

---

# Climatic variability leads to temporal changes in forest communities through effects on both environmental and biotic assembly processes.

Mickael Chauvet\*<sup>1</sup>

<sup>1</sup>Centre d'écologie fonctionnelle et évolutive (CEFE) – CNRS : UMR5175, Université Montpellier II - Sciences et techniques, Université Montpellier I, Université Paul Valéry - Montpellier III, École Pratique des Hautes Études [EPHE] – Campus CNRS - 1919 route de Mende - 34293 Montpellier cedex 5, France

## Abstract

Climate change affects both species richness and composition of plant communities. One process possibly involved may be the increase in climatic variability. Actually, species assembly is supposed to be driven by both environmental and biotic filters. Environmental filtering determines the local species pool of a site, *i.e.* all species theoretically able to co-occur, while biotic filters, especially competition, determine eventually the realized species composition. Yet, little is known about the effect of changing temporal climatic variability on these filters. For instance, field studies represent snapshots of community composition and cannot really account for temporal dynamics of the local and the realized species pools.

Here, we used a forest gap model to carry-out simulations of tree communities in Central Europe under three different climatic scenarios. This model allows simulating forest dynamics by modelling competition for light between tree species while considering environmental constraints. Focusing on the effect of temporal climatic variability on environmental and biotic filtering, we explored: (1) how does climatic variability affect the local and the realized species pool over time? (2) Does climatic variability influence communities' response to competition for light?

Our results highlight that both the local and the realized species pool are dynamic during forest succession because of temporal climatic variability. We found that climatic variability leads to more complex community temporal dynamics, with important shifts in community composition, species richness and relative abundances of tree species. These findings suggest that climatic variability may be a key driver of assembly patterns over time in forest communities.

**Keywords:** Community assembly, climatic variability, environmental filtering, biotic filtering, temporal changes, forest communities, gap, model

---

\*Speaker