How shift in traits composition along climatic gradients emerge from the interplay of climate stress and competition? A theoretical model analysis in forests.

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Abstract

Understanding changes in vegetation composition across large biogeographic gradients is fundamental, to predict biodiversity and ecosystems functioning at large scale. A long-standing theory is that these changes in forest composition emerge from the interplay of direct climate constraints and biotic interactions, and that biotic processes have a stronger role than abiotic processes in productive climatic conditions. Numerous models have been developed to explore this question, yet few connect with the real climatic gradients and the real traits shaping plants strategies. Here we explore this question with a new model – *plant* – in which interaction between trees is driven by competition for light in size-structured meta-populations. Trees performance connects directly with their leaf and stem traits. More specifically we explore the dynamics emerging for one or multiple traits that underpin trade off between species competitive ability for light and tolerance to climate stresses such as drought or frost. This knowledge is crucial to progress our understanding of how geographic boundaries of forest tree species are determined along climate gradients, and how they may move in the future.

Keywords: Traits, Competition, Climatic gradients, Forest, Coexistence

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