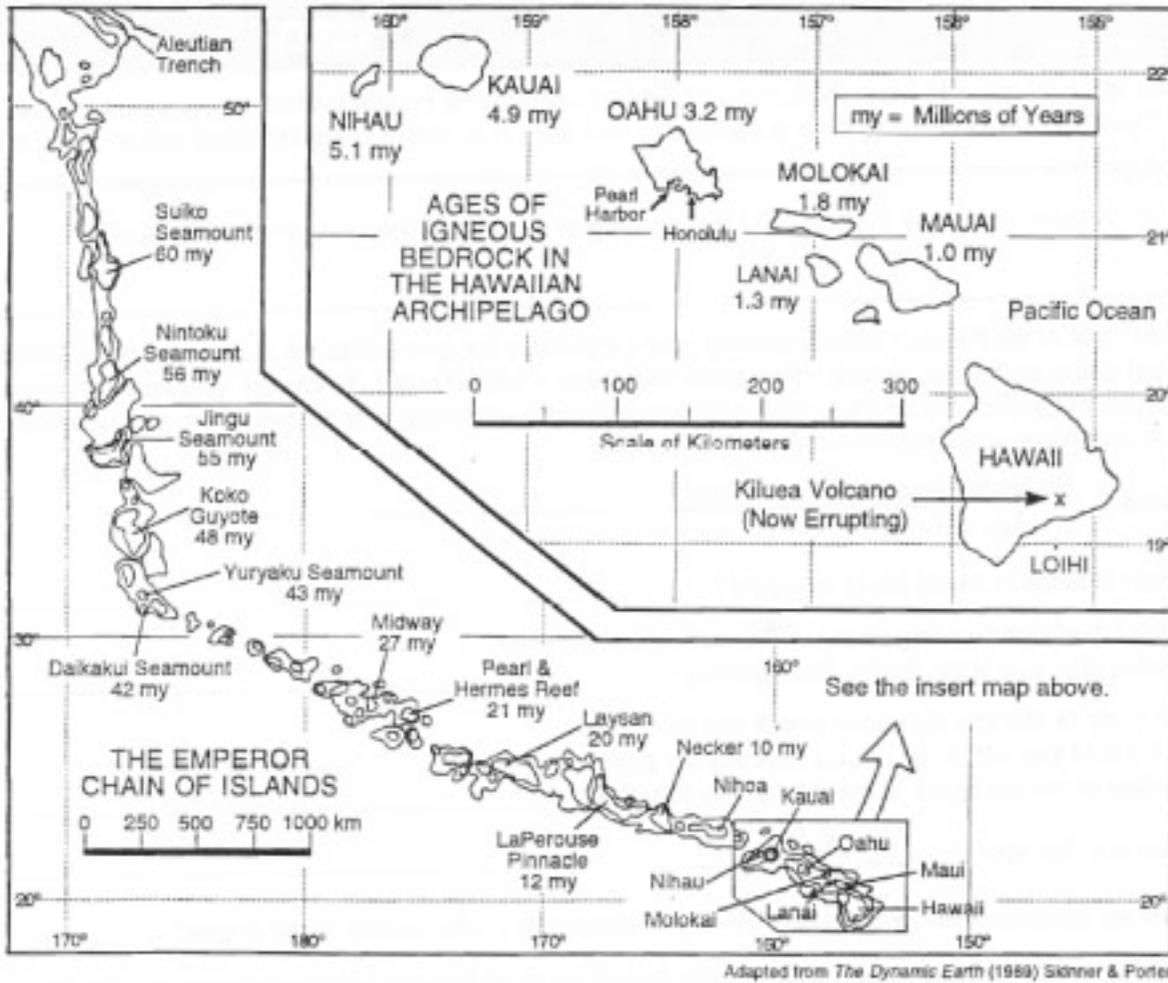


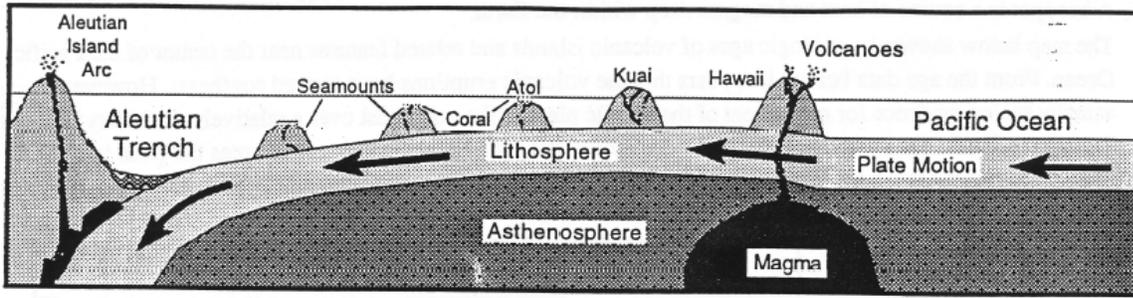
HOT SPOTS

A hot spot is a source of heat and magma deep within the Earth. The map below shows the geologic ages of volcanic islands and related features near the center of the Pacific Ocean. From the age data below, it appears that the volcanic eruptions have moved southeast. However, we are actually seeing evidence for movement of the Pacific plate to the northwest over a relatively stationary hot spot deep in the Earth. As the Pacific plate moves over the hot spot, upwelling magma pierces the plate in a series of volcanoes that extend toward the southeast. However the real motion is the crustal plate traveling northwest.



Use the data on this map to construct a line graph following this change in distance through time. The "x" on the big island, Hawaii, shows the position of Kiluea volcano.

Graph the *distance* from this on the horizontal (bottom) axis. (Please measure to the center of each island.) Graph age, in millions of years, on the vertical (up and down) axis. You must plot at least six data points. Label each data point with the name of the island or geographic feature it represents. You may graph the whole Emperor Chain, or just the Hawaiian Archipelago.



The chain of islands from the Emperor Seamounts to the Hawaiian Islands is evidence that the Pacific Plate is moving over a stationary hot spot (source of magma) deep within the Earth.

1. A graph should help you to understand the meaning of data. What does your graph line show?

2. If the crust of the Pacific Ocean is moving over a stationary hot spot within the Earth, what is the average speed of this motion in cm/year. (Remember that 1 km = 100,000 cm.) To change kilometers to centimeters just add five zeros. (Please show your calculation clearly, and round your answer to the nearest whole number with the proper units. Significant figures might help.)

Speed = $\frac{\text{Distance: Hawaii to Kauai (in cm)}}{\text{Age of Kauai (in Years)}}$ = _____ = _____

3. Where is the next island likely to appear?

4. These islands are forming on top of the moving Pacific Plate. In what direction is the Pacific Plate moving?

5. The slope of this line shows the rate of this movement. How could you tell, from a quick look at your graph, whether or not the speed of movement was constant?

6. What is a "hot spot"?

7. What are the terrestrial coordinates (latitude & longitude) of the city of Honolulu? (to the nearest degrees)

(Extra Credit: On a separate sheet of paper, compare the drift rate for the Hawaiian Island with the rate of motion for the whole Emperor Chain. A graph of both is required. Show your work and explain your results clearly.)

