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# Saltmarsh record of post Little Ice Age mass balance changes in southeast Greenland

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Saltmarshes provide excellent archives of relative sea-level (RSL) changes over a range of different timescales. In Greenland they yield precise RSL data over the past few decades to hundreds of years that can help constrain Greenland Ice Sheet mass changes during and after the Little Ice Age (LIA). They are particularly valuable as they provide a longer term context upon which to evaluate recent tide gauge and GPS records which span only the past decade or so. In Southeast Greenland the current rate of crustal uplift recorded by GPS is approximately +7 mm/yr at the open coast and up to +18 mm/yr close to the ice sheet margin, which reflects high rates of recent mass loss.

This study investigates a fossil saltmarsh located within 5 km of the ice sheet margin at the head of Skjoldungen fjord in southeast Greenland. The aim is to use RSL data to establish the timing and magnitude of mass loss since the end of the LIA. This is the first time that saltmarshes so close to the ice sheet margin have been utilised to create high precision proxy-GPS data for the last few hundred years.

Microfossil (diatom) evidence from saltmarsh sediments at the Skjoldungen study site record a recent change from RSL rise to stable RSL, then RSL fall during the past 200 years. We interpret the change from RSL rise to stable RSL as evidence for the initial onset of mass loss locally from the Greenland Ice Sheet at the end of the Little Ice Age. Later RSL fall occurs as mass loss accelerates during the 20th Century. We use a combination of dating methods to establish the timing of the initial RSL slowdown and rates of RSL rise during the LIA and fall during the 20th Century. We then compare our RSL record to geophysical model predictions of local RSL change due to post-LIA Greenland mass loss and consider the contribution of other factors (e.g. thermosteric effects, fingerprint of glacial melt elsewhere) to RSL during the 20th Century in this location.

This study provides the first direct evidence that saltmarsh sediments from near-field sites can be used to reconstruct the timing of recent mass loss change from the Greenland Ice Sheet, extending direct GPS observations back to the end of the Little Ice Age and beyond using geological data.