

Tributary effects on the ecological responses of a regulated river to an experimental flood

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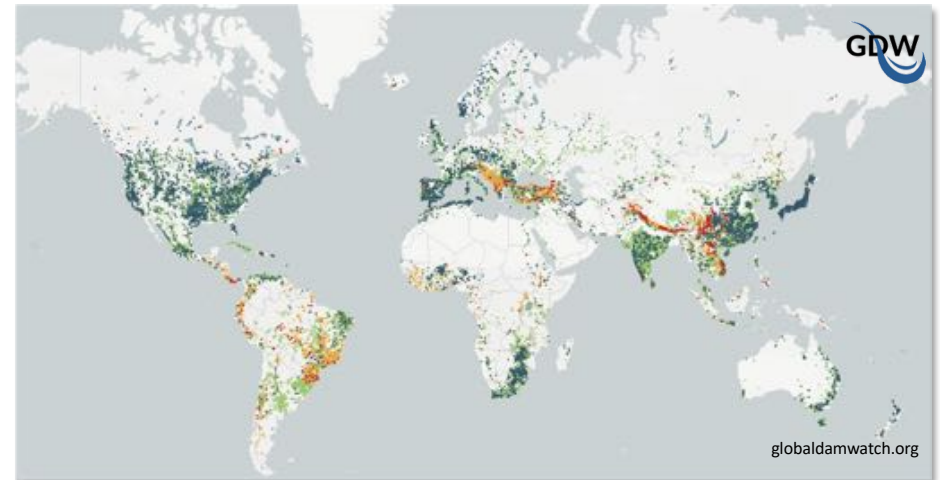
E_{vo}FLOW



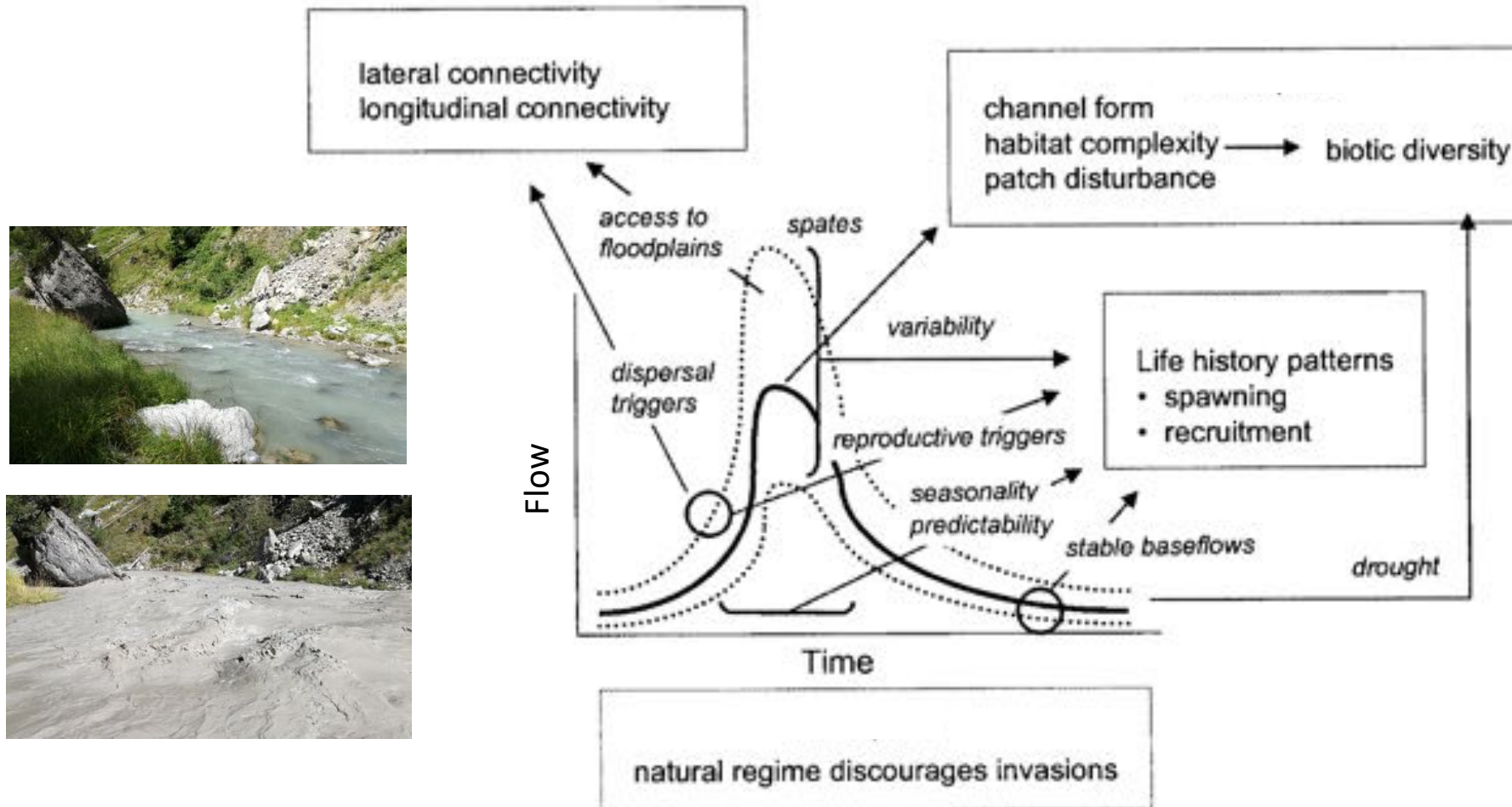
Damming effects on rivers

Global scale alteration of natural flow and sediment regime

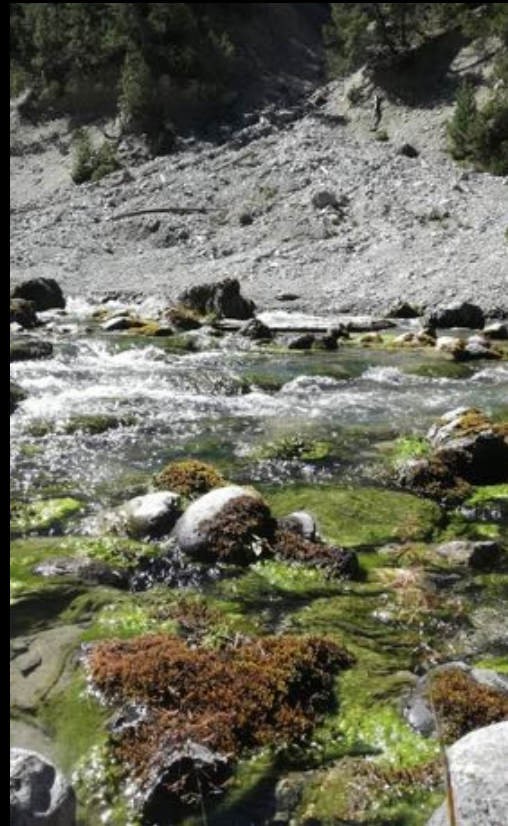
- Reduce water flow and discharge variability
- Limit sediment supply
- Alter nutrient cycles
- Reduce longitudinal and lateral connectivity
- Effect on physical habitat and biota



Aquatic biodiversity and the natural flow regime



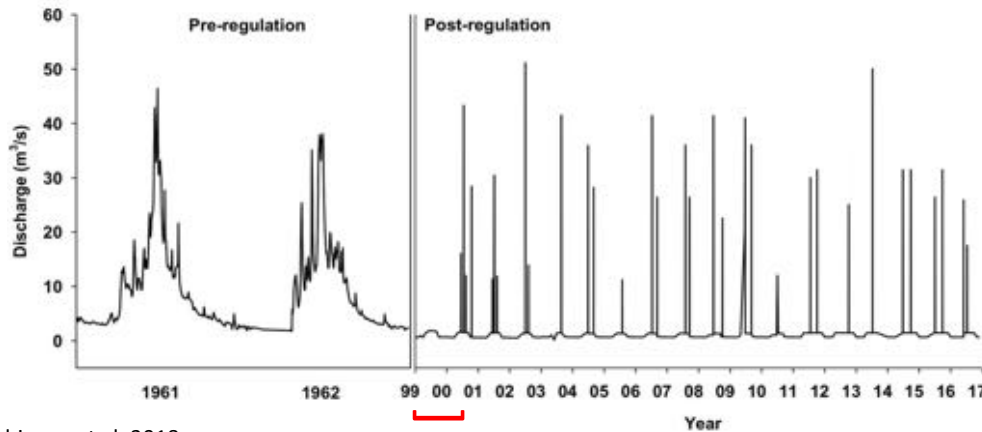
River Spöl



E-flows and experimental floods

Environmental flows: regulating quantity, timing and quality of freshwater flows to meet ecological and societal needs

- **Experimental Floods:** partial restoration of natural hydrological variability to recover ecosystem properties and re-activate geomorphological processes



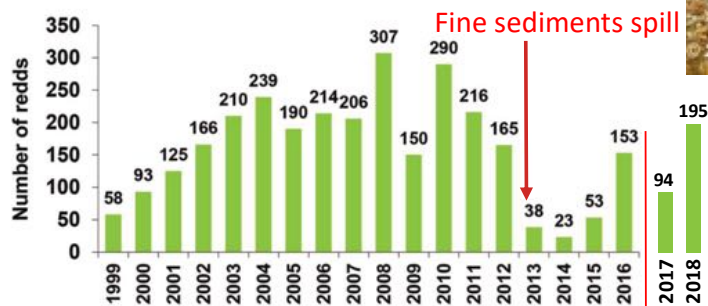
Robinson et al. 2018

Before flood programme



20 years of experimental floods – results from the Spöl

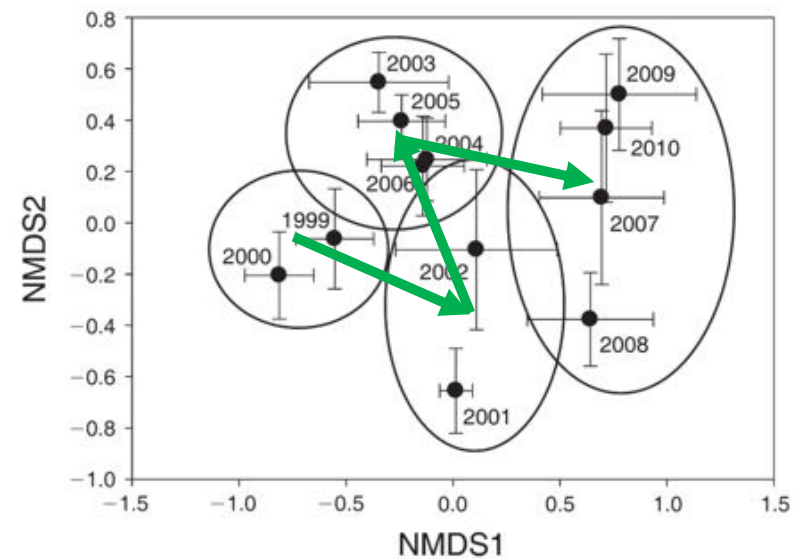
Brown trout redds count



Discontinuation of flood programme

Robinson et al. 2018

Macroinvertebrate community shift

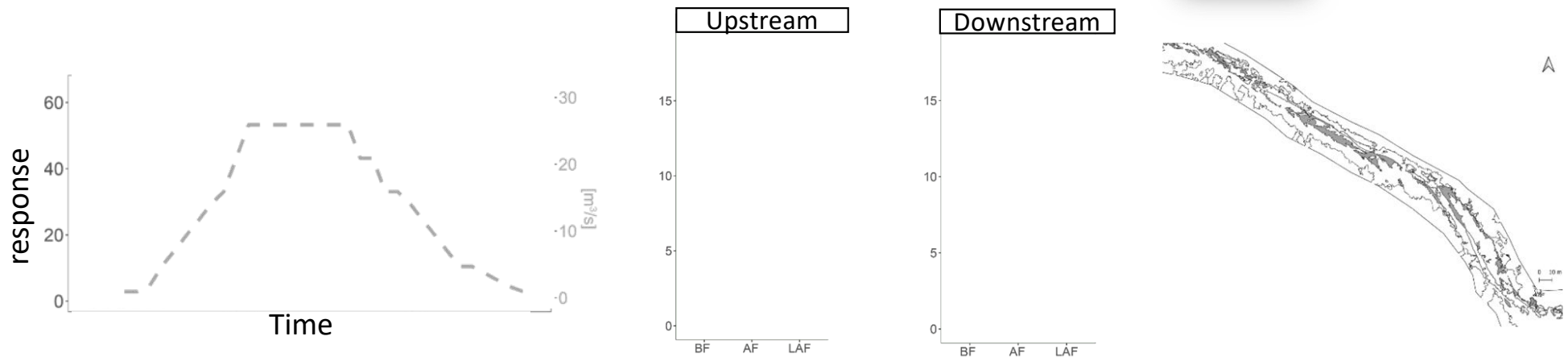
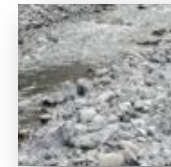
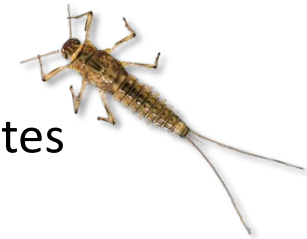


Robinson et al. 2012

Objectives

Test the influence of a source of sediment and flow variability on **immediate** and **B/A** **ecological and morphological responses** to an experimental flood

- Macroinvertebrates
- Algal growth and organic matter
- Sediments



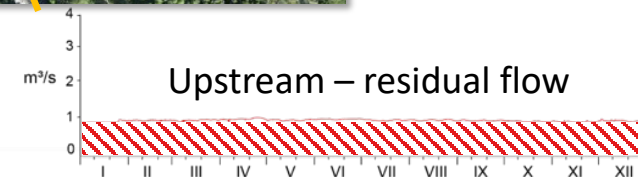
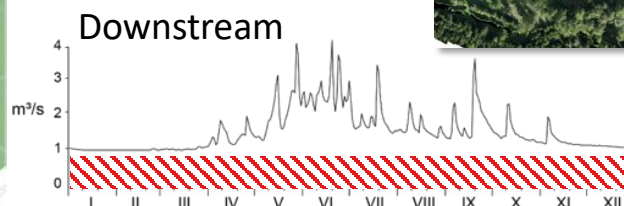
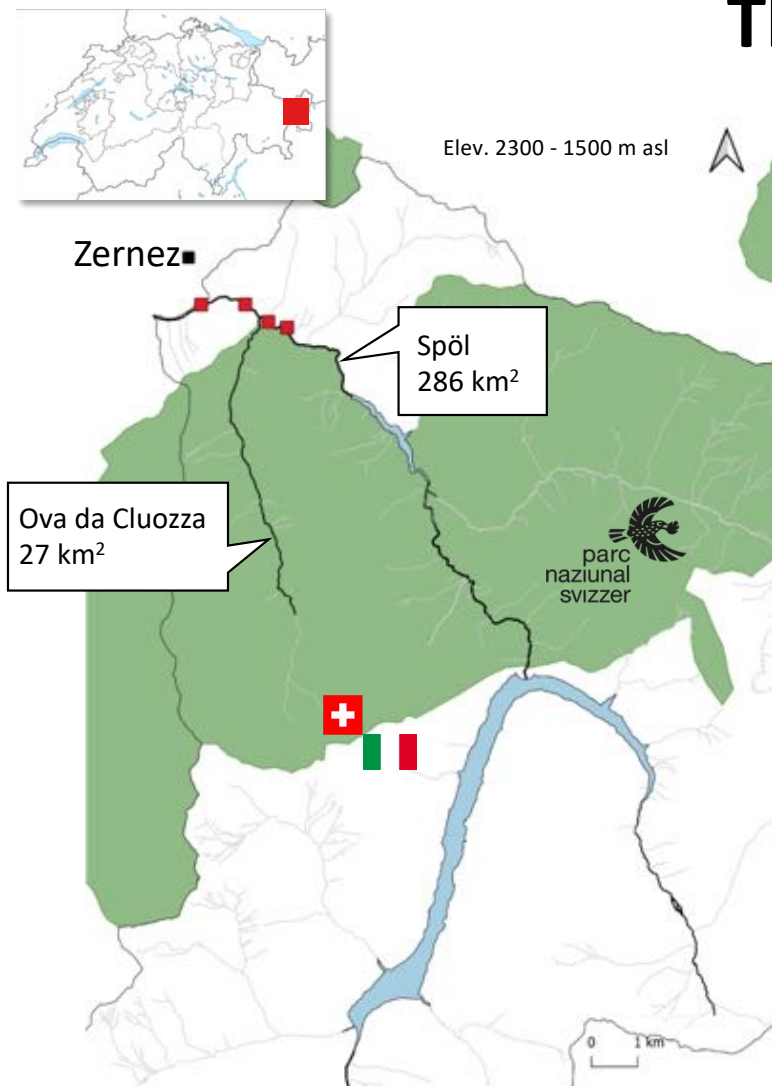
Tributary effect

- Changes in longitudinal biotic and abiotic gradients
- Water, **sediment**, organic matter input
- Flow variability
- Recruitment source

Tributaries are optimal setups to study relationships between reservoir outflow modification and downstream ecosystem responses.



The Spöl catchment



Methods



25m³/s

Before/after

- Periphyton
- Benthic samples
- Drone survey (BF/AF)
- Sediment respiration

During flood

- Drifting organic matter
- Drifting invertebrates
- Water samples (chemistry)
- Turbidity, temperature, conductivity

Before **BF**

After **AF**

Long after **LAF**

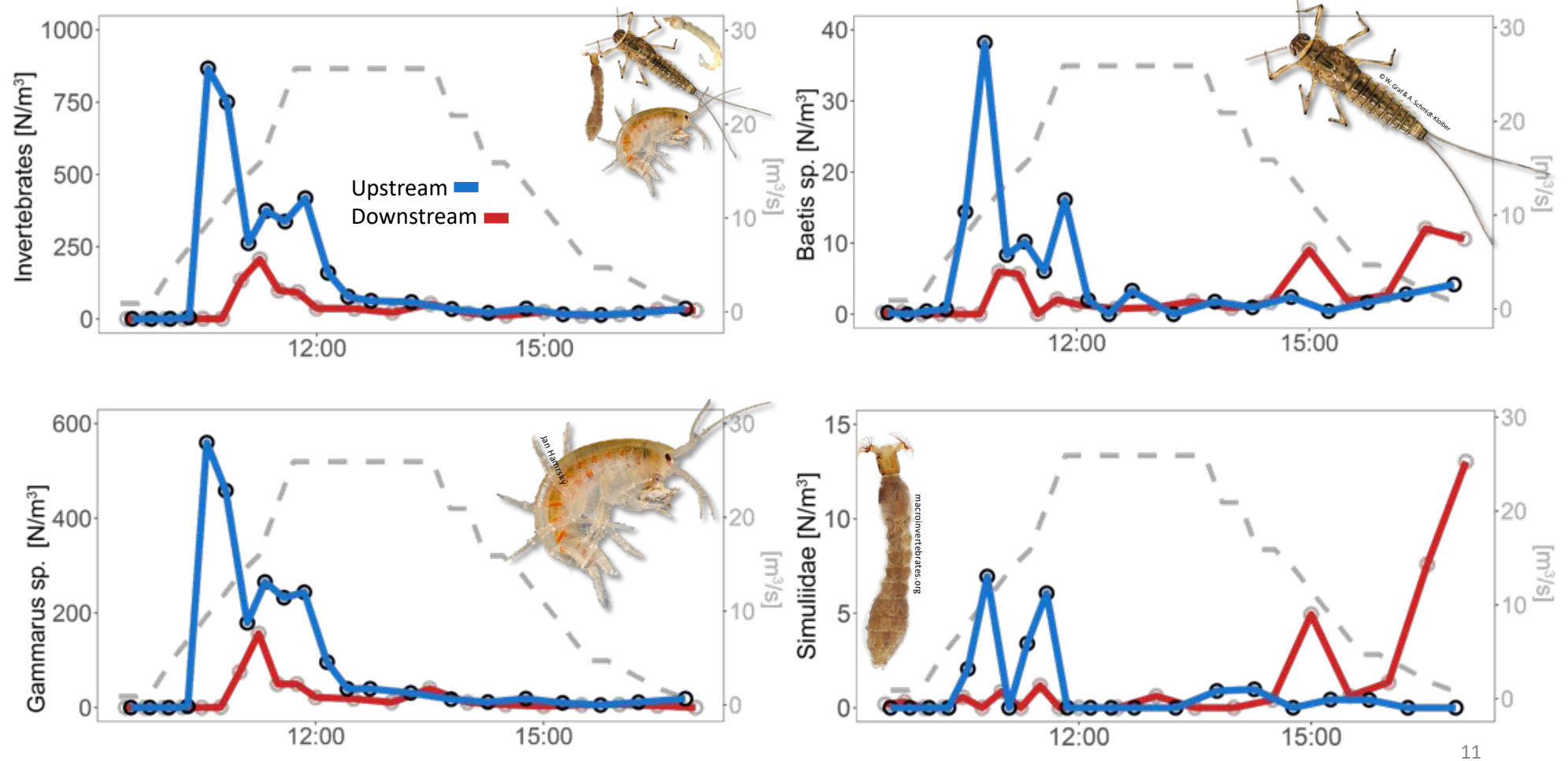
1 week

Sept. 2018 8 hours

4 weeks

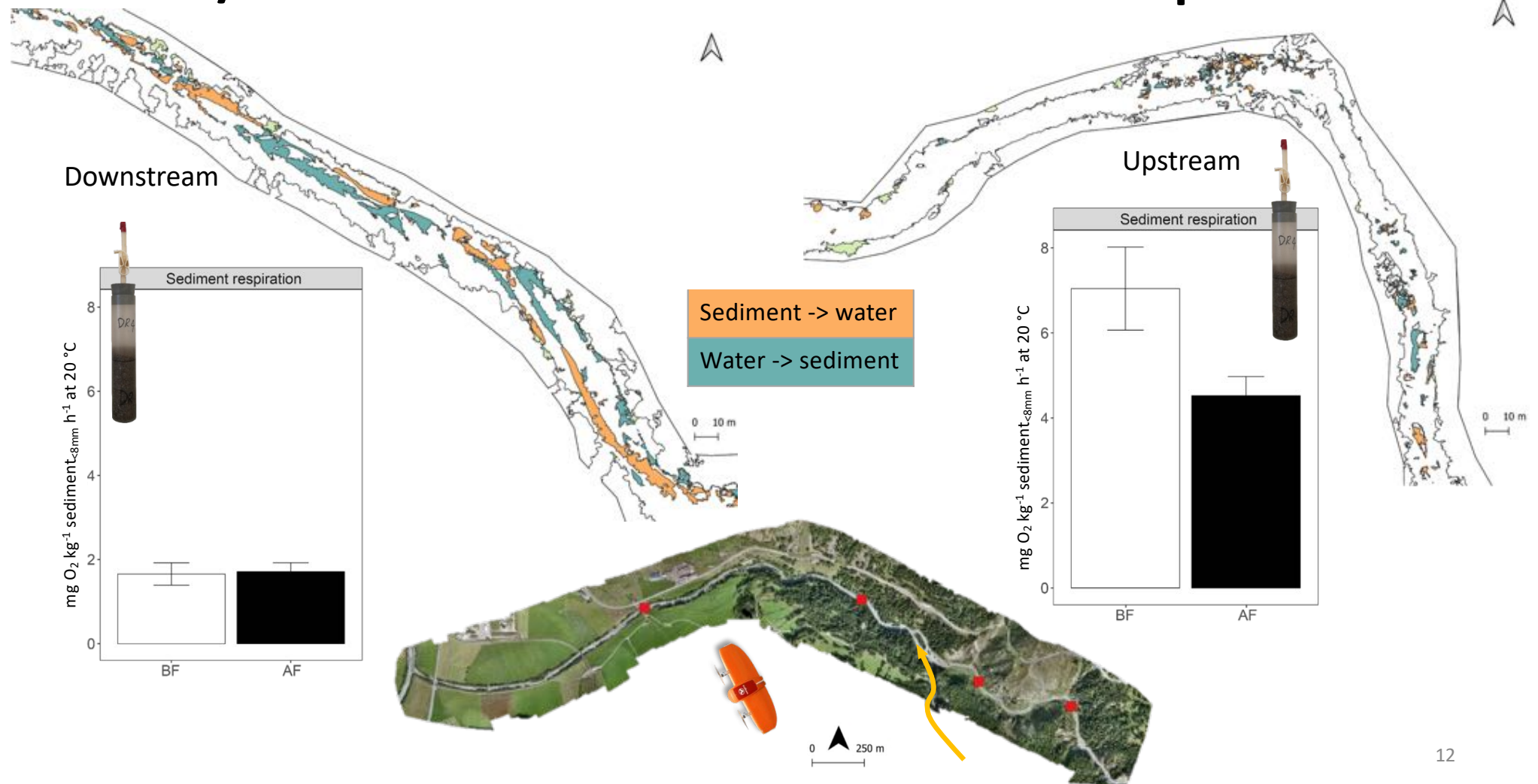
Results

During flood – Macroinvertebrates



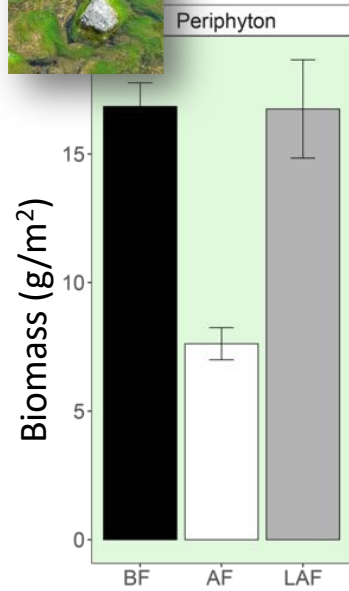
Results

B/A - Habitat turnover and sediment respiration

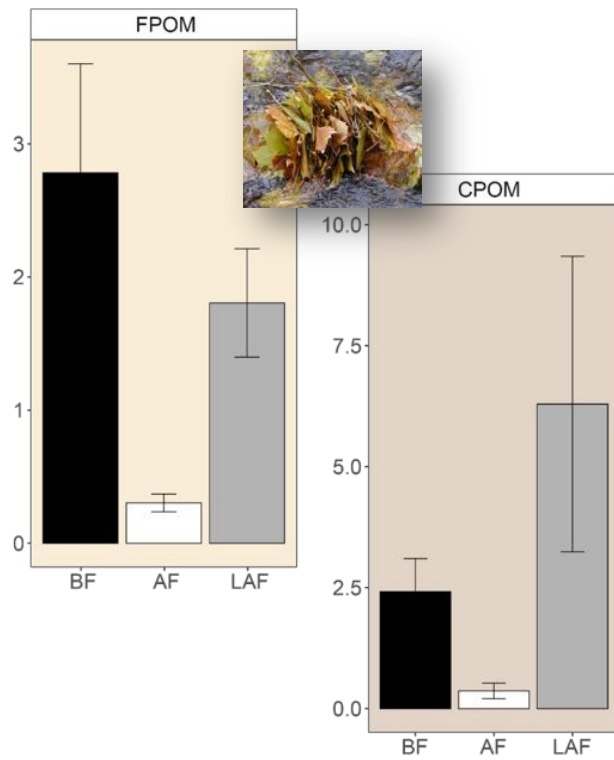


Results

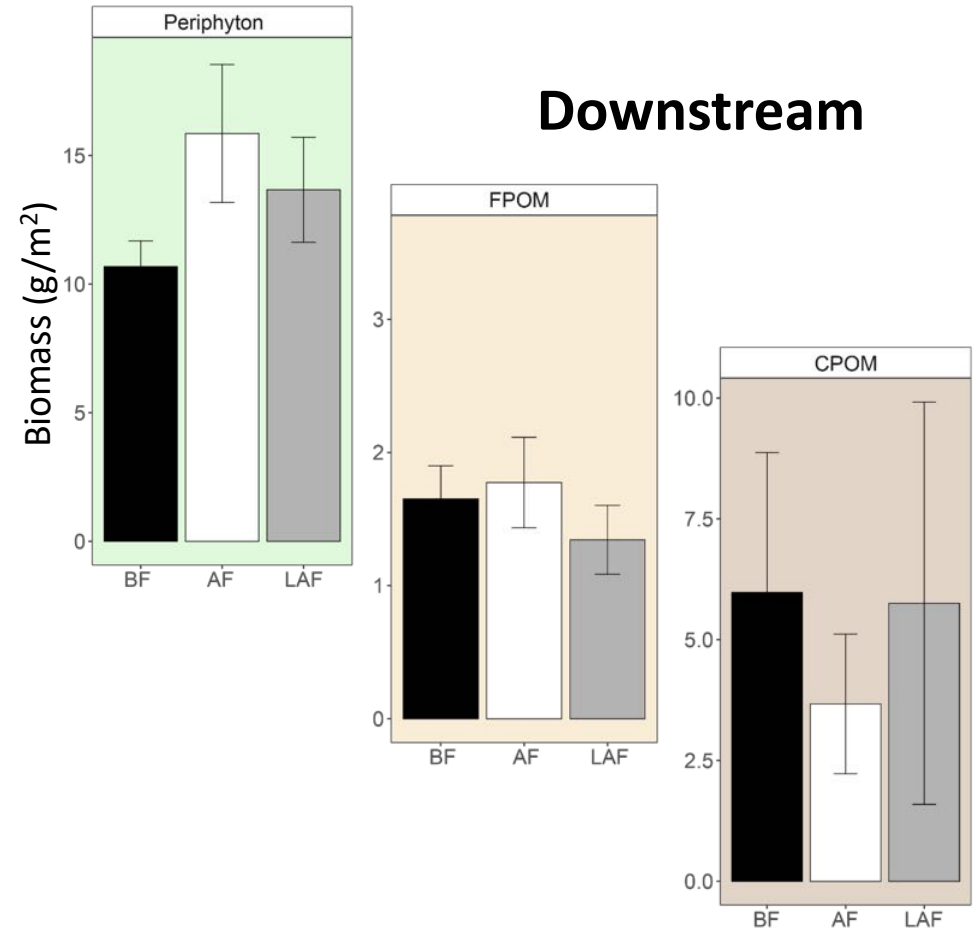
B/A – Organic resources



Upstream



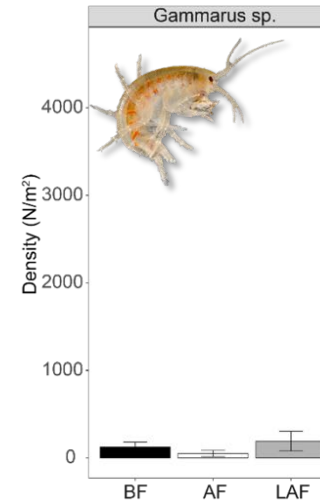
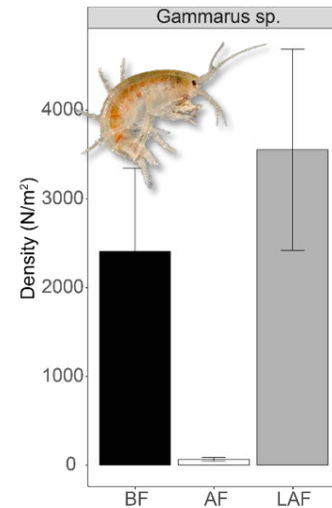
Downstream



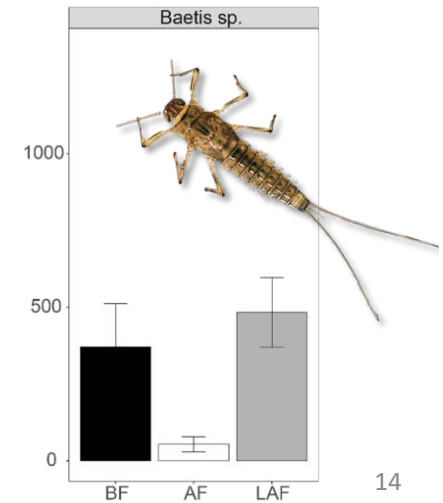
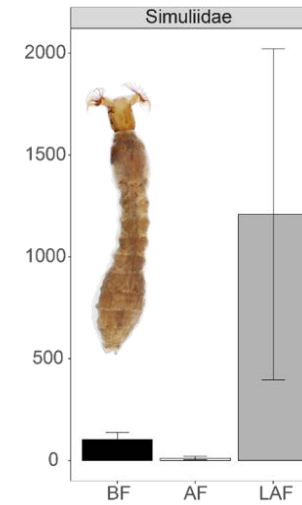
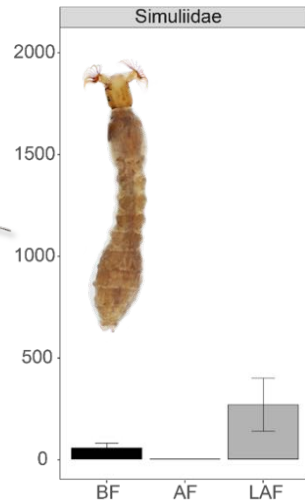
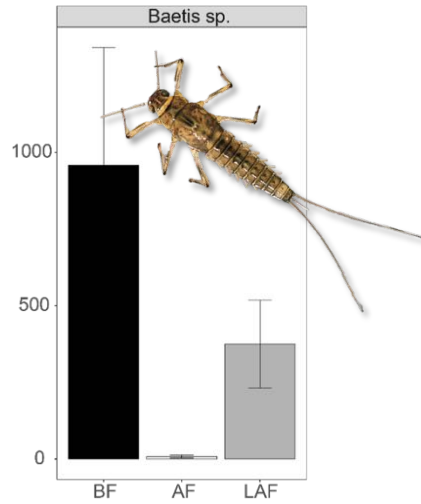
Results

B/A - Single taxa

Upstream

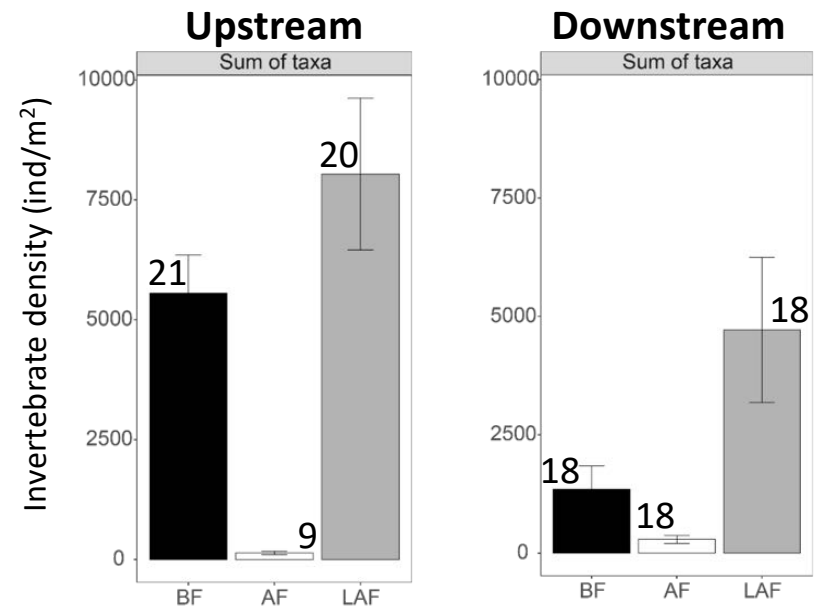
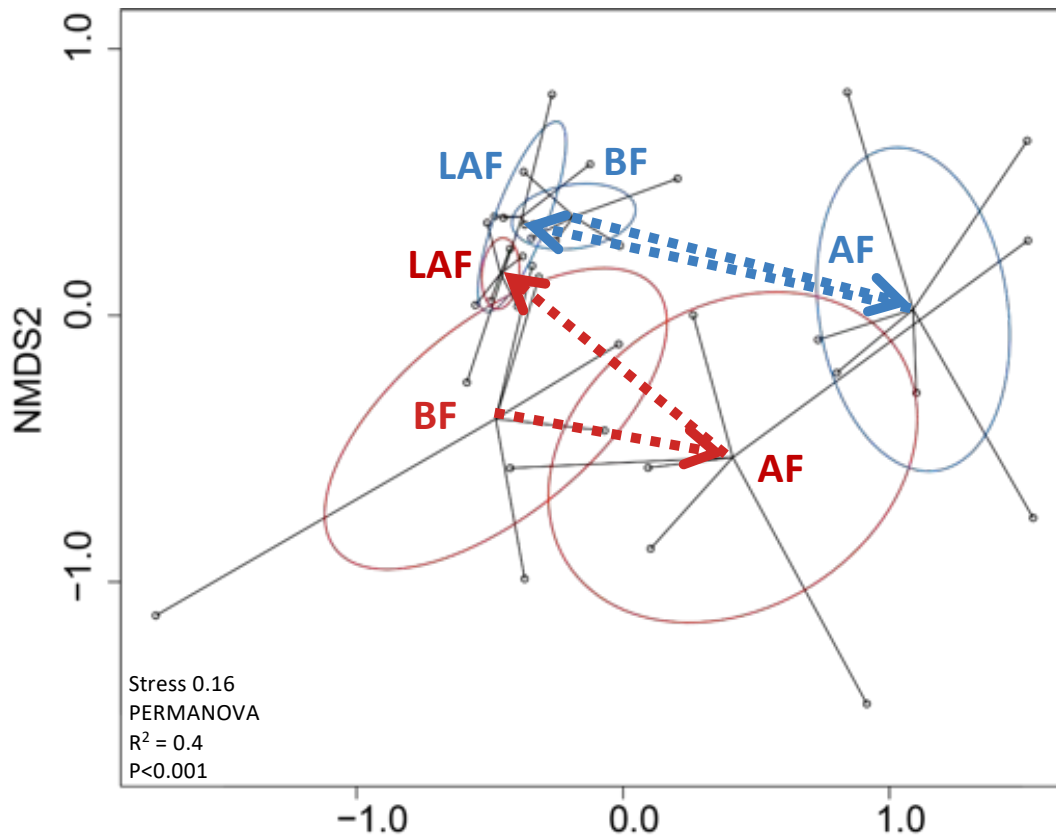


Downstream



Results

B/A - Community response



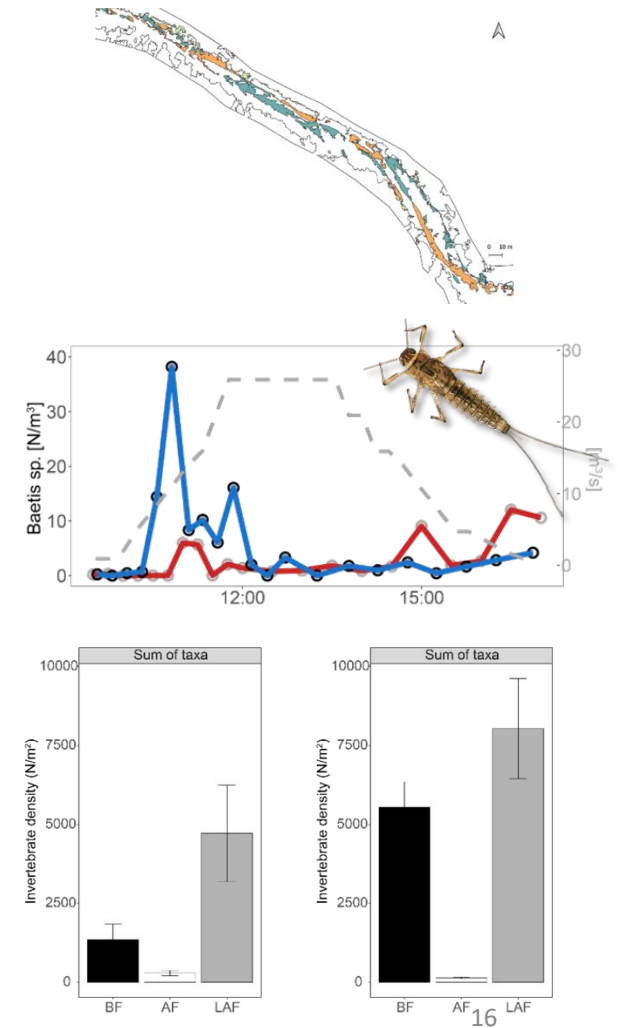
Conclusions

- Habitat turnover and sediment respiration data indicate differences in sedimentological properties between the two sites
- **During flood:** site and taxa specific responses, with interesting peculiarities (Baetis, Simuliidae)
- **Before/after:** data on sediment respiration, resources and invertebrate community show marked differences in baseline and responses upstream/downstream

NEXT...

2nd flood (summer 2019) to confirm patterns and add seasonal perspective

Integrate with results on morphology – sediment



Acknowledgements



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zhaw

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Giorgia Camperio

...

To know more about Euroflow
<http://water.leeds.ac.uk/euroflow>
Twitter: @EuroFLOW_ITN



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Società svizzera di idrologia e limnologia
Societad svizra d'idrologia e da limnologia

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River Spöl



Floods are important!

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