

Project acronym: GLAMSTAR

Project title: Glacial Meltwater Sediment Transformation in Arctic River systems

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Discipline: Earth Sciences & Environment

Station(s): Arctic Station (Greenland)

Arctic air temperatures are rising at twice the global average rate, leading to Arctic-wide glacier retreat. As ice masses recede, vast proglacial forelands of unconsolidated sediment are exposed, and meltwater stream discharge is greatly enhanced, such that carbon and minerals stored in the proglacial zone can be rapidly remobilised. This has the potential to profoundly alter terrestrial and marine chemistry, mineral transfer, ecosystems, and carbon flux.

In the Arctic, where glacier margins are relatively close to the coast, such changes are rapidly propagated downstream and offshore. The interactions between climate warming, glacial and glaciofluvial behaviour, and ecosystem change have been highlighted as a key research objective, but the mechanisms linking them are poorly understood. This is because existing studies have not examined spatio-temporal variations in glaciofluvial sediment transfer and carbon storage-release patterns. It is currently not known how such processes vary locally across individual ice margins, and latitudinally throughout the Arctic.

Using detailed mineral (XRF, XRD, grain size, magnetic susceptibility) and carbon analysis of glaciofluvial sediments in front of ice cap outlet glaciers close to Villum Research Station (NE Greenland) and Arctic Station (W Greenland), this project aims to examine spatial patterns in proglacial meltwater sediment transformation. These datasets will be used as a basis to develop the first sub-to-high Arctic transect of meltwater systems, to examine latitudinal variations in proglacial response to present and future climate warming.