



Conference Abstract

# Intra-annual tree growth patterns in eLTER sites in Romania based on dendrometer data

Andrei Popa<sup>‡,§</sup>, Stefan Leca<sup>‡</sup>, Ovidiu Badea<sup>‡</sup>, Ionel Popa<sup>‡,|</sup>

<sup>‡</sup> National Institute for Research and Development in Forestry 'Marin Dracea', Bucharest, Romania

<sup>§</sup> Faculty of Silviculture and Forest Engineering, Transilvania University of Brasov, Brasov, Romania

<sup>|</sup> Center for Mountain Economy (CE-MONT), Varna Dornei, Romania

Corresponding author: Andrei Popa ([popa.andrei.dorna@gmail.com](mailto:popa.andrei.dorna@gmail.com))

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## Abstract

Long-term monitoring of tree growth represents a valuable source of information about tree's capacity to react and adapt to environmental changes. As climate change has already affected forest ecosystems, continuous measurements of tree reactions to environmental factors need to be considered in sustainable forest management. In this study, we investigate intra-annual tree growth patterns of the most common tree species (*Picea abies*, *Fagus sylvatica*, *Quercus robur*, *Quercus petraea*, *Abies alba*, and *Pinus cembra*) in Romanian forests based on 10 years of dendrometer data with hour-resolution. These measurements were conducted in 7 eLTER plots in Romania. The cumulative radial increments were modeled using the Gompertz function, which allowed for the estimation of the period with the highest growth rate through the function's first derivative. Growth parameters were derived from the Gompertz model, i.e., the maximum radial increment (*A* parameter of the function) and the growth vigor (*k* parameter of the function). Climatic factors most contributing to tree growth were identified using Random Forest Analysis, which highlighted the variable importance using changes in Mean Square Error. The onset and cessation of the growing season were defined by determining thresholds of 5% and 95% of the maximum growth rate. Periods with increased Tree Water Deficit were determined using the zero-growth concept. Preliminary findings indicate that *Quercus robur* initiates radial growth earlier than other species, while *Fagus sylvatica* has the latest onset of growth. Furthermore, *Fagus sylvatica* reaches the peak of daily growth rate later in the growing season compared to other

species. In terms of maximum radial growth, *Picea abies* exhibited the highest values among the studied species. The results also revealed that spring precipitation strongly influences the growth of *Quercus* species, whereas *Fagus sylvatica* growth is constrained by spring-summer temperatures. Preliminary results significantly enhance our understanding of the intra-annual growth dynamics of Romanian main tree species.

## **Presenting author**

Andrei Popa

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## **Conflicts of interest**

The authors have declared that no competing interests exist.