Outburst floods of glacier-dammed lakes: a case study in Gornergletscher

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Background

Sudden drainage of a glacier-dammed lake is one of the most serious glacier related hazards in Alps and other regions in the world. Our research at the lake in Gornergletscher aims to understand the triggering mechanism of the outburst, hydrological process of the drainage, and other glacial phenomena caused by the flood.

Study site

Gornersee is a glacier-dammed lake located at the confluence area of Gorner- and Grenzgletscher in Valais, Switzerland (Fig. 1). The lake is annually formed and developed from early spring towards mid ablation season, and it drains approximately 2 million cubic meters of water within a period of several days to a week. Timing of the drainage varies year to year from early summer to autumn.

Research plan

One of the topics related to this project is influence of the flood on glacier dynamics. Because the ice flow field of a temperate glacier is strongly dependent on the subglacial hydrological conditions, sudden drainage of large amount of water may cause drastic change in the ice flow speed. In order to study the anomalous flow event triggered by the outburst flood, and also to investigate the change in the flow regime before and after the flood, we set up a stake net on the glacier surface (Fig. 2). Stakes are surveyed to measure the surface flow field, and three GPS's are operated continuously to detect the changes in the flow speed.

Figure 1: Gornersee at the confluence area of Gorner- and Grenzgletscher in June 2003.

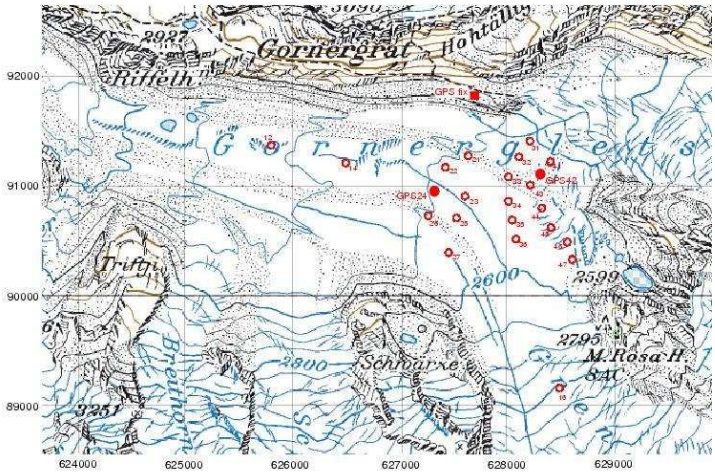

Figure 2: Map of Gorner- and Grenzgletscher showing the locations of stakes and GPS's.