# Scientists' Drill Hits Magma: Only Third Time on Record

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The geothermal field at Krafla, Iceland, where a borehole being drilled for a geothermal energy research project hit molten rock at 6,900 feet. (Peter Schiffman/UC Davis)

(PhysOrg.com) -- Scientists drilling a borehole deep into Iceland's rocky crust to explore new methods of using geothermal energy hit a major roadblock on Thursday: Their drill ran into molten rock at a depth of 6,900 feet.

"This is only the third time that magma has ever flowed into a geothermal drill hole, as far as we know," said Peter Schiffman, a geology professor at UC Davis and member of the international team conducting the study. "A research project in Hawaii hit magma in 2005, and in 1977 magma erupted out the top of a producing geothermal well not far from our site in Krafla, Iceland."

In Hawaii, drilling stopped. And Schiffman is doubtful that this project, known as the Iceland Deep Drilling Project, or IDDP, can continue. But if the magma body is narrow — as he and the research team expect it is — it may be possible to bore through it or around it, he said. “We’ve been able to keep circulation of cold water through the drill string, so our equipment is still functional.”

The team had originally planned to drill to 11,500 feet, or almost 2.2 miles into the earth.

The main purpose of IDDP — an international research effort supported by the National Science Foundation, the International Continental Drilling Program, Alcoa Inc., and Icelandic power companies — is to investigate the economic feasibility of extracting energy from hydrothermal systems that are under extremely high temperatures and pressures.

Drilling began at the site near Krafla in northeast Iceland in December 2008. After reaching a depth of 2,600 feet, the project was put on hold for two months before resuming in early March.

Around the middle of April, Schiffman said, drilling became difficult. “We kept drilling, but had lots of technical problems. We just seemed to be stuck at the same depth,” he said. “Just yesterday we realized that we had run into magma.”

Schiffman is receiving updates from his UC Davis colleagues who are onsite in Iceland: geology professor Robert Zierenberg and graduate student Naomi Marks. The pair reported that a phenomenon known as “steam flashing” seems to have occurred on Thursday (June 25), when drilling fluid came in contact with magma, creating an explosion. Glass shards removed from the hole provided evidence for this, Schiffman said. These most likely formed when the fluid, which is principally

water, quenched molten rock.

Based on geophysical mapping of the area, Schiffman said, the team suspects that it has encountered a small offshoot of a larger magma body that lies more than two miles below the surface. “Whether we can keep drilling or not will depend on the thickness of this magma finger, and whether it’s horizontally or vertically oriented,” he said.

If the hole cannot be drilled any deeper, it might prove useful for testing a system of geothermal energy extraction that involves sending cold water into one borehole to be retrieved as superheated steam from deeper holes nearby, Schiffman said.

More information about IDDP can be found at www.iddp.is/about.php

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