



Eidgenössische Technische Hochschule Zürich
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Institute of Environmental Engineering

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SEMINAR

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Ecohydrological controls on plant communities: linking vegetation dynamics, carbon and water cycling and land-atmosphere interactions

Abstract:

Many regions around the world have undergone significant shifts in vegetation cover and plant community composition under global environmental change. These changes in vegetation have important impacts on ecohydrological and geochemical processes, regional climate and the provision of ecosystem services such as livestock grazing, soil conservation, and carbon sequestration. Two major ongoing shifts in vegetation composition are associated with woody plant dominance in savannas and grasslands, and tree die-offs in forests. The drivers, mechanisms and impacts of these changes in plant community composition remain poorly understood. In this presentation, I provide a process-based modeling framework - supported by experimental and satellite data - to explain the ecohydrological controls on the major changes in vegetation. I use long-term global datasets, remote sensing data, and earth system models to investigate spatiotemporal changes in vegetation carbon turnover time. I use a common garden to quantify the phylogenetic and biogeographic/climatic controls on nighttime stomatal conductance. I also show how vegetation loss increases dust emission and then suppress rainfall, thereby leading to the vegetation-rainfall feedback responsible for vegetated/wet and unvegetated/dry alternative stable states in West-African Sahel.

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