Bold Venture Aims to Plumb a Volcano’s Fiery Depths

Most volcanologists monitor a mountain’s inner workings with instruments placed on the surface like a doctor’s stethoscope. But this summer an international team will try something never done before: drilling into the heart—the magma conduit—of a recently active volcano.

The sleeping giant the Japanese-led team intends to penetrate is Unzen, a volcano in southwestern Japan that erupted in 1995. The hope is that the high-risk venture will shed light on the factors that determine whether an eruption is explosive—“one of the fundamental questions of volcanology,” says volcanologist Setsuya Nakada of the University of Tokyo.

When a volcano starts rumbling, volcanologists try to predict the timing and size of a potential eruption by deciphering the “smoke signals”—seismic waves and ground deformation—it sends out. The Unzen Scientific Drilling Project will be the first time that volcanologists attempt to correlate these data with chemical and physical information from a volcano’s interior obtained soon after an eruption. A better understanding of the link between processes in the conduit and the signals monitored at the surface “has the potential to be quite an advance in forecasting eruptions,” says John Eichelberger of the University of Alaska, Fairbanks.

In the first phase, cores taken from two boreholes filled in essential details about Unzen’s structure and natural history. Researchers knew that over 4 years Unzen had effused 200 million cubic meters of magma in roughly 10,000 pyroclastic flows.

The team learned from the cores that Unzen’s earliest eruptions—about 500,000 years ago—were explosive, but that the eruptions grew tamer and tamer, becoming effusive about 200,000 years ago.

The researchers hope that the project’s second phase will shed more light on the subject. But they are not sure what will happen when they tap into Unzen’s conduit, the channel through which magma rises to the surface. The drillers expect to reach the conduit at a depth of about 1300 meters beneath the summit. The first hole is expected to yield rock samples describing the stability of the conduit and its surrounding rock. If all goes well, a second summer of drilling in 2005 will slant out of the same borehole into the conduit at a shallower elevation, taking continuous core samples. That hole would give valuable data on how gas bubble size and the physical characteristics of magma change on the way up the conduit.
Insights into exactly how volcanoes shed gas, says Chris Newhall of the University of Washington, Seattle, “surely will save both lives and unnecessary evacuations at volcanoes.”

by Dennis Normile, Science

Answer the following questions about the reading.

1. What is new about the way the Japanese-led team is studying the volcano?

2. Why did the team choose Unzen for their project?

3. How was information obtained for the first phase, and what did the team discover about Unzen?

4. What is a magma conduit?

5. Describe the two boreholes that will be drilled during the project’s second phase and what kind of information the team hopes to obtain.