Séminaire / Seminar AMAP

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Zoom : https://umontpellier-fr.zoom.us/s/6334730669

SOUTENANCE DE THESE

The role of biodiversity in tropical forest response to climate

presented by

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ABSTRACT

Tropical forests are remarkable ecosystems that host most of the earth's terrestrial biodiversity and are crucial for water and carbon cycles from the regional to the global scale. However these forests are threatened by anthropogenic disturbances and increasing intensities and frequencies of extreme climate events such as droughts. At the global scale, tree diversity increases forest productivity as well as forest resistance and resilience to droughts. However, at the local scale, diversity effects can range from positive to negative, suggesting a key role for the local environment, in particular via local differences in community composition and interactions between neighbouring trees. As forest response to climate is the compounded outcome of individual tree responses. The main objective of my PhD was thus to investigate the role of intrinsic and extrinsic biotic factors in shaping tropical tree growth and its response to drought related climate anomalies. My PhD research was based on 30 years of tree census data from the permanent forest plots of Paracou in French Guiana. Additionally we integrated leaf water-related traits that can be clearly connected to physiological processes involved in the maintenance of leaf water status and are directly tied to physiological responses within leaves when water stress occurs. In a first study we showed that these traits defined different functional dimensions and were largely decoupled from leaf and stem functional dimensions pertaining to light, carbon and nutrient use, illustrating the potential diversity of species strategies towards different resources and environmental stressors. In the second study we then showed that these traits can capture species growth response to different drought related climate anomalies and neighbourhood densities. Highlighting the importance of the local neighbourhood context, we showed that denser neighbourhoods can buffer negative effects of drought related climate anomalies on tree growth. We additionally highlight the importance of considering forest disturbance history when assessing tropical forest response to climate change, by showing that selectively logged forests are more sensitive to climate stress. Finally, the third study sheds light on the mechanisms through which neighbours can buffer or exacerbate climate stress. We showed that beyond focal tree functional identity, and neighbourhood densities, functional trait differences between neighbouring trees are crucial to understand individual tree responses to climate. Overall, my thesis highlights the important role of biotic factors in shaping drought response from the individual scale, over species to entire forest communities. We suggest that a better representation of species strategies, neighbourhood interactions and forest disturbance history would considerably improve our predictions of the future of tropical forests in the face of climate change.

KEYWORDS

Tropical forest; Neighbourhood interactions; Growth; Climate; Disturbance; Functional ecology; Bayesian Modelling

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