

Geologist plans volcano safety for Ecuador

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A geologist at Washington University in St. Louis is doing his part to make sure that the small Latin American country of Ecuador follows the Boy Scout motto: Be prepared.

Robert Buchwaldt, Ph.D., Washington University lecturer in earth and planetary sciences in Arts & Sciences, is the only American who sits on an international committee that is seeking ways to address the volcanic threat in Ecuador, especially in Quito, a city of five million nestled against a volcano, Guagua Pichincha, that erupted just two years ago.

Buchwaldt, a couple of German scientists and a mixture of Ecuadorian politicians and citizens comprise the committee, which is called the Ecuadorian Volcanic Hazard Assessment Group. Its task is to develop an emergency plan in case of an eruption, which could happen again soon because magma temperatures are rising, according to Buchwaldt.

“Dealing with the threat of a volcano is not an uncommon problem,” Buchwaldt said. “In North America, we have Seattle, which is adjacent to Mount St. Helens and two other volcanoes. They have a plan. We’re trying to implement one in Quito, but the Latin American culture is different.”

Money and communications problems

A key problem is wealth, or the lack thereof in Ecuador.

“America is a First World country, but Ecuador is Third World, so

financial support is not strong. Setting up seismometers is an expensive process. Hundreds will be needed, but currently there are only two near Quito set up by German researchers.”

Ecuador, roughly the size of Nevada, has a whopping 270 volcanoes, twenty of which are active, the most active being Tungurahua,, with 70 eruptions over the past 3,000 years. Buchwaldt said a second major problem is communications.

“As scientists , we need to avoid the academic gobbledegook,” he said. “The politicians, though, tend to dummy things down. We’re seeking a communications platform that will enable us to communicate between different fields.

“What happens when you get a volcanic eruption, you have excited scientists because it means data,. But data mean nothing to a normal citizen sitting there while a one-mile pyroclastic flow starts streaming by .”

A pyroclastic flow is a very violent, destructive, gas-rich and fast-moving mass of rock flow from a volcanic vent. Imagine opening up a cola bottle and seeing the white flow of foam that accompanies that – the foam is an indication of gas separating, and that is what you have with the pyroclastic flow.

Buchwaldt said that the committee has plans in effect for public meetings that will educate the citizenry and government officials, explain the dangers and develop escape plans for Quito and other communities.

He made a presentation on projects there and the committee’s work at Goldschmidt Conference 2007, held from Aug. 20-24, in Cologne, Germany.

Buchwaldt is just beginning research in Ecuador, and he has projects in Madagascar and Cameroon. His main interests are geochronology, petrology, and geochemistry.

“I’m interested in using well-established methods to understand the dynamics of systems, especially Earth systems,” he said. “Volcanoes interest me greatly because they are very dynamic,”

Resemblance to western Washington state

He said that western Washington state and Ecuador are similar in that they each are situated along a major subduction zone. A collective zone occurs throughout the Pacific Ocean and is called the Ring of Fire. Most of the volcanism on the planet occurs around these subduction zones. Volcanoes produced in subduction zones have different magmas than those produced in hot spot areas, such as in Hawaii, for instance. In subduction zones, water is brought down into the mantle where it gets dissolved in the magma and therefore creates a gas-rich magma that produces a very explosive situation. In hot spot volcanoes, water is not involved, so the magma is more viscous and thus flows more easily.

Buchwaldt is looking at the chemistry of different magma deposits to see how different volcanoes evolve and determine the evolution of different volcanoes as well as the kinds of dynamic processes involved in volcanic eruptions. He also is using Geospatial Information Systems technology to detect the dominant flow patterns in the area with the goal of classifying different regions in terms of the severity of their volcanic potential.

What he finds will add to the geological record of Ecuador and the general knowledge base of volcanoes. But his findings also will help Ecuadorians plan city buildings and emergency buildings and escape routes to avoid future volcanic destruction. During Spring Break 2007, Buchwaldt took 30 members of his Washington University geosciences

class to a field trip in Ecuador and the Galapagos Islands to study the differences in volcanoes.

“It was an extremely interesting opportunity for students to actually see real geology, at times as it was happening,” he said. “A geologist needs to be outside looking at rocks and minerals. One of the memorable things was standing on a pyroclastic flow that had come down just two months before , and that flow was atop the foundation of a house it had over-run.

“It’s kind of scary when you actually stand on a volcano and you feel the rumbling of the volcano mountain when the magma comes up and you see ash coming up at the top of the volcano. We were truly seeing the surface expression of this dynamic planet we’re living on.”

Source: Washington University in St. Louis

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