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Validation study of terrestrial biomarker proxy (BIT index) in the Gulf of Lions (NW Mediterranean)

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The BIT (Branched and Isoprenoid Tetraether) index (Hopmans et al., 2004) is based on the relative abundance of non-isoprenoidal glycerol dialkyl glycerol tetraethers (GDGTs) derived from organisms living in the terrestrial environment (Schouten et al., 2000) versus a structurally related isoprenoid GDGT "crenarchaeol" which is produced by marine Archaea (Sinninghe Damsté et al., 2002). The BIT index varies between 0 and 1, representing pure marine and terrestrial organic matter (OM), respectively (Hopmans et al., 2004). In this study, the applicability of the BIT index in the Gulf of Lions, a river-dominated continental margin, is tested in combination with other organic and microbiological parameters.

In general, the BIT index from terrestrial samples shows high values ($>$0.8). In marine environments, it varies between 0.00 and 0.83, decreasing seawards (from inner shelf to off-shore). High BIT values are associated with lower $\delta^{13}C_{org}$ values as well as higher TOC contents and n-alkane concentrations, suggesting high portion of terrestrial OM in sediments. Those results confirm that the BIT index can be applied in marine environments in order to characterize terrestrial OM as proposed by Hopmans et al. (2004).

Interestingly, our results from river water and soils show the occurrences of crenarchaeol which is concurrent with the presence of Crenarchaeota in river water. This implies that more work is clearly required to better understand the origin of GDGT compounds and thus to better assess the BIT index as a robust terrestrial proxy.

References

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