

## Submitted Abstract

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>> SYNTHESIZE MOUNTAINS OF KNOWLEDGE <<

## Abstract

Climate change is affecting the composition and functioning of ecosystems across the globe. In alpine ecosystems, species will have to face new conditions, either by adapting their life to warming or by migrating upwards into a new environment to track their thermal niche. Upwards migrating species will experience no change in temperature but lower atmospheric pressure due to higher elevation. Reduced air pressure affects biologically relevant physical parameters such as vapor pressure deficit, gas diffusivity, and CO<sub>2</sub> partial pressure with possible consequences mostly on plants. Many studies have revealed the effects of changing climate on plant species and their migrations in this context are well described. In contrast, less is known about the ability of associated soil microorganisms to shift their ranges and in particular, the many possible new combinations of shifting and persistent plants and microorganisms and the resulting new interactions. Generally, the impact of moderate pressure reduction on soil microorganisms associated with plants still needs to be investigated.

Thus, main goals of the international UPSHIFT project are i) to assess how soil microorganisms react to lower air pressure in terms of diversity, functional traits, and biomass production and ii) to investigate new and altered interactions with upwards migrating plants. For that purpose, we will set up a gradient design by lowering the air pressure to simulate four elevational levels (200, 1500, 2500, and 4000 m a.s.l.) in hypobaric chambers (terraXcube) while temperature, humidity, and solar radiation are kept constant according to ambient conditions of 1500 m. For each scenario, the reaction of common microbial test strains as well as some typical soil microorganisms will be investigated, both in pure and mixed cultures. Additionally, the impact of decreased air pressure on soil microbial diversity will be determined along with studies on the interactions between plants and soil microorganisms from both the bulk and rhizosphere fraction.

The UPSHIFT project is the first attempt that we know of to assess the effects of atmospheric pressure on (soil) microorganisms and plant-microbe interactions in the context of climate change. This is essential due to the upward migration of plants and the profound consequences for the functioning of alpine ecosystems.