[JJ] Evening Poster | B (Biogeosciences) | B-BG Biogeosciences & Geosphere-Biosphere Interactions

[B-BG03]Microbial ecology in earth and planetary sciences

convener:Michinari Sunamura(University of Tokyo Dept. of Earth &Planetary Science), Natsuko Hamamura(Kyushu University), Keisuke Koba(京都大学生態学研究センター, 共同), Yuki Morono(Kochi Institute for Core Sample Research, Japan Agency for Marine-Earth Science and Technology)
Wed. May 23, 2018 5:15 PM - 6:30 PM Poster Hall (International Exhibition Hall7, Makuhari Messe)
Microbes have exerted the great influences on earth environments through the history of earth. Microbial ecology is a study of interaction between microbes and surrounding environments. Research target of Microbial ecology covers most of environments on the earth and planet, e.g. soil, subsurface, subseafloor, ocean, river, lake, air, space, volcano, fault and earthquake, minerals, and more. In this session , we aim to exchange informations of microbial distribution, population dynamics, function, effect on material cycles between microbial ecologist and earth&planetary scientist. We hope effective discussion from interdisciplinary approaches in this session.

[BBG03-P04]Community structure of planktonic bacteria relating to subsurface methane maximum of aerobic lake waters

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Freshwater methanogenesis has become paradox as with the presence of supersaturated methane (CH_4) in aerobic lake waters. Methane production in oxic lake waters is considered to be produced by planktonic microbes under phosphorus-starved conditions. These microbes having C-P lyase gene are able to produce CH_4 aerobically by utilizing dissolved organic phosphorus (DOP) such as phosphonates under the condition where inorganic phosphorus (P_i) is extremely limited. However, the metabolic pathways and specific organisms responsible for aerobic methane production are still unknown. Therefore, the study of the community structure and physiology of CH_4-producing planktonic microbes of freshwater ecosystems are important to fully understand the biogeochemistry of CH_4 in lake ecosystems.

In the present study, we collected water samples at the different depth of nine lakes throughout Japan to examine the existence of subsurface CH_4 maximum in summer. Further, we analysed the community structure of planktonic bacteria in lake water samples through PCR amplification of bacterial 16S rRNA genes followed by sequencing analysis, where aerobic methane production was observed at subsurface maximum of the lakes.

The subsurface CH_4 maximum was observed at thermocline within the upper 10-15m of the nine lakes. The metalimnetic peak of CH_4 ranged between 60 and 600nM among the lakes, corresponding with the dissolved oxygen concentrations and chlorophyll *a* maxima. The amplicon sequencing analyses of bacterial community detected about 7,229 OTUs of bacteria including 58 phyla from epilimnetic, metalimnetic (i.e., thermocline), and hypolimnetic samples of all the study lakes. In thermocline, the relative abundance of Proteobacteria (30%) was dominant, followed by Actinobacteria (20%), Verrucomicrobia (18%), Cyanobacteria (14%), Bacteroidetes (13%) and the others (5%). Among them, Proteobacteria, Actinobacteria, and Cyanobacteria have C-P lyase gene *(i.e., phnJ* gene) in their cells, suggesting that they can utilize phosphonates under Pi-starved conditions. Moreover, these C-P lyase-carrying

planktonic microbes were relatively evenly distributed across the layers of lakes excluding Cyanobacteria, which tended to increase in thermocline where the highest CH_4 peak was observed. The facts suggest that the P_i-starved planktonic cyanobacteria might have a connection to DOP decomposition including phosphonates, thereby producing CH_4 in oxygenated lake waters. Further research and data processing is still ongoing to identify the specific microbes that could govern aerobic methane production in freshwater lakes.