

Climate change in deep time

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Climate change has a profound impact on the ocean chemistry and the marine organisms, leaving behind an important record in the marine sediments. Therefore, climate reconstruction of Earth's history has mainly focused on sedimentary archives and the data available therein. The discovery of a fossil record in the igneous oceanic crust opens up an important, and yet unexplored, microbial habitat on Earth. Possibilities within this archive, can result in new and novel climate research, enhancing our understanding for Earth's history in deep time. Thus, the question we ask is:

Could igneous oceanic crust be used as a climate archive?

Our curiosity led us to explore if the deep biosphere might be affected, and could hold a climate record; similar to what is true for the marine biota and fossils. Precipitation of minerals in vesicular basalt are dependent on hydrothermal fluids. Therefore, it seems reasonable to focus on pillow lavas and the following aspects: 1) **Stable isotopes** of C and O in carbonate minerals, 2) preserved **elemental changes** during fossilization, and 3) the **diversity and abundance in biota** within the deep biosphere.

Our data indicate a possible correlation with past studies, where similar trends for C and O isotopes from calcite can be seen. A varying abundance of fossilized microorganisms in samples covering the K/T boundary is also observed. To confirm any connection between the deep oceanic crust, its biosphere, and our climate, more work is needed.