Frozen peatlands could pass climate tipping points sooner than thought

We had calculated that frozen peatlands would remain stable until the 2070s, but a new analysis suggests they may begin thawing as early as the 2040s

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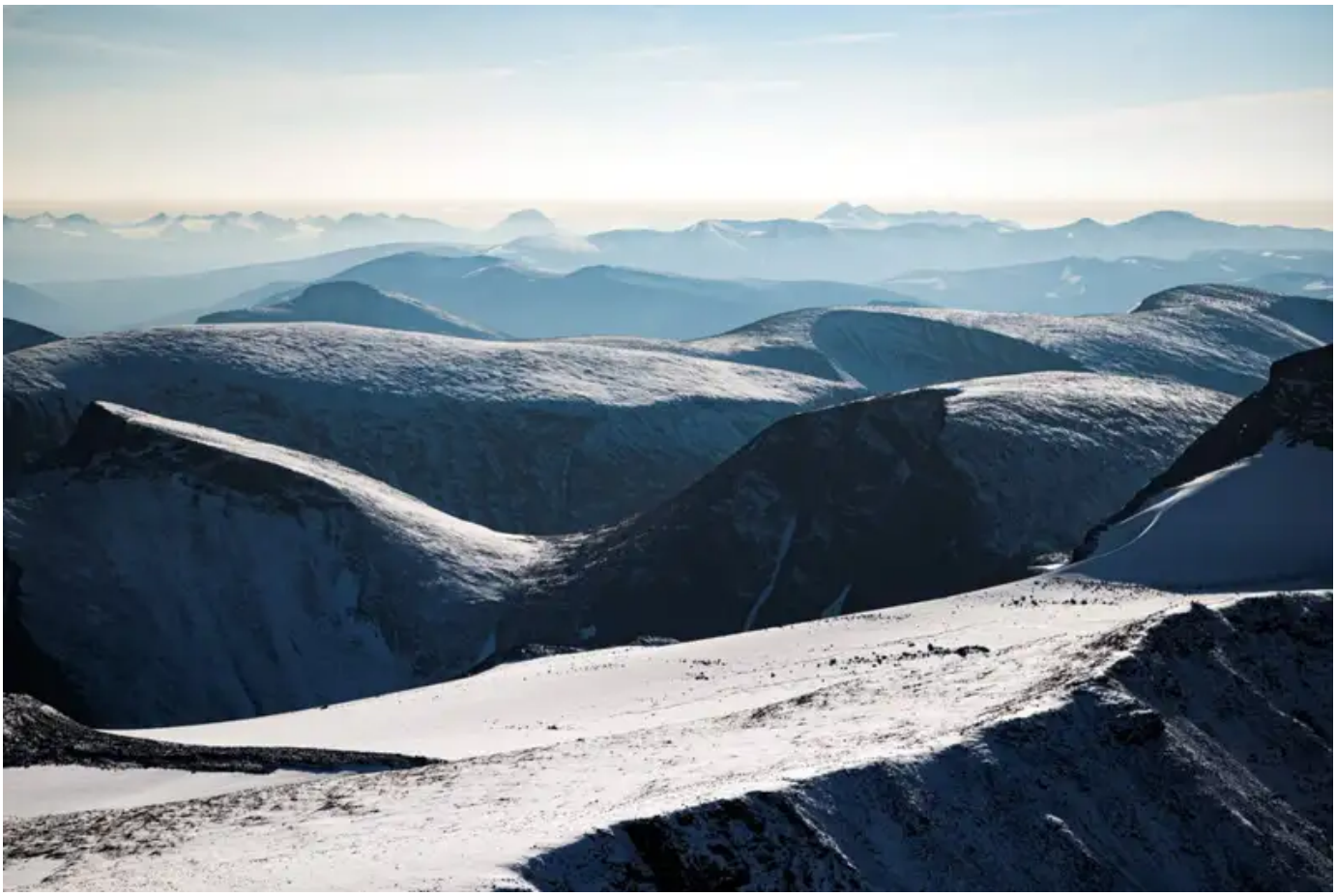
By **Adam Vaughan**



Scandinavian mountain range, above the Arctic Circle in northern Sweden
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Vast expanses of peatland in frozen soil across northern Europe are expected to pass a climatic tipping point far sooner than previously thought, threatening to release billions of tonnes of carbon that would accelerate climate change.

Global warming has already caused Arctic permafrost to start releasing more carbon than it absorbs. But Richard Fewster at the University of Leeds, UK, and his colleagues have pinpointed in new detail when and where local climates will become unsuitable for peatland locked away in permafrost.

Finland, Norway, Sweden and a small part of north-west Russia will become too warm for permafrost peatland by the 2040s in all possible future carbon emissions scenarios considered by the team, compared with 2070 as thought previously. In the three higher-emission scenarios, most of Western Siberia will pass the same threshold in the 2090s.

This would leave 39.5 billion tonnes of carbon, twice the amount contained in Europe's forests, at risk of being released into the atmosphere and turbocharging climate change. The vast majority of that carbon is locked up in western Siberia, which has much older and larger peatlands than the other areas included in the study.

"We're looking at a huge carbon store that's undergoing rapid changes. A huge amount of this carbon could be released into the atmosphere," says Fewster. However, he cautions against fatalism and says a key message is the importance of the choices countries make today to tackle climate change. Under the lowest-emission scenario, about 14 billion tonnes of carbon could still survive in the far north of Western Siberia. In the higher-emission scenarios, this will eventually be released.

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Fewster and his colleagues arrived at their findings after building a baseline of suitable climates for permafrost peatland stores across a region of northern Eurasia, leaving out places such as Eastern Siberia where detailed maps of peatland are patchy. They then used state-of-the-art climate models to project how long areas would remain cool enough to support frozen peatlands.

One caveat is that it remains unclear how long the carbon in the frozen soils will take to reach the atmosphere once climatic tipping points are reached. In places where it has already become too warm, observations show permafrost can sometimes thaw quickly in two years, but in other cases can take a decade, says Fewster. Getting a better handle on that rate will be the subject of future research.

"Peatlands are the most important terrestrial store of carbon on the planet, and if, as this research suggests, we risk seeing a significant proportion of them turn from sinks to sources of carbon, we are in real trouble," says Christian Dunn at Bangor University, UK, who calls the study "depressingly fascinating".

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Article amended on 15 March 2022

We clarified that Arctic permafrost is releasing more carbon than it absorbs

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