



Fluids from ultramafic-hosted hydrothermal systems of the Mid Atlantic Ridge - Organics and Life.

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The process of serpentinisation at slow spreading ridges is due to the circulation of seawater in outcropping mantle rocks. The peridotites of the mantle are altered via fluid-rocks interaction generating high CH₄- and H₂-concentrations in the water column. The likely abiogenic origin of the methane has been supported by the isotope-ratio values. This has led to the idea of abiogenic formation of larger organic compounds such as hydrocarbons or key molecules for the origin of life issue. Furthermore, Fisher-Tropsch type reactions might be a likely pathway to the production of these organic. Both thermodynamics and laboratory work support this idea, whilst field data are currently studied. During the EXOMAR cruise conducted by IFREMER, France; hydrothermal fluids from the MAR have been collected at different hot vent sites presenting highly different features (high/low pH, ultramafic/basaltic petrology, etc.). Innovative and efficient techniques have been used to concentrate and extract compounds from the fluids. As such, SPE (Solid Phase Extraction)-GC-MS and SBSE (Stir Bar Sorptive Extraction)-TD (Thermal Desorption)-GC-MS analyses showed the presence of a whole range of organics in the fluids. Mainly hydrocarbons, but also oxygen- and nitrogen-compounds were clearly identified by comparison of recorded mass spectra with library data. In order to establish whether the compounds were biogenic or abiogenic, carbon isotopic ratio measurements have been performed at the Vrije Universiteit Brussel. The $\delta^{13}\text{C}$ values suggest a mix of abiogenic and biogenic carbon for a great majority of the molecules. However, preliminary results indicate a possible abiogenic origin for a few compounds.

This first step allowed us to get an overview of the fluids composition. We are now

focusing on specific compounds in an origin of life perspective. Much effort has been put since to optimise the sample conditioning method in order to separate and concentrate targeted compounds. New methods will be tested during the last SERPENTINE mission to be conducted by IFREMER, France. We are expecting especially better results on the fatty acids. We are hoping as well to detect some origin of life key-compounds. This work is carried out partly within the MoMARnet (Monitoring deep sea floor hydrothermal environments on the **Mid-Atlantic Ridge: A Marie Curie Research Training network**) framework.