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3D model of the bottentopography of Björlings glaciär

Torbjörn Karlin and Cecilia Reinestam

Ground-penetrating radar (GPR) is a modern geophysical technique that has been applied to investigate the ice thickness of Björlings glacier, located in the Kebnekasie massif, Northern Sweden. The purpose of this study is to make complementary radar measurements to a study made 1985 and to create 3-dimensional surface and bed topography maps over the area.

The results show that Björlings glaciär is located in an overdeepening in the bedrock topography. Different ice depths between the study in 1985 and present study might be a difference in interpretation of field data. These maps can be used for information in future hydrological investigations where a reconstruction of subglacial hydrological networks are made.

Energy balance and ablation on Storglaciären, Northern Sweden

Kerstin Hörnby and Mattias de Woul

It is important to measure the melt from glaciers to predict water level for example in water constructions like dams and to model the response of global climate changes. In this study melt was computed at a climate station in the ablation area of Storglaciären for a three-week period in July 2002 using an energy balance approach. Computed melt was compared with the average of melt measurements from 32 different ablation stakes close to the climate station. The net radiation had the largest impact on the melt with a contribution of 57 %, followed by the sensible heat flux with 30 % and the latent heat flux with 13%. Observed melt was systematically larger in southern part of the stake net as a result of the surface topography sloping slightly to the south in the southern part and to the north in the northern part of the area. When comparing the melt from the energy balance and the measurements from the ablation stakes, 0.76 m w.eq. and 0.60 m w.eq. were gained. In addition to the energy balance and the measurements a calculation of the degree-day factor was made yielding a value for snow of 2.2 mm d^{-1} °C^{-1} and for ice of 8.6 mm d^{-1} °C^{-1}.

Dischage measurements in Nordjokk and Sydjokk draining Storglaciären using salt dilution method

Eva Rönnberg and Magnus Sannebro

This study deals with discharge measurements from Storglaciären, a small valley glacier in northern Sweden using the salt dilution method. This method is suitable for measuring discharge in glacier outflows characterized by high turbulence, rapidly changing channel geometry, high sediment load and low electrical conductivity. A specific mass of salt in solution is injected upstream the measuring point. Conductivity is measured and converted to salt concentration, which is proportional to water discharge. Measurements were made in Nordjåkk and Sydjåkk, the two proglacial stream of Storglaciären, during the period July 24 to July 30 2002. The first aim of this study was to establish rating curves, i.e. a relationship between discharge and water level, for the two creeks. The second aim was to evaluate the salt dilution method regarding the importance of measuring distance and mass of salt injected. A rating curve for Sydjåkk was established, although more measurements are needed to ascertain results. For Nordjåkk a rating curve could not be established due to measuring problems concerning water level. Our conclusions are that the method is simple and useful for this type of creeks. It is necessary to carefully select measuring distance and salt mass for the investigated creek. Water discharge also affects the measuring conditions. Our field surveys indicate

that measuring distance should not be shorter than 50 meters for a creek like Nordjåkk. The amount of salt injected turned out to be of less importance for calculated discharge than the choice of the distance between measuring point and injection point. We suggest that systematic studies of the salt dilution method are conducted, in order to evaluate the different parameters importance for the reliability of the method. Studies should also be conducted in creeks of different size and character, and during different discharge situations.

Coupling between annual layer exposed on the surface Björlings glaciär and climate proxydata

Jakob Heyman, Malin Simonsson

Ice structures and other surface features on Björlings glaciär, a small valley glacier in the Kebnekaise area, have been mapped. The most important part of the study has been to map and measure the thickness of the stratification (annual layers). These lines originate from concentration of sediments in the accumulation area in the summer and can be used to infer past mass balance for the glacier. 179 stratification lines have been counted, dating the oldest line to 1800 ± 20 years. It is difficult to see a correlation with dendrocronology and a similar study on a closely situated glacier, and thus it is impossible to make any certain conclusions. However, the method has a potential as a complement to existing mass balance measurements.

Tracer studies in the lower part of the ablation area of Storglaciären, Sweden

Michaela Agoston

In order to investigate the englacial drainage of a sub-polar glacier, two artificial tracers – salt and Rhodamine B – were injected during the melt season into two moulins and a borehole, respectively, in the lower part of the ablation area of Storglaciären, Sweden.

The salt was detected in Sydjåkk, the southerly of the two proglacial streams draining the glacier. No salt was detected in Nordjåkk, the northerly stream, confirming previous studies indicating that Sydjåkk drains the supraglacial melting of the ablation area.

Rhodamine B was expected to appear in Nordjåkk, which on the basis of theoretical considerations was assumed to drain the accumulation area through englacial conduits, but at the time of the end of the study, no dye tracer had been detected in either of the streams.

The flow velocities obtained from the two salt injections differed by a factor two. This can be explained by the large variations in discharge at the times of injection, with the lower discharge resulting in decreased flow velocity.