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Historical Ice Velocity Change at Land-Terminating Margins in North-East Greenland

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Over the past two decades, the Greenland Ice Sheet has experienced significant mass loss, of which ∼60% can be attributed to enhanced surface melt as a result of increasing Arctic air temperatures. The dynamic response of the Greenland Ice Sheet is thought to be impacted by feedbacks between surface meltwater delivery to the bed and ice flow. It was initially thought that increased surface meltwater to the sub-glacial environment acts to increase basal water pressure, reduce basal drag and so enhance ice discharge into the ocean, however recent studies over a land terminating sector of the western Greenland ice sheet argue that enhanced surface melt will cause a reduction in glacier velocity as a result of the earlier development of an efficient sub-glacial hydrological network.

Considerable uncertainties remain regarding processes linking hydrology and dynamics of the Greenland Ice Sheet, notably the impact of enhanced surface melt further inland and further north, where melt seasons are shorter.

Here, we present preliminary results following the derivation of robust surface velocity fields through repeat-image feature tracking, utilising the entire Landsat archive, for the North-east sector of the Greenland Ice Sheet from 1985 to 2018. From this data, inferences can be made into whether the negative feedback between surface meltwater production and ice velocity observed in the West Greenland sector around Leverett glacier is observed across other sectors of the ice sheet, and what controls variability in the observed response.