

## Effects of desiccation on the self-purification capacity of headwater streams: Consequences for the stream management

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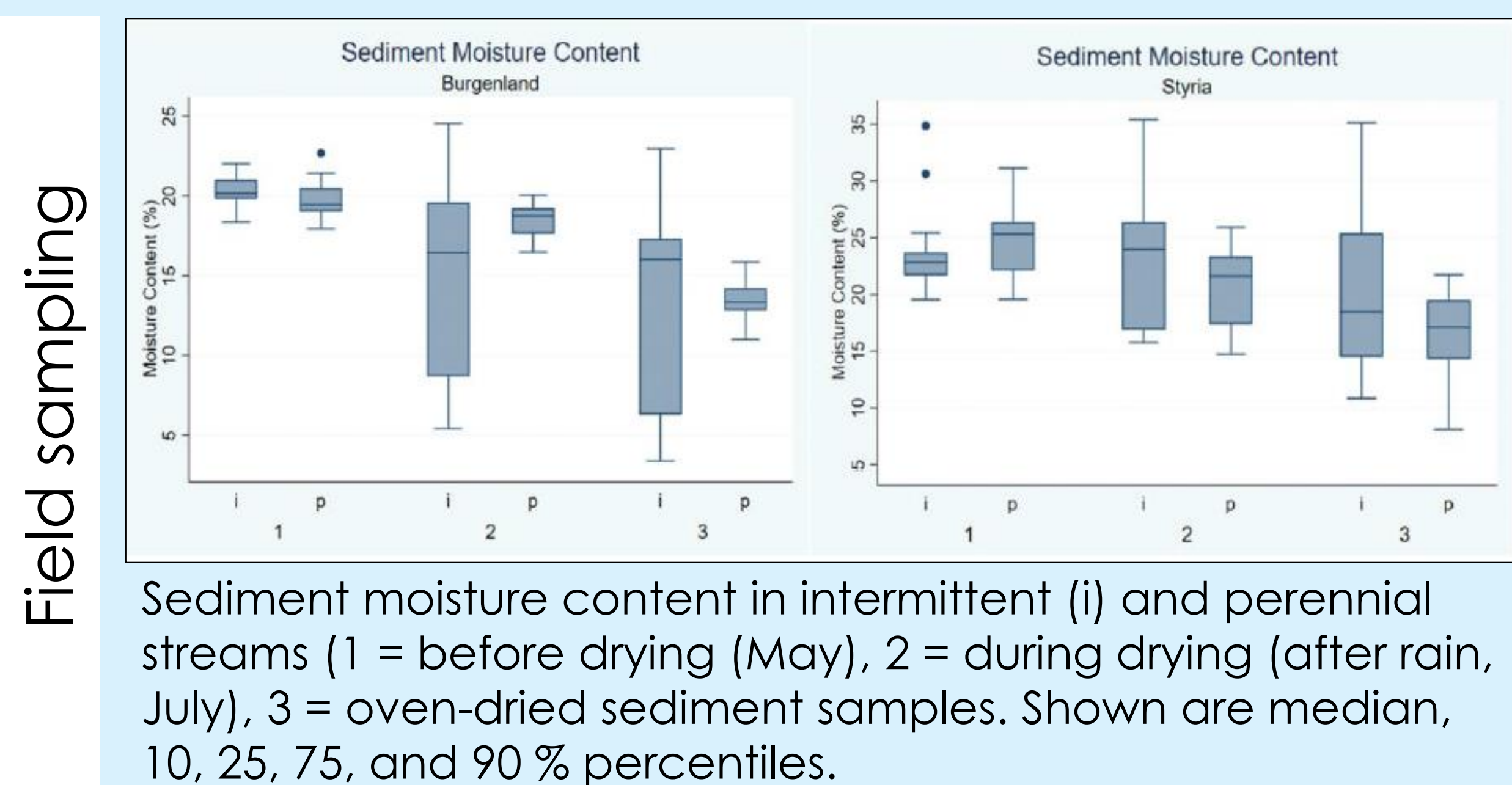
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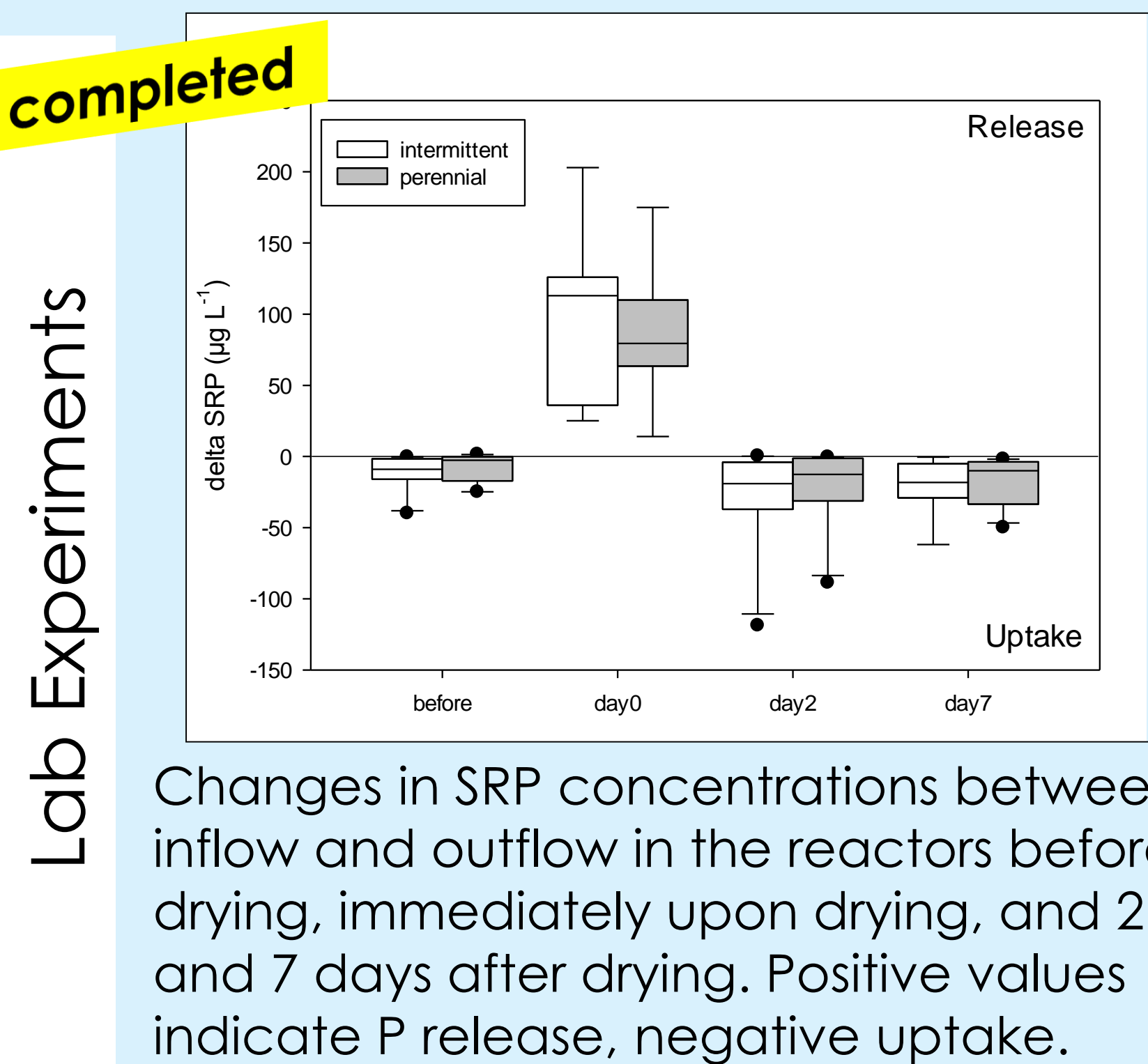
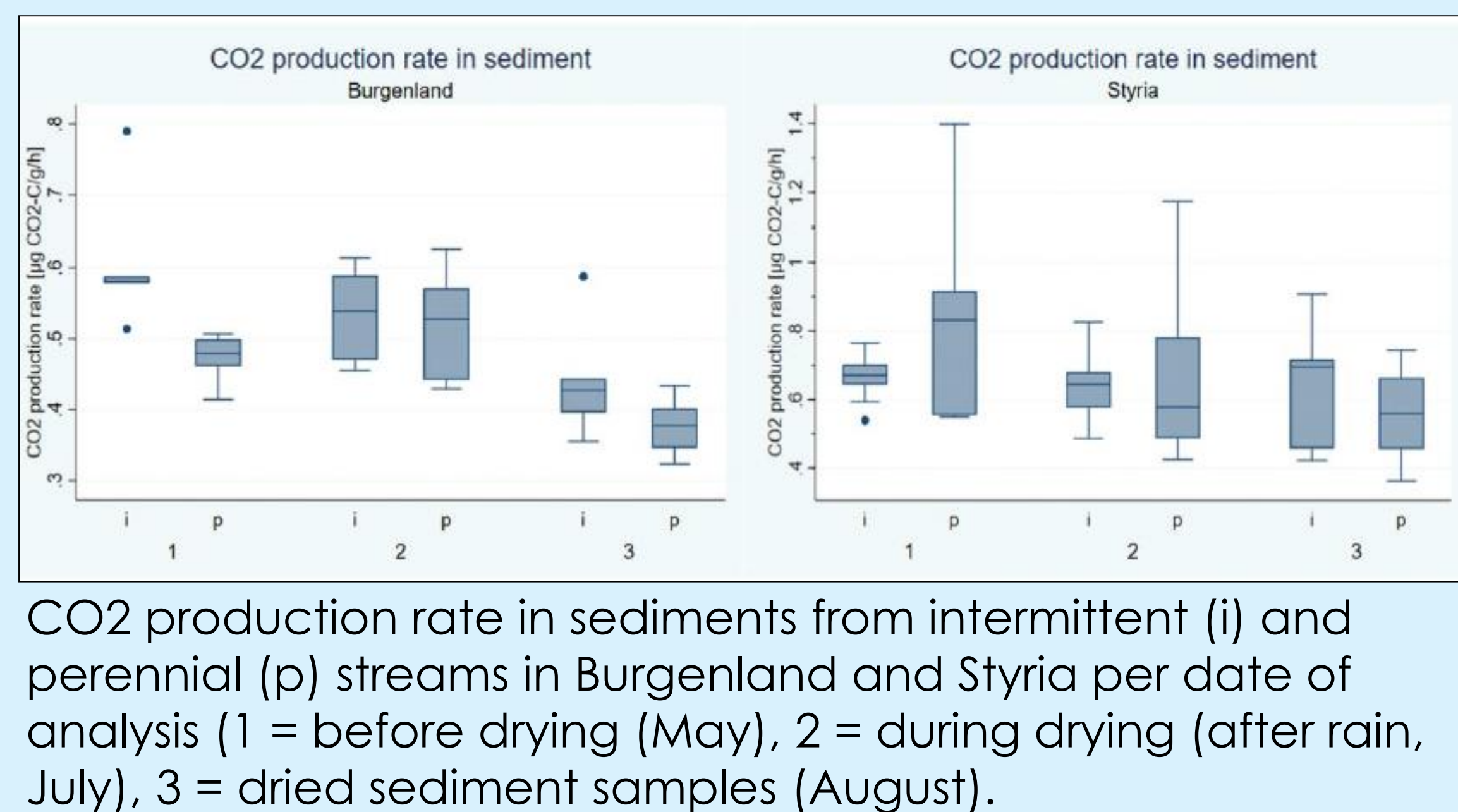
### Advancing intermittent stream research in Austria and supporting environmental authorities in the protection and sustainable management of intermittent streams by setting the following objectives:

- Investigation of the medium- and long-term effects of drought on ecosystem structures and functions determining the water quality of intermittent streams in Austria (Burgenland, Carinthia, Styria, and Lower Austria)
- Analysis of potential effects of desiccation on the self-purification capacity of the sediment surface and the hyporheic zone
- Identification of factors which determine the resistance and resilience of streams to desiccation impacts
- Modelling of potential consequences of drought for the water quality of streams in Austria
- Development of a guideline for water management authorities to assess the risks of a possible deterioration of water quality due to droughts

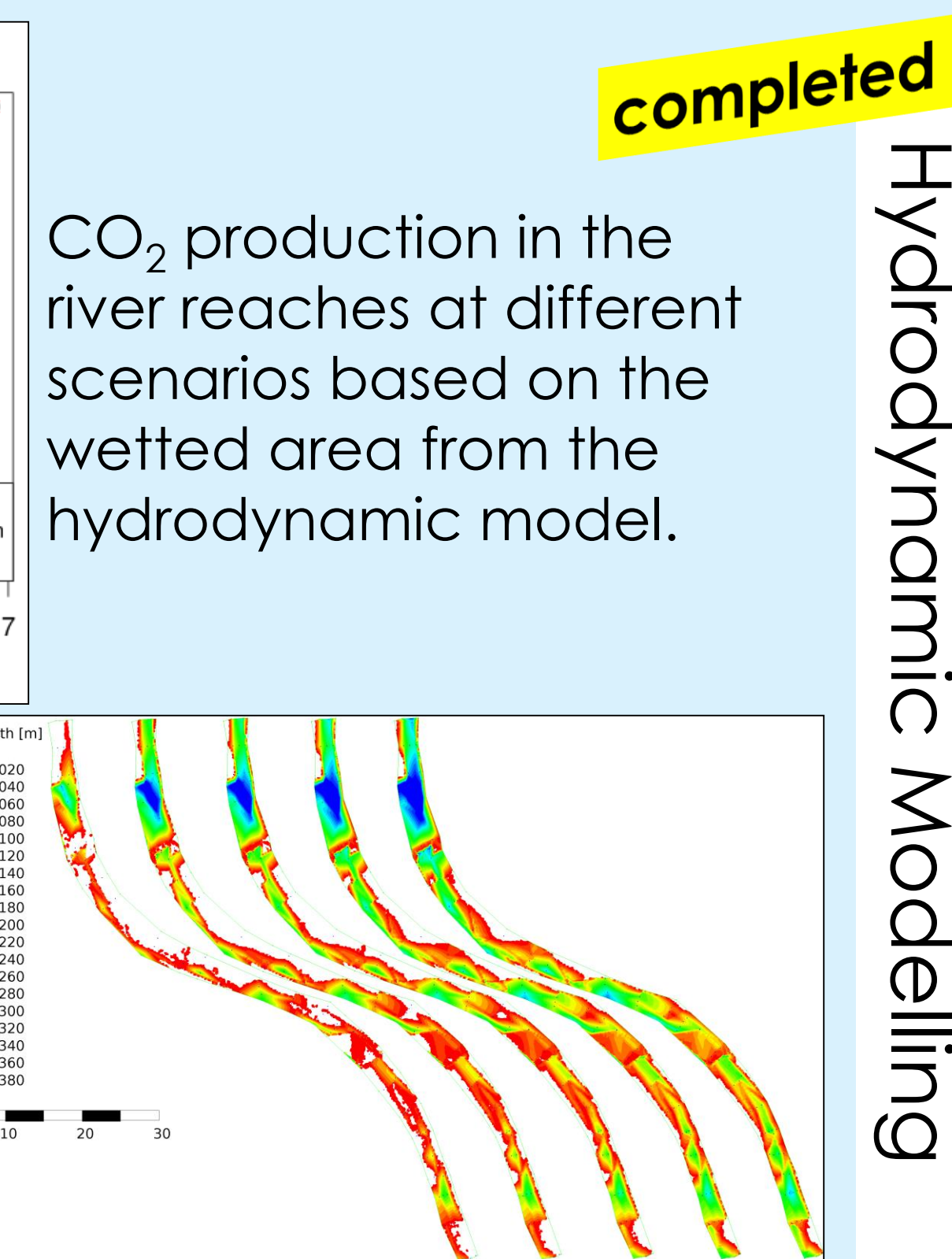
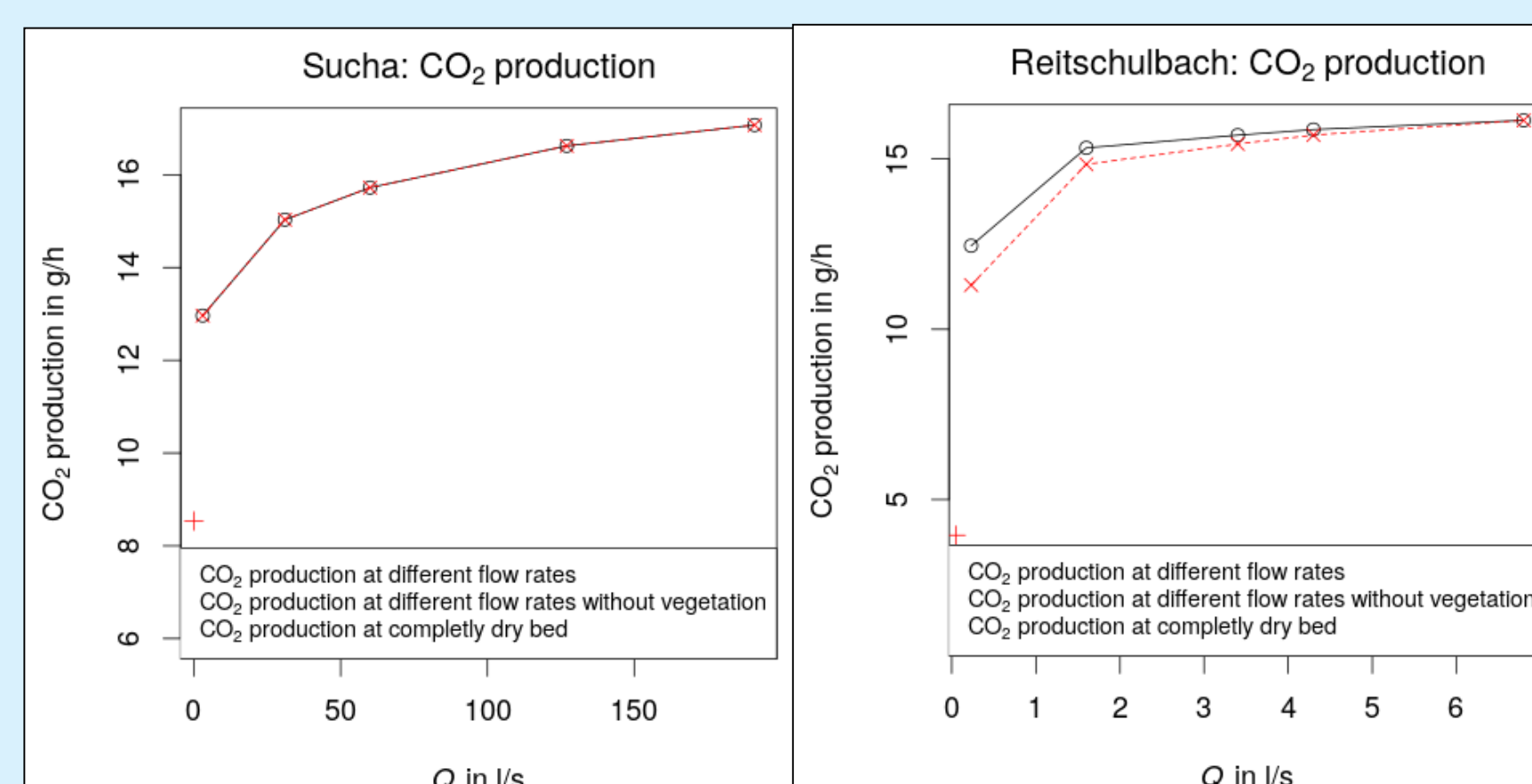
### Progress and First Results



Both benthic and hyporheic sediments showed only small effects of desiccation on the microbial community and processes at a moisture content >10%. Only <5% water content did we observe reductions in the activities.



Results from the upflow reactors show that intermittent and perennial streams respond similarly to drying. Immediately upon rewetting, we observed a release of nutrients and organic carbon from the sediments and the uptake capacity was reduced. However, uptake recovered latest 2 weeks after the dry phase in all sediments.



**Shading can buffer the impacts of desiccation** on biofilms through maintaining a high water content in the sediments during the no-flow period. During rewetting, short pulses of organic carbon and nutrients are released into the water column, but the recovery of both the community and the processes is fast.

Deterioration of the **water quality** was observed at **low water levels in agricultural streams** due to missing dilution, release from the sediments, and enhanced mineralization (high temperatures).

### Challenges and Adaptations

- Most biogeochemical processes in the sediments show only small/no changes between the flowing and the non-flowing phase
- Choriotope nutrient uptake parameters cannot be up-scaled to stream reach for the hydrodynamic model

Instead of modelling nutrient uptake capacity, we have modelled the effects of drying on the respiration rates in the sediments.

??+ measure gas fluxes + model greenhouse gas fluxes during different dry states

**Covid-19 situation?**

### Dissemination and Publications

- Project website: <http://www.intermittentstreams.at/>
- Two Master thesis finished in 2019, two more are currently going on.
- Pre-scientific Theses of 4 school students
- Conference Presentations: SIBECOL 2018, SEFS 2019, ISRS 2019, EGU 2020
- Weigelhofer, G.; Tritthart, M. (2019): Austrocknung von Bächen – eine Gefahr für die Wasserqualität?, Österreichische Wasser- und Abfallwirtschaft 3-4/2019, doi: 10.1007/s00506-019-0580-2
- International Cooperation with University of Trieste

**OUTLOOK:** BIOGEMON 2021, SEFS 2021 ???  
**Papers:** 2 on lab experiments, 1 on field data, 1 synthesis paper