Lipid biomarker and isotopic characteristics of Mesoproterozoic rocks formed in different sedimentary environments

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Lipid biomarker is a principal tool in unraveling microbial compositions and sedimentary conditions of Precambrain ocean. The *n*-alkyl lipids of Precambrian samples were observed to be enriched in ^{13}C relative to the syngenetic bulk organic matter (BOM), which might last to the end of Ediacarian (Logan et al., 1995; Brocks et al., 2003). This inverse relationship which is opposite to the Phanerozoic scenario and biosynthetic expectation has been ascribed to severe biodegradation which induces *n*-alkyl lipids sourced from heterotrophs (Logan et al., 1995) or to an isotopically heterogeneous community of primary producers (Close et al., 2011).

In order to deeply understand the mechanism controlling the relationship between *n*-alkyl lipids and BOM $\delta^{13}C$, Mesoproterozoic rocks deposited in different sedimentary environments on different paleocontinents, e.g., carbonate platform, microbial mats, black shale, etc., have been analyzed for lipid biomarkers and carbon isotope compositions. The results suggest that Mesoproterozoic microbial community was predominated by prokaryotes, whereas the fraction of eukaryotes was very low. Meanwhile, the distribution of bacteriohopanpolyols (BHP) producing bacteria was spatially heterogeneous-high concentrations of hopanoids in oxic/suboxic shallow water environment but low concentrations in anoxic deep water environment-which suggests that BHP synthsizing gene might origin in aerobic bacteria. All three relationships between *n*-alkyl lipids and BOM $\delta^{13}C$ were observed in the Mesoproterozoic samples, suggesting that microbial community composition which might be controlled by marine chemistry would be the main factor.

References

Brocks et al., 2003, *GCA* **67**, 4321; Close et al., 2011, *Geobiology* **9**, 230; Logan et al., 1995, *Nature* **376**, 53.