

VIDEO: Thawing Permafrost - Changing Planet (6:47)

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VIDEO TRANSCRIPT

ANNE THOMPSON, reporting:

You can't see it, but it's here. In Alaska, in Greenland, and in Siberia. Permafrost: frozen ground that's so cold, it stays frozen even during the summer.

Dr. VLADIMIR ROMANOVSKY (University of Alaska Fairbanks): Permafrost is any earth material underground surface, which at or below zero degrees Celsius for two or more consecutive years.

JOHN DANCY (in 1975 NBC News Clip): Approximately fifty percent of the Soviet Union is on permafrost, ground that never thaws completely.

THOMPSON: Some permafrost has been frozen solid for thousands of years. But not anymore. Because of a warming climate, permafrost is warming, too, challenging the people who build on it and live on it, and accelerating global warming even more.

[MAP] Permafrost makes up nearly a quarter of all the land in the northern hemisphere, about 8.8 million square miles. In some places, like Siberia, the ground is frozen a thousand feet deep or more. In Interior Alaska, the permafrost dates back to the last glacial cycle.

Dr. MATTHEW STURM (U.S. Army Corps of Engineers CRREL): We're at least 30,000 years here.

THOMPSON: Ten miles north of Fairbanks, the U.S. Army Corps of Engineers' Cold Regions Research and Engineering Lab operates a tunnel where scientists can research permafrost: its geological properties and the fossils frozen in its walls. Dr. Matthew Sturm is their chief scientist in Alaska.

STURM: The permafrost tunnel was built in the 1960s. The reasons at the time were to see how do you dig permafrost? But with time, the tunnel – I like to think of it as a phoenix, it keeps rejuvenating itself. There's other new questions we can investigate. So modern questions now have to do with climate change, changes in environmental systems. But we're also interested in how to deal with permafrost, 'cause it's still a big issue in Alaska.

THOMPSON: Alaskans have known for years all about the shifting nature of permafrost. Large parts of the Trans-Alaska Pipeline had to be built above ground on stilts, to prevent the permafrost below from thawing. And Fairbanks, Alaska's second-largest city, is dotted with pockets of permafrost. The sinkholes, collapsed roads and tipping houses are clues to places where it has warmed. But now measurements around Fairbanks show that in many places, permafrost temperatures have risen so much that it is only one degree below freezing. At the University of Alaska's main campus, geophysics professor Vladimir Romanovsky runs the permafrost laboratory. He uses a Russian word to describe thawing permafrost: "Taliks."

ROMANOVSKY: And *talik*, it means "not frozen" in Russian, just simply "not frozen." So it's very important now, because these *taliks* start to develop because of warming in climate, and the development and growing of *taliks* is really an indication of permafrost degradation.

Biuro projektu: Księcia Janusza 64, 01-452 Warszawa edu-arctic2.eu edukacja@igf.edu.pl

Projekt EDU-ARCTIC 2: od badań polarnych do naukowej pasji - innowacyjna edukacja przyrodnicza w Polsce i Norwegii otrzymał dofinansowanie w wysokości ok. 240 000 EUR z Islandii, Liechtensteinu i Norwegii w ramach funduszy EOG. Celem projektu EDU-ARCTIC 2 jest: poszerzenie wiedzy o przyrodzie, geografii, zasobach naturalnych, specyfice politycznej dotyczącej regionów polarnych oraz zwiększenie świadomości w zakresie zagadnień środowiskowych i zmian klimatu, zwiększenie zainteresowania kontynuowaniem edukacji i kariery STEM dzięki zwiększeniu wiedzy o badaniach naukowych i ich miejscu we współczesnym świecie; przybliżenie młodym ludziom możliwości kariery naukowej; wprowadzenie innowacyjnych narzędzi i efektywnych metod nauczania przedmiotów ścisłych w szkołach.

THOMPSON: Romanovsky has planted forty-five boreholes deep in the permafrost all over Alaska. The results show that permafrost temperatures have warmed as much as two degrees Celsius in the last 20 to 30 years.

[GRAPHIC] Normally, because of the heat emanating from the center of the Earth, permafrost should be warm at the bottom, and get colder as it reaches the surface. But exactly the opposite is happening. Romanovsky's data show that since the mid-1980s, the temperatures in permafrost have gotten warmer as they creep towards the surface.

ROMANOVSKY: And this warming is a hundred percent effect of changing climate, warming in air temperature.

THOMPSON: Thawing permafrost can take a toll on buildings and even force entire communities to relocate. But an even bigger cause for concern is the powerful greenhouse gas that gets released from thawing permafrost. Katey Walter Anthony was a young assistant professor when she made the discovery that permafrost thawing under lakes in Siberia and Alaska releases high levels of methane into the air. Methane is a greenhouse gas that's 25 times stronger than carbon dioxide.

KATEY WALTER ANTHONY (University of Alaska Fairbanks): If you look at the shore, you can see that there are lots of trees that are falling in the lake, and they're dying. What's happening is the permafrost is thawing, and the ice that was in the ground, when it melts, causes the ground surface to collapse. Then the forest falls in, and the organic matter – dead plant and animal remains that were in the permafrost – thaw out in the bottom of the lake. Microbes decompose it, and it generates methane. And methane doesn't like to stay in the water, in solution. It forms bubbles, and those bubbles make their way to the surface.

CLIP: Katey Walter Anthony sets methane on fire, she and students cry, "Whoa!"

THOMPSON: Katie's dramatic videos of methane being released from frozen lakes have gotten her – and methane – a lot of attention.

WALTER ANTHONY: So I have seen now hundreds of lakes, thousands of lakes. And some lakes can release hundreds to thousands of times more methane than other lakes. And the most important factor is permafrost. If permafrost is around the lake and thawing beneath the lake, the lake will emit a lot of methane.

THOMPSON: Even small releases of methane from the soil under these frozen lakes can make permafrost thaw more. That can help form more lakes that will release more methane, and so on and so on. Back in Vladimir Romanovsky's lab, his models predict permafrost warming all over Alaska in the near future.

ROMANOVSKY: By the end of the century, only the permafrost on the North Slope and maybe in Brooks Range will be stable. Rest of it will be pretty much thawing by the end of the century.

THOMPSON: Scientists at the National Snow and Ice Data Center in Colorado estimate that if global warming continues at current rates, up to two-thirds of the earth's permafrost could be gone by the year 2200, vastly increasing the amount of greenhouse gases in the atmosphere.

There's little chance that all the world's permafrost will thaw at once, and an even smaller chance that deep permafrost can thaw rapidly. But just ask someone living in the far north if permafrost is warming, and they'll show you. All they have to do is look down.