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Gorner jökulhlaups: Results of the 2004, 2005 & 2006 field campaigns

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Gornergletscher is located in the Swiss Alps. Gornersee, an ice marginal lake on Gornergletscher, forms every spring with melt water. During summer it drains as an outburst flood, a so called jökulhlaup. This lake is particularly suited to study jökulhlaups as hydrographs of the outlet river exist back to 1970 and its easy accessibility. The lake is relatively small with a volume of 1-4$\times 10^6$ m^3 and a peak outflow of about 40 m$^3/s$, this is only about three times as much as maximal base discharge at the outlet.

In the years 2004, 2005 and 2006 detailed measurements were conducted around the drainage of Gornersee. This presentation aims at giving an overview over the wealth of collected data. Some of the measured parameters are: hydrographs of the outlet and of the lake, water pressure in several bore holes, ice flow at over 30 stakes, dye tracer experiments, ablation and accumulation, etc.

The most striking difference between the three years are the three very distinct drainage types: in 2004 and 2005 the lake outflow hydrographs look very different. They suggest that in 2004 drainage was triggered by flotation of the ice dam whereas in 2005 the classical Nye channel enlargement caused the flood. These hypothesis are supported by ice flow measurements and tracer experiments. However, the influence of the drainage on the ice flow further down glacier and on the subglacial water pressure was similar in both years. In 2006 the flood was different again as the lake drained superficially. This lead to a slow emptying of the lake, lasting over three weeks as opposed to five days in the previous years.