



Project acronym: PROGLACIAL

Project title: PROGlacial Lake records of Arctic Climate change And Landscape instability

Project leader: Kathryn Adamson, Manchester Metropolitan University, United Kingdom

Discipline: Earth Sciences & Environment: Other - Earth Sciences

Station(s): Arctic Station (Greenland/Denmark)

PROGLACIAL will provide the first high-resolution, micromorphological analysis of proglacial lake sediments in Greenland to establish the impact of climate change on landscape change. Future Arctic climate projections suggest increased air temperature and precipitation, alongside glacier melt and permafrost thaw. These changes will likely transform catchment processes, including high magnitude events (e.g. mass movement and runoff), affecting Arctic communities and ecosystems. Reliably predicting future landscape change relies on a firm understanding of how Arctic systems have responded to past climate shifts.

Proglacial lakes provide the ideal solution because they contain catchment-integrated signals of landscape response to past climate perturbation. However, many Arctic proglacial lake studies have focused on macrostratigraphy, tying sedimentology to major climate and glacier changes. Much less attention has been paid to microstratigraphic characteristics, a rich yet currently underutilised archive of past landscape dynamics.

To address this, PROGLACIAL will examine late Holocene sediments from three proglacial lakes on Disko Island, via three objectives: 1) We will combine thin section micromorphology, SEM, XRF, and geochronological methods to reconstruct lake sediment inputs (e.g. glacial, colluvial, aeolian) and thus landscape change at a level of detail not yet achieved in Greenland, 2) The sedimentary archive will be cross-referenced with existing climate monitoring and proxy data to securely tie known climate perturbations to lake sediment characteristics, 3) Using these insights we will develop the first analytical framework for use in proglacial studies Arctic-wide, including by other research teams, to unlock the full potential of these sedimentary archives, and transform current research approaches.