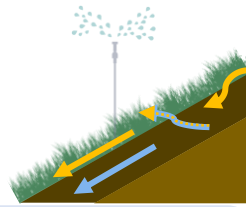




# Connectivity between overland flow and topsoil interflow: insights from tracer experiments during artificial rainfall

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## Introduction

Near-surface flow pathways provide a fast transport route for water in humid catchments with low permeability soils. We conducted tracer experiments on trenched runoff plots to investigate solute transport and mixing of overland flow (OF) and topsoil interflow (TIF) through the topsoil.

## Study area

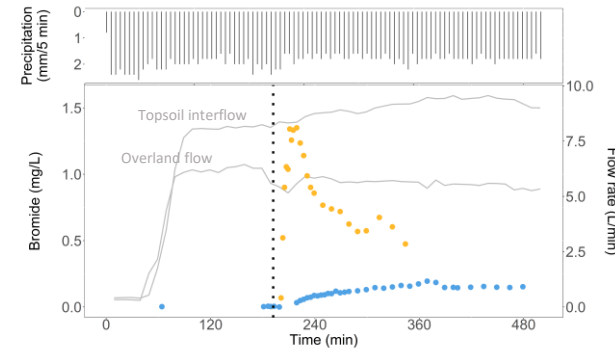
- two plots (>80 m<sup>2</sup>)
- Swiss pre-Alps
- humid, temperate climate
- mean annual precipitation: 2300 mm y<sup>-1</sup>
- steep hillslopes (20-40°)
- open forests, pastures, and wetlands
- soil depths: 0.5 to 2.5 m
- conductive, organic topsoil layer
- low permeability gleysols
- Flysch bedrock

## Methods

- stream water applied to the surface of the plots
- average rate: 27 mm/h
- tracer application after OF and TIF reached steady state
- D<sub>2</sub>O-labeled water applied via the sprinklers
- Uranine and NaCl: line tracers at various distances from the trench
- NaBr applied to subsurface (at ~20 cm depth) at 7.5 m from the trench
- samples of OF and TIF collected for several hours after tracer application

## Results

Breakthrough curves of bromide (applied to subsurface) in overland flow and topsoil interflow for location 1.

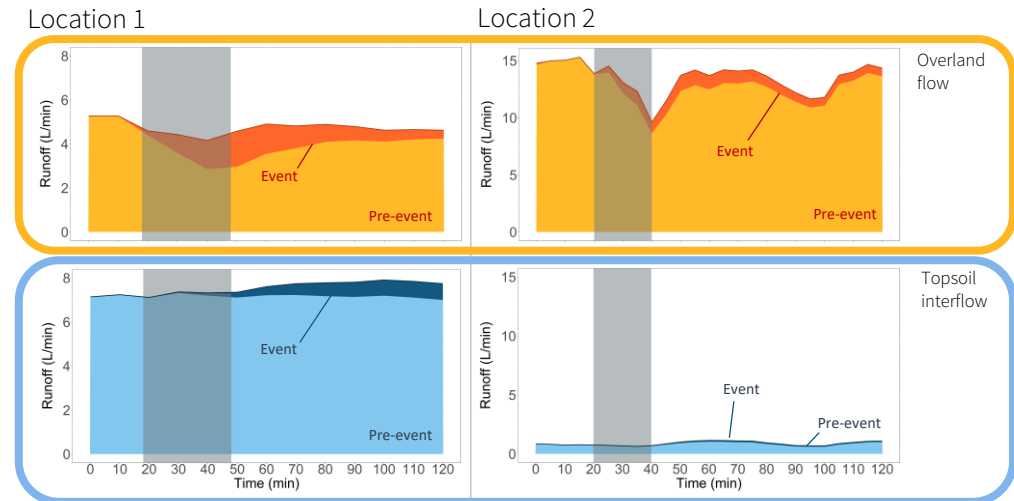


- Bromide in overland flow
- Bromide in in topsoil interflow
- Time of bromide application
- Flow rate of overland flow and topsoil interflow

## Conclusion

- considerable mixing of overland flow and topsoil interflow
- particle velocity high in both flow pathways, but higher for overland flow than topsoil interflow
- runoff generation faster in location 1 (opening in mixed forest) than in location 2 (pasture)

Pre-event water D<sub>2</sub>O-labeled water Time of D<sub>2</sub>O application



Maximum particle velocities (all tracers):

Location 1:	OF: $1.4 \times 10^{-2}$ m/s
	TIF: $0.8 \times 10^{-2}$ m/s
Location 2:	OF: $0.7 \times 10^{-2}$ m/s
	TIF: $0.5 \times 10^{-2}$ m/s

Recovery of D<sub>2</sub>O-labeled water (first 100 min):

Location 1:	OF: 10%
	TIF: 5%
Location 2:	OF: 21%
	TIF: 3%

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