Biogenic or abiogenic organics in hydrothermal fluids from ultramafic-hosted vents of the Mid Atlantic Ridge. The first step to the origin of life?

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The process of serpentinisation at slow spreading ridges is due to the circulation of seawater in outcropping mantle rocks. Association of high CH_4- and H_2-concentrations in the water column with the serpentinisation of ultramafic rocks is now well agreed upon. The likely abiogenic origin of the methane has been supported by the isotope-ratio values. This has lead to the idea of abiogenic formation of larger organic compounds such as hydrocarbons or key molecules for the origin of life issue.

Hydrothermal fluids from the MAR have been collected at different hot vent sites presenting highly different features (high/low pH, ultramafic/basaltic petrology, etc.). SPME (Solid Phase Micro Extraction)-GC-MS and SBSE (Stir Bar Sorptive Extraction)-TD (ThermalDesorption)-GC-MS analyses on the extracts have revealed the presence of organic compounds at trace level in the fluids. Mainly hydrocarbons, but also oxygen-, nitrogen-, sulfur- and phosphoruscompounds 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. Despite a lack of resolution on the major part of the spectra, quite a few peaks were separated well enough to get reliable $\delta^{13}C$ values. These suggest a mix of abiogenic and biogenic carbon for a great majority of the molecules. However, preliminary results show that some of the compounds may have been generated from mineral chemical reactions. We propose that catalytic processes may be involved in the reaction pathway for the formation of organics from thermogenic carbon. Outline for the future is to better separate the chromatographic peaks in order to get more accurate $\delta^{13}C$ data. This work is carried out partly within the MOMARnet (**MO**nitoring deep sea floor hydrothermal environments on the **M**id-**A**tlantic **R**idge: A Marie Curie Research Training **NET**work') framework.