Abstract of the field projects from the Tarfala student course 2008

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Botanical-glaciological studies in Tarfala valley

Barbara Hauzenberger, and Joanna Weiss

Inventorying vegetation succession is a powerful instrument to get *inter alia* indices of soil development and quality, climate or the age of deglaciated areas. In Tarfala valley, Northern Sweden, an investigation of botany for dating ice free areas was done by Adelaide Stork in the 1960s (Stork, 1960 and 1962). Since this time such a broad study has not been repeated. It was the aim of the current project to repeat a partial vegetation succession inventory. Both kryptograms and phanerogams were mapped at Isfallsfallsglaciären's forefield. The species were chosen according to Stork (1962, 1963). Our results show a clear succession pattern for lichens in four squares located at plots along a line with different exposition ages. The distribution of higher plants seemed to be more randomly. Factors like limited time and flowering season have to be considered in the interpretation of the results. For the future it is desirable that vegetation inventories are made more frequently to give important evidence in how plants react to development of landscape or climate change.

Isytans rörelse på Storglaciären

Ida Edelman, Lovisa Högstedt, and Florence Pendrill

To measure the horisontal surface ice velocity, 18 stones in the ablation area of Storglaciären, northern Sweden, were marked and their position determined with a DGPS. One year later, in August 2008, 13 of the stones were found and their new positions recorded in the same way. The velocity of the stones was compared to calculations of a theoretical ice velocity, based on a modification of Glens flow law. The range of the theoretical velocities was 0 to 376 m/yr, while the actual movement of the stones was between 23 to 35 m/yr. This concludes that the range of the theoretical velocities is too large to give a relevant estimate of the actual ice velocity.This may be due to the generality of the equations and parameters used in the calculations. The measured movement was somewhat higher previous studies on Storglaciären. Discussion on this contains factors such as increased water pressure, changes in mass balance and measurement errors.

Kebnekaises topphöjd 1880-2008

Elin Karlsson, Ardo Robijn and Maria Torefeldt

The Kebnekaise sydtopp (south summit) is Sweden's highest mountain, the summit is formed by a small ice field and has therefore been subject for intense measuring during the past century. The subject of this paper is to measure 2008ths height and summarize all measurements on record. The measurements for this year were simultaneously done trigonometrically with a theodolite and a differential-GPS. The difference in the results of both methods were within 0,3 m and the official height for 2008 is 2104 m above sea level, which is 1 m higher then 2007.
The first measurement from 1880 shows a very high height which is very unlikely to be correct compared to the behavior of Storglaciären at that time. Storglaciären shows an increase in mass until 1910 which is not indicated in the sydtoppen record. In the time period between 1969 and 2005 the change of height of sydtoppen and the mass balance of Storglaciären show a similar pattern. When Storglaciären is gaining mass, the elevation of sydtoppen gets higher.

En analys om förhållandet mellan sommarmedeltemperaturen i Tarfala och Stroglaciärens volymförändringar.

Axel Andersson, Mattias Ek

The object of this report is to determine if the volume changes in Storglaciären can be determined by the mean summer temperature in Tarfala. This hypothesis was divided into two smaller questions, Firstly that Storglaciärens summer balance is determined by the mean summer temperature in Tarfala, and secondly that Storglaciärens volume changes are directly linked to the glacier's summer balance. With a strong r2 value of 0,80 the first part of the hypothesis is proved correct. The second part of the hypothesis is also confirmed with a slightly lower r2 value of 0,70 but it is equally satisfying. The hypothesis that Storglaciärens

volume changes are determined by the summer mean temperature in Tarfala seems to be proven correct as there is a good correlation with an r2 value of 0,63. However in the mass balance record there is a period around the beginning of the 1990s that appears to be different, here the volume changes seem to be linked to the winter balance instead. This period is associated with an advancement of Storglaciären. The period is too short to make any definitive answers it is however big enough so that we cannot say with confidence that Storglaciärens volume change is directly liked to the mean summer temperature in Tarfala. We can however say that this is true when the glacier is retreating as is the case at the moment, but when the glacier is advancing its volume change appears to be linked with the winter balance; further studies are needed to confirm this relationship.