Lipid biomarker distributions in deep sea hydrothermal vent fields of the Central and Southeast Indian Ridges, and Mid-Indian Basin

Unyime Umoh[1,2*] and Li Li[1]

1. State Key Laboratory of Marine Geology, School of Ocean and Earth Science Tongji University Shanghai, China
2. Atlantis Oceanographic Society, Akwa Ibom State Nigeria

unyimeumoh@tongji.edu.cn

Abstract

Forty-two years after the first discovery of deep-sea hydrothermal vents at the Galapagos Rift in 1977, hydrothermal exploration of mid-ocean ridges for either its economic resources or biological standpoint is increasing in the last decades. The hydrothermal vent deposits are known to harbour a diverse assemblage of hyperthermophilic, thermophilic and mesophilic archaea and bacteria, which gain energy and metabolic substrate directly from the hydrothermal fluids. Here, we explore the impact of hydrothermal activity, investigating whether hydrothermal microbial signatures are exported to surrounding deep water and marine sediments or if such organisms serve as an important source of organic matter in the study area. Series of *n*-alkane hydrocarbons ranging from C_{16} – C_{35} were detected with long chain predominance of no carbon number preference. Also, even-numbered alkenes were detected ranging from C_{16} – C_{34} maximizing at low molecular. Sulfate-reducing bacteria (e.g. *Desulfatibacillum aliphaticivorans*, *Desuolfatibacillum alkenivorans* and *Desulfatiferula olefinivorans*) which are abundance in hydrothermal vent fields of the Indian Ocean are known to synthesize low molecular (< C_{23}) *n*-alk-1-ene. Furthermore, varying concentration of GDGTs were recorded with predominance of iso-GDGTs. Long chain alkenones mainly $C_{37:3}$ and $C_{37:2}$ showed significance concentrations in the sediment. Sterols, *n*-alkanol and *n*-alkanoic acids were also detected at varying concentrations. Generally, high *n*-alkane and *n*-alkene concentrations were found at deep water sites close to, and/or hydrothermal vent sites suggesting an impact of hydrothermal activities to deep seawater organic matter especially with increasing concentration towards the bottom.