

Research Project

A novel through fall exclusion experiment to assess the physiological and biogeochemical consequences of precipitation changes for temperate forests (NF R'Equip)

Third-party funded project

Project title A novel through fall exclusion experiment to assess the physiological and biogeochemical consequences of precipitation changes for temperate forests (NF R'Equip)

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Project Website <https://ppe.duw.unibas.ch/en/sccii/>

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Status Active

Rising global temperatures, fewer number of precipitation days and an increased intensity of drought events are projected to shape the future climate of central Europe. Changes in water availability and more intense drought events will have significant impacts on the central European vegetation and on temperate European

forests in particular. Importantly, critical mechanisms that determine how changes in water availability and drought will impact the functioning of temperate European forests are poorly understood and not well represented in earth system models. Anticipating the consequences of a future climate for the functioning of temperate European forests is therefore difficult and hinders the design of mitigation options and future forest management plans.

Most experiments that attempt to improve the mechanistic understanding of drought responses of terrestrial ecosystem have to date focused either on the experimental manipulation of grasslands or on investigations with tree seedlings or saplings. Although forests play an essential role for the delivery of ecosystem goods and services, very few experiments exist in established temperate European forests that mechanistically investigate the responses of mature trees and forest to changes in water availability or drought. To close this critical research gap, it is the goal of this proposal to establish an experimental research platform in a species rich and mature temperate forest in Switzerland. This experimental platform will provide the opportunity over the next two decades to host research projects addressing some of the most important unresolved questions with respect to tree and forests responses to changes in the precipitation regime and drought. Specifically, these projects will address the long-term acclimation potential of individual species or entire forests to precipitation changes, physiological and biogeochemical thresholds and tipping points

during drought, and recovery processes during and after extended drought events.

The experimental research platform that we seek to establish will combine a unique infrastructure that we request with this proposal. This infrastructure will include (i) a canopy crane that will allow scientific investigations in the canopy of more than 250 mature trees, (ii) six mobile roofs that will be installed 2.5 m above the ground and will cover a total area of 3398 m² for the manipulation of precipitation inputs into the

forest, and (iii) state of the art scientific instrumentation.

Keywords forest drought, drought, climate change, acclimation potential

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