Volcano observatory has perfect record

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Alaska Volcano Observatory activities in Fairbanks include monitoring of seismograph data on Redoubt Volcano. Above, state seismologist John Davies, left, relays information by phone, while volcanologist Juergen Kienle discusses the situation with glaciologist Dennis Trabant, right, of the U.S. Geological Survey.

FAIRBANKS — Early in the afternoon of Dec. 13, a fellow staff member of the Geophysical Institute stopped by the publication office.

"You might want to visit the seismology lab," he said. "And bring a photographer. Redoubt's acting up, and it might be nice to have a few shots of the crew in action — just in case something does happen."

I knew Redoubt Volcano was one of Cook Inlet's active volcanoes and that it could cause considerable damage if it erupted. I hustled right down to seismology. The normally quiet laboratory was packed with busy people. It looked like a well prodded nest of hornets. But there was system in the seething, as I began to understand once volcanologist Juergen Kienle could grab a moment to explain what was happening.

The Alaska Volcano Observatory, a joint activity of the U.S. Geological Survey, the University of Alaska Fairbanks Geophysical Institute and the Alaska Division of Geological and Geophysical Surveys, operates five seismographs set at various places on and around Redoubt Volcano.

The observatory machines broadcast the tremors and shivers of the mountain to the institute's seismology lab, where the information is monitored and processed.

Kienle showed me some of the seismograms recorded during November from the Redoubt stations. Thin, nearly unvarying lines had been traced on the paper-covered revolving drums. At widely spaced intervals, hours or even days apart, clumps of barely perceptible spikes showed up on the record. The spikelets had no particular pattern and very little energy; they were the sort of random wiggles that sensitive equipment can detect from a distant earthquake, a strong gust of wind, or — as a joke has it — a hibernating grizzly turning over in his sleep.

As a comparison to this record of background seismicity, he next directed my attention to a seismogram copy posted on the wall as if it were a trophy fish. It is a trophy of sorts; it's the record of seismic activity at Mount St. Augustine immediately before the 1986 eruption of that volcano.

The contrast with a quiet-time seismogram was stunning. On the Augustine record, it was hard to pick out the individual traces. Jittery spikes overlapped one another on a sooty blur, packed too densely for an untrained eye to be certain where one trace left off and another began.

Then student Guy Tytgat showed me the record being traced moment by moment from the seismometers at Redoubt Volcano. Feathery spikes were packed atop spikes as the needles skittered over the slowly turning drums.

They were not large tremors; the biggest would have been perhaps 1.6 on the Richter scale, far too small to be felt by a person standing on the mountain. But they were pouring in, one microseismic event every minute. The record looked exactly like the pre-eruption seismograms from Augustine.

Yet did it mean the same thing? The seismometers on Redoubt had surged from slightly above background to intense activity within the space of hours. Augustine had turned up the action, so to speak, over the course of nine months.

When the Alaska Volcano Observatory team successfully forecast Augustine's 1986 eruption, they were buillding from very good data gathered about its seismic behavior before even earlier eruptions. And, as the most active of the volcanoes rimming the west side of Cook Inlet, Augustine had a comparatively regular pattern of eruptions that could guide judgments about when it was next due to erupt.

Redoubt is less regular and less well studied.

Yet the observatory scientists were not observing some laboratory experiment with possibly interesting results. Part of their duties includes providing information to civil and military authorities about impending eruptions. They have to call them as they see them — which means they have to be awfully sure about what they see.

An incorrect decision could cost people's lives, either immediately if a volcano erupts without warning, or later if the observatory's forecasting ability had lost credibility with the public so that its later warnings were not believed.

I mentioned above that the seismic information was monitored and processed in the laboratory. Watching the crew in action, I came fully to appreciate that their ultimate processing tools are human brains.

They had seismometers, computers, technical papers, but mostly they had experience and knowledge. They knew that chemically Redoubt was similar to Augustine.

They analyzed the nature of the signals from the volcano, their frequency, their changing pattern as recorded from the different instruments in the net.

The Anchorage and Fairbanks components of the Alaska Volcano Observatory debated and discussed back and forth by telephone. A little more than two hours after the Redoubt signals had suddenly jumped to the Augustine pattern, state seismologist John Davies called for notifying emergency preparedness officials that an eruption was imminent.

Thomas Miller, the Alaska Volcano Observatory spokesman from the USGS in Anchorage, carried out the formal process. The observatory had stuck out its coleletive neck.

Twenty hours later, Redoubt Volcano erupted.

So far, the fledgling Alaska Volcano Observatory has a perfect record. The same team, before they were organized officially, accurately forecasted the onset of the 1986 Augusine eruptions.

Perhaps even more important, they were able to say that activity at Mt. Dutton in July 1988 would not lead to an eruption. That correct call spared an expensive and disruptive evacuation of the town of King Cove.

They don't expect to maintain their record. It's a small group, and not every volcano in Alaska sports a seismometer network, much less a history of specific research.

But after watching them in action, I'm certainly convinced that they do very well with what they have. The work of the Alaska Volcano Observatory is a strong argument that basic research — years of long-term gathering and monitoring seismic data, of field studies, of simply satisfying curiosity about volcanoes — can pay off in very practicial ways.