Testing waters of East Siberian Arctic Ocean suggests origin of elevated methane is reservoir located in Laptev Sea

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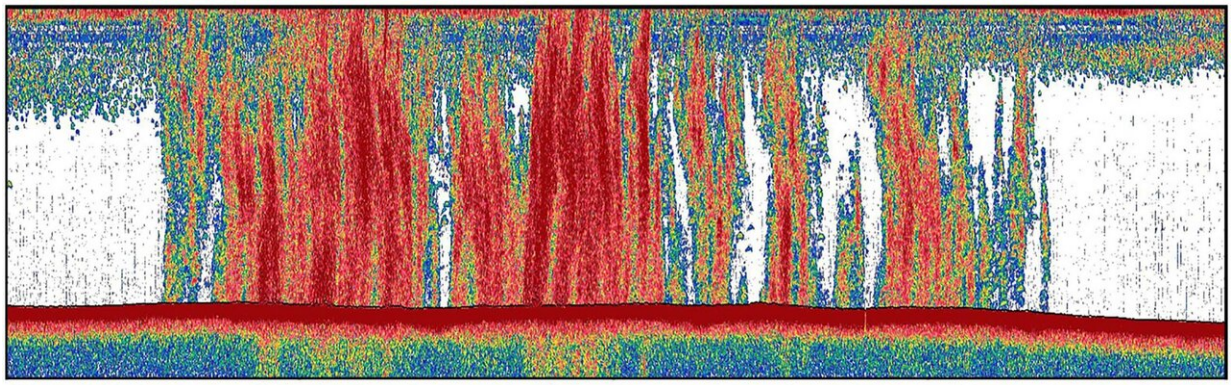

Echosounder showing methane bubbles rising from sediment to the ocean surface in the Laptev Sea, Arctic Ocean. Credit: Denis Chernykh (Pacific Oceanological Institute, Vladivostok, Russia)

An international team of researchers has found evidence implicating a deep underground reservoir as the source of high levels of methane in the waters of the East Siberian Arctic Ocean. In their paper published in *Proceedings of the National Academy of Sciences*, the group describes testing three isotopic forms of dissolved methane in the waters.

Planet scientists have become concerned about methane released into the atmosphere from the East Siberian Arctic Ocean. Such emissions have

been found to play a role in climate change. Prior research has shown that methane is better at holding heat in the atmosphere than carbon dioxide. Other prior research has shown that the Arctic is growing warmer faster than other parts of the planet. This is believed to be due to melting of permafrost, which holds a very large amount of sequestered carbon. In this new effort, the researchers sought to learn more about the source of methane emissions from the ocean.

The work involved first obtaining water samples from regions of the East Siberian Arctic Ocean. Each of the samples then underwent triple-isotope-based fingerprinting. Doing so showed that only a small amount of the methane was coming from shallow microbial sources—the rest was coming from what the team believes is a very large, deep thermogenic reservoir. The researchers also believe the reservoir is located beneath the Laptev Sea; a portion of the East Siberian Arctic Ocean situated north of the eastern part of Russia.

Prior research has suggested that there are very large deposits of methane located in many places beneath the world's ocean floors. Prior research has also suggested that if the ocean water is warmed, some or all of the methane can be released. Researchers have found that such releases can sometimes result in pressure building up as the gas makes its way into unstable parts of the ocean floor. And that can lead to seepage or sometimes explosive events as the gas is suddenly released up through the water and to the surface.

Planet scientists are concerned that warming waters, in addition to a warming atmosphere, could accelerate the release of methane into the air, resulting in accelerating warming, which could in turn lead to accelerated permafrost melting. This cycle could lead to warming the entire planet at a faster pace than has been predicted.

More information: Julia Steinbach et al. Source apportionment of

methane escaping the subsea permafrost system in the outer Eurasian Arctic Shelf, *Proceedings of the National Academy of Sciences* (2021). DOI: 10.1073/pnas.2019672118