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Hydrodynamic Response to Partially Spanning Logjams

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Wood is a key part of a river ecosystem and affects both flow conditions and channel morphology. Wood accumulations or logjams may generate important habitat by increasing the upstream water surface elevation (backwater rise) and creating a downstream region with reduced flow velocity. Depending on the logjam size and the flow conditions, the resulting backwater rise can also provoke a flood hazard. Therefore, the prediction of backwater rise due to logjams is required to inform river restoration as well as flood hazard assessment efforts. Backwater rise due to channel spanning logjams can be described based on analytical and empirical models. However, logjams can exhibit various shapes, including partially spanning logjams. The hydrodynamic response to logjams that partially span the channel lateral extent has not been studied so far. Therefore, a series of flume experiments was conducted at the Laboratory of Hydraulics, Hydrology and Glaciology (VAW) at ETH Zurich to study how the flow depth and flow velocity are altered by partially spanning logjams with a lateral gap. The objectives were to determine how the jam relative width (jam width to channel width) influenced flow heterogeneity, described by flow velocity and turbulent kinetic energy, and to predict the backwater rise. Initial results demonstrated that logjams with a relative width $B_{rel} \geq 0.5$ created two distinct zones of velocity and increased flow heterogeneity. In addition, backwater rise increased with increasing relative logjam width. As a next step, the existing analytical model for channel spanning logjams will be adapted to describe backwater rise due to partially spanning logjams.