

Focus on the Future of Mountain Forests

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The Future of Mountain Forests' project funded by doc.funds was launched on the 25th September. The project aims to look at the effects of changing climate at multiple spatial scales from carbon and water balances, to plant stress responses and interactions with microbial communities, to the wider impacts on ecosystem services. Eight interconnected PhD projects focus on (i) the carbon balance of trees, (ii) plant stress responses, (iii) the development and anatomy of vascular tissues in trees, (iv) interactions of microorganisms and plants, (v) forest fire, (vi) the carbon cycle of forests, (vii) volatile organic compounds, and (viii) ecosystem services of forests.



Seven out of the eight PhD students involved in the project discussed the planned research, potential interfaces, and focal points with their supervisors.

Mountain regions play a central role in global geochemical cycles, host exceptional biodiversity and fulfill diverse ecological and socio-economic functions. Global warming is particularly pronounced in the Alpine region and will also impact the structure and composition of mountain forests. Rapid adjustments in this environment are not possible due to the long generational cycles of trees. It is therefore expected that heatwaves accompanied by prolonged periods of drought will adversely affect the vitality and productivity of mountain forests. When these effects are combined with the increased risk of forest fires, the protective function of forests will be diminished.

Modern forests are faced with a myriad of challenges: drought, heatwaves, bark beetle infestations, forest fires, windthrow, and fungal diseases all in the complex context of rapid socio-ecological change. Research is particularly needed for mountain forests, as they serve a variety of crucial functions in the densely populated Alpine region.

The 8 doctoral projects are embedded in the Doctoral College 'Alpine Biology and Global Change' within the Research Focus Alpine Space at the University of Innsbruck. The four-year project is led by Stefan Mayr, Institute of Botany, and carried out in collaboration with established scientists from the Institutes of Botany, Ecology, Microbiology and Atmospheric and Cryospheric Sciences. Irmgard Juen, research Focus Alpine region, is the project coordinator. The PhD students are supervised in teams and benefit from interdisciplinary exchanges with other PhD students, close collaboration with recognized international scientific partners, the availability of well-equipped field stations, and a comprehensive training program. They are also involved in organizing the 'International Mountain Conference' and its associated Summer School.

A better understanding of the ecology of mountain forests

The kick-off event provided an opportunity not only for the PhD students from China, Germany, Italy, the Netherlands, Austria, Scotland, and Spain to introduce themselves, but also a platform for the development of initial joint project ideas. The investigations will focus on three extensively instrumented field stations – FAIR Forest Station Mieming, LTSER site Kaserstattalm, and Tree Line Station Praxmar – allowing for various synergies between individual experiments and long-term studies. Initial coordinated investigations such as the long-term effects of drought stress on Spruce and Larch, gas exchange of Pine and Juniper, and soil microbiology and seed viability of trees during and after fires, were discussed. The next exchange is planned within the course 'Characteristics of Mountain Research' and the seminar of the IDC 'Alpine Biology and Global Change,' providing the basis for the elaboration of the PhD exposés.

Through the close integration of different fields, our understanding of the ecology of mountain forests under current and future climatic conditions is intended to improve. At the same time, the doc.funds project allows for a well-rounded and broad education of the PhD students and an important advancement of the Research Focus Alpine Region in a highly notable and particularly relevant subject area, especially in the Alpine region.

<https://www.uibk.ac.at/de/newsroom/2023/zukunft-der-gebirgswalder-im-fokus/>

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