Aims & Objectives:
Better process understanding
- Lateral & vertical subsurface flow & water balance
- Pre-event/event water fraction
- Ecosystem fluxes (soil water, tree xylem)

Experimental Site: Conventwald, Black Forest, Germany
- Soil: Skeletic cambisol
- Texture: Sandy loam
- Geology: Paragneis
- Trees: Fagus Sylvatica
- Altitude: 840 m
- Precip.: 1749 mm/a

Experimental Setup:
- Trench (drains in 10, 150, 300 cm soil depth)
- Lysimeters (in 10, 40, 150, 300 cm soil depth)
- In-situ isotope probes in a soil profile (in 6 depths)
- In-situ isotope probes in 3 trees
- Isotope analyzer continuously operating in the field

Sprinkling experiments:
- 60,000 liters, deionized water
- 15-20 mm/h intensity for 12h
- Water samples every 30 min

Research Topics:
1) Lateral & vertical soil water fluxes
2) Quantification of soil water storage
3) Propagation of wetting front into the soil
4) Plant source water depth & uptake delays

Hypotheses:
1) Coarse textured soil:
   - > predominantly vertical flow
   - > high event water fraction
2) Trees:
   - > tracer arrival in stem on same day
3) Incoming natural precipitation:
   - > isotopic tracer further pushed down to deeper soil depth

Syntheses:
- Flux per m²
- Total flux hillslope
- Water balance
- Soil water and xylem isotopes:

Results:
Sprinkling Experiment
- a) Lateral flow
- b) Vertical flow
- c) Tree xylem isotopes
- d) Soil isotopic profile

Lateral & vertical soil water flux:
- Flux per m² is larger for lateral than vertical flow (a, b)
- Reason: saturation in deeper soil depth indicated by soil moisture data
- Large fraction of pre-event water at deeper soil depth

Plant water uptake and soil isotopic profile:
- Isotopic tracer in tree stem first measured after 2-3 days; peak after ca. 10 days (c)
- The isotopic tracer of the sprinkling water was further propagated into the soil profile by incoming natural rainfall (d)