

Origin of Massive Methane Reservoir Identified Deep Inside the Ocean Floor



Scientists have discovered evidence of a massively distributed reservoir of methane formed by chemical reactions deep inside the ocean floor. Abiotic methane – created in reactions that do not involve organic matter or living creatures – has long been known to exist buried in the seabed and released via deep-sea vents, but while the gas is plentiful in the atmosphere where it's produced by living things, the source of methane at the seafloor was a mystery. "Identifying an abiotic source of deep-sea methane has been a problem that we've been wrestling with for many years," says marine geochemist Jeffrey Seewald from the [Woods Hole Oceanographic Institution](https://www.whoi.edu/) (WHOI). The findings of the researchers are reported in the Proceedings of the National Academy ([PNAS](https://www.pnas.org/)).

Pockets of Methane

In the [study](#), Seewald and fellow WHOI researchers analysed rock samples from the Earth's upper mantle and lower oceanic crust collected from across the ocean: 160 rock pieces in total, sourced from numerous, along with subduction zones – such as the Mariana forearc – and uplifted sections of oceanic crust called ophiolites. In almost all the deep-sea locations sampled, spectroscopy and microscopy techniques revealed the rocks contained pockets of methane, often along with hydrogen.

Evolution of Primitive Organisms

On Earth, deep-sea methane might have played a critical role in the evolution of primitive organisms living at hydrothermal vents on the seafloor, Seewald explains. Elsewhere in the solar system, on places like Jupiter's moon Europa and Saturn's Enceladus, methane produced through the same process could provide an energy source for basic life forms.

Photo: The manipulator arm of the remotely operated vehicle Jason samples a stream of fluid from a hydrothermal vent. The fluid contains gases that are in liquid form because of the high pressure of the deep ocean. Photo by Chris German/WHOI/NSF, NASA/ROV Jason 2012, © Woods Hole Oceanographic Institution.