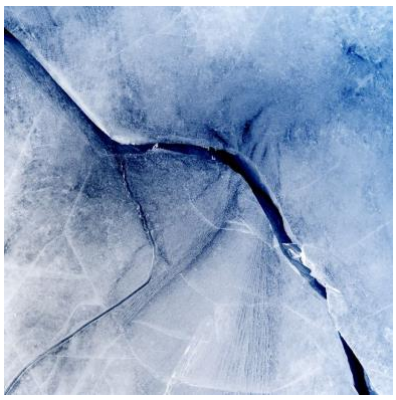
POPULAR MECHANICS

It’s Frostquake Season: Here’s What You Need to Know About the Mysterious Wintertime Threat



Cyroseisms, or seismic events that happen when groundwater freezes and expands, are becoming more common with climate change.

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Around midnight on Christmas Eve in 2013, residents around the Toronto area were startled to hear loud cracking sounds coming from outside their homes. Some called 911, while others took to Twitter to report a house-shaking bang, wondering if a tree had fallen on their roof, a power transformer had exploded, or a meteor had entered the atmosphere.

A couple days later, meteorologists had pinpointed the cause of the racket. Torontonians had experienced a cryoseism, otherwise known as a “frostquake,” a localized seismic event that happens when temperatures plummet and groundwater freezes. While a frostquake can cause earthquake-like tremors, the weather phenomenon is much less dangerous than its tectonic cousin.

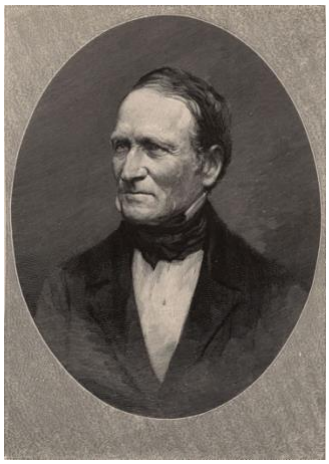
Historically, frostquakes have been rare, with years passing between occurrences. But as the climate changes, scientists speculate they may become more frequent.

Frostquakes: 101

The right conditions for a cryoseism typically begin with a heavy precipitation that soaks the soil. The next ingredient is a rapidly falling mercury, usually from above zero degrees Fahrenheit to subzero temperatures. As the water in the soil freezes, it begins to expand. Just like a bottle of beer will shatter after too long in your freezer, the ground will also eventually burst from the pressure the frozen groundwater exerts. It’s the splitting of the soil that makes such a loud sound, and can even cause slight tremors.

A frostquake is most likely to occur after midnight and before dawn, when temperatures fall sharply in a short amount of time. They’re also more common when there is little to no snow on the ground that can act as an insulating layer for the soil below.

An Elusive Subject



Edward Hitchcock, an American geologist, made one of the first recorded observations of a frostquake in 1819. In a letter to the *American Journal of Science*, Hitchcock wrote of a banging sound that occurred near his home in Deerfield, Massachusetts around 1 a.m. on a cold winter's night. Surrounding neighbors reported their homes and furniture shook during the event, which Hitchcock surmised resulted from the flooding of a nearby stream and the sharp drop in temperatures.

In the 200 years since Hitchcock first wrote about frostquakes, the wintertime phenomenon has been reported in frigid places like Scandinavia, Alaska, and cities and towns around the Great Lakes. Because frostquakes are infrequent and localized, there is a dearth of scientific literature about them. In fact, many researchers rely on social media accounts to figure out when and where cryoseisms are happening.

Coming Soon to a Winter Near You

The occurrence of frostquakes is typically confined to Earth's boreal (or cold) temperate regions, but scientists are still trying to figure out what climate change will mean for the frequency and location of this meteorological marvel. Recent scholarship has concluded that frostquakes could become more widespread.

"With climate change, rapid changes in weather patterns have brought frostquakes to the attention of the wider audience, and they may become more common," Kari Moisio, a senior researcher at the University of Oulu, says in a press release. Moisio was on the research team that completed the first applied study of cryoseisms, which included the installation of two seismic monitors in northern Finland, after parts of the country experienced 26 frostquakes in 7 hours during 2016—some so severe they damaged building foundations and roads.

Seismic recording equipment used in the new study on frostquakes.

The researchers hypothesized that as annual snowfall totals continue to decrease, the ground will be more vulnerable to saturation and freezing, increasing the likelihood of frostquakes. They published their work in the journal EGUsphere late last year.

How to Stay Frostquake-Safe

In 2016, the town of Talvikangas, Finland, experienced a frostquake so intense that a

geologic observing station almost nine miles away detected its tremors. Incredibly, the quake's tremors caused physical damage, including rupturing a local roadway and sending cracks up the walls of a nearby home. The homeowners said it sounded like a truck had crashed into their living room.

According to Sheldon Yellen, the CEO of an international disaster restoration company and an expert on extreme weather, that kind of damage from a frostquake is "very, very, very rare."

Yellen, who has experienced two frostquakes—one in Michigan and the other in Minnesota—says they sound a lot like a house settling. "There's a loud pop … and a crackling afterward." Both happened on notably frigid days. "Oh my gosh, it was cold," he remembers.

The increase of frostquakes due to climate change should not worry the average person, Yellen says, and any damage, if it were to occur, would likely be confined to roads and underground walls.

Still, Yellen suggests that while frostquakes are on your mind, you should prepare for other, more dangerous weather.

"Not every event is going to be a small event like a frostquake," he says. "So where is your family's disaster preparedness plan? And have you checked it twice this year?"

Link to the full story in Popular Mechanics- HERE