A look inside the Panola trenched hillslope

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A tracer test at the well-known Panola trenched hillslope
Methods

- **Bromide line application**
  - 10 m upslope from the trench
  - 5 cm below the soil surface
  - 512 g Br

- **Chloride area application**
  - Sprayed on top of soil surface
  - Lower 10 m of the hillslope
  - 3.1 kg Cl

- **Sampling**
  - At 49 suction lysimeters
    - Shallow: ~ 17 cm
    - Deep: ~ 60 cm
    - 1055 samples
  - At 2 m wide trench sections during events
    - 1286 samples
Sampling sites and surface and bedrock topography

- Surface topography
- Bedrock topography

The colors at the lower end of the hillslope represent the distance along the slope in five increments (each 4 m) and will be used throughout this presentation.
Well known difference between surface and bedrock topography leads to large spatial variation in subsurface flow volume.
Suction lysimeter data: Bromide

Each subplot shows the time series of the bromide concentrations for one location on the hillslope. 

**Orange**: shallow

**Red**: deep
Suction lysimeter data: Bromide

Each subplot shows the bromide concentrations as a function of cumulative precipitation for one location on the hillslope. Orange: shallow; Red: deep.
Suction lysimeter data: Chloride

Each subplot shows the time series of the chloride concentrations for one location on the hillslope. Light blue: shallow, Dark blue: deep.
Suction lysimeter data: Chloride

Each subplot shows the chloride concentrations as a function of cumulative precipitation for one location on the hillslope.

Light blue: shallow

Dark blue: deep
20 m trench

- Well known difference between surface and bedrock topography leads to large spatial variation in subsurface flow volume.
Trenchflow data: Bromide - event
Trenchflow data: Chloride

- **Concentration (mg/l)**
  - **8.3**
  - **5.4**
  - **3.5**
  - **31.5**

- **Subsurface flow (Liter/30 min)**

- **Furthest left section**
  - 18-20 m
  - 16-18 m
  - 14-16 m
  - 12-14 m

- **Furthest right section**
  - 0-2 m
  - 18-20 m
  - 16-18 m
  - 14-16 m
  - 12-14 m
Take home messages and next steps

Take home messages:
- Rapid transport during large events
- Highly variable tracer breakthrough related to main flow pathways and spatial variability in saturated flow occurrence

Data analysis has just started.

Next steps:
- Compare data from wells to data from suction lysimeters
- Determine velocities and celerities
- Analyse data during rainfall simulation on part of the hillslope

For questions and suggestions, email me:
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References for the Panola hillslope

- **Hydrometric data:**

- **Papers:**