1. What is the association between tectonic plate boundaries and volcanism? Can the eruptive style and the chemical composition of the volcanic deposits or the rock type be correlated with the type of plate boundaries (convergent versus divergent)?

More than 90% of the world's volcanic activity occurs at plate boundaries, and the type of activity can be related to the type of boundary. Free-flowing basaltic lavas appear at divergent boundaries; andesitic and rhyolitic lavas generally erupt violently at convergent boundaries.

2. What kinds of forces result in earthquake-producing faults occur at the three types of plate boundaries?

Earthquakes that occur along mid-oceanic ridges result from tension; those along transform boundaries are produced by shearing; and those along convergent boundaries are caused by compression.

3. At what depth do earthquakes form at the three types of plate boundaries?

Most major earthquakes occur along plate boundaries. Shallow-focus earthquakes tend to occur at divergent and transform boundaries. Deep-focus earthquakes occur at convergent boundaries. Several shallow-focus earthquakes occur each year at locations that are not associated with plate boundaries.

4. At a place along a boundary fault between the Nazca Plate and the South American Plate, the relative plate motion is 8 cm/year. The last great earthquake, in 1880, showed a fault slip or displacement of 12 m. When should local residence begin to worry about another great earthquake?

With a relative motion of 80 mm per year, the total motion will be about 8 m in 100 years (or 80 m in 1000 years). This is not that close to the 12 m of slip that occurred in 1880 and more than 100 years have passed since that time. They might be more concerned in 2025 when the total motion may be nearer 12 m.