



Project acronym: WAVES

Project title: Where do they come from, where do they go 2? Assessing export, retention 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. This has led to an increase in the duration and spatial extent of exposed bare-ice on glacier surfaces. The bare-ice environment hosts an active microbial ecosystem which demonstrably reduces surface albedo, further enhancing glacial melt rate. This ecosystem also contributes to biogeochemical cycling both on the glacier, and in the sub- and pro-glacial environments. However, the ecological controls on this habitat remain poorly characterised. To address this knowledge gap, we will measure the supply, retention, and mobilisation of microbes upon and from the glacier surface and within the near-surface weathering crust. In our 2022 INTERACT-funded project WAVES, we measured the sources of glacial surface microbes. We will now measure the abundance, retention, and export of microbes from the ice surface, through the weathering crust, and into channelised surface glacial meltwaters, thus 'closing' the system of supply/retention/export. We will also measure the viability and activity of microbes within each micro-habitat, characterize their diversity, and link them to measured nutrient and organic carbon concentrations. Combined with the successes of WAVES, 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 the controls upon the characteristics of the supraglacial ecosystem, its biogeochemical processes and provide new insight on how it will respond to the up-glacier migration of snowlines.