

Death Valley crater was recently active, and could be again -- study

Laura Petersen, Environment & Energy Publishing, 1-26-12

A volcanic crater in one of the nation's most popular national parks has been active as recently as 800 years ago and could erupt again, according to researchers from Columbia University.

Geologists have long known how Ubehebe Crater in California's Death Valley National Park came to be, but dating the formation had proven a challenge. But a study published in the latest edition of *Geophysical Research Letters* found the crater is extremely young, in geologic terms, and potentially still active.

Ubehebe -- one of about a dozen craters spread over 750 acres of park land and by far the largest at more than 2,600 feet across and 770 feet deep -- was formed when magma rising up toward the Earth's surface mixed with groundwater caused a series of violent eruptions called phreatomagmatic explosions, according to Purdue University geologist Brent Goehring, a study co-author.

The magma was so hot, water instantly turned into steam and the change in volume caused an outburst, throwing a column of debris into the air much like a mushroom cloud, Goehring said.

The presence of a Native American artifact below the debris around the crater led researchers to think that it was younger than 10,000 years old. But more specific volcanic dating techniques work only on sites at least 50,000 years old.

A team of researchers based primarily out of Columbia University's Lamont Doherty Earth Observatory measured the amount of beryllium 10, a rare isotope that changes when exposed to cosmic radiation, in rocks around the crater. Working backward from the state of the isotope now, the scientists identified how long the rocks had been lying exposed on the earth's surface.

This particular type of analysis cannot typically be applied to volcanic sites, but the researchers -- led by Peri Sasnett, an undergraduate student working on a senior thesis -- was able to use it in this case thanks to certain minerals in some of the ejected material.

Based on their analysis, most of the rocks were ejected from the crater between 800 and 2,100 years ago, though some were pushed out as early as 5,000 years ago.

"We were pretty sure it was quite young because of the appearance of the crater," Goehring said. "We did not realize it was going to quite as young as 800 years."

The time frame of the eruptions reveals that they took place both during wetter and drier periods, indicating climate was not a factor. Rather, there was a permanent source of groundwater sufficient to trigger a violent reaction when magma reached it, Goehring said.

A 'static feature' that could come back

Given this information, and the relatively recent activity, "there is no reason to think there will not be another eruption down the road," Goehring said.

There's no way to predict when the next explosion might occur because there is not a long enough record to

identify any patterns, he said. However, there should be plenty of warning signs of pending volcanic activity, such as shallow earthquakes and steam vents opening, which could go on for years before an eruption occurs.

The young dates did not surprise park hydrologist Richard Friese.

"You can see it's quite young," Friese said. "The crater is steep and highly erodible. If it was very old it would not be so steep and the crater would be filled in to a certain extent."

However, what did surprise Friese was the finding that eruptions were not dependent on a wetter climate and occurred even during drier time periods, like today.

Currently, visitors can drive right up to the crater. Park managers are not overly concerned about another eruption because they expect there to be plenty of advance notice, Friese said. However, should such indications arise, the park could ensure visitor safety by closing a large enough area around the explosion site, which would still be relatively small compared to the size of the park.

"We've typically viewed Ubehebe as a static feature, but of course we're aware it could come back," said Stephanie Kyriazis, a geologist and park education specialist in a statement.

"Right now, we're not planning to issue an orange alert or anything like that," Kyriazis said.