

Cohen-Corticchiato, Denis<sup>1,2</sup>; Haeberli, Wilfried<sup>3</sup>; Landgraf, Angela<sup>4</sup>; Fischer, Urs H<sup>4</sup>

## Erosion and sediment transport by subglacial water in the Rhine glacier during the LGM

<sup>1</sup>CoSci LLC, USA;

<sup>2</sup>NMT, Socorro, NM, USA;

<sup>3</sup>University of Zurich, Zurich, Switzerland;

<sup>4</sup>Nagra, Wettingen, Switzerland;

[denis.cohen@gmail.com](mailto:denis.cohen@gmail.com)

Subglacial water plays an important role in eroding bedrock and in transporting sediments out of the glacial system. It is responsible for producing erosional features such as tunnel valleys and inner gorges (slot canyon) carved deep into the bedrock. Subglacial water also plays an important role in the formation of overdeepenings. Sediments transported in subglacial streams are deposited in outwash fans in front of the ice margin. They can also form deposits in tunnel valleys and eskers during periods of lower discharge. Here we model the erosion and sediment-transport processes in these subglacial channels using a simple subglacial hydrology model that computes hydraulic gradients from high-resolution ice-flow simulations of the Rhine glacier system in Northern Switzerland. From the hydraulic gradient and a model of surface melt obtained from recent high-resolution climate models over the Alps at the LGM, we estimate the flux of water in these subglacial channels as a function of seasons and during the advance and retreat of the Rhine glacier. The flux of water is then used to calculate local erosion (and deposition) in the subglacial streams. A sediment transport algorithm then estimates the total flux of sediments through these channels flushed out of the glacial system. Model parameters are adjusted using best estimates of observed sediment-size distribution and channel morphology in the Rhine glacier basin. This model has potential applications to understanding the origin and the movement of sediments in subglacial channels and explaining erosional features found today in the Northern Swiss lowlands that cannot be explained using glacial erosion mechanisms such as abrasion and quarrying.

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