Title: lipid biomarker compounds in deep-sea hydrothermal system of Central and Southeast Indian Ridges

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Background

Forty-one years after the first discovery of deep-sea hydrothermal vents at the Galapagos Rift in 1977 (Corliss et al., 1979), hydrothermal exploration of mid-ocean ridges (MOR) for either its economic resources or biological standpoint is increasing in the last decades. Recently, many scientific studies including geological, geochemical, and biological studies have been conducted at MOR hydrothermal vent sites, providing important insight into the effect of MOR hydrothermal activity in deep ocean (e.g. German et al., 2015; Iyer et al., 2017; Ji et al., 2017). However, most of these studies in hydrothermal fields are based primarily on economic mineralogy, biodiversity and inorganic biogeochemistry with few reports on organic compounds focusing on methane and total organic matter. Thus, the organic geochemistry of the MOR hydrothermal system remain poorly understood, and it appears highly uncertain the impact of hydrothermal fluid in carbon cycle to global hydrothermal systems. Here, the primary aim of this study was to examined series of organic compounds in deep sea waters, normal marine and hydrothermal vent sediments to understand the extent of impact of hydrothermal activity in deep sea organic matter (OM) source in Central (CIR) and Southeast Indian Ridges (SEIR).

Outcome

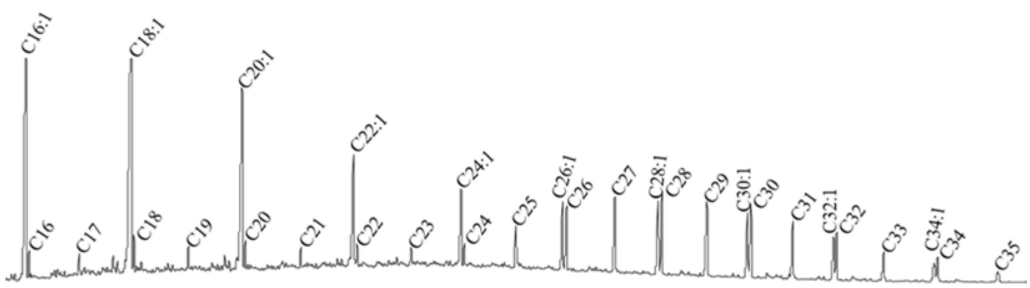

Figure 1: Gas chromatogram showing n-alkane and n-alk-1-ene

Homologous series of n-alkane and only even-numbered n-alk-1-ene were detected in deep sea waters collected within the vent sites (Fig. 1). Glycerol dialkyl glycerol tetraethers (GDGTs; Fig. 2) detected in our samples were similar to observations in normal marine sediments. However, branched GDGTs (brGDGTs) and traces of novel H-tetraethers (H-isoGDGTs and H-brGDGTs) that are usually absent in open marine sediments were found in some hydrothermal vent sediment depths but absent in reference marine sediment indicating in situ production. Long-chain alkenones mainly $C_{37:3}$ and $C_{37:2}$ were also present at low abundances.

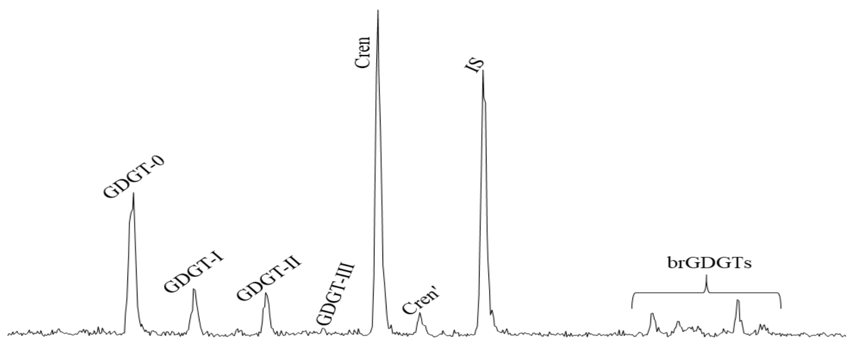

Figure 2: GDGTs distribution

Conclusion

It seems like hydrothermal archaea and sulfate-reducing bacterial are the main sources of organic compounds in the study area, but there is also possibility of abiogenic organic matter sources. However, the impact of megaplumes appears to be minor in deep sea organic matter distributions.

References

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