

Variations in the inter-annual melt cycles at 79°N Glacier inferred from remote sensing data

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Supra-glacial lakes (SGL) reflect glacier-climate interactions through their number, size and time of appearance and disappearance. At the 79°N glacier in northeast Greenland, the melting season, indicated through the first appearance of SGLs, typically starts in early June and ends in late August, with the exact date being subject to significant inter-annual variability. We use a combination of Landsat-5/7/8 and Sentinel-2 satellite datasets to detect the start, intensity and duration of the appearance of supra-glacial lakes, and compare the results to in-situ measurements of surface temperature. For the recent years, the time series is supported and validated by Sentinel-1-derived lake detection. We test the hypothesis that the amount, size or distribution of supra-glacial lakes can serve as indicators for changes in the glacial temperature regime, and if other climate variables can be identified as key drivers of melting processes on the glacier's surface. For this purpose, we focus on the period 2016 – 2018 and use the output of a WRF regional model and data from two Automatic Weather Stations to analyze periods of significant leaps in size and distribution of SGLs.