



Project acronym: AMBER-ICE

Project title: Activity, metabolism and gene expression in the cryosphere

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Discipline: Earth Sciences & Environment: Ecosystems & Biodiversity

Station(s): Czech Arctic Research Station (Svalbard/Czech Republic)

Glaciers and ice sheets cover roughly 10% of Earth's surface, harbouring organisms from all major domains of life (bacteria, archaea and eukaryotes). The activity (or inactivity) of these microorganisms impacts regional and global biogeochemical cycles, the chemistry of glacial meltwater, and the albedo of snow and ice - the single most important variable controlling the amount of surface melt and thus sea level rise. There are relatively few studies that capture the dynamic nature of glacial ecosystems on a seasonal basis, despite tremendous variation in environmental and physical factors between the onset of spring melting and the peak of summer. AMBER-ICE will conduct a comprehensive investigation into microbial and biogeochemical changes that occur during spring melting (i.e., mid-May), and peak summer (early August) on Foxfonna Glacier, Svalbard (via access to the Julius Peyer House, Longyearbyen). We will assess microbial community structure with 16S and 18S rRNA gene amplicon libraries, obtain metagenomes to assess community-wide gene functions, assess the activity of the natural microbial population through metatranscriptomes, the carbon speciation via FT-ICR-MS, and visualize microbial activity on an individual cell basis using BONCAT. By combining all of these techniques and analyses, AMBER-ICE will obtain an intricate and well-supported view of how microorganisms in glacial habitats alter their metabolic state in response to changes in environmental and geochemical conditions over spring to summer.