Aims & Objectives:
Hydrological effects on phosphorus (P) fluxes in beech forests
- Lateral & vertical subsurface flow
- Major loss of P from the forest ecosystem

Hypotheses:
1) P-losses are higher in P-rich than in P-poor ecosystems
2) P-losses are higher in coarse textured than in fine textured soils
3) P-losses are higher during wet antecedent conditions than during dry antecedent conditions

Experimental sites:
Three sites from P-rich to P-poor
- Mitterels (MI): Bavarian Forest
- Conventwald (CO): Black Forest
- Tuttlingen (TU): Schwäbische Alb

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

Fine textured soils / P-rich:
- moderate and delayed flow response
- almost all flow is pre-event water
- higher P-concentrations in the sub soil than top soil

Coarse textured soils / P-poor:
- high flow response, most likely due to saturation at deeper soil depth (see increase in soil moisture)
- increased event water fractions (TU)
- lower P-concentrations in the sub soil than top soil

Antecedent conditions:
- Faster response of subsurface flow during wet than during dry antecedent conditions
- Peaks do not differ much between wet and dry antecedent conditions

Synthesis:
- Coarse textured soils / P-poor: small storage, saturation near the saprolite -> high and fast flow response -> more P export (esp. sub soil)
- Fine textured soils -> more storage -> slow flow response (mainly top soil) -> low P-export (esp. top soil)