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# Predicting the future of mountain plant communities: A network of transplant experiments across Northern Hemisphere

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## Résumé

Climate change is affecting plant populations on mountains, causing species from lower elevations to move upslope and leading to a decrease in species that reside at higher elevations. It’s anticipated that plant communities at high elevations will increasingly mirror those found at lower elevations, yet verifying this hypothesis is challenging due to the absence of baseline and future community predictions and hurdles in studying the introduction

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of new species at community level. To tackle these challenges, we conducted 44 transplant experiments along 22 elevational gradients throughout the Northern Hemisphere. By relocating communities from higher to lower elevations, we mimicked the effects of warming and allowed for the colonization of species from lower elevations. We measured how quickly and to what degree communities at higher elevations, subjected to warming, changed to reflect the species composition found in lower elevation communities, in comparison to control groups from both elevation levels.

We observed that plant communities from higher elevations started to adopt the characteristics of those from lower elevations, especially under more intense warming conditions. Significant changes were noted in the first year following transplantation, though the rate of change decreased over time, leaving the communities distinct from those at both the original and new elevations by the end of the study. These transformations were equally driven by the arrival of new species and changes in the abundance of high-elevation species, although the extent of change varied across the studies.

Our study highlights that while high-elevation communities affected by warming may start to resemble current lower elevation communities, they ultimately form a unique mix of species from both high and low elevations. This finding underscores that the future of high-elevation communities is predictable only to a degree and that the dynamics of such transient non-equilibrium states need to be better understood for ecological forecasting and conservation planning.

**Mots-Clés:** transient dynamics, colonization, transplant experiments, alpine plants, climate warming