High- and low-temperature alteration of ultramafic oceanic crust: Mineralogy, geochemistry and isotope characteristics of hydrothermal systems at the Mid Atlantic Ridge between 14° and 15°N

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Hydrothermal deposits may be created as a result of either ultramafic rock-seawater or basalt-seawater reactions. Sampling the Mid Atlantic Ridge between 14°45‘N and 15°05‘N during the Meteor cruise M60/3 has indicated that ultramafic rocks make up a significant proportion of the upper oceanic crust in this area. The ultramafic rocks from the Logatchev hydrothermal field show a remarkable variety of rock types and intensities of alteration, ranging from relatively pristine ultramafic rocks (e.g. orthopyroxenite, peridotite) to lizardite-chrysotile-magnetite or talc-lizardite-chrysotile-magnetite-hematite assemblages. The partial to complete serpentinization of the rocks indicates that reaction of hydrothermal fluids with upper mantle lithologies is a common process. Here we report on the mineralogy of the sampled bulk and clay samples and discuss initial alteration processes investigated during the first phase of the project.

The continuation of the project requested here aims to extend the detailed investigations of the partially to completely serpentinized rocks and sediments. Detailed chemical and isotopic analyses will be done during the second phase of the project. An estimation of the chemical exchange for the different alteration styles will allow us to quantify the chemical changes related to serpentinization. From this study together with the sulfide and fluid data (Herzig, Scholten, Koschinsky) we hope to better define the significance of reactions between seawater and lower crust/upper mantle in global lithosphere-seawater exchange.