Mapping extreme climate events to predict the risk of decline of mountain conifers

Level	M2	Duration	6 mois
Laboratory	UMR SILVA		
Location	AGROPARISTECH de Nancy		
Supervisor (s)	**Piedallu Christian and Hélène Carletti**		
keywords	**Climate Change**	**Vulnerability**	**Ecology**	**Géomatics**

Summary

The conifers of temperate forests are an important component of mountain landscapes, which have a very important recreational use in our societies. They also play a vital role in local economy, and provide numerous ecosystem services, some of which constitute major challenges, such as carbon storage, contribution to the quality of drinking water, limiting the risk of erosion, or mitigation of the effects of global warming. Over the past ten years, significant decline phenomena have appeared in coniferous forests in Europe, intensifying over the past 5-6 years, including in areas with a priori favorable climate, and jeopardizing storage strategies. of carbon. Numerous studies have highlighted the effects of ongoing climate change on these diebacks. Knowing that the situation will continue to deteriorate in the next decades (see IPCC reports), it is important to determine the levels of climatic stress that the different populations can reach before dying.

Dieback is complex to study because it results from different causes predisposing, triggering, or aggravating the decline of the trees. Competition for light and water influence dieback at the stand level, with effects of density, structure or mixtures, that can vary depending on environmental conditions. Most large-scale studies aiming to disentangle the different causes of dieback focus on the effect of the average climate, sometimes, but more rarely, on its evolution, but almost never on the effect of extreme events, because their spatial distribution is little known The objective of this work will be: i) To identify different indices used in the literature characterizing the intensity, repetitiveness, or intensity of extreme climatic events; ii) To collect data from allowing their calculation iii) To produce maps of their distribution across the whole of France; iv To evaluate their ability to improve the dieback models already developed for at least one of the following three species: fir, spruce, Scots pine;

The different steps of this word are :
- Bibliographic synthesis of climatic indices used in the ecology literature (1.5 months),
- Calculation and mapping of these indices at 1 kilometer resolution for France (2 months)
- Evaluation of their ability to improve existing mortality models - (1 month)
- Report writing (1.5 months).

Student profile: master 2 level, knowledge of ecology, modeling, data analysis, GIS, R software, writing skills

Supervisors Christian Piedallu, and Hélène Carletti

Application: send a CV and a cover letter by email to C. Piedallu mentioning the title of the offer, before the end of November 2023.

Contact : Christian Piedallu, Tel 00.33.(0)3.83.39.68.77, fax 00.33(0)3.83.39.68.78, mail christian.piedallu@agroparistech.fr

Beginning	March 2023 (according to the applicant)	Date de fin du stage	August 2023 (according to the applicant)
Gratification	4,05 € /hour (approximatively 3600 € for 6 months)		