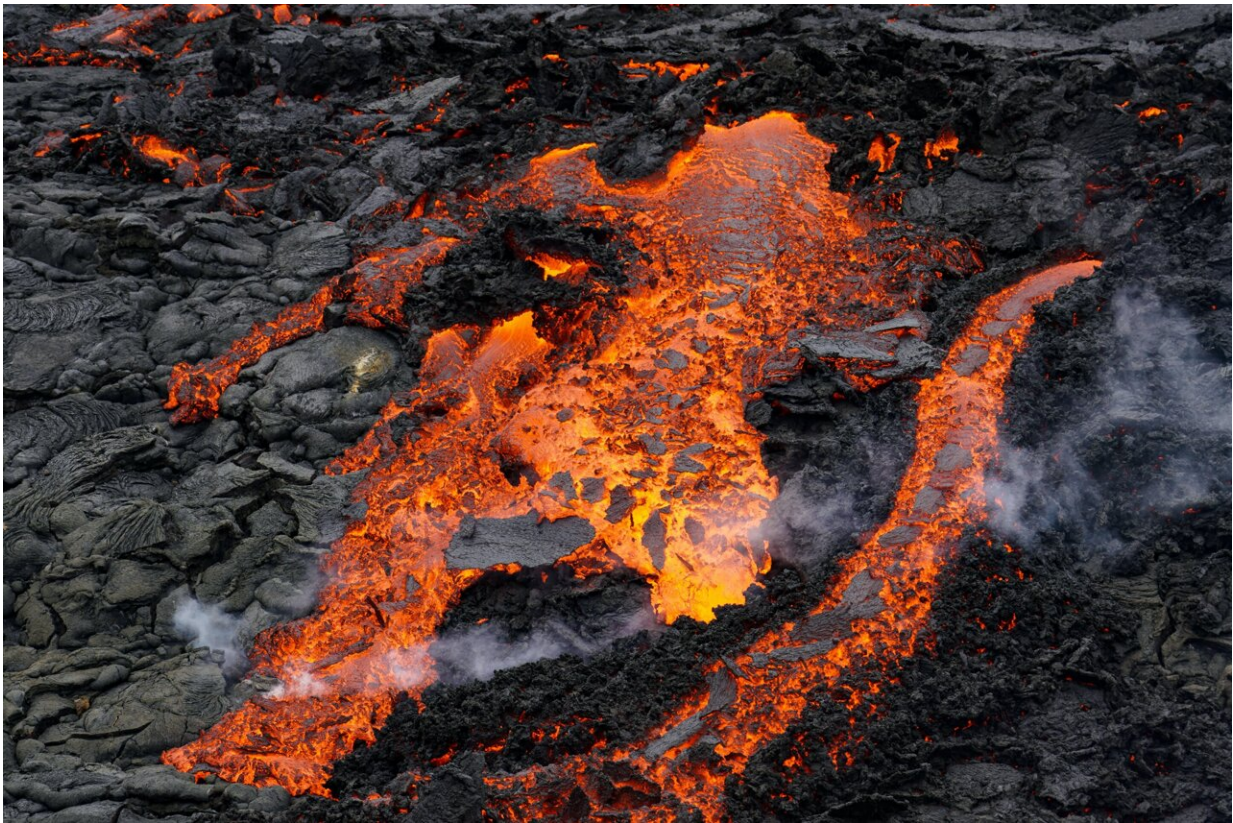


# Q&A: Waiting for an eruption—what do we know about the Iceland volcano?

November 29 2023, by Lilly Matson

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Lava from Fagradalsfjall volcano, Iceland. Credit: Unsplash/CC0 Public Domain

Icelanders are no strangers to volcanic eruptions, but right now the country waits in a state of limbo.

"Iceland is a unique place in the world that's tearing itself apart," says Professor Martin Van Kranendonk, a geologist from the UNSW School of Biological, Earth & Environmental Sciences.

"It's literally splitting apart as a result of powerful forces down beneath the surface of the Earth's crust, that's driven by convecting material in the mantle. Iceland is sitting on the division between the North American and the European tectonic plates."

Small earthquake tremors were first recorded in Iceland's Reykjanes peninsula in late October. Since then, the Icelandic Meteorological Office has been recording more than 1,000 [small earthquakes](#)—or "earthquake swarms"—a day, with an initial warning that the Fagradalsfjall volcano was "[significantly likely](#)" to erupt.

The town of Grindavík, with a population of about 2,800, was evacuated on 11 November, and residents have no idea of when they'll be able to return home.

While the rate of earthquakes has reduced over the last week, and the risk of an eruption appears to be decreasing, Grindavík and the rest of the world are watching and waiting.

"We live on a dynamic planet," says Prof. Van Kranendonk. "What that actually means is that the ground can shift and change, and when it does, we have to be ready to act."

## **What's the current situation?**

Iceland is one of the most tectonically active places on earth, with 33 active volcano systems.

"Iceland is part of ocean floor that has broken through the water," says

Prof. Van Kranendonk. "This kind of volcanism is usually kilometers underground, and while these kind of eruptions happen every day, they are usually occurring under the water's surface."

The country is famous for its geothermal heat. Iconic landmarks, such as the Blue Lagoon, are created by boiling magma that sits just below the Earth's surface.

"You go to Iceland and 90% of the time it's quiet and stable, but deep down these forces are continuing, and they eventually produce [volcanic eruptions](#)," says Prof. Van Kranendonk. "And at this particular moment, some of that magma is starting to make cracks that are reaching the surface, and it's very close to coming out."

The small earthquake tremors experienced in Grindalvík are not like the large destructive earthquakes that we have seen in Italy, the west coast of the Americas or the Himalayas that occur very deep in the crust. Instead, the earthquakes seen in Iceland are within a few 100 meters of the surface.

"But these earthquake swarms have created big tears and gaps across roads, houses and valleys—the island is actually tearing itself apart. These cracks will allow liquid magma to come up to the surface, and likely in a short time, that will erupt and start to make a pretty spectacular volcanic eruption," Prof. Van Kranendonk says.

## **How do you monitor potential volcanic activity?**

The fissures in the ground caused by tectonic movement are up to a meter deep in Grindalvík.

But the signs of a possible eruption are not always so clear cut. In cases where the signs of an eruption are not visible, advanced monitoring

techniques have been installed.

"One of the places where that's been applied is in Yellowstone. Yellowstone is another place where there's a lot of geothermal heat and energy, driven by magma that is very close to the surface," says Prof. Van Kranendonk. "What they do there is measure the tilt of the ground with sensors."

This degree of movement is not something you can see: for example, the land could rise by 10 centimeters on one side and drop by 5 centimeters on the other side, over a distance of 50 kilometers, explains Prof. Van Kranendonk. "And if the authorities measured a change like that, then they would have to start to think about the safety of visitors."

While in Grinalvík there are distinct signs of a possible eruption, the details about the exact time and scale of a volcanic eruption are far hazier.

"The tricky part in these situations is being able to predict exactly where and when," says Prof. Van Kranendonk. "Because of the very discrete linear fissures in the crust, they have a good idea of the avenue the eruption could happen, but as it's a fluid interacting with a hard crust, you don't know exactly where the major breaks are going to be."

Although the risk of an eruption has decreased, the evacuation zone is still deemed dangerous by civil defense officials, as an eruption could happen with only minutes' notice.

"Taking the precaution to evacuate is the right thing to do because when emergencies happen, roads get jammed and people can't get out," says Prof. Van Kranendonk.

"I think in this case, it's a relatively straightforward risk assessment. In

other places, when the warning signs aren't there, volcanic eruptions can have catastrophic consequences."

## **What is the potential impact?**

When these huge fissures occur in the ground and the eruption starts, they can last up to several months and deliver a large volume of lava that can flow over an extensive area of ground.

"There is the possibility that there will be a very long-lived event, and depending on the shape of the landscape—where the hills and the valleys are—large areas can get covered," says Prof. Van Kranendonk. "The famous Blue Pools that have been such a tourist draw are in low lying areas, and if the lava starts to flow that way, they may be lost forever."

But the magnitude of such a volcanic eruption could have a global impact.

The 2010 eruption of Eyjafjallajökul, in southern Iceland, projected a huge amount of ash into the atmosphere and caused a significant disruption to international travel, with over 10 million travelers stranded.

"If it's a really big eruption it's going to pump a lot of gases into the atmosphere, and then that can actually have an impact on our global climate," says Prof. Van Kranendonk. "We've known from previous big volcanic eruptions that there can be a long-lasting cooling effect."

If a gaseous eruption does happen, the impact on those living locally can also be very serious. "The high concentration of gases released by a volcano can be lethal on its own. And so that can sometimes warrant a larger evacuation, but that would be monitored very closely, on an hour by hour, minute by minute basis."



## Can anything be done to reduce the damage of a volcanic eruption?

Last week, Icelandic authorities said that they were [considering pumping water](#) onto any lava to cool and divert it.

"Volcanic eruptions are pretty big forces of nature. And they require major engineering programs to affect them in any way," says Prof. Van Kranendonk.

"You can divert flows to some degree. And depending on how steep the topography is, you may be able to direct where the lava goes. But if it's a big volcanic system, reducing the damage caused is always a challenge."

Iceland is known for its geotourism and every year visitors go to see magnificent natural sights, including the remnants of past volcanic events. And while there may be a temporary disruption to travel in tourism in the wake of Fagradalsfjall, Prof. Van Kranendonk says that tourists will always come back.

"Tourists will want to understand the threat people are living in every day—it's amazing to see and it's something that ties us to our planet.

"To actually go and see that the planet is a living, breathing, changing thing and that we are here due to its good graces, is always a powerful draw."

The situation with Fagradalsfjall is changing daily. Despite the uncertainty, the state of the volcano is being thoroughly monitored as the country continues to brace for a possible [eruption](#).

Provided by University of New South Wales

Citation: Q&A: Waiting for an eruption—what do we know about the Iceland volcano? (2023, November 29) retrieved 2 May 2024 from <https://phys.org/news/2023-11-qa-eruptionwhat-iceland-volcano.html>

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