

ABSTRACT

Effects of atmospheric warming and precipitation reduction on the interaction between carbon and nitrogen in forest ecosystems

Climate change is expected to increase atmospheric temperatures and modify precipitation regimes with negative consequences on the performance and survival of forest ecosystems. The carbon and water mechanisms of mortality have been extensively studied; however, under current debate is the role of nutritional status on the performance of trees under climate change. It is highly likely that a negative impact of drought and heat on tree nutritional status could play a significant role in the performance of forests. Yet, bridging the gap between nitrogen and the more well studied carbon and water components of drought-induced mortality has not been attempted.

This project is aimed at quantifying the influence of climate change on the link between nutrient, water and carbon relations in forests. For this purpose, we will measure the key processes of the nutrient cycle in trees exposed to reduced precipitation, atmospheric warming and their simultaneous effects. Underlying processes affecting tree nutrient uptake and use will be measured to obtain a mechanistic understanding of the impact of climate change on tree nutritional status. Measurement of key processes of the water and carbon cycle will be simultaneously measured to determine the link between nutrient and carbon relation, in other words, to quantify the consequences of climate-induced changes in nutrient uptake and use.

Knowledge acquired during this experiment will enable the completion of current conceptual frameworks, as well as provide information for climate-vegetation modelers who rarely consider the link between nutrient and carbon relations in forest decline under climate change.