

# Radio-equipped sensors advance volcano research

*New data-loggers at Yellowstone provide 24-hour temperature info*

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To confirm a theory, you must have data. But, often, vital information lies high in the mountain ranges, in the Kenyan desert or in some cases, Yellowstone National Park.

Over the last eight years, Yellowstone's temperature sensors lacked the ability to transmit. This system required visits by the researchers to retrieve their data.

Worse, what if for some reason one of the sensors malfunctioned, or stopped working? It would have meant all the data for those months would be lost. Jake Lowenstern, the lead scientist at Yellowstone Volcano Observatory, commented on the frustration over their previous data-loggers.

"Someone has to go out and hand download the data - if anything goes wrong with the logger, you don't find out about it until you go to field," Lowenstern said. "You can lose a month's worth of data."

This month, 10 new, radio-equipped sensors were installed at various locations within the Norris Geyser Basin. The sensors record temperatures from geysers, hot pools, soils and air. The sensors save the data and small radios transmit the data every 24 hours to the United States Geological Survey (USGS) offices stationed in Menlo Park, Calif.

"The sensors radio in the data everyday, and if something isn't working, we know about it right away. We can contact [the sensor] from our office or send someone out to go explore it," said Lowenstern. "Sometimes the radios don't work, but the logger keeps collecting the data. As long as the logger isn't destroyed or chewed by a coyote, you will be in pretty good shape."

The sensors that were needed by Yellowstone required small radios. The radio signal needed to be strong enough to transmit 24 hours worth of temperature data. Lastly, the equipment had to be able to withstand acid waters, steam and below-freezing temperatures during the harsh seasons.

"It hasn't been done for geysers and hot springs. That's what unusual in this case. We are applying it to a system that doesn't have publicly accessible data," Lowenstern said.

Once sent to the USGS offices, the information is archived and distributed to the public on the Yellowstone Volcano Observatory website. According to Lowenstern, this information is both educational and accessible.

"The public is interested in how geysers work and how often they erupt. Here, they can look in detail at what happens every day in those particular features," Lowenstern said. "The plots tell you everything you need to know ... once you learn to read them."

To Kushmin Cheema, a Davis resident interested in geology, the accessibility of this information was quite exciting.

"I can definitely see myself using this site. The idea that there could be some relationship between temperature and geyser activity is pretty cool," says Cheema said.

Lowenstern thinks that not only will the information help scientists track temperature changes, it will also reveal potential correlations between the temperature recordings and the geological activity at Yellowstone.

This project addresses research, educational and safety concerns. This information could provide data on the stability of the volcanoes and geysers, revealing any threat of eruption. Lowenstern said that once the data-loggers are linked to an automated system, access to the information will be more efficient.

"The next step is that this can be applied at other places. There are a lot of places around the county researching temperature variations on a rapid basis," Lowenstern said. "It was a project everyone agreed would be worthwhile from a scientific and educational standpoint."