

WP2.1 The role of microbial peat decomposition in land subsidence

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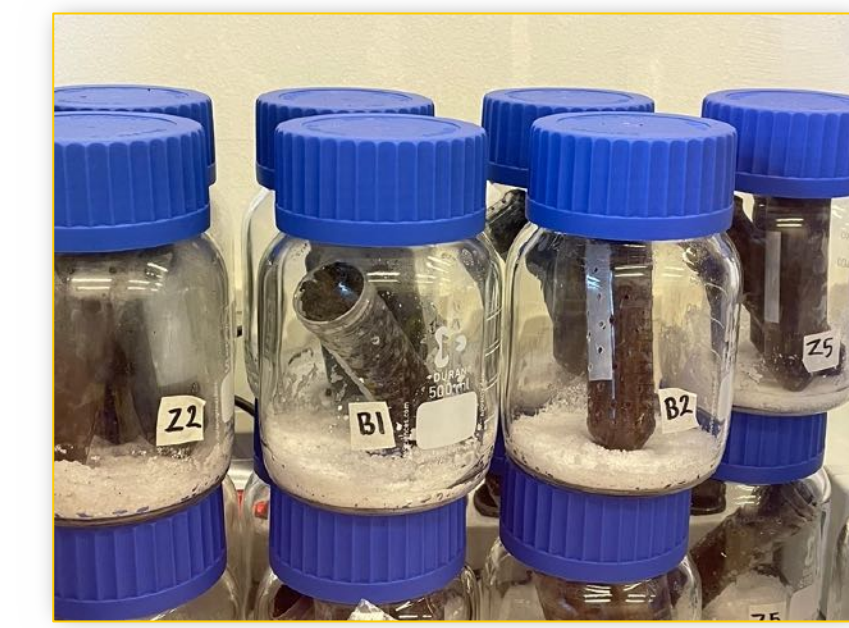
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Research Focus

- Revealing the contribution of water-saturated peat layers to land subsidence in terms of microbial activity
- Understanding the drivers of microbial decomposition in peatlands
- Determining the environmental factors that effects the microbial decomposition rate

Short-term and mid-range disturbance effects on the anoxic microbial decomposition

- Anoxic sample collection from botanically different peatlands
- Anoxic and oxic incubation at the laboratory for three months
- Monitoring microbial activity by checking CO₂ production and enzyme activities
- Collecting information about organic matter content, pH, the concentration of phenolic compounds

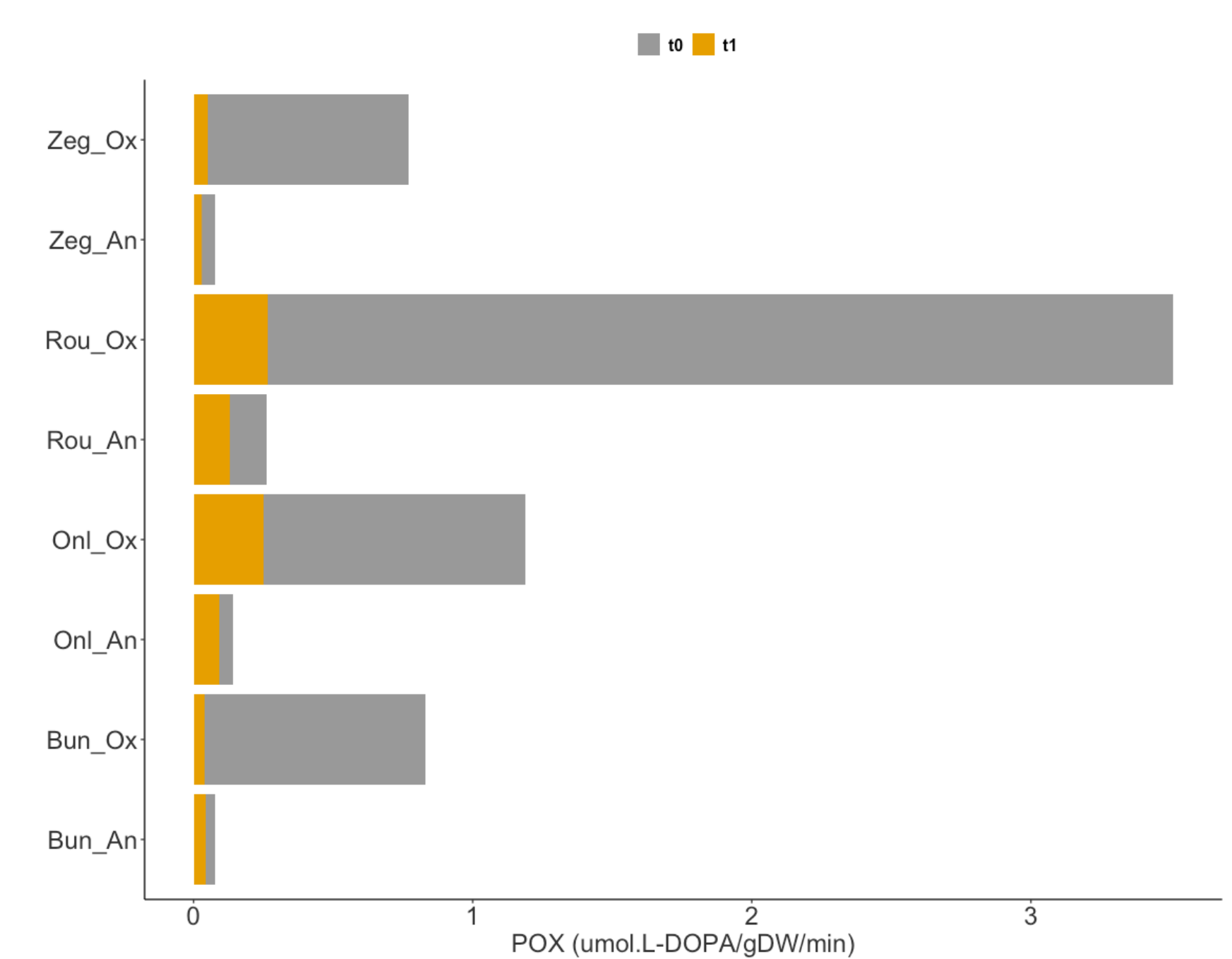


PRELIMINARY RESULTS

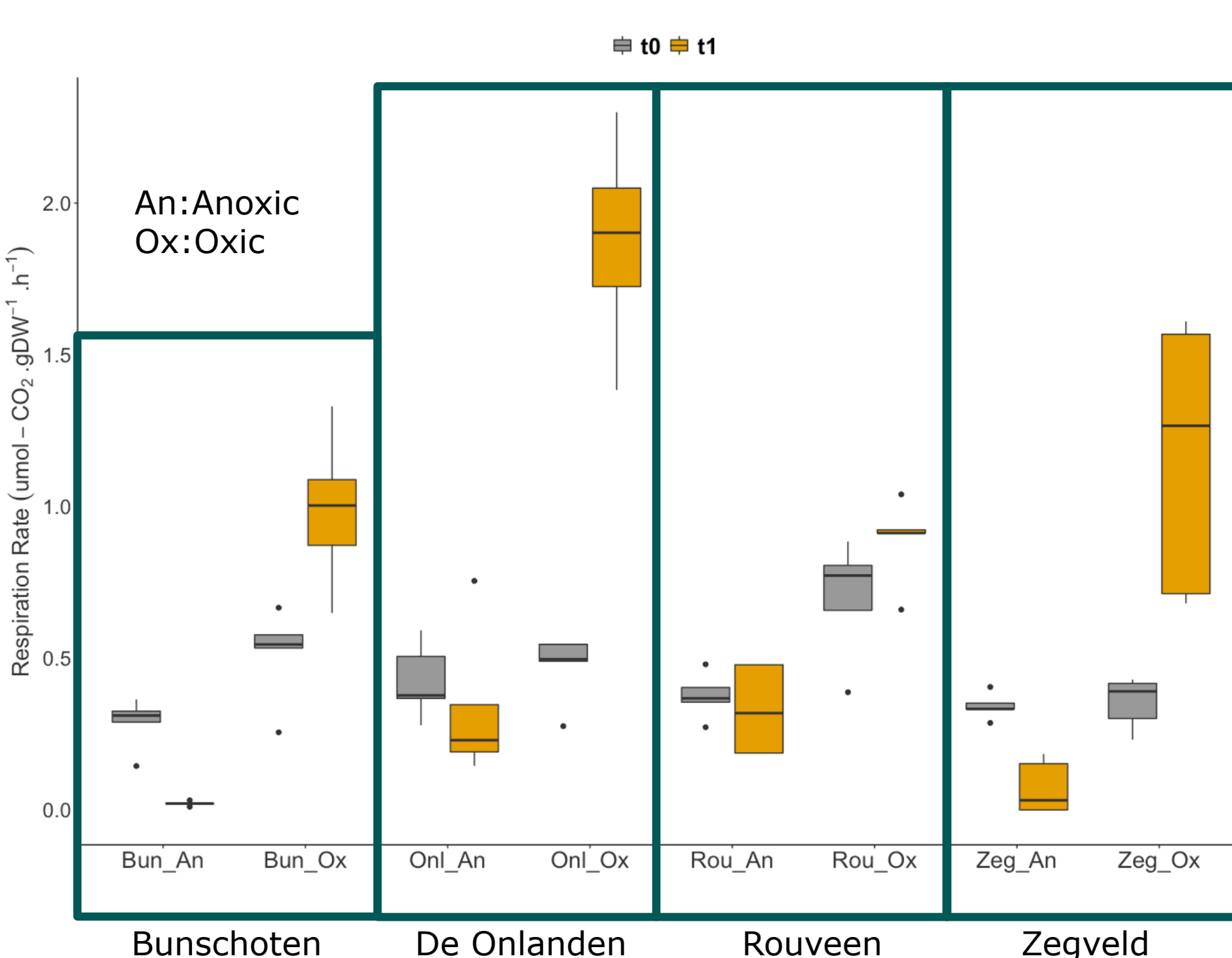
- Oxygen exposure increases the microbial CO₂ production from different peatlands at different rate
- Hydrolytic exoenzymes are positively correlated with each other but there is not strong correlation with microbial basal respiration rate.
- pH plays a critical role in the microbial respiration rate.
- Phenol oxidase gets active with the oxygen presence, but lmid-range oxygen exposure decrease the activity due to the depletion of available substrate for the enzyme or/and due to pH changes
- Soluble phenolics increased in Zegveld peat and decreased in Rouveen peat the most.

MAIN CONCLUSIONS

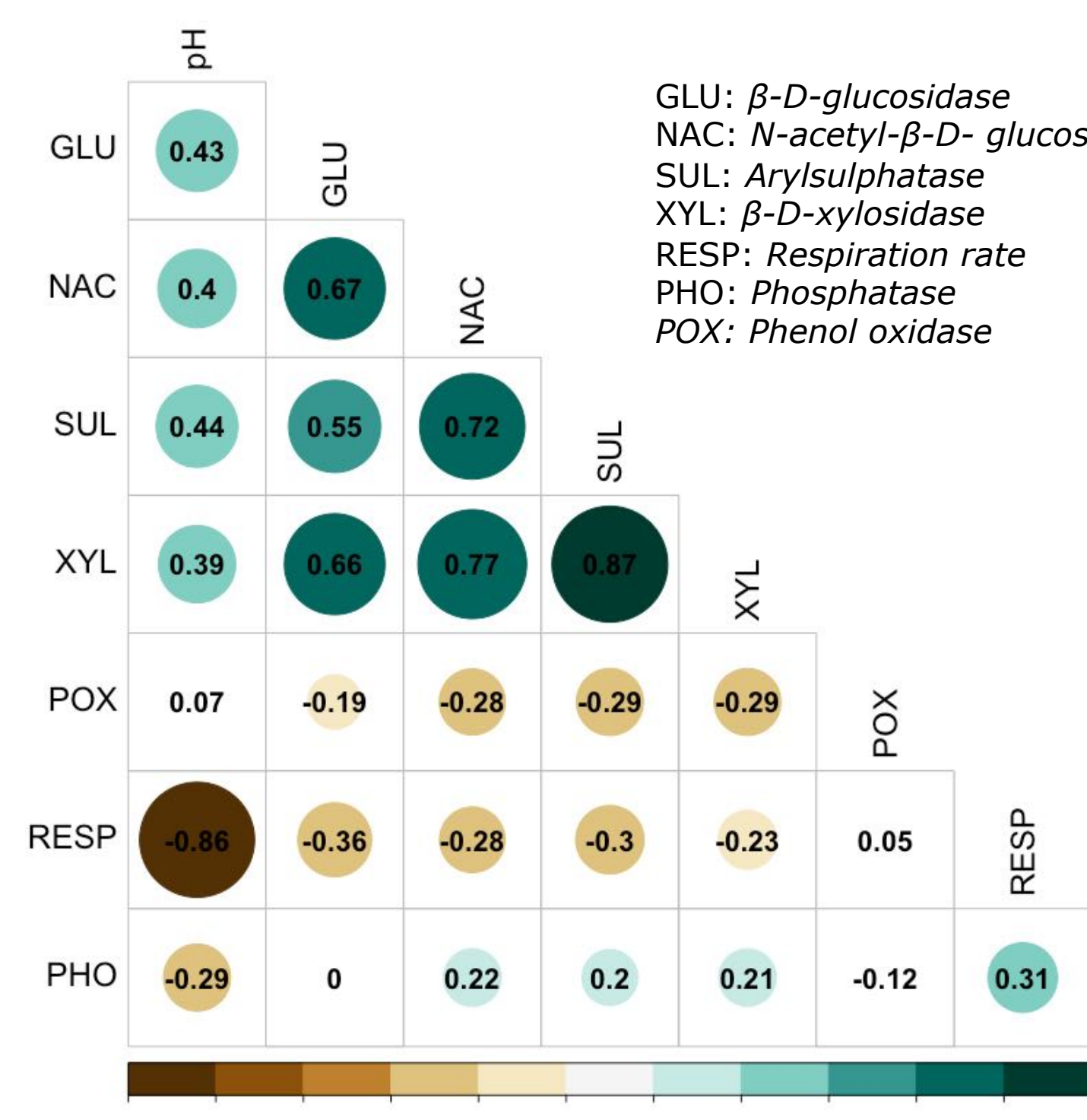
- Available energy sources might be the main driver of the microbial activity in peatlands
- Different peatlands show different behaviour in terms of microbial activity. Therefore, local drivers should be revealed for an effective management strategies
- Anaerobic microbial activity might be important for land subsidence, therefore the future models should consider the rate of anaerobic microbial decomposition



Phenol oxidase activity differences between botanically different peatlands under oxic and anoxic conditions

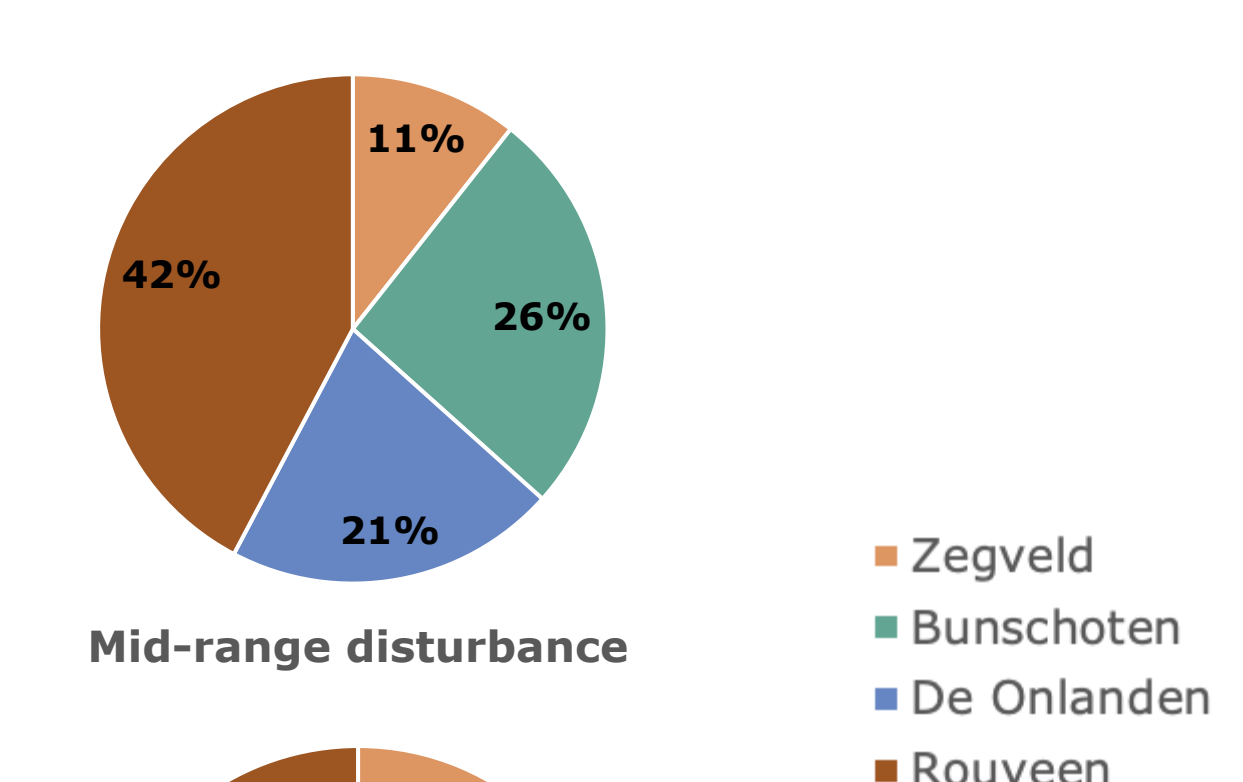


t₀: The initial oxic and anoxic measurements after the anoxic sampling at the field
t₁: The measurements after three months laboratory incubation under oxic and anoxic conditions

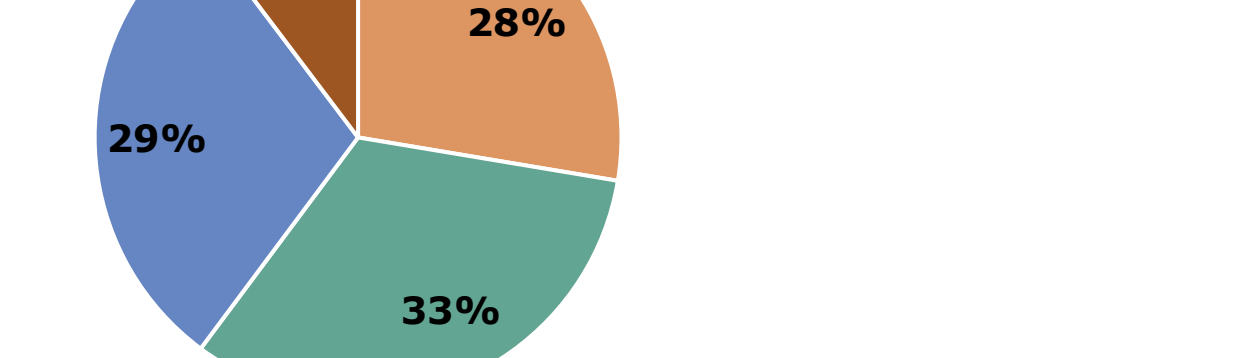


Relationship between exoenzymes and microbial respiration rate

Short term disturbance



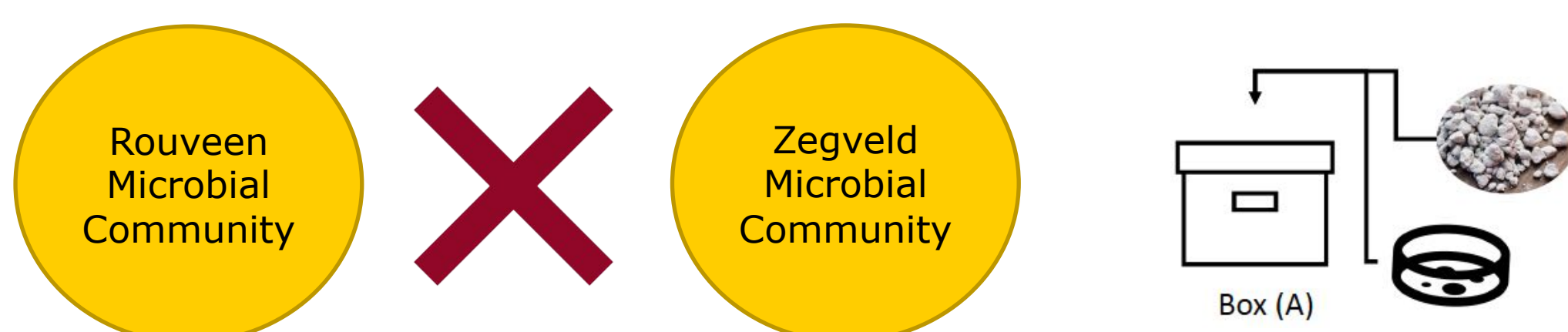
Mid-range disturbance



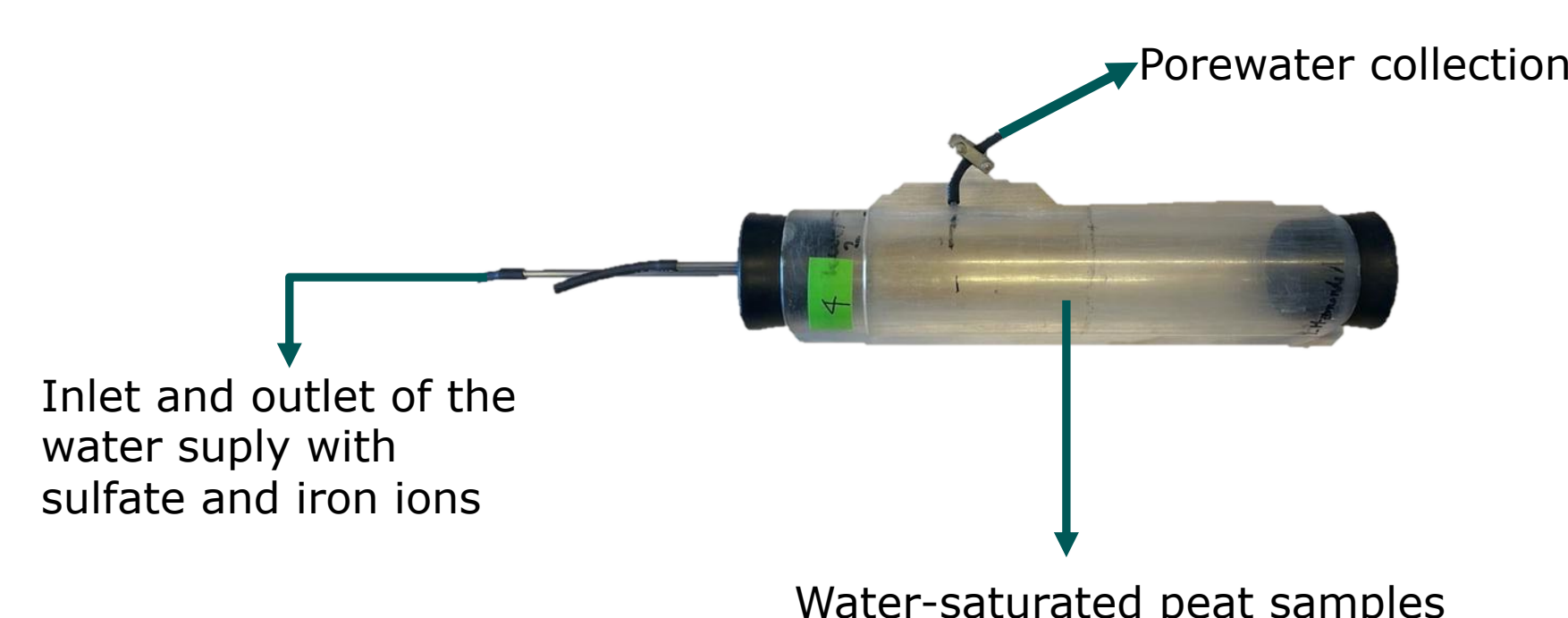
Changes in soluble phenolics between four peatlands

NEXT STEPS

Cross experiment to determine whether microbial decomposition rate is determined by the community or the available energy source in the peat



Determine potential energy source for microbial community under water saturated conditions
Check the effects of Iron and sulfate presence on microbial decomposition
Reveal the contribution of anaerobic decomposition to the land subsidence rate



Field experiment: Transferring water saturated peat layers to oxygen rich layers and the other way around to monitor the effects of peat history on microbial decomposition.



The relationship between microbial decomposition and physical land subsidence processes

