Source and Preservation of Archaeal Intact Polar Lipids in the South China Sea Subsurface Sediments

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Intact polar lipids (IPLs) have been used as biomarkers for live microbes to estimate the biomass in the marine deep biosphere. However, questions have been continuously raised about the stability and source of the archaeal IPL pool buried in sediments. In this study we investigated the archaeal intact polar lipid concentration and distribution in the South China Sea (SCS) sediments collected at Site U1431 and 1433 during the IODP 349 Expedition. The results presented that in < 1 mbsf (meter below seafloor) sediments at Site U1431 the IPL concentration increased with depth ($R^2 = 0.86$), and exerted a significantly positive correlation with core lipid (CL) concentration ($R^2 = 0.94$); at Site U1433, the IPL concentration slightly decreased with depth ($R^2 = 0.32$), and decreased with decrease in CL concentration ($R^2 = 0.48$). It suggested that production of IPLs by benthic archaea make a big contribution to the IPL pool buried in < 1 mbsf sediments. In sediments > 1mbsf at both sites, the IPL concentration primarily decreased with depth in individual deposition stages, and dropped more quickly with increasing depth. Also, in the stage of higher depositional rate, the correlation between IPL and Cl pool became more significant. It indicated that IPL preservation in deep buried sediments was remarkably impacted by depositional rate and sediment depth.