

# BaltDendro 2023: sharing knowledge and experience in the field of dendrochronology across the Baltic states



The sixth international conference of dendrochronologists from the Baltic states, known as BaltDendro, took place on 14–18 August 2023 on Saaremaa Island, Estonia. Organised in collaboration between the Estonian University of Life Sciences and the University of Tartu, the conference accommodated 22 participants from Lithuania, Latvia, Estonia and guest researchers from Poland and Italy. The BaltDendro conference serves as a meeting point for the tree-ring scientific community of the Baltic states. Its primary objective is to bring together students, scientists, and professionals from various fields of tree-ring research, such as dendroarchaeology, dendroclimatology and dendroecology. This re-occurring event and gathering of tree-ring researchers allows the exchange of experience and knowledge, fostering collaboration within the scientific community. The first BaltDendro conference took place in 2010 in Kolka, Latvia, and was initiated by researchers and students from the University of Latvia. Since then, the conference has been organised every two years in rotation among the Baltic countries. The chronological sequence has been as follows: 2010 in Kolka, Latvia; 2012 in Šventoji, Lithuania; 2014 in Järvselja, Estonia; 2016 in Annas Tree School, Latvia; and 2018 in Liškiava,

Lithuania. The next BaltDendro in Estonia was postponed until 2023 because of the pandemic.

The BaltDendro 2023 conference featured various presentations that delved into diverse aspects of dendroecology, tree adaptation to climate, dendroarchaeology, and the use of some innovative techniques. These included sonic tomography for wood decay detection and the analysis of growth rings in herbaceous perennial plants, like yarrow (*Achillea millefolium*) and dropwort (*Filipendula vulgaris*).

At the meeting, an invited speaker, Dr Marcin Klisz, introduced the latest investigations carried out by collaborative work of the dendrochronologists from the Dendrolab at Polish Forest Research Institute (IBL). A diverse range of studies were presented, including investigations of oak trees in floodplain and pines growing in peatlands, the effects of nuclear radiation on tree growth and their climatic sensitivity. The analysis of tree rings yielded valuable insights into the historical fire occurrences in Białowieża Forest, while charcoal dating facilitated research into the environmental history. Moreover, the presentation featured studies dealing with climate adaptation strategies that examined inter-annual density fluctuations (IADF) in native



**Photo 1.** Participants of BaltDendro 2023 conference in front of the belfry of Kihelkonna church on Saaremaa (photo by Ahto Kangur)

and non-native tree species. Dr M. Klisz also presented findings on the growth patterns of introduced species under changing climate conditions and expected changes in their range. The use of local sampling approaches for obtaining regional insights was highlighted. Collaboration within networks like TREOS and STReSS was also emphasized.

Guest researcher Dr Alan Crivellaro from Italy highlighted the evolving role of wood anatomy in dendrochronology, transitioning from qualitative to quantitative methods, and emphasized the significance of qualitative wood anatomy in trait interpretation. Dr A. Crivellaro shared insightful findings from the recent studies, highlighting the impaired lignification ability of trees and the formation of “blue rings”. This information was later supplemented by a workshop focused on identifying “blue rings” in the wood of common juniper (*Juniperus communis*).

The conference featured an array of presentations that explored various topics, including advancements beyond wood anatomy research, investigations into the adaptability of local tree species to changing environmental conditions, the identification of environmental imprints through stable carbon isotope analysis in tree-ring records, the study of radial growth patterns of Scots pine on peatlands in response to fluctuating water levels and weather conditions, modelling tree growth in dynamic site conditions, and the analysis of the impacts of thinning and drought on tree growth. Several talks focused on the effects of drought on the radial growth of Norway spruce (*Picea abies*) and silver birch (*Betula pendula*) and the influence of climate and drought on annual growth variation in different Norway spruce provenances. Additionally, insights were shared regarding dendroarchaeological research in the Baltic region. Recent wood dating efforts in Estonia focused on doors in chapels, manuscript covers, artworks by Bernt Notke, musical instruments, as well as timbers from wrecked ships. The presentation on archaeological dating in Latvia provided an overview of dendrochronological work over the past decade, including examination of nearly 200 wooden structures from 72 historical sites. The compiled tree-ring chronologies provide a comprehensive timeline, for Scots pine from the 10<sup>th</sup> to the 20<sup>th</sup> century, for Norway spruce from the 16<sup>th</sup> to the 19<sup>th</sup> century, and for common oak from the 10<sup>th</sup> to the 18<sup>th</sup> century. Dendroarchaeological dating in Vilnius focused on the rise of the Lithuanian capital city. Recent dates of the oldest wooden structures suggest that intense construction activities began in the second half of the 13<sup>th</sup> century, preceding the official “birthday” of Vilnius by more than fifty years.

For the first time, the BaltDendro conference format introduced workshops to enhance dendrochronological knowledge by developing of practical skills, software applications, and application of wood anatomy to explore the formation of “blue rings”. The workshop “How can R help in dendrochronology: moving forward and beyond”, led by senior researcher Dr Roberts Matisons from the Latvian State Forest Research Institute “Silava”, emphasized the



**Photo 2.** Workshop of “blue rings” led by Alan Crivellaro (photo by Maris Hordo)

significance of utilizing the R program for tasks like data handling, analysis, and visualization within dendrochronological research. The workshop also covered statistical concepts and techniques for extracting environmental signals from tree-ring data. The second hands-on workshop dedicated to “blue rings” in dendrochronology was led by Dr Alan Crivellaro, assisted by doctoral student Aleksei Potapov from the Estonian University of Life Sciences. The first part of the workshop included a presentation that described “blue ring” formation and reviewed the current understanding of the hypothesis of their formation. It was followed by a practical activity that included wood sectioning, double staining and observation of microscopic slides. Wood samples of common juniper from Estonia, Iceland and Finnish Lapland, were used for microscopy during the workshop. The workshop provided the opportunity to update everyone’s personal experience on “blue ring” occurrence analyses and formation hypotheses.

The next BaltDendro conference will be hosted in Latvia.

The BaltDendro 2023 Book of Abstracts can be downloaded here: <https://balt dendro2023.ut.ee/abstract>.

*The BaltDendro 2023 conference was financed by the Doctoral School of Earth Sciences and Ecology, supported by the European Union, European Regional Development Fund (Estonian University of Life Sciences ASTRA project “Value-chain based bio-economy”).*

**SANDRA METSLAID, MARIS HORDO, ALEKSEI POTAPOV, AHTO KANGUR**

Chair of Forest and Land Management and Wood Processing Technologies, Institute of Forestry and Engineering, Estonian University of Life Sciences  
**ALAR LÄÄNELAID, KRISTINA SOHAR**  
 Department of Geography, Institute of Ecology and Earth Sciences, University of Tartu, Estonia