

Nutrient and organic matter retention in the hyporheic zone during drying and re-wetting in a mesocosm experiment

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Motivation

- ◇ Does desiccation of streams influence water quality in terms of DOM and nutrient retention and release?
- ◇ Is the biofilm in hyporheic sediments of intermittent streams adapted to desiccation?
- ◇ Can a river shifting from perennial to intermittent cause water quality problems downstream?

Study streams

- ◇ 20 streams sampled
- ◇ four regions in Austria (Burgenland, Lower Austria, Styria, Carinthia)
- ◇ intermittent and perennial, equally distributed
- ◇ gradient from gravel to clay sediments

The experiment

- ◇ collect hyporheic sediments
- ◇ fill the tubes at the stream
- ◇ set up a flow-through system
- ◇ 1 ml min⁻¹ with peristaltic pump
- ◇ measure release during base concentrations
- ◇ DOM and nutrient pulse
- ◇ measure uptake during pulse
- ◇ dry-out for 7 weeks
- ◇ monitor with soil moisture sensors
- ◇ re-wetting and recovery
- ◇ 3 DOM and nutrient pulses over 2 weeks
- ◇ 3 sampling dates during base concentrations



Findings

- ◇ intermittent streams seldom show totally dry sediments in Austria
- ◇ this is supported by field measurements
- ◇ re-wetting caused a massive DOM (up to 18 mg l^{-1} , factor 3 to 15 compared to continuous flow) and nutrient release
- ◇ the pulse lasted for less than 24 hours
- ◇ 1 day after re-wetting retention nearly recovered
- ◇ intermittent and perennial streams did not differ!
- ◇ similar patterns within regions but differences between them!

Next task: What can be reasons for different behaviour?

Detailed results will be in a publication end of 2020.