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Toward modelling glacier lake outburst floods from ice-dammed lakes: case study in Rembesdalskåka, Norway

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Outbursts from ice-dammed lakes typically recur through cycles of filling and are driven by complex drainage mechanisms that can influence the magnitude and the timings of the Glacial Lake Outburst Flood (GLOF). Predicting GLOFs from ice-dammed lakes is complex, because ice dams are formed by an active glacier that is constantly changing in response to climate. New approaches combining numerical modelling, AI-driven models and remote sensing can be used to understand these protean hazards. This study combines subglacial modelling (using GlaDS within Elmer/Ice) with novel field data to enhance the understanding of physical processes during outburst flood events from an ice-dammed lake in Norway. This aim fits within the larger CryoSCOPE project that seeks to integrate machine-learning with physics-based numerical models and remote-sensing observations to improve the assessment of cryospheric hazards. The study glacier is Rembesdalskåka, the largest outlet glacier of Hardangerjøkulen ice cap in southern Norway and the source of Norway's most destructive GLOFs in 1893 and 1937. The glacier was monitored over the last 50 years, making an ideal case study to improve understanding of these complex processes at place. We will present field observations from 2025, and the data inputs for the modelling of GLOFs between 2023 and 2026 as a first step towards understanding the exact sequence of events and interplay of processes that drives GLOF-events at Rembesdalskåka.