# Scientists search for seafloor eruption

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The most intense swarms of earthquakes detected in the last 10 to 12 years on the far edge of the Juan de Fuca plate could indicate the eruption of magma from the seafloor or an underwater volcano. Between 50 and 70 earthquakes an hour, most of them small, were occurring at the end of February at a spot some 200 miles off the Canadian coast.

University of Hawaii's Jim Cowen, chief scientist, and National Atmospheric and Oceanic Administration's Ed Baker, co-chief scientist, are at sea now leading an expedition at the Endeavour Segment, the site of the quakes. The Endeavour Segment is located in deep water and the quakes are not of a magnitude that would cause noticeable effects on land in Canada or the United States.

Reports from the expedition are at www.pmel.noaa.gov/vents/acoust … epac/endeav0205.html.

As of March 8, the site said the number of quakes had calmed in recent days.

The scientists are on board the Thomas G. Thompson, the 274-foot research vessel operated by the University of Washington, and will return to Seattle March 11. The project is a rapid-response cruise funded by the National Science Foundation and the National Atmospheric and Oceanic Administration, with cooperation from the Canadian government.

There have been six rapid-response cruises to investigate seismic activity

on the Juan de Fuca plate since 1991, the most recent having been in 2001 led by Marv Lilley, University of Washington oceanographer.

Nowhere have scientists been in position to document lava flows while they are erupting, other than in Hawaii where Kilauea lavas flow into the sea, Lilley says. They've been tantalizingly close a few times out on the Juan de Fuca Ridge, once detecting fresh lava that was still hot enough to have diffuse water flowing out of it and another time arriving to find small glass shards still suspended in the water.

Even if there is no chance to witness lava flows, scientists are eager to arrive at the site as quickly as possible to measure changes that rapidly unfold following an eruption. Fluids discharged into the ocean during such events can form a billowing plume half a mile thick and stretching 6 miles in diameter, substantially changing water temperature and chemistry. Microorganisms flourish, increasing in such abundance that scientists say water near eruption sites can appear blizzard-like as it becomes laden with individual organisms and those that have formed into trailing mats and strings in the water.

"What's expelled gives scientists a view into what's deep in the seafloor, in places scientists can't reach," chief scientist Cowen says.

The swarms of quakes started Feb. 27 and lasted long enough that co-chief scientist Ed Baker told the Seattle Times before the expedition left port that, "We're pretty sure lava is moving."

The seafloor quakes are monitored by SOSUS, the SOund SUrveillance System, that can "hear" sound waves generated by seismic events, submarines or whales.

The swarms are centered about 200 miles west of Vancouver Island, British Columbia, at 48 degrees N and 129 degrees W. The seafloor is

about a mile and a half below the surface there. As of March 4, fewer than 10 quakes an hour were being detected.

The site is on the Endeavour Segment, on the northern part of the Juan de Fuca Ridge. The ridge is where the Juan de Fuca plate is pulling away from a neighboring plate. Molten lava typically oozes up into the open spaces creating new seafloor at a pace of usually only inches a year. There can be more rapid spreading, however, during volcanic eruptions and earthquakes. Fields of hydrothermal vents form where seawater circulates beneath the seafloor gaining heat and chemicals until the fluids vent back into the ocean, sometimes like geysers. As the fluids mix with cold seawater the chemicals separate and solidify, sometimes piling up into impressive mounds, spires and chimneys.

Researchers will sample sea water, take images using a camera sled, collect rock fragments and deploy three to four floats made especially to be able to float along with the plume of vent fluids for several months.

There is the possibility scientists will find something other than an eruption underway. A swarm of earthquakes off the coast in 2001 caused an area of the seafloor to draw in surrounding seawater for more than a year. It was a surprising twist for scientists who visited the site expecting to find hot water, and possibly magma, being expelled, says Lilley, leader of that expedition and co-author of a paper last July in Nature about the event. The void created by the earthquakes was under negative pressure, drawing water down into hundreds of feet of sediments, something scientists had never observed before.

Scientists, graduate students and undergraduates on the current expedition are from the University of Hawaii, University of Washington, University of Miami, Oregon State University, NOAA's Pacific Marine Environmental Laboratory, Woods Hole Oceanographic Institution and Scripps Institution of Oceanography, as well as students from Canada,

Hong Kong and Switzerland.

Source: University of Washington