



Sustainable use of alpine and pre-alpine grassland soils in a changing climate (SUSALPS)

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The development of ecologically as well as economically sustainable management options for the carbon- and nitrogen rich alpine and pre-alpine grassland soils in a changing climate poses a grand scientific and socio-economical challenge. The transdisciplinary SUSALPS project starting in 2016 aims to essentially improve the knowledge on the functionality of alpine and pre-alpine grassland soils using both natural-scientific/ technical and socio-economical approaches. The project is building on existing infrastructure of German grassland-ecosystem-research like the pre-alpine TERENO (Terrestrial ecosystem observation network observatory) observatory sites, the EVENT and SIGNAL sites as well as long term LfL (Bayerische Landesanstalt für Landwirtschaft) sites, plus a new additional high elevation (1400m a.s.l) site in the Bavarian Alps. The site setup along the elevational gradient on the edge of the Alps (1400 m to 300 m) is used for space-for-time climate change experiments which are combined with extensive and intensive management treatments.

A key focus of SUSALPS will be the characterization of combined climate change/management effects on carbon and nitrogen biogeochemistry. Hence, we will evaluate the influence of different management options and current and future climate changes on the soil microbiome and associated biogeochemical processes in the plant-soil-system, on nitrogen use efficiency, on biosphere-atmosphere exchange of greenhouse gases as well as on leaching of environmentally relevant compounds. For this purpose, we simulate the predicted climate change in the region by translocation of large lysimeters (1m², 1.4m depth; TERENO lysimeters, translocated in 2011) for measurements of biosphere-atmosphere hydrosphere exchange of environmentally relevant C and N compounds as well as by newly transferred smaller plant-soil-mesocosms used for destructive biogeochemical process studies. By closely linking this experimental work with biogeochemical and socio-economic modeling as well as the development of smartphone-based farmer decision tools, it is expected that SUSALPS will lead to new practicable management strategies, which sustain key soil functions and balance ecological and economical needs under a changing climate.