

# PREFACE

Volume 55(65) of *Annals of Glaciology* focuses upon 'Advancing clean technologies for exploration of glacial aquatic ecosystems'. Glacial ecosystems cover approximately 10% of the Earth's surface, yet biogeochemical and biological processes here remain poorly understood, largely because of the difficulties surrounding access and sampling in such extreme and remote settings. Diverse microbial communities are now known to thrive within glacial ecosystems, are likely adapted to the extreme in situ conditions and drive nutrient export in subglacial runoff and greenhouse gas accumulation (e.g. as methane hydrate) in deep sedimentary basins. As a result, better constraint on biogeochemical processes within glacial aquatic ecosystems features highly on the International Scientific Agenda, and particularly in sub-ice-sheet environments such as Antarctic subglacial lakes. Despite the growing appreciation of the significance of glacial ecosystems for regional and global biogeochemical cycles, there is currently a mismatch between the science goals for their environmentally responsible measurement and monitoring and the technological tools available to meet these objectives.

This special issue of *Annals of Glaciology* aims to explore the issues that arise when considering the development or adaptation of instruments for process measurement in glacial aquatic environments, including perhaps the most challenging of all glacial aquatic ecosystems: Antarctic subglacial lakes. It also showcases a diverse range of novel technologies for the future access and sampling of glacial aquatic ecosystems, from wireless probes to autonomous platforms. Examples of topics covered within this issue include: (1) sample acquisition and processing, including environmental protocols, (2) specific instrumentation for environment access and monitoring (e.g. sensors, autonomous platforms and ROVs) and (3) technologies for subglacial lake access and sampling.

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