

Gas chemistry and carbon cycling at hydrothermal systems along the Mid-Atlantic Ridge: time- and space-referenced biogeochemical and isotopic investigations

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The study is part of the SPP 1144 dedicated to investigate geological, geochemical, biogeochemical, and biological transformation processes at spreading axes with emphasis on variations in time and space by a close co-operation between working groups rooted in the fields of mineralisation – petrology, geochemistry of vent fluids–gas chemistry, biogeochemistry–organic geochemistry, and microbiology-zoology. Areas of investigation are the regions at 15°N and at 4° to 11°S, Mid-Atlantic-Ridge (MAR).

Objective is to elucidate the transformation of carbon species and reduced gases brought along by hydrothermal fluids. Three goals are in the focus (i) to understand the biogeochemical transformation processes (sources, sinks, transport) of volatile carbon species and hydrogen (ii) to record abiogenic and biogenic organic compounds present in the vent fluids and plumes with emphasis on their relevance for metal complexation and vent biota (iii) characterisation of extend and relevance of hydrothermal cyclicality by charting the variability in composition of vent fluids in time and space. For this purpose, concentrations and isotope signatures (C, H) of the main reactive gases methane and hydrogen as well as of other components of the carbon cycle namely C₂-C₅ hydrocarbons, polar and nonpolar organic compounds, dissolved organic matter (DOC), CO₂, and biomass are determined. It is aspired to compile a comprehensive data set that allows to combine the identified geochemical and biological processes in model description of the investigated system.