

Have the remnants of the Proto Atlantic any use as fuel? Some implications for the early history of the Earth, early life and other things

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Mantle sections of the Bay of Islands Ophiolite complex are remarkably un-serpentinized but are presently undergoing serpentinization as groundwater drains through the peridotites. Calcium in diopside does not fit into serpentine minerals and is expelled as dilute solutions of $\text{Ca}(\text{OH})_2$ at springs and seeps with pHs between 8 and over 11. Calcite tuffa forms by reaction with atmospheric CO_2 . Fossil springs are marked by weathered tuffa, some of which is now dolomite. It may be possible to study paleohydrology by dating the tuffa (^{14}C). Reducing conditions during serpentinization results in the local generation of H_2 from water. The gas presumably escapes from the earth which becomes a little more oxidized, an effect that may have been more important during the Archean when there were more ultramafic rocks at the surface.

A diverse microbial community lives in the springs and streams. Circumstantial evidence suggests that the microbes help to precipitate the tuffa sometimes as microstromatolites. Their tolerance to high alkalinity may mean that they are descended from microbes that lived in the ancient alkaline oceans.

Many geomorphic features, such as protalus lobes with a high angle of repose, prove to be stable because they are cemented with calcite.

Ironically, the survival of so much olivine for more than 450 Ma may be due to serpentinization itself, though stratigraphic and tectonic processes are also involved.