



## Microbial Ecology in Permafrost

---

### 9A - Permafrost Microbiology: Combining -omics with Ecological Theory

Susanne Liebner<sup>1</sup>, Rachel Mackelprang<sup>2</sup>, Andrea Soellinger<sup>3</sup>

<sup>1</sup>GFZ German Research Centre for Geosciences, <sup>2</sup>California State University Northridge, <sup>3</sup>Arctic University of Norway

---

Permafrost ecosystem microbiomes are exposed to extreme biotic and abiotic conditions. Unravelling their ecophysiology, genetic potential, community structure and functional response to environmental change has been in the core of permafrost microbiology research for about a decade. In particular, -omics and trait-based approaches have emerged as promising tools for understanding the functional diversity and ecological processes in permafrost microbiomes. These approaches provide a way to link the characteristics of microorganisms with their roles in ecosystem functioning and to predict how microbial communities respond to environmental change. However, integration of these approaches with ecological theory and modelling is still in its infancy.

This session provides an opportunity for researchers to bridge this gap by discussing the latest developments in permafrost microbiology covering a range of topics, including: (1) The role of microbial communities in the permafrost carbon cycle and the impact of climate change on these communities; (2) The genetic and physiological adaptations to long-term frozen conditions; (3) Changes in microbial growth, activity, metabolism, and interactions with the environment during thaw; (4) The use of -omics and trait-based approaches to predict the functional diversity and ecological processes in permafrost microbiomes; (5) The integration of -omics and trait-based approaches with ecological theory, such as niche theory and community ecology; and (6) The implementation of genomic, physiological and trait-based data in permafrost carbon feedback models.

This session will provide a valuable platform for researchers to exchange ideas, promote cross-disciplinary collaborations, and advance our understanding of the permafrost microbiomes and their role in the global carbon cycle.

**Keywords:** Microbial Traits, Microbial Diversity, Adaptation, Arctic

Contact: Susanne Liebner: [sliebner@gfz-potsdam.de](mailto:sliebner@gfz-potsdam.de)