

## Initiation of a major calving event captured by high-resolution UAV photogrammetry

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During the summer 2015 field campaign on Bowdoin glacier (Northwest Greenland), the camera inboard a UAV captured the initiation of a major calving event with 7 centimetre accuracy. Two UAV flights were operated prior to and during the opening of a large crack that formed about 100 metre upstream from the calving front, propagated laterally over more than a kilometre and eventually lead to calving. The post-processing of the resulting aerial images by structure-from-motion and feature-tracking techniques allowed us to infer surface velocity fields before and during crack opening. Detailed analysis of maximum principal stresses computed from both velocity fields indicate that the event was triggered by high vertical shear stresses between a lateral band of slow flow where the glacier is solidly anchored to shallow bedrock, and a central band of fast flow where the glacier is nearly floating due to deeper bedrock. We estimate that the observed event contributed by 5 to 10% to the annual mass loss by calving.