AGU 100 FALL MEETING
Washington, D.C. | 10-14 Dec 2018

B41G-2781: Evidence of methanogenesis related to the past fish farming in Lake Soyang

Thursday, 13 December 2018
08:00 - 12:20
Walter E Washington Convention Center - Hall A-C (Poster Hall)

Here, we investigated the possible link of metane production to eutrophication in Lake Soyang, a large artificial lake (ca. 2-110 m water depth, 16.08 km^2 in area) by analyzing total organic carbon (TOC) and lipid biomarkers (*n*-alkanes, isoprenoid DGDs, sterols and fatty acids) combined with $\delta^{13}C$ analysis. For this purpose, we collected a sediment core covering the period between ca. 1980 and present. Extremely high TOC contents (~30 wt. %) were observed in sediment layers deposited in the early 1990s. Concentrations of coprosterol, cholestrol and stigmasterol which are indicative of excrement, fish organisms and cereal grains, respectively, were also high. Hence, the sediment layers with high TOC contents seem to be associated with fish farming activity between 1986 and 1999. Concentrations of isoprenoid DGDs (e.g. archaeol and *sn*-2-hydroxyarchaeol) were relatively higher and their $\delta^{13}C$ values ranged from -41.9‰ to -27.2‰ during the period of fish farming. The isotopic fractionation values (2.6-14.8) to $\delta^{13}C_{TOC}$ (-25.1±0.8‰) indicates that in Lake Soyang acetoclastic methanogenesis were responsible for methane generation during the fish farming. Thus, our results provide organic geochemical evidence for active methanognesis in accordance with fish farming in Lake Soyang.

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