



Temporal evolution of ice velocities of Storstrømmen between 1975 and 2016 shows clear signs of a surge event.

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For at least the last two decades the Greenland ice sheet has experienced an increased mass loss due to a warming climate. Many of the outlet glaciers in Greenland have been associated with speed-up in surface velocities in recent years. However, Storstrømmen in North-eastern Greenland displays a different behaviour, with decreasing velocities near the terminus. Here, we present surface velocities of Storstrømmen from the 40-year period 1975-2016 in order to investigate the temporal evolution of this major outlet glacier from the Greenland ice sheet. Surface velocities are derived from optical Landsat images (Landsat 2, 5, 7, and 8) and using the method of feature tracking as implemented in the ImGRAFT toolbox. The successes of the method are highly susceptible to cloud coverage or extended snow coverage. During periods where no optical Landsat images were available, data from MEaSURES (Making Earth System Data Records for Use in Research Environments) have been used to fill-in. The two different dataset are seasonally biased, and to bring insights in to the differences between the optical and radar derived velocities, we also investigate the seasonal variability of the velocity using data from Sentinel-1 SAR obtained multiple times during 2015 to 2016.

We find that the surface velocities of Storstrømmen peaked in 1985, and have subsequently decreased. Hence, in contrast to the neighbouring Nioghalvfjerdingsfjorden glacier, Storstrømmen is not experiencing increasing ice velocities. Our findings supports previous studies that found that Storstrømmen glacier was surging between 1978 and 1984. However, in spite of the surge the upper region has remained nearly stagnant during and after the surge.