What happens to hydrothermal sediment? A diagenetic study along the Mid-Atlantic Ridge

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The role of hydrothermal vents to the chemistry of global oceans is well recognized, and some key elements as trace metals can be scavenged during precipitation and transport/deposition of mineral phases. Where do these freshly formed mineral phases end-up, and what is their fate? Are diagenetic processes significant in terms of altering this signal and releasing some of these elements in the water column? What is the importance of deep sea fauna and bioturbation in modifying O_2 and metal fluxes at the sediment-seawater interface? To answer these questions, sediment cores were sampled in the Mid-Atlantic Ridge during the BICOSE 2 cruise (DOI 10.17600/18000004) onboard RV Pourquoi pas? with the HOV Nautile. Push cores were retrieved at two locations, in the vicinity of TAG Active Mound, and the Snake Pit hydrothermal field. Multi corers were also deployed from the vessel a few kilometers away from both sites. Sediment and pore water analyses were performed to better constrain diagenetic processes controlling the storage and release of trace metals in these peculiar sediments.

The main focus of this study is on iron and sulfur geochemistry, and associated base metals (e.g. copper, zinc) and organic constituents. Since the contribution of pelagic sediment, and/or sulfide minerals eroded from extinct hydrothermal mounds can also obscure the signal recorded in hydrothermal sediments, we use a multivariate approach to determine the nature of vent-derived materials. This approach, combining pore water chemistry and mineral geochemistry will ultimately allow a better reconstruction of hydrothermal activity through sediment analysis.