



Ice-velocity observations using a single-frequency GPS on Nordenskiöldbreen, Svalbard

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A precise measurement of ice-flow velocities is necessary for a proper understanding of the dynamical feedback of glaciers to climate change. A newly developed low-cost single-frequency GPS can function unattended for more than one year, allowing uninterrupted measurements for long periods and a reasonable temporal resolution after an averaging procedure.

As part of the International Polar Year (IPY) project GLACIODYN, which investigates the dynamical response of Arctic glaciers to climate change, 9 GPS have been deployed on Nordenskiöldbreen, Svalbard. Data is available from March '06 until April '08.

An indication of the accuracy is given by the standard deviation of 1.68 m of the observed locations at a stationary base station. Applying a weighed running-average on the observed locations significantly reduces this value. Processing of the data from sites on the glacier results in an annual displacement between 40 and 55 meters every year of the stations located on the central flow-line. Both the location of the base station and the annual displacement agree reasonably well with DGPS measurements.

On weekly to monthly time-scales we observe a peak in the ice-flow velocities at the beginning of July during the highest melt-rates. The highest measured velocities vary between 60 and 90 m/y. No significant lag can be observed between the timing of the maximum speed in the lower and higher stations. This is a result of the short distance between the sites and the necessity to average the data. Periodicity in the data found by spectral analysis is a result of atmospheric influence on the GPS signal.