Universität Basel

Research Project

Below-ground responses to manipulated snow cover duration and summer drought in alpine grassland (Acronym. bel-alp)

Third-party funded project

Project title Below-ground responses to manipulated snow cover duration and summer drought in alpine grassland (Acronym. bel-alp)
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Organisation / **Research unit**
Departement Umweltwissenschaften / Physiological Plant Ecology (Kahmen)
Department
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Status Completed

Using a newly established infrastructure at 2500 m elevation in the central Alps, the proposed project aims at capitalizing on existing data on above-ground responses of alpine grassland to snow manipulation x summer drought by exploring below-ground responses. Since close to 80% of alpine biomass is below ground, measurable signals emerge slowly and potential effects are initially masked through the longevity of roots and storage organs. As the experiment will enter its fourth year in 2019, we will use in situ root imager to study root phenology, seasonal / annual fine root turnover, nutrient changes in soil solution and stable isotope labelled litter to track soil carbon and nutrients fluxes and pools, while continuing monitoring above-ground responses. Given the large size of test plots, we expect clear cut signals on whether and how changes in season length andsummer precipitation affect the most abundant type of alpine late successional vegetation. We await increasing season length to stimulate, but top-soil desiccation during summer drought to slow the carbon and nutrient cycle. We also expect that seasonal fine root dynamics are not in phase with leaf phenology, but continue throughout the snow-free period, despite and beyond pulsed leaf expansion. In a summer drought scenario, root production will be restricted to early and late season and will be shifted to deeper soil horizons. Graminoids are likely to cope better with such climatic shifts than dicot herbs, the contribution of which to NPP will diminish.The four-year project is designed for one PhD student (Patrick Möhl), who will complement the current works by Maria Vorkauf (PhD project funded by Mercator Foundation, Zürich-Basel Plant Science Center). Her PhD is entering its 3rd year (2018) and covered the pre-treatment period and the first two treatment seasons, with a focus on above-ground responses, including phenology. We envisage this project to establish for the first time the functional, high-time resolution interplay between above- and below-ground processes in a high elevation ecosystem, and it will contribute to a facts based projection of climatic change effects on the most abundant type of alpine vegetation in the Alps.

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