

Use a laptop to view recent earthquake information at:

<https://earthquake.usgs.gov/earthquakes/map/>

Take a few minutes to explore the site, and then answer the following questions.

On this map, what do the size and color of the circles represent?

What are the red lines?

Describe the relationship between earthquake locations and the red lines, and come up with an explanation for the relationship.

Now let's investigate how we can use measurements of earthquakes to determine the structure of the Earth. An earthquake occurs when two neighboring plates experience friction and then slippage while shifting. When the friction holding the surfaces together is finally overcome, the plates rapidly slip against each other, causing an earthquake. After an earthquake occurs, waves propagate out from the point of friction. These waves are what we experience as earthquakes. Step through the animations here for a visual representation: <http://news.bbc.co.uk/2/hi/4126809.stm>

The waves do not only travel along the surface of the Earth, though. The figure below shows how earthquakes travel through the interior of the Earth. The speed and strength of

these waves are determined by the type of material they are traveling through. Think about dropping a rock in a pool filled with water and one filled with jello. Both would produce waves in the pool, but the waves produced in the water-filled pool would travel further and faster than the waves in the jello-filled pool. Measuring the time between detection of earthquakes at different locations as well as the strength of the earthquake at those locations allows seismologists to determine some properties of the interior structure of the earth.

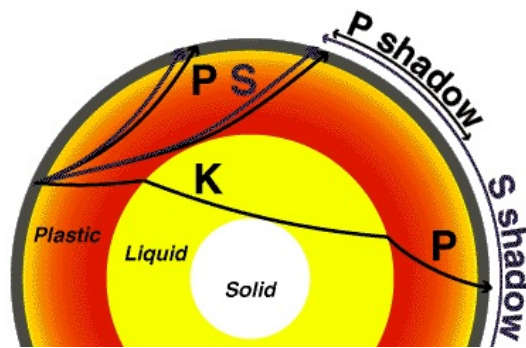
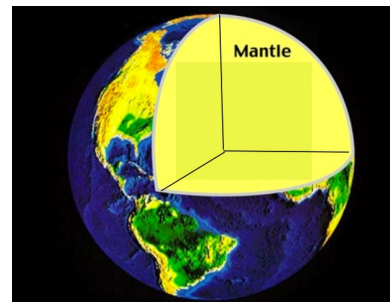
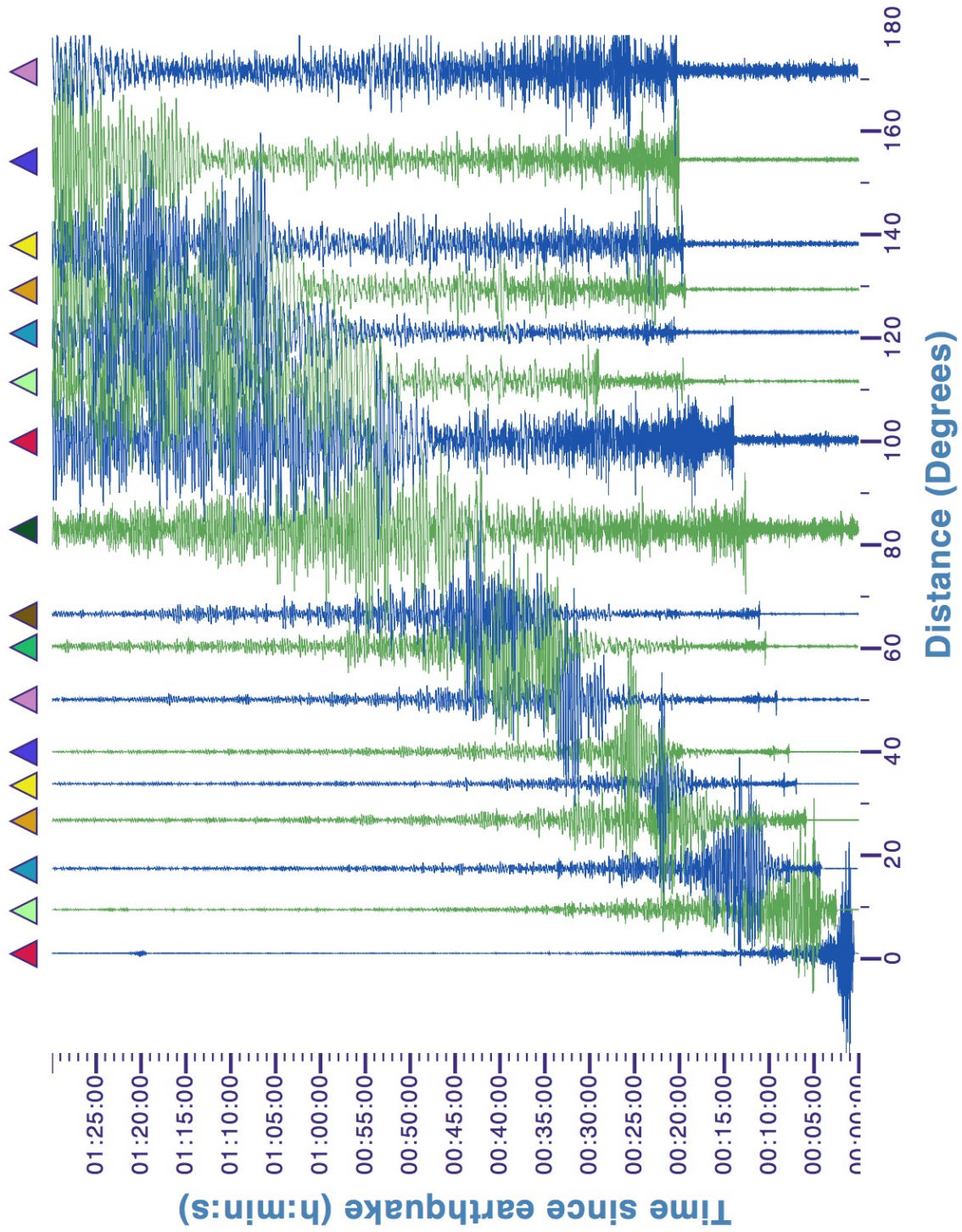


Fig. 1.— Model of how earthquakes travel through the interior of the earth

Within your group, discuss what you would expect if the Earth had no differentiated layers and was perfectly uniform throughout its volume.



Now let's see if this matches what we see with actual data. Below are the data from several seismographs located around the Earth after the Haiti 2010 earthquake. Do your best to determine the time when the earthquake reached each location and plot that on the graph on the following page. Does this graph match a uniform-Earth model? Why or why not?



Sample record section: Seismograms generated from the 2010 Haiti earthquake taken from 17 seismic stations at increasing distance from the hypocenter.

