

Hot Volcanic Eruptions Could Lead To A Cooler Earth

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WASHINGTON, June 14 (SPX) -- Volcanic eruptions may be an agent of rapid and long-term climate change, according to new research by British scientists.

Vincent Gauci and co-authors Nancy Dise and Steve Blake of the Open University simulated the volcanic acid rain from one of Europe's largest historical eruptions, the Icelandic Laki eruption of 1783, which caused widespread crop damage and deaths around Europe.

Their findings are scheduled for publication in the American Geophysical Union journal, *Geophysical Research Letters*, later this month.

Gauci says, "we know that volcanic aerosol [airborne] particles reflect the Sun's rays back out to space and also create more clouds that have the same effect. It all helps to cool the planet for a year or two. These simple physical relationships have been known for a while.

"Our findings show that volcanic eruptions have another, more indirect, effect: the resulting sulfuric acid from the volcano helps to biologically reduce an important source of atmospheric greenhouse gases. At the extreme, this effect could cause significant cooling for up to 10 years or more."

Blake says, "The amount of sulfur dioxide put out by Laki in nine months was ten times more than the amount that now comes from all of western European industrial sources in a year. That would have caused a major natural pollution event."

The researchers found that such eruptions create a microbial battleground in wetlands, with sulfate-reducing bacteria suppressing the microbes that would normally produce the powerful greenhouse gas methane. In other words, the sulfate-loving bacteria are victorious over the microbes producing methane, leading to a cooling effect.

"We did the simulation on a peat bog in Moray in northeast Scotland, an area we know was affected by the volcanic fallout from the Laki eruption," adds Gauci, "and found that the reduced methane emission lasts several years beyond the end of the acid rain. Our calculations show that the emissions would take many years to recover - far longer than volcanoes are currently understood to impact on the atmosphere."

The researchers now think that volcanoes may exert a more powerful influence over Earth's atmosphere than was thought. Volcanoes may even be a more important regulator of wetland greenhouse gases than modern industrial sources of acid rain.

"Wetland ecosystems are the biggest source of methane and for the most part are located in areas of the world that are remote from industrial activity.

But many of Earth's wetlands seem to be located in volcanically active regions such as Indonesia, Patagonia, Kamchatka, and Alaska. Even some wetlands that are quite far away from volcanoes, such as those in Scandinavia or Siberia, will be regularly affected by Laki-like pollution events from Icelandic eruptions" says Gauci.

Gauci adds that there was a period of Earth's pre-history when this effect may have created important climate changes.

"This interaction may have been particularly important 50 million years ago, when the warm greenhouse climate of the day was due, in large

part, to methane from the extensive wetlands that covered the Earth at that time. During that time, large volcanic eruptions could have been real agents of rapid climate change due to this mechanism."

The research also points to a long recovery period for wetland ecosystems that have experienced industrially-derived acid rain. Gauci says, "We've been getting on top of the sulfur pollution problem in Europe and the U.S. for a long time now. Our findings show, however, that the effects of acid rain can still linger for a long time."

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