

# Previously unknown sink for methane discovered deep in granitic rock

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A study published in *Nature Communications*, April 2015, by Henrik Drake of Linnaeus University, Sweden, and colleagues, explores a previously unknown sink for the greenhouse gas methane at great depth in fractured granitic rock. The methane in the granite is consumed through microbe-mediated anaerobic oxidation, a process dominantly described from marine seabeds where it significantly mitigates the escape of methane to the atmosphere. However, the methane oxidation deep in the granite shows several intriguing differences compared to marine seabeds.

What makes the methane oxidation in the energy-poor fractured granite unique compared to other environments is the previously unseen magnitude of  $^{13}\text{C}$ -depletion in the carbonates precipitated during the methane oxidation. The isotopic composition of co-genetic sulphide and specific biomarkers (e.g. fatty acids) preserved within the carbonates suggest presence of syntrophic consortia of methane oxidisers and sulphate-reducers.

Another unique feature in the fractured granite is that methane formed at shallow depth and oxidised at several hundred meters depth at the transition to a deep-seated sulphate-rich saline water. This spatial distribution of methane and sulphate is completely opposite to what is observed during [methane oxidation](#) in near surface environments such as seabeds.

This previously unknown methane-trapping process of surficial methane

at the transition to a deep sulphate-rich water can theoretically be widespread in the sparsely investigated deep terrestrial landscape. This process can thereby be of importance for the carbon cycling within the upper crust and for preventing methane to reach the atmosphere.

The results are presented in the article "Extreme  $^{13}\text{C}$ -depletion of carbonates formed during oxidation of biogenic [methane](#) in fractured granite" in *Nature Communications* (open access).

**More information:** "Extreme  $^{13}\text{C}$  depletion of carbonates formed during oxidation of biogenic methane in fractured granite." *Nature Communications* 6, Article number: 7020 [DOI: 10.1038/ncomms8020](https://doi.org/10.1038/ncomms8020)

Provided by Linnaeus University

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