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Using sub-daily timelapse imagery to investigate the behaviour of Narsap Sermia, SW Greenland.

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Greenland's tidewater glaciers (TWG) have been retreating since the mid-1990s, contributing to mass loss from the Greenland Ice Sheet and sea level rise. Satellite imagery has been widely used to investigate TWG behaviour and determine the response of TWGs to climate. However, multi-day revisit times make it difficult to determine short-term processes such as calving and shorter-term velocity changes that may condition this.

Here we present velocity, calving and proglacial plume data derived from hourly time-lapse images of Narsap Sermia, SW Greenland for the period July 2017 to June 2020 (n=13,513). Raw images were orthorectified using the *Image GeoRectification And Feature Tracking toolbox* (ImGRAFT; Messerli & Grinsted, 2015) using a smoothed ArcticDEM tile from 2016 (RMSE=44.4px). TWG flow velocities were determined using ImGRAFT feature tracking, with post-processing adjusting for varying time intervals between image acquisitions (if >1 hour) and removing outliers (>x2 mean). The high temporal resolution of the imagery also enabled the manual mapping of proglacial plume sizes from the orthorectified images and the recording of individual calving events by visually comparing images.

Results show a total retreat of approximately 700 m, with a general velocity increase from ~15 m/d to ~20 m/d over the investigated time period and highly variable hourly velocities (± 12 m/d). The number of calving events and plume sizes remain relatively stable from year to year throughout the observation period. However, later in the record plumes appear earlier in the year and the size of calved icebergs increases significantly, which suggests a change in calving behaviour.