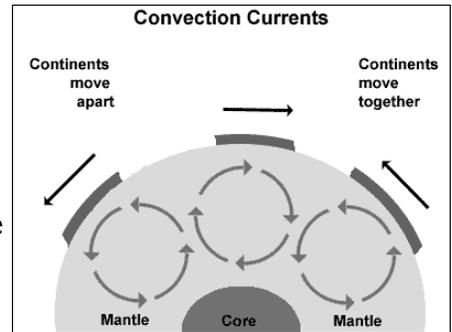


Motion of the Hawaiian Islands

The Earth's crust is broken into large sections called **plates**. Just below the crust, the partially-melted rock of the mantle flows around in slow but huge convection currents. As the rock of the mantle moves around, it carries the plates with it. This is why the continents move!



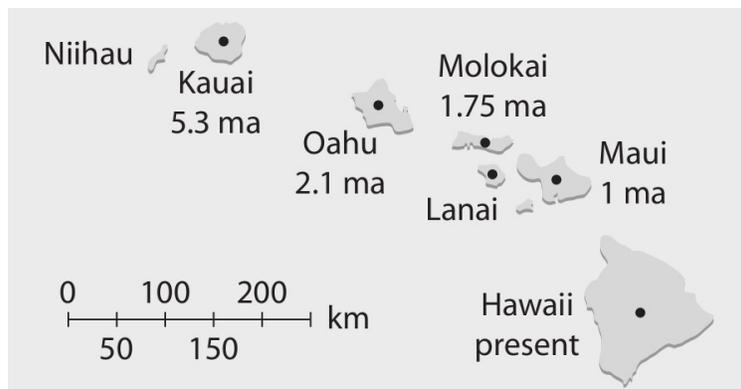
Most volcanoes occur along the boundaries of the plates, but the islands of Hawaii are different: they lie near the middle of the Pacific plate. Hawaii is thought to lie over a **“hot spot”** in Earth's mantle where hot material is rising up in one of the convection currents. This provides a lot of magma which has melted and forced its way up through the plate and erupted out as volcanoes.

The Pacific plate moves, but the hot spot doesn't, so a chain of volcanoes are born and then die as they move away from their source of magma. Once they are no longer active, the islands slowly erode away.

This provides an easy way to study the motion of the Pacific plate!

Data

Below is a map of Hawaii. Each island has a dot to show its main volcanic vent and a number to show the age of the rocks on the island. (“ma” stands for “millions of years”).



1. Use a ruler and the scale on the map to fill in the distances between islands in the data table.
2. Calculate the age differences of the same islands.
3. Divide the distances by the age differences to find the speed of the plate's movement in km per million years.

Islands	Distance (km)	Age difference (mil. yr)	Speed (km/mil. yr)	Speed (cm/yr)
Hawaii and Maui				
Maui and Molokai				
Molokai and Oahu				
Oahu and Kauai				

4. "Kilometers per million years" is a little hard to understand. "Centimeters per year" would be a better match for the speed of this motion. Write out conversion factors that will allow you to change your measurements:
5. Use the conversion factor to convert the speeds and fill them into the last column of the table.

Questions!

6. The speed of the Pacific plate seems to have changed a lot over the lifetime of the Hawaiian islands. What might have caused this?
7. What direction is the Pacific plate moving? (Hint: the older islands have already moved off in this direction.)
8. The islands of Lanai and Niihau don't have ages written on them. Estimate their ages based on your knowledge of the plate's motion.
9. Look at this map of the Pacific ocean. Hawaii has been circled in the middle for you. Based on the direction the plate's moving, where might you find a divergent boundary? Where might you find a convergent boundary?

