Project acronym: WAVES

Project title: Where do they come from, where do they go? Assessing sources, sinks and viability of glacier surface microbes

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Discipline: Earth Sciences & Environment: Global change & Climate observation

Station(s): Ny-Ålesund Research Station - Sverdrup (Svalbard/Norway)

Glaciers and ice sheets are experiencing unprecedented, accelerating melting due to climate warming. Moreover, albedo reduction and increased bare-ice extent is a key component of the increased melt rates of Arctic ice masses. On bare ice, there is an active microbial ecosystem which demonstrably reduces surface albedo, increasing glacial melt rates. However, the controls upon this community remain poorly characterised. To address this knowledge gap, we will assess the sources, sinks and viability of microbes on the glacier surface. We will enumerate microbes in the seasonal snowpack on the ice, on the ice surface, within the ice itself and in interfluve meltwaters in the snowpack and near-surface weathering crust to assess the proportion of viable microbes in each micro-habitat. We will examine links between these abundances and nutrient, major ion and DOC concentrations. Finally, we will identify the sources of microbes which initiate the formation of the bare-ice ecosystem, and their fate, using 16S and 18S microbial sequencing. Our data will reveal where supraglacial microbes come from, where they go, and controls upon their abundance and viability. By doing so, we will advance our understanding of biogeochemical processes on bare-ice glacier surfaces, significantly advancing understanding of controls upon supraglacial ecosystem initiation and how such systems will respond to the up-glacier migration of snowlines.