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Dye tracer experiments during a jökulhlaup

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In the years 2005 and 2006 we conducted over 130 tracer injections on Gornergletscher, a large valley glacier in Switzerland. These experiments were part of a large field campaign to study the drainage of Gornersee, an ice marginal lake, as a jökulhlaup (see presentation in session CR10).

For the year 2005 we present results showing the transition of the drainage system near the lake from inefficient to efficient just prior to the jökulhlaup and a series of experiments from a moulin below the lake throughout the jökulhlaup.

In 2006 the lake did not drain as a jökulhlaup but emptied superficially into a moulin near the lake. This moulin was completely filled during the first three days of the drainage; afterwards the spillway was the limiting factor. So during the first three days it was the beginning of a normal jökulhlaup, but allowing us to inject dye into the drainage channel. These experiments showed that the flow speed more than doubled during these three days from 0.3 m/s to 0.65 m/s whilst the discharge increased from ca. 0.1 m^3/s to ca. 5 m^3/s.

Furthermore in 2006 the catchment area of the lake was determined using tracer experiments. It shows that preferential englacial flow path of the water is parallel to the crevasses near the lake.