Sulphur isotopic investigation of dissolved and solid sulphur phases in fluids, mineral precipitates, sediments and rock samples from the Mid-Atlantic Ridge

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The ultimate objective of this research project is a qualitative and quantitative understanding of sulphur cycling at mid-ocean ridges. Abundance and isotope results obtained so far for different sulphur forms in liquid and solid samples from the two principal study sites (i.e. Logatchev hydrothermal field and southern MAR sites) provide evidence for inorganic (leaching of mantle sulphur and high-temperature seawater sulphate reduction) and biological (reduction of sulphate and elemental sulphur) cycling of a diverse mix of sulphur compounds, including metastable thiols. Current estimates, in part based on preliminary multiple sulphur isotope data, point to a 30% contribution from recycled seawater sulphate to the overall sulphur budget of hydrothermal fluids. Future work will focus on two different aspects: (a) the determination of multiple sulphur isotopes at different spatial resolutions in order to (i) quantify the different sulphur contributions (i.e. recycled seawater sulphate, leached mantle sulphur, biological sulphur cycling, and (ii) identify the details of sulphur isotope fractionation at mid-ocean ridge hydrothermal settings, and (b) the quantification of sulphur metabolism and associated isotope effects based on culture experiments with organisms cultivated from the vent sites studied.