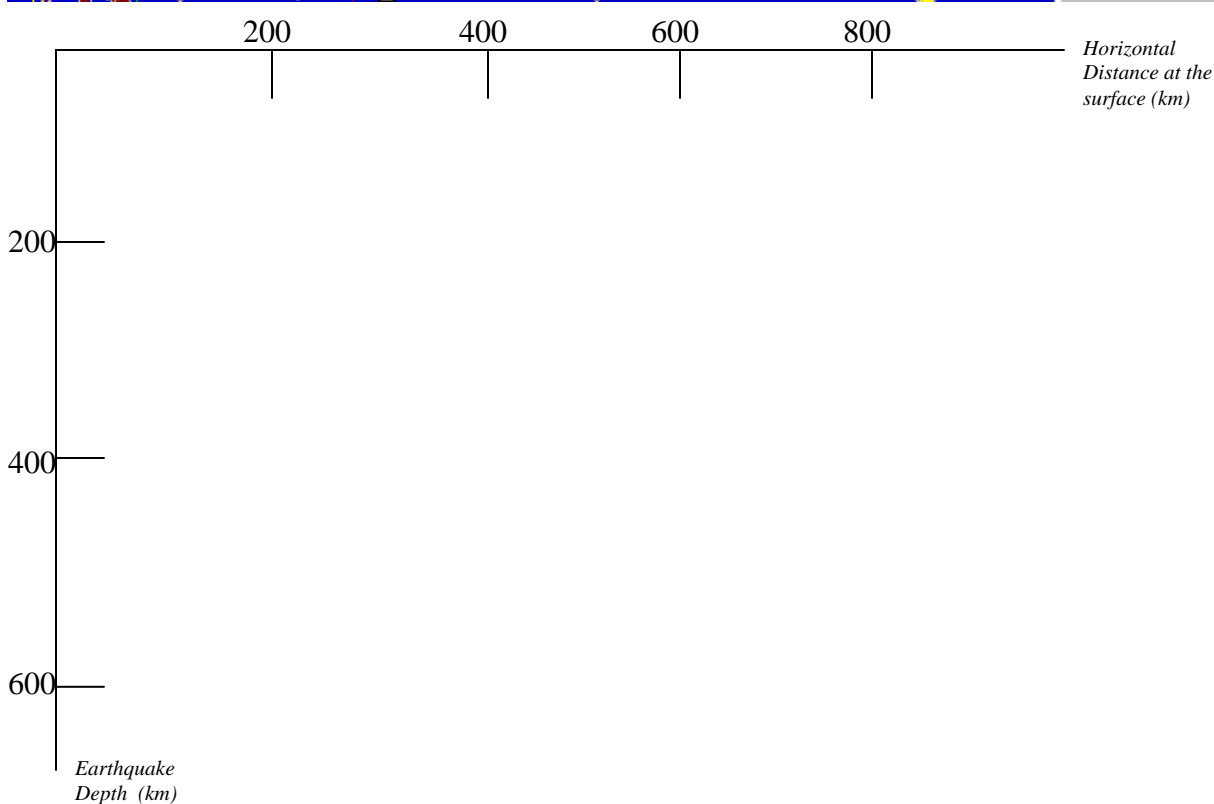
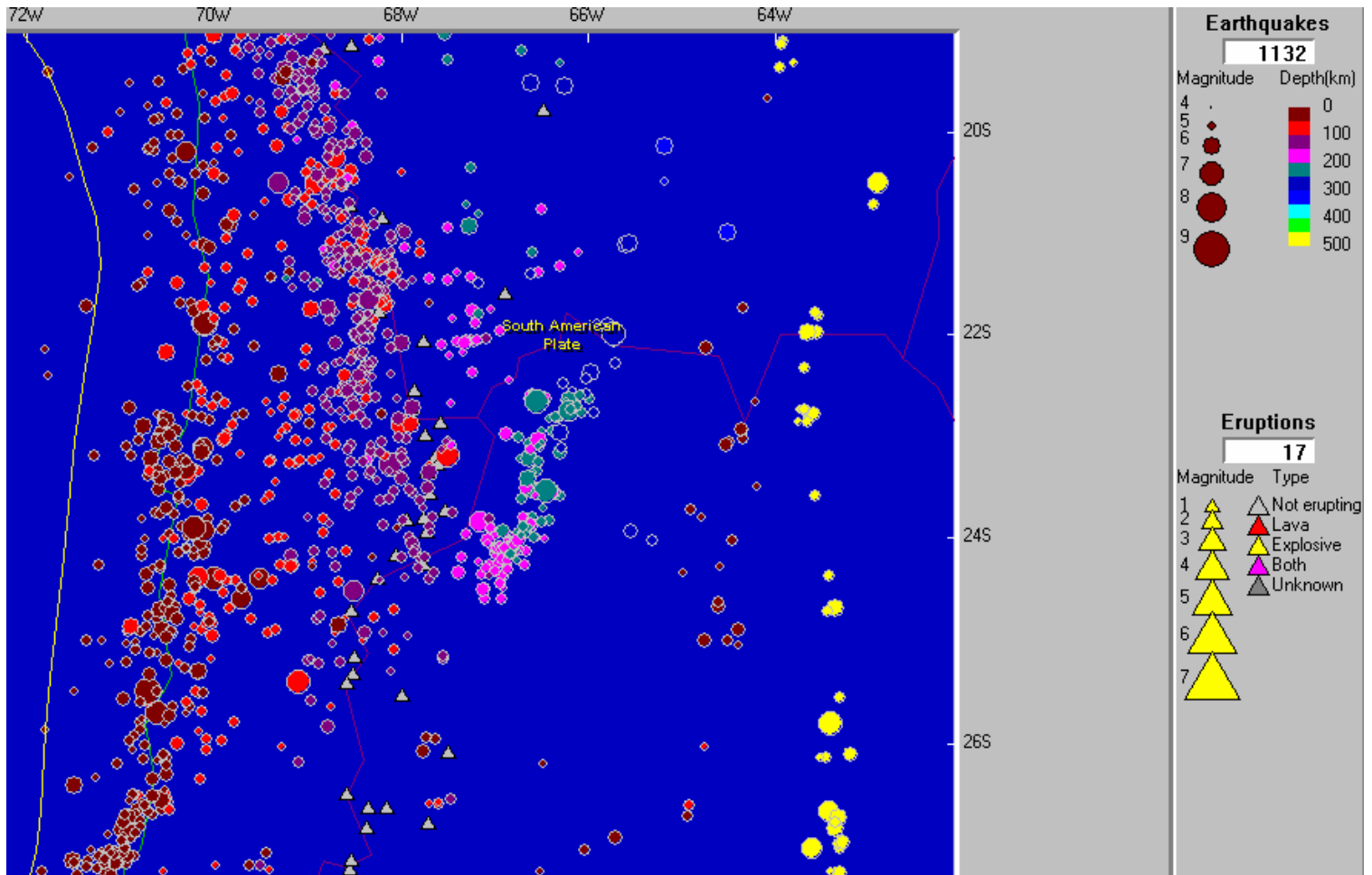
Looking at the cross-section of the Earth, what are the main types of seismic waves? Do they propagate through the Earth at the same rate? Rank the wave types by their relative speed.

Identify the amount of time required for the different earthquake wave types produced by the Indonesian earthquake to reach Diego Garcia. Identify the amount of time required for the same waves to reach Alaska. Thinking about the equation $\text{Distance} / \text{Time} = \text{Velocity}$, what do the arrival times of these waves tell us about the interior of the Earth?

We are only seeing what happens in 2-dimensions on the computer screen. Think about what is occurring in the third dimension.

Play around with the program. It is cool.

Earthquakes, Volcanoes, and Plate Tectonics



Create a cross-section of the Pacific Margin of South America

1. Select a line through the Andes Mountains; draw it on the map with a ruler
2. You do not have to plot all the earthquakes. Simply pick an earthquake from the map, draw a vertical line down to the cross-section, and place the color coded point at the appropriate depth. See example.
3. Think about possible causes for the earthquake v. depth relationship, the earthquake size v. depth. Looking at the World Map, can you see any other localities where a similar process might be occurring?