

## **Do all biogeochemical cycles work at elevated temperatures that exist at deep-sea hydrothermal vents?**

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Many investigations carried out at deep-sea hydrothermal vents resulted in the isolation and description of novel species and genera, belonging to both *Archaea* and *Bacteria* domains. For all these organisms, metabolic features were described (carbon sources, electron donors and acceptors), and temperature ranges for growth were determined. Molecular diversity studies were also performed but brought limited informations about energetic metabolisms, although several functional genes were detected from environmental samples. However, measurements of microbial activities with respect to the main biogeochemical cycles (C, N, S, etc) are very rare and concern almost exclusively the cold parts of the ecosystems. Consequently, the question of the complete functioning of biogeochemical cycles at elevated temperatures (>60°C) is still open.

According to metabolic features of newly described deep sea vent microorganisms, it is possible to identify the part of biogeochemical cycles for which microorganisms able to perform the metabolism corresponding to this portion do exist.

For instance, in the case the nitrogen cycle, thermophilic nitrate-reducing organisms have been reported but no ammonium oxidizers are known for such temperatures. Do the nitrogen cycle work at temperature above 60°C ? We do not know yet; and similar questions remain unsolved for the other cycles.

The aim of this presentation is to discuss the biogeochemical cycles at elevated temperatures, by using available microbial diversity data. Gaps will be pointed out and research strategies will be presented for discussion and further action.

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