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Abstract

Forest plant community changes during 1989-2007 in response to climate warming in the Jura Mountains (France and Switzerland)
J. Lenoir, J. C. Gégout, J. L. Dupouey, D. Bert & J.-C. Svenning

Abstract:
Question: How strong are climate warming-driven changes within mid-elevation forest communities? Observations of plant community change within temperate mountain forest ecosystems in response to recent warming are scarce in comparison to high-elevation alpine and nival ecosystems, perhaps reflecting the confounding influence of forest stand dynamics.
Location: Jura Mountains (France and Switzerland).
Methods: We assessed changes in plant community composition by surveying 154 Abies alba forest vegetation relevés (550-1,350 a.s.l.) in 1989 and 2007. Over this period, temperatures increased while precipitation did not change. Correspondence analysis (CA) and ecological indicator values were used to measure changes in plant community composition. Relevés in even- and uneven-aged stands were analysed separately to determine the influence of forest stand dynamics. We also analysed changes in species distribution to detect shifts along the elevation gradient by focusing on the lowest, central and highest positions of lowland and mountain species altitudinal ranges.

Results: We found significant shifts along the first CA axis, which reflected a change in plant community composition towards a greater frequency of lowland species. Analyses of ecological indicator values indicated increases in temperature and light availability in A. alba stands, particularly in evenaged stands. However, no major changes in overall species distribution were found. Conclusions: The community-level changes are consistent with effects of climate warming and local stand dynamics. Changes in species distribution were small in comparison to observed local temperature increases, perhaps reflecting dispersal limitation, phenotypic plasticity or microclimatic buffering by the tree canopy. Causality cannot rigorously be inferred from such a descriptive study; however, we suggest that recent warming is now driving plant community change in the climatically more moderate mid-elevation forest setting.

forest dynamic, gap dynamic, succession
forest ecology
forest structure: herb layer
climate: climate change
phytosociology
Notes

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Tartalom:

Biotic impacts; Forest ecosystems; Global warming; Plant community ecology; Range shifts; Species distribution; Vegetation change

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