

Lipid patterns of anaerobic methanotrophic consortia in South China Sea seep carbonates

L. GE^{1*} AND S. Y. JIANG²³

¹Institute of Isotope Hydrology, School of Earth Sciences and Engineering, Hohai University, Nanjing 210098, China (*correspondence: gelu211@163.com)

²State Key Laboratory of Geological Processes and Mineral Resources, Faculty of Earth Resources, China University of Geosciences, Wuhan 430074, China

³State Key Laboratory for Mineral Deposits Research, Department of Earth Sciences, Nanjing University, Nanjing 210093, China

The anaerobic oxidation of methane (AOM) which is a significant process in the global carbon cycle is mediated by methane oxidizing archaeal in consortium with sulphate reducing bacteria in marine environments. At modern cold seeps, the presence of AOM communities was demonstrated by specific ¹³C-depleted lipids which tend to be well preserved in seep carbonates.

Cold seep carbonates recovered at different water depth in the northern South China Sea were the products of anaerobic oxidation of methane (AOM). Lipid biomarkers and their stable carbon isotopic compositions of seep carbonates were analyzed in this study. Distinct AOM communities are indicated by highly ¹³C depleted archaeal biomarkers and bacterial biomarkers.

Differences of AOM communities between the carbonates indicated by specific lipid patterns appear to be caused by the respective biogeochemistry settings. High-Mg calcite carbonates are dominated by ANME-1 archaea, revealing the precipitation at relatively low methane fluxes. ANME-2 consortia mediating the precipitation of aragonite carbonates and dolomite chimneys appear to prosper at sites of high methane supply.

This research is funded by the National Science Foundation of China (Grant No. 41203021) and the Jiangsu Postdoctoral Sustentation Fund, China (Grant No. 1201061C) and the National Postdoctoral Foundation of China (Grant No. 2013M530231) and the State Key Laboratory for Mineral Deposits Research Fund of China (Grant No. 17-1112-2).