

Master internship offers:

Title: Variability in tree response to fires and climate change over 200 years in Greece

Keywords: fire, climate, dendrochronology, tree ring, resilience, resistance

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Aims. Analysis of the interannual variability of tree-rings in response to wildfires over the past 200 years in Greece, and analysis of the response variability of trees according to the climatic-atmospheric context (temperature, precipitation, drought index, CO<sub>2</sub>).

Background. Black pine is a species that does not necessarily burn during wildfires, but presents visible fire scars. Scars accumulate over time on the same tree. However, recent wildfires seem more severe, leading to increased tree mortality. Ongoing climate change can explain this mortality. But the reason why an old-growth tree dies remains unclear, while it had experienced several fires in its lifetime. Ongoing climate change is resulting more severe droughts. This trend is expected to continue into the 21st century.

Hypothesis. Variability in tree radial growth depends on the last fire, but also on the environmental stresses. We hypothesize that water and heat stress have varied over the past 200 years in the Mediterranean basin. The recent climatic change would have decreased (i) the resistance ( $h$ ) of trees to fires and (ii) their post-fire recovery time ( $\lambda$ ). These two measurable components characterize the resilience. A warmer and drier climate would constitute an adding variable that would threaten the resilience of black pines during future wildfires.

Methods. Wood samples were collected from the Peloponnese, Greece. Radial increments of pine trees were performed but not analyzed by now. Superposed epoch analyses (SEA) will be implemented in R to decompose the radial increment pattern before and after fire years. The pre-fire years will serve as a reference state to infer the resistance ( $h$ ) and recovery time ( $\lambda$ ) of trees after fire. Climate data (annual and seasonal temperature and precipitation, drought index) at annual resolution will be extracted from the ClimateExplorer database.

Student profile. Data analysis, biostatistics, proficiency with R, and attendance.

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# The tree, the fire and the climate

