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Long-term changes in alpine tundra vegetation: 25 years of the International Tundra Experiment ITEX

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Summary

The International Tundra Experiment ITEX is a scientific network of experiments focusing on the impact of climate change on selected plant species in tundra and alpine vegetation. Currently, research teams at more than 40 circumpolar sites carry out similar, multi-year plant manipulation experiments that allow them to compare annual variation in plant performance with respect to climate conditions.

Switzerland is taking part in the global data analysis and maintains its own site in the country. It also sends researchers to ITEX sites in other countries, such as Alexandra Fjord in the Canadian Arctic. The Swiss ITEX site is located in the Park Ela, Grisons. It was set up in 1994 and has been maintained by the WSL Institute for Snow and Avalanche Research (SLF) in Davos since 2009.

In this experiment, alpine vegetation is warmed with passive warming chambers (OTCs). The vegetationconsists of alpine cushion plants, dwarf willows, grasses, and sedges. Researchers at the SLF investigate changes in the vegetation within warmed and control plots over a period of time. As ongoing climate change is expected to affect alpine vegetation, the SLF plans to continue maintaining the Swiss ITEX site.

The ITEX research model combines long-term and short-term experimentation with monitoring and has the elegance and simplicity called for to understand ecosystem response and vulnerability to change. The experiment is designed to examine the effects of temperature change on individual plant species on as broad a geographical base as possible and by limiting technical and equipment requirements.

In control plots across all study sites, it was found that changes in vegetation height and the abundance of growth forms were largely consistent with predictions based on warming experiments. Comparisons with other sites indicated that shrubs (particularly deciduous shrubs) increased over time, primarily in sites that were warming rapidly over the study period. But this pattern was only apparent in locations already quite warm. In contrast, vegetation in the coldest tundra sites was relatively insensitive to climate warming.

Figure 1: Swiss ITEX site in Park Ela, Val Bercla, Mulegns, Grisons, Switzerland

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