



Worksheet

Visualizing Relationships between Earthquakes, Volcanoes, and Plate Boundaries

Part I: Comparing earthquake and volcano locations

You will need:

- Internet access (Mac and PC-compatible) or the map packet
- Dry erase pens and transparency paper with map of Western U.S. **OR** color pencils

Instructions

Break into teams of two. In your teams, designate one person to study the Earthquake map and one person to study the Volcano map. Separately study your designated map and answer the questions below.

Follow the computer instructions on how to use EarthScope Voyager Jr. or study the maps showing Earthquakes and Volcanoes of the Western United States provided from the map packet.

Earthquake Map Questions: Study where earthquakes are and are not located.

Sketch the approximate locations of several earthquake "clusters" using a dry erase pen on the **map of the western United States** printed on a transparency or from the last page of the worksheet.

Q: How are earthquakes distributed? If there is a pattern, how would you describe it? Where are there no earthquakes? Are they located near the edges of the continents, mid-continent, in the ocean?

Q: At what depth do the earthquakes occur?

Volcano Map Questions Study where volcanoes are and are not located.

Sketch the approximate locations of several volcanoes using a dry erase pen on the **map of the western United States** printed on a transparency or from the last page of the worksheet.

Q: How are volcanoes distributed? Where are there no volcanoes? Are they located near the edges of the continents, mid-continent, in the ocean?

Q: If there is a pattern, how would you describe it?

What are some of the magnitudes of vectors in the Pacific Northwest and in southern California? What direction(s) do the vectors point in the Pacific Northwest and California?

How does the magnitude of plate movement vary in the Pacific Northwest compared to California?

How does the magnitude change from the coast of California to further in land?

Describe how the direction of plate movement varies in the Pacific Northwest compared to California.

What do you think is happening in these regions to cause these differences?

Part III: Locating Plate Boundaries

Draw on the western United States map where you believe plate boundaries are located (think about the clusters of earthquakes, volcano locations, and plate velocity vectors). Use different color pens for each type of plate boundary.

Now take a look at the plate boundaries following the computer instructions or the plate boundary map in the map packet. Compare the plate boundaries that you drew on your map to the plate boundaries in the EarthScope Voyager Jr. tool.

Complete the table below for each of the three types of plate boundaries. As an example, a portion of the table has been completed for you.

Boundary Type	Color you used	Color of boundary on map according to legend	Is this type of boundary present? (yes/no)	If yes, location of boundary
Convergent		Dark blue	Yes	
Divergent				
Transform				

What boundaries were you able to locate?

How are your boundaries similar to or different from the map?

Why do you think you could locate some plate boundaries and not others?

Based on your data, which plate boundaries should be shown as a line or a zone? Why?

How would you characterize the plate boundaries along the West Coast? How do they change?

More questions to think about

- Why does volcanism occur at subduction zones but not at transform boundaries?

- Relative to the location of the plate boundary, what do you notice about the locations of earthquakes/volcanoes at a subduction zone relative to a transform boundary?

- Do you observe a relationship between topographic features and plate boundaries?

- Do the patterns that you observed in the western United States occur worldwide? How would you find out the answer?