

Yellowstone Hotspot: Scientists Find Source Of Supervolcano's Heat



Researchers used seismic tomography to find Yellowstone's hotspot suspected to be part of a mantle plume originating from Earth's mantle and core boundary. "Stealing" the supervolcano's heat may prevent the next Yellowstone eruption. (Mark Ralston | AFP/Getty Images)

A giant volcano lies beneath Yellowstone National Park and the heat it generates powers all the hot springs and geysers in the area, but where does this heat come from?

Yellowstone Hotspot

Scientists describe Yellowstone as a hotspot marked by anomalously high temperature. The intense heat produced by this hotspot is responsible for the melting of the crust and the formation of basaltic and rhyolitic magma.

The Yellowstone hotspot is fixed within the Earth's mantle and has long been suspected to be part of a mantle plume, an upwelling of abnormally hot rock within the Earth's mantle. Mantle plumes may originate from the boundary separating the mantle and the core about 1,850 miles beneath the surface.

To find evidence of a plume beneath the Yellowstone, Study researchers Peter Nelson and Stephen Grand, from the University of Texas, used seismic tomography, a technique for imaging Earth's subsurface using seismic waves produced by earthquakes or explosions. The data provided evidence for plume extending from the core-mantle boundary all the way to the base of the crust at Yellowstone.

"The model reveals a single narrow, cylindrically shaped slow anomaly, approximately 350 km in diameter that we interpret as a whole-mantle plume. The anomaly is tilted to the northeast and extends from the core-mantle boundary to the surficial position of the Yellowstone hotspot," the researchers wrote in their study, which was published in Nature Geoscience in March. "Our results strongly

support a deep origin for the Yellowstone hotspot.”

Preventing Yellowstone Eruption By Stealing Supervolcano’s Heat

Yellowstone erupts about every 600,000 years and its next eruption could be catastrophic. A group of NASA scientists and engineers earlier revealed the idea of stealing the volcano’s heat to prevent an eruption.

If more heat could be extracted, the volcano may not erupt. NASA estimates that cooling the volcano on its brink of an eruption by 35 percent could ward off an explosion.

The idea is to drill a hole into the side of the volcano and pump water through it. The circulating water would come back out heated to over 600 degrees, which, given enough time, could slowly take enough heat from the volcano and prevent an explosion.

“You would have to give the geothermal companies incentives to drill somewhat deeper and use hotter water than they usually would,” said Brian Wilcox of Nasa’s Jet Propulsion Laboratory. “The long-term benefit is that you prevent a future supervolcano eruption which would devastate humanity.”

Scientists, however, acknowledged that this idea of saving Earth from a supervolcanic eruption is far from perfect.

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