

**Title: Microbial Life in Arctic Snow and Ice**

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Polar Regions are transforming and as they constitute integrators of climate variability, they provide visible signals of change. In addition, Polar Regions intrinsically participate in global cooling through a number of feedback mechanisms. The observed climate changes alter the structure and functioning of many cryosphere ecosystems and by extension ecosystems around the planet. Due to the extreme temperatures and the limited presence of liquid water, snow and ice have long been regarded simply as freezers that entrap and store microorganisms in a vegetative state, and therefore, the microbial ecology of the cryosphere has been largely overlooked. Our research on the role of microorganisms in the functioning of environmental ices highlights the links between their biotic and abiotic components. Our work focuses on observations of snow and ice in the Arctic and explores the biodiversity, the microbial population dynamics and influence of microorganisms on biogeochemical cycling, and their interactions with their physical and chemical environment. Through these studies, we have challenged the view of snow and ice as freezers and have shown that they should be considered as viable, active and important ecosystems.

Key words: Arctic, snowpack, ice, microorganisms, biogeochemical cycling