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Investigating the dynamics of deglaciation in coastal areas of southeast Greenland

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Southeast (SE) Greenland has experienced large glaciological changes over the last two decades. Glacial retreat, acceleration, and thinning have resulted in substantial mass loss. However, despite its significance, relatively little is known about the glacial history of SE Greenland. Reconstructions of glacier behaviour provide valuable context for assessing the magnitude of present-day changes, they can also be used to better-understand the mechanisms that control glacier behaviour.

We present 11 new cosmogenic exposure ages from previously uninvestigated coastal areas of SE Greenland. Paired erratic and bedrock samples from low-elevation locations were analysed for ^{10}Be content. Samples were collected from central areas of Køge Bugt and Ikertivaq; consequently, these samples track the retreat of the major, marine terminating outlet glaciers here. Samples from Gerner Ø and Tugtilik were collected from locations away from major outlet glaciers; these samples track the deglaciation of 'passive' margins of the Greenland Ice Sheet (GrIS). Comparing the timing of deglaciation in these areas with different dynamic regimes permits investigation of the relative influence of ice dynamics on deglaciation.

Results from ^{10}Be analysis are complicated; understanding their significance requires careful interpretation and consideration of the individual sample settings. The timing of glacier retreat appears to have been largely dependent on the local physiographic setting and glaciological regime. The deglaciation of Køge Bugt occurred broadly contemporaneously with retreat in Sermilik Fjord, 100 km to the northeast. Fjord retreat in Køge Bugt probably occurred in response to climatic amelioration at the start of the Holocene (Hughes et al., 2012). The deglaciation of Ikertivaq occurred marginally later, but likely also in response to early-Holocene climatic warming. The minor difference in timing may be attributable to the specifc geometry of Ikertivaq. The deglaciation of passive areas appears to have occurred later than in the major fjord systems; this suggests that ice dynamic processes were a key driver of deglaciation in SE Greenland.

References: Hughes, A. L. C.; Rainsley, E.; Murray, T.; Fogwill, C. J.; Schnabel, C., Xu, S., 2012. Rapid response of Helheim Glacier, southeast Greenland, to early Holocene climate warming. Geology 40, 427–430.