



MoDEperiss

Monitoring spatial et déterminisme environnemental du dépérissement des résineux tempérés

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Thematic action concerned: ARBRE work package: WP2

Summary

The funding requested to the Labex arbre aims to complement two fundings already obtained allowing to pay a PhD student starting in November 2022 for three years. This research takes place in a context of adaptation to climate change, with migrations of species distribution areas towards high latitudes and altitudes, causing significant decline for many species. These changes raise important questions about the sustainability of our forests to ensure their functions in terms of wood production, with very significant economic issues affecting the entire wood industry, and to maintain the ecosystem services it product (wood energy, soil erosion, water purification, carbon storage, recreational role, maintenance of biodiversity, etc.). Here we aim to map over large geographical areas the evolution of mortality of the main temperate softwoods, to identify environmental conditions that can lead to their dieback, and to map their vulnerability. Previous studies showed softwood dieback preferentially occur on specific stands (monospecific, old, without mixture) and environmental characteristics (areas with low water availability and suffered from important drying in a short period, Taccoen et al 2019, Taccoen et al, 2021). The objective is here to identify by analyzing time series of remote sensing data a level of risk related to the nature, intensity, duration or recurrence of extreme events, for different stands. Three major species of French forests which are subject to severe decline will be studied: silver fir, Norway spruce and Scots pine. This topic is positioned both on the scientific front, while having very applied risk assessment objectives for the managers of our forests. This resserch will cover important ecological and spatial gradients and aims to allow the development of replicable methods that can be generalized. It will be carried out in three steps:

- mapping of the evolution of dieback dynamics in recent years, on a north-south gradient at the national scale,
- calculating climate vulnerability indicators integrating the number, intensity, duration or recurrence of extreme climate events,
- for different stand characteristics, identifying climatic indices explaining dieback, making possible to determine and map a level of risk for each species studied, on vast territories