Diversity of benthic microbial mats in five lakes on Sôya Coast ice-free areas, East Antarctica

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There are various lakes in the ice-free regions on Sôya Coast, East Antarctica. Japanese Antarctic Research Expedition (JARE) has investigated these lakes' limnology, ecology, and geology. Antarctic terrestrial ecosystems have low biological diversity because of its high latitude, harsh climate, and ice cover. However, lacustrine environments, such as lake bottoms, have relatively rich biomass called microbial mats. Microbial mats are mainly dominated by bacteria including cyanobacteria, microalgae, mosses, and fungi, and are highly variable depending on lakes (Kudoh & Tanabe, 2014). The diversity of the microbial mats and their relationship to environmental factors have not fully understood. Here, bacterial diversity in bottom benthic mats of five lakes were investigated by a multi-facet approach. Morphological (cell biovolume - three groups of cyanobacteria were determined according to their cell morphology: unicellular, filamentous, and heterocystous cyanobacteria) and molecular methods (NGS amplicon sequencing of cyanobacterial 16S rRNA) were combined with a characterization of their ecological role (nitrogenase activity). Five samples were collected from five lakes (Bosatsu-ike, Hotoke-ike, Nyorai-ike, Naga-ike, Skallen-Ôike), spanning a range of different ecological environments deglaciated areas of Skarvnes and Skallen. We evaluated the influence of lake characteristics on the benthic mats' diversity and ecophysiological activity. In addition to cyanobacteria, eukaryotic microalgae (diatoms, coccoid, filamentous algae – Chlorophyta and Charophyta) were also distinguished. Our observation showed some dominant cyanobacterial genus, such as *Leptolyngbya sp.*, *Phormidium sp.*, and *Nostoc sp*. (Fig. 1). DNA sequencing data showed that microbial mats in each lake had a distinctly different community structure (Fig. 2). This research is supported by JARE-60 2018/19 and contributes to the long term monitoring of Antarctic lakes.

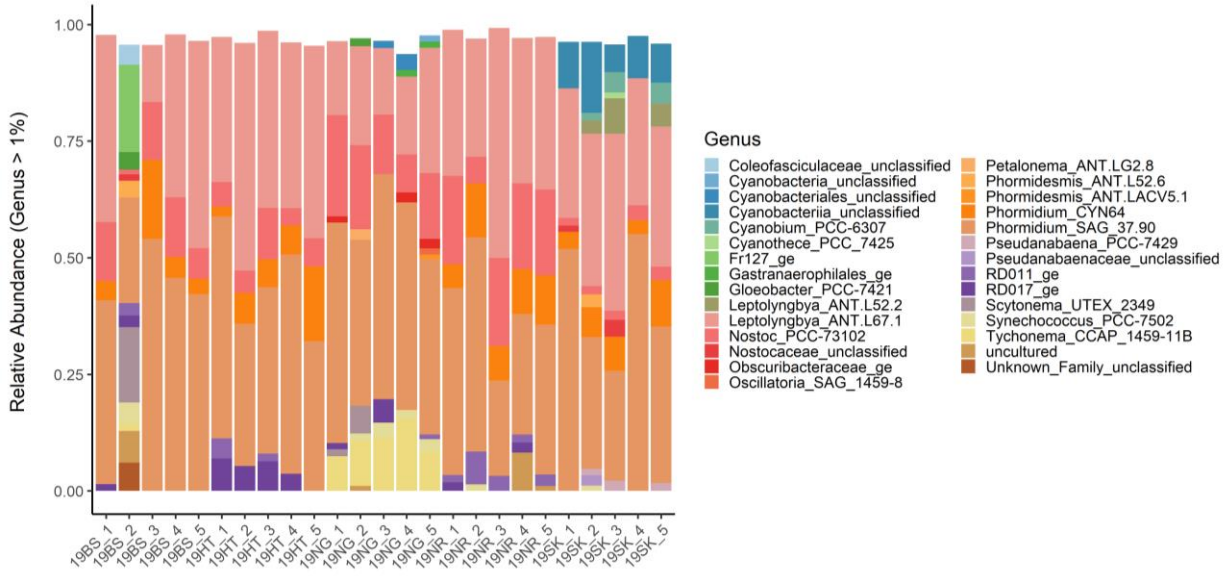

Figure 1. Cyanobacterial community structure of each sample. Bar plots show the composition of operational taxonomic units (OTUs) that aggrigated to the genus level classification of SILVA ver. 138.1. The figure shows genera with relative abundance more than 1 %. The genus name for each color is showed in the legend. The x label means "lake name_sample number". Abbreviations mean followings; BS, Bosatsu-ike; HT, Hotoke-ike; NG, Naga-ike; NR, Nyorai-ike; SK, Skallen-Ôike.

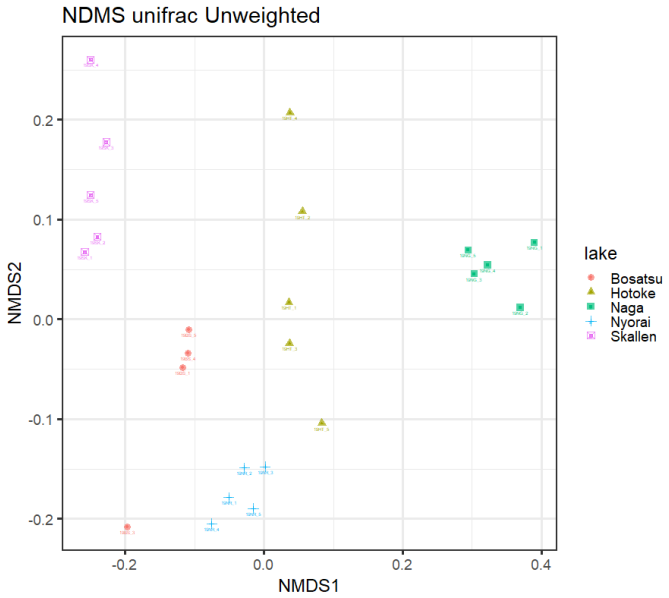

Figure 2. The NMDS plot of unifrac unweighted distance matrix of each sample without Bosatsu_2.

References

Kudoh S. and Tanabe Y., Limnology and ecology of lakes along the Sôya Coast, East Antarctica, Adv Polar Sci, 2014, 25:75-91.