

Our Ocean Backyard — *Santa Cruz Sentinel* columns by Gary Griggs, Director, Institute of Marine Sciences, UC Santa Cruz.

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Heading Across the Pacific**

Our ocean backyard is going to be a bit more global for the next four and a half months. We departed Friday, January 10 from Ensenada, Mexico on a 600-foot ship, the MV Explorer, headed for Hawaii. So this morning we will be about 200 miles further west as we head across the middle of the Pacific, hopefully with calm seas while we get acclimated to life on the water.

I'm teaching on the Semester-at-Sea program, administered by the University of Virginia, and which has about 550 students from 280 different colleges and universities enrolled in a worldwide voyage of discovery. Our Spring 2014 voyage will be the 50th anniversary of the program, which will probably be cause for some occasional celebration along the way.

Forty faculty members teach classes every day at sea, but while in port, educational, cultural, natural history and other field trips, travel and experiences will provide for a unique opportunity to study and learn about the global natural environment and also the diverse human communities.

Over the next four months the ship will have port stops in 16 cities in 12 different countries, including Japan, China, Hong Kong, Viet Nam, Singapore, Myanmar, India, Mauritius, South Africa, Ghana, and Morocco. After having sailed about 25,000 miles across the Pacific, Indian and Atlantic Oceans, the ship will dock in Southampton, England on May 2nd. From my own past experiences on ships, I think it's fair to say that after this many months at sea, most everybody on board will be happy to be on dry land and a stable platform again.

The 2400-mile transit to the big Island of Hawaii takes six days, where one of my classes (Natural Disasters) will spend a long day exploring an active volcano, climbing on lava flows, and hiking through lava tubes. The Hawaiian Islands are at one end of a 3000-mile long chain of volcanic islands and submerged seamounts that extend from Hawaii on the southeast to the Aleutian Trench to the north.

The vast Pacific tectonic plate, which underlies virtually the entire Pacific Ocean, has been moving northwest over a hot spot or thermal plume in the mantle for millions of years. There have been about 100 active hot spots scattered across the Earth's surface over the past 10 million or so years, and active volcanism occurs where these molten plumes reach the Earth's surface. Yellowstone, the Galapagos, the Azores, Canary Islands, Samoa and Iceland are a few examples of hotspots.

As the Pacific Plate migrates over the Hawaiian hot spot, at a rate of only a few inches a year, the site of volcanic eruptions gradually shifts to the southeast, much like moving a piece of paper slowly over a burning candle.

The big island of Hawaii consists of several very large shield shaped volcanoes that are no longer active (Mauna Loa and Mauna Kea), and also the East Rift of Kilauea, on the southeast corner of the island, which is the site of active eruptions today. Offshore, 20 miles to the southeast, is the newest volcano, Loihi, which now rises about 11,500 feet from the seafloor. Based on current rates of activity, it should reach the surface in 30,000 to 100,000 years and will create another Hawaiian Island for more real estate development over time.

The northernmost seamount in what is known as the Hawaiian-Emperor Seamount Chain, the Detroit Seamount, was built up over the hot spot 81 million years ago, but has been slowly transported north. It lies adjacent to the Aleutian Trench and over time, it will be carried down into the trench back into the mantle where it all started, recording the life, travels and death of a hot spot volcano.