Spatio-temporal Flow Velocities at the Front of Jacobshavn Isbræ/Greenland from 2004 Field Observations

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The knowledge about the mass balance of the Greenland ice sheet is an important information about past, ongoing and future climate changes, especially for the northern hemisphere. For the Greenland ice sheet, the Jacobshavn Isbræ is one of the most dynamic outlet glaciers. In recent time a remarkable retreat of the ice front and an increasing flow velocity have been reported.

In August 2004, geodetic-photogrammetric field work was carried out next to the present front position of the Jacobshavn Isbræ. With ground-based observations the flow velocity field for the area of the ice front up to 5 km upstream was determined.

The observation concept and the data analysis will be described in detail. We will present a visualization of glacier flow based on high resolution digital image sequences. Spatio-temporal velocity fields were derived from these sequences by photogrammetric image sequence analysis techniques. The obtained velocities range up to 40 m/day, which supports recently published findings based on satellite remote sensing data. Compared to observations performed 20 years ago the flow velocities increased by a factor of 2. The consequences for the mass balance of the Jacobshavn Isbrae and its catchment area will be discussed.