

Secrets of 'Gateway to the Underworld' Threatened by

Russia-Ukraine War

BY PANDORA DEWAN ON 6/20/23 AT 2:14 PM EDT

A collapsed hillside in Siberia might hold the secrets to what life was like on Earth more than 600,000 years ago, but since the outbreak of the Russia-Ukraine war on February 24, 2022, the site has become largely inaccessible to Western researchers.

"It was a huge, huge disruption to all of our science and also our long-standing cooperation with Russian institutions," Thomas Opel, a paleoclimatologist at the Alfred Wegener Institute in Germany, told Newsweek.

The Batagay megaslump, known to locals as Siberia's "gateway to the underworld," is the largest landslide of frozen earth on the planet, stretching over an area of 80 hectares.

"The first time I looked into this giant slump it was just mind-blowing," Opel said. "In the summertime, when I was first there you could really see and listen to the changes. There was this constant dripping of meltwater, and huge chunks of [frozen earth] would just break off the headwall and fall down. So you could just really hear how this site was changing over time."

The cause of the slump is unclear, but researchers believe it was likely initiated by deforestation and heavy machinery. By disturbing the insulating layers of vegetation at the slump's surface, heat was able to penetrate deep into the soil, causing the buried permafrost to thaw.

"With climate change, it's much more likely that features like this can develop," Opel said.

Because this particular permafrost has a high ice content, exposing it to heat caused the entire structure to collapse. As more of the ice has melted, the crater has been able to grow into what is now described as a "megaslump."

"This is the first time that a frost of that age was really dated somewhere in Siberia," Opel said. "When we got the dating results back from our samples, we were so surprised. We thought 'Oh, wow, this is really old.'"

Using two dating techniques, the team was able to estimate the age of the permafrost at more than 600,000 years.

"From my background as a paleoclimatologist, this is really exciting," Opel said.

"While it's not really surprising that that kind of old permafrost exists, it is usually buried deep in the ground, and you can't really access it. At this site, we can take samples from the permafrost that has developed more than 600,000 years ago and really work on the reconstruction of the climate and environment at that time."

The slump is a continually moving system that Opel said is retreating roughly 100 feet every year.

"Ultimately that will retreat until it reaches the bedrock, and then there will be no ice-rich material anymore that we can sample," he said. "But nobody knows when that will happen. It could happen in 10 years, 50 years, or 100 years."

However, after visiting the slump in 2017 and 2019, this time-sensitive resource has become inaccessible to Opel and his team.

"Originally it was planned to go there again, but then the Russian war against Ukraine happened and now everything is frozen and official relations to Russian institutions and researchers are not really existent anymore," Opel said.

But Opel and his team have continued to use the data from previous visits to gain new insights from the ancient soil. The progress was reviewed in a paper published in the journal of Permafrost and Periglacial Processes on May 30.

There are many ways to gather information from ancient, frozen dirt.

"We can track past temperatures using stable isotopes of oxygen and hydrogen in the ice in the permafrost, so they give us information on past winter temperatures," Opel said. "But we can also do all kinds of paleoecology."

This includes everything from pollen analysis to uncovering the remains of ancient animals.

"There were some spectacular finds—for example, a baby horse from the last Ice Age," Opel said. "Colleagues of mine have also started to analyze the ancient DNA contained in the sediment, which allows us to not only reconstruct the vegetation of the time but also the entire ecosystem."

The slump might also reveal how ancient permafrost survived through previous warming periods, with implications for the planet today.

"We know that this really old permafrost survived at least two really, really hot or warm periods in the past, so the question now is how the present-day permafrost will react to warming in the future," Opel said.

Thawing permafrost can have significant effects on the stability of the planet. Firstly, about 1,700 billion tons of carbon—thought to be sequestered in this frozen soil—will be released into the atmosphere as it thaws. Secondly, disease-causing microbes that have been locked in the soil for millennia might begin to emerge as the soil thaws.

The impact of the Batagay megaslump on Earth's climate systems is so far unclear, but Opel said that he and his team were working to uncover the effects.