Constraining the deglacial chronology of Nuup Kangerlua (Godthåbsfjorden), SW Greenland

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Summary
The BSG supported fieldwork for ground truthing of remotely mapped geomorphology and the sampling of cosmogenic nuclide rock samples from erratics perched on the early Holocene Kapisillit Moraines of the Nuup Kangerlua fjord complex, SW Greenland. This particularly focused on those of the tidewater glaciers Kangiata Nunaata Sermia and Akullersuup Sermia (Figure 1). Previous work in this area has focused on the deglaciation of the wider fjord complex following the last glacial maximum (Larsen et al., 2014) leaving the timing of the stillstand indicated by the Kapisillit Moraines unconstrained, though suggested to be linked to the 8.2ka climate event (Weidick et al., 2012).
Six cosmogenic nuclide samples are currently being processed at the Scottish Universities Environmental Research Centre (SUERC) that will constrain the timing of Kapisillit Moraine maxima. This will provide valuable information for whether the 8.2ka event impacted tidewater glacier dynamics in Greenland; and provide data for proof of concept ice flow numerical modelling that will help determine how/if these models can capture ice dynamic changes in areas of complex topography as the Greenland ice sheet continues to retreat.

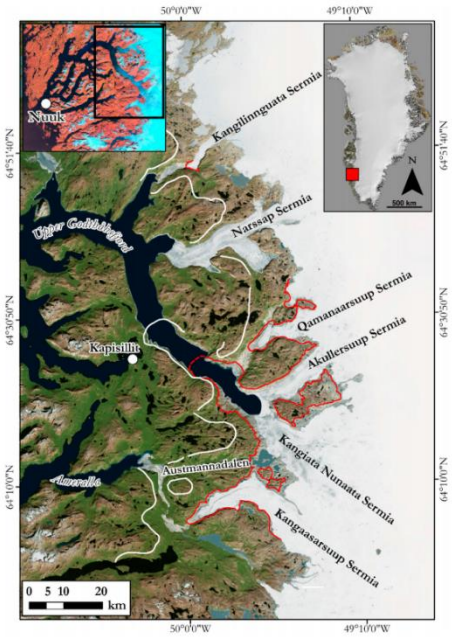

Figure 1 - Aerial map of upper Godthåbsfjord showing outlets from the GrIS. Approximate Little Ice Age Extent (red) and Kapisillit Moraines (white) shown.

Sampling
Twelve samples from seven locations were obtained during field seasons in 2015 and 2016 (Figure 2). Perched erratics on the crests of moraines with at least 0.5 m of clearance from the ground surface were selected to minimise risk of the boulder having being exhumed and/or having shifted position since emplacement. All samples were from quartz rich Archaean gneiss boulders, maximising the potential suitability for ^{10}Be analysis. Topographic shielding values were also taken at each site to assist in production rate calculations. Sites were selected to provide the timing of moraine formation at key ice sheet outlets indicated by the Kapisillit moraines, including a pre-Little Ice Age moraine identified within the traditional limit of these (Figure 2A). This will constrain whether the timing of the local maximum extents was synchronous and the rate of deglaciation following the Kapisillit maximum.

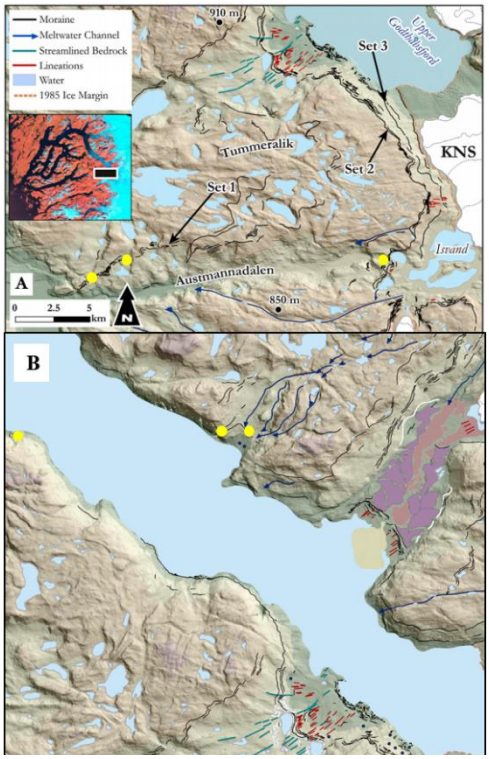

Figure 2 – Location of sample sites (yellow dots) overlaid on geomorphological map of the region (Pearce et al., 2018)

Value of the grant
The support provided by the BSG has already resulted in one publication describing the geomorphology of the region (Pearce et al., 2018). Once the results of samples submitted for dating are received and proof of concept numerical modelling of ice sheet dynamics has been undertaken, this will form the basis for more detailed work funded by a prospective NERC Standard Grant on the effect of complex fjord topography on the past and potential future deglaciation of the Greenland ice sheet.

References
Larsen, N. *et al*., 2014. *Quat. Sci. Rev.* 92:310-323; Weidick, A. *et al*. 2012. GEUS; Pearce, D. *et al.,* 2018. *J. Maps* 14(2):44-55