

Potential for volcanic activity in Salton Sea

Keith Matheny, Palm Springs Desert Sun, 6-11-11

PALM SPRINGS -- As if the Big One -- an overdue major earthquake on the southern San Andreas fault -- isn't enough of a concern, the Salton Sea area has another potential force of nature that could someday put on a show: volcanoes.

The Salton Buttes are a line of four small volcanoes on the southeastern shore of the Salton Sea near Calipatria, about 100 miles east of San Diego. Scientists estimate they last erupted between 6,500 and 10,000 years ago -- which at least technically classifies them as active.

Brothers Jimmy and Lonnie Mason of Bakersfield recently fished for tilapia in the Salton Sea, yards from Obsidian Butte, one of the Salton Buttes.

"As long as it stays underground, I'm not afraid," Jimmy Mason said. "But if anything starts bubbling or popping, I'll be out of here quick."

Visitors to the buttes today don't have to worry about dodging molten lava. To a non-scientist, the Salton Buttes look like four small, rather insignificant hills. Only their odd rock formations hint at something more unusual.

Obsidian Butte has served in recent years as a mineral quarry. Another volcano nearby, Red Hill, also was extensively quarried and now features a county park and marina. Rock Hill is part of the trail system at the Sonny Bono Salton Sea National Wildlife Refuge. Another volcano, Mullet Island, is northeast of Red Hill and accessible only by boat.

The most visible evidence today of the turbulence happening beneath the Earth's surface in the area is the white plumes of steam coming from the smokestacks of several nearby geothermal energy plants, which are using the heat naturally produced underground to create electricity.

That's not to say there's absolutely nothing to worry about with the Salton Buttes.

"The compositions of lavas of past eruptions and the association of vents with groundwater and the Salton Sea suggest that pyroclastic flows and surges and explosive eruptions could occur in the future," a 1989 bulletin by U.S. Geological Survey on potential future volcano hazards in California said.

"Such events commonly are destructive out to distances of at least 10 kilometers (6 miles) from an active vent."

Pyroclastic flows are a mixture of mineral fragments and hot gases that move almost like a flash-flood of water. According to USGS, they reach speeds of more than 60 mph, with gases topping 800 degrees Fahrenheit. Pyroclastic flows are responsible for thousands of deaths in history's worst volcanic disasters, including at Herculaneum and Pompeii in ancient Roman times and at St. Pierre in Martinique in 1902, where 30,000 people died in a pyroclastic flow after Mount Pelee erupted.

"Eventually, something is going to come to the surface in the Salton Sea area. But we're a long, long way from being able to make any predictions on that," said Patrick Muffler, a USGS geologist from Palo Alto who's spent more than four decades focused on geothermal energy, and whose studies include the Salton Buttes.

Muffler said he "would not anticipate" any sort of major eruption occurring at the Salton Buttes like the 2010

eruption in Iceland that left European air travel in chaos, or the 1980 eruption at Mount St. Helens in Washington state that killed 57 people.

"Would not anticipate," Muffler admits, is a "carefully crafted phrase."

"We didn't anticipate St. Helens, either," or the massive explosion out of the side of its cone, he said.

"Science is dependent upon the observations you are privileged to make. Occasionally you get surprised."

The Salton Buttes and the area's geothermal fields and spitting mud pots caused by escaping carbon dioxide from the Earth's crust occur because the Salton Sea is in what's known as a rift valley.

"The area of the Salton Sea is being pulled apart due to major tectonic forces beneath it," said Bruce Perry, an Earth sciences lecturer at California State University-Long Beach.

"As it is pulled apart, the crust gets thinner, and that allows magma -- molten elements from deep underground -- to work their way to the surface."

To see what happens to a rift valley over millions of years, look to the Baja Peninsula in Mexico, a long finger of land that broke away from the Mexican mainland along a rift valley, Muffler said.

The past eruption of the Salton Buttes spewed rhyolite, a thick, viscous molten rock at a significantly lower temperature than more liquid, basalt-based lava like that seen flowing from Hawaii's volcanoes, he said.

"It's not like you'd have to run for your life to get out of the way" of another Salton Buttes eruption, Muffler said. "It's like a paste."

But as the 1989 USGS bulletin found, the dynamic of the Salton Sea nearby and a relatively shallow water table due in large part to human agricultural activities in the region could make any new eruption volatile, according to Perry.

"Steam-charged eruptions are very unpredictable and can be extremely dangerous, absolutely," he said.

Earthquake swarms -- hundreds of small earthquakes occurring over a period of a few days -- have occurred in the Obsidian Butte area several times in recent years, including last year and in 2009.

"It's certainly a concern to geologists," Perry said. "When you get these swarms, it's often an indicator of an upward movement of magma. And if the magma breaches the surface, you have a volcanic eruption."

But Mark Benthien, outreach coordinator for the Southern California Earthquake Center, said the earthquake swarms are a result of the rift zone being split apart; not a sign that a volcanic eruption sequel is coming soon.

"It is volcanism, but it's over a broader range and deeper," he said. "It's not like magma coming up in a typical volcanic sense."

Benthien noted the Salton Sea region is well-monitored by scientists due to its geologic complexity and the nearby San Andreas fault.

"Long before any eruption were to happen, there would be a lot of evidence that something was happening -- and that evidence is not the earthquake swarms," he said.

Added Perry, "I would be much more concerned about the potential for the Big One on the San Andreas fault than the volcanism at the southern end of the Salton Sea."