

Water depth affects the distribution of Glycerol Dialkyl Glycerol Tetraethers in an alpine Lake of Southwest China

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In lacustrine environments, the presence of allochthonous vs autochthonous input of glycerol dialkyl glycerol tetraethers (GDGTs) is complex based on a range of lakes investigated. This study profiles a subtropical, monomictic lake (Lugu Lake, China) by analyzing the distribution of GDGTs from surface sediments with various water depth and surrounding soils to further constrain the production of GDGTs in a deep freshwater lake.

In our study, water depth seems affect the distribution pattern of isoGDGTs and brGDGTs in the surface sediment. The values of GDGT2/3 of lake surface sediments increased with the water depth, which was also found in the marine environments, suggesting water depth may alter the isoGDGTs distribution and potentially a change in thaumarchaeotal community in deeper water. In contrast to GDGT2/3, the BIT values have a negative correlation with the water depth due to the increase of crenarchaeol and IIIa as well as the decrease of IIa and Ia with the water depth. Based on this, we speculated that the crenarchaeol and IIIa of lake sediment are mainly derived from in situ production, while the IIa and Ia could have the allochthonous input. Similarly, the increase of IIIa together with the decrease of IIa, Ia and Ib leading to the negative relationship between MBT' and water depth.