Master thesis: Iceberg break-off detection from time-lapse images in front of a glacier

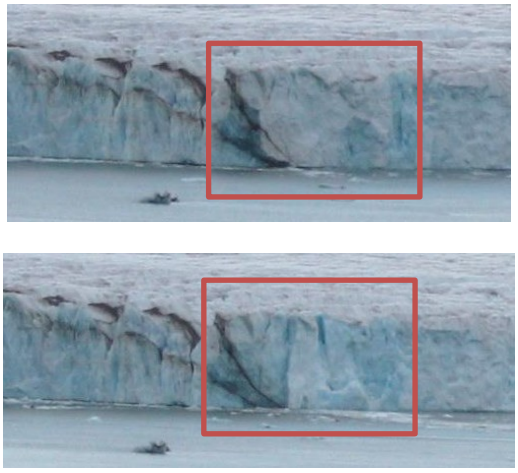
Background

Sea level rise is among the greatest threats of rising temperatures, with around 150 million people globally living within 1 m of high tide. Over the next century, most new water will come from ice sheets and glaciers. The break-off of ice-bergs from glaciers terminating in the ocean through calving processes is a major uncertainty in estimating their contribution to sea-level changes (IPCC-AR5). The non-linear variability with external factors is still poorly understood. No existing parameterisation of calving is able to reproduce observed calving rates, severely limiting the predictions made by land ice models forced by evolving climatic variables. However, observations show that glacier fronts behave as a self-organised critical system (like earthquakes) and the distribution of event volumes follows a power law.

A time-lapse camera is installed in front of Tunabreen, Svalbard since April 2014 to monitor the size of calving events. To calculate the size of the detached iceberg, an image analysis is necessary to automatically detect when a calving event is occurring.

Project description

This project aims at recognize calving events (frequency and magnitude) on a calving glacier on Svalbard by analyzing an important dataset of pictures taken by a time-lapse camera installed in front of the glacier. By analyzing the pictures and using satellite images, it could be possible to detect an event and calculate its size. This work will be used to validate a newly developed particle model that reproduces calving glacier fronts.



Prerequisites

Basic image analysis and programming knowledge is a requirement.

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