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Detection and visualization of outlet glacier changes at the Jakobshavn Glacier drainage basin from 1985 to 2007

Abstract
The Greenland outlet glacier Jakobshavn Isbræ is one of the most productive and fastest glaciers in the world. Rapid increase in discharge as well as velocity was observed at this glacier since the late 1990s and until present, associated with a large brake off of the floating glacier tongue and a rapid thinning of the glacier area.
Regarding these dramatic changes, it was the goal of this project to visualize the impressive retreat at the glacier calving front area for the time period in between 1985 to 2007 by the creation of several animations. Glacier terminus positions can easily be mapped out of satellite imagery, but this does only offer a general impression of how a glacier behaves. Including elevation information in an animation by the use Digital Terrain Models (DEMs) allows to create pseudo 3D or real 3D animations that can visualize the mass changes of a glacier as well.
The creation of animations was achieved by the use of two high accuracy DEMs of 1985 and 2007 that were generated out of aerial and satellite stereo imagery. Within this project, these DEMs were available for use, but had to be corrected in their elevation on water bodies and on cloudy areas. For the period in between 1985 and 2007 several satellite images were collected, and out of this imagery and the DEMs of 1985 and 2007 intermediate DEMs were generated. These intermediate DEMs were serving as reference points within the animation time series in particular for time periods of much glacier activity. Out of this data, numerous pseudo 3D animations by the use of simple blending techniques were generated at particularly interesting positions, showing the glacier retreat from 1985 to 2007. Furthermore, a number of overflights movies over the terrain of 1985 were produced. The generated animations give a good general impression of the glacier activity over the last two decades. Moreover, the data that was improved or generated within this project can serve for further processing.

Stichworte/Keywords
1.Glacier
2.Visualization
3.Digital Terrain Model

Note:
This project was part of a cooperation between the Institute for Cartography at Dresden University of Technology (Germany) and the Remote Sensing Laboratory at the SUNY at Buffalo (USA) within the scope of a pre-thesis work (Studienarbeit). The supervisors were *Prof. Eur.-Ing. Dipl.-Geol. Dr.phil.habil. Manfred F. Buchroithner* from the Dresden University of Technology and *Dr. Beata Csatho* from the SUNY at Buffalo.
