

Microbial life in areas with high CO₂ content near Horseshoe Lake. Model for Mars.

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The atmosphere of Mars contains 95 % CO₂, 2,7% N₂, 1.6% Ar, 0.13% O₂ and traces of other gases. Martian polar caps consist almost exclusively out of carbon dioxide.

Assuming similarity between life on Mars and Earth we decided to explore terrestrial extreme environments with high concentrations of carbon dioxide that can provide us with hints how to detect life or its remnants on Mars.

Mammoth Mountain in California's Sierra Nevada is a large volcano with a long history of volcanism (more than 200,000 years). After a 1989 earthquake areas of tree kill began to appear in 1990 in Mammoth Mountain in several locations, including Horseshoe Lake. It was shown that the concentration of carbon dioxide in soil gas phase there could be as high as 70%. We collected soil samples from surface and depth 10 cm in 3 locations near Horseshoe Lake, where trees were dead, and no vegetation was observed on the surface.

Our preliminary data showed that the concentration of microorganisms in soil from areas with elevated content of carbon dioxide is very low – a. c. 10000/g. We tried to isolate pure culture of organisms capable of living under high CO₂ concentration. We were able to isolate so far only few different species. Also we created library of clones containing 16SRNA genes from environmental samples. Sequencing of 16SRNA genes and their phylogenetic analysis is under way.