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Assessing microbial nitrite oxidation from subglacial sediments

It has been shown that microbial communities are active at temperatures close to freezing (0-1˚C) in subglacial systems. These microorganisms are an integral part of the biogeochemical cycles that take place in subglacial environments and it has been argued that they may play a significant role in global biogeochemical cycles on glacial-interglacial timescales. Previous research at Robertson Glacier, Canada has shown that its subglacial sediments harbor diverse assemblages of potential nitrifying and nitrate reducing organisms. My research project has focused on an aspect of the aerobic portion of the nitrogen cycle in subglacial systems. I set up enrichment cultures for nitrite oxidizers at 4˚C, close in situ subglacial temperatures, using subglacial sediments from Roberson Glacier. Conversion of the added nitrite to nitrate in the biotic experiments and no change in the unamended control experiments demonstrated microbial nitrite oxidation. Multiple transfers of the enrichment culture were then undertaken to try and obtain a pure culture. The activity, through nitrite oxidation and cell biomass of these latter 4oC enrichments was measured, and showed activity but without significant increases in biomass. Ongoing work is focused on determining the identity of the nitrite oxidizing organism or organisms in the enrichments.