WORKSHOP

DENDROCLIMATOLOGY: ESSENTIAL STATISTICAL PROCEDURES AND TOOLS

DENDROCLIMATOLOGIA: PROCEDIMENTOS E FERRAMENTAS ESTATÍSTICAS ESSENCIAIS

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Organizing committee:
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Without fee but with necessary prior registration:

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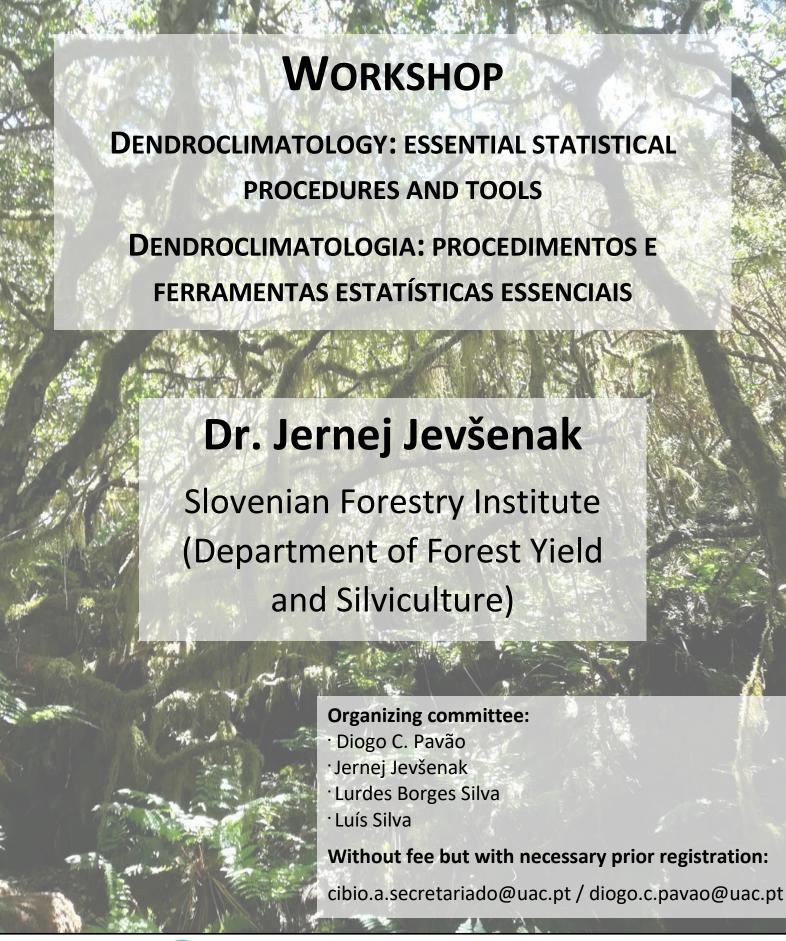
Dendroclimatology: essential statistical procedures and tools

Workshop

Dr. Jernej Jevšenak

24-26 March 2020

Ponta Delgada, São Miguel, Azores

Sala A. 060 (Antiga Sala dos Recursos Multimédia)

Forests play a vital role in climate change mitigation and contribute to soil and water conservation in many fragile ecosystems. While alive, trees react to changes in their environment and record those in their growth rings. Tree-rings therefore represent records of survival, with the tree reacting as a filter: changes in environmental conditions are leading to physiological and metabolic reactions, which produce ring structures of different characteristics. The most studied tree-ring characteristic is tree-ring width, while there are others, such as wood density, anatomical structures and stable isotope compositions. Dendrochronology defines ring width as an indicator of tree performance in a changing environment where abrupt changes are of special interest in dendrochronological studies, as these can be used to date and analyze the impact of certain incidents, such as fires, volcanic eruptions, management activities, air pollution and extreme climatic events. Dendrochronology is therefore a scientific discipline focused on extracting encoded information from tree-rings, while dendroclimatology is a subdiscipline focused on tree-ring characteristics as a function of climate.

Dendroclimatology examines the relationship between tree growth and climate based on annually resolved increments. Through the measurement of annual growth rings of several individuals of a tree species, continuous growth chronologies can be constructed and dendroclimatological methods can be used to analyze the effect of climate on tree-rings, reconstruct past environmental conditions or estimate future performance of tree species based on realistic climate scenarios. Tree-rings have unique advantages compared to other proxies (e.g. ice cores, lake sediments, etc.) as trees have a wide geographical distribution; their rings preserve a continuous record with an annual resolution and can consequentially be dated by ring counting.

Presently, a wide variety of dendroclimatic tools are available to evaluate and measure forest resources. However, this knowledge has not yet been fully applied to most woody species from the Azores. Therefore, it is a great interest to the region, especially while addressing dominant forest species, having the first workshop on dendroclimatology, in order to call more attention of other researchers, and improve their skills on applications and tools that are presently of considerable importance to support fundamental and applied research on dendroclimatology.

Organized by the CIBIO-Azores (Research Center for Biodiversity and Genetic Resources), this workshop will be developed over 3 days, headed by Dr. Jernej Jevšenak, experienced researcher in the field of dendrochronology from the Slovenian Forestry Institute, and will provide an introduction on dendroclimatology, preparation of ring and climate data for dendroclimatology research and management of specific software and tools on the area.

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PROGRAM

DAY 1

09:00 Reception of participants

09:30 Welcome session

09:45 Principles of dendrochronology

10:30 Field sampling and laboratory proceedings and Ring-width acquirement (CooRecorder)

11:00 Break

11:20 Cross-dating, detrending and building master chronologies (CDendro and dplR R Package)

13:00 End of day

DAY 2

09:00 Reception of participants

09:30 Climate data acquirement

10:00 How can we relate growth-ring and climate data?

10:30 Break

11:00 Common statistical analysis in dendroclimatology (treeclim R package)

12:00 Interpretation of statistical analysis in dendroclimatology

13:00 End of day

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DAY 3

09:00 Reception of participants

09:30 Daily climate data and the dendroTools R package

11:00 Break

11:20 Applications of dendroTools R package

12:40 Closing session

13:00 End of day

INFORMATION

The workshop schedule will be flexible, and it is preferable to bring your personal computer with the R or RStudio software installed, in order to exploit the analyses and techniques that will be in-depth on the workshop.