

# Geochronometria

Conference Abstracts Series

Volume 3

ISBN 978-83-904783-5-7

*14<sup>th</sup> International Conference*  
*"METHODS OF ABSOLUTE CHRONOLOGY"*  
17-19<sup>th</sup> May 2023  
Gliwice, Poland



Editor-in-Chief  
**Grzegorz ADAMIEC**

Managing Editor  
**Sławomira PAWEŁCZYK**

Editor  
**Danuta MICHCZYŃSKA**

Guest Editor  
**Jarosław SIKORSKI**

**2023**

# **Geochronometria**

**Conference Abstracts Series**

**Volume 3**

**ISBN 978-83-904783-5-7**

**Institute of Physics – Centre for Science and Education**

**Silesian University of Technology**

**Gliwice, Poland**

**2023**

**14<sup>th</sup> International Conference**  
**“METHODS OF ABSOLUTE CHRONOLOGY”**

17-19<sup>th</sup> May 2023  
Gliwice, Poland

# ABSTRACTS & PROGRAMME

*The conference is organised by*



Gliwice Absolute DAting Methods Centre  
Institute of Physics - Centre for Science and  
Education  
<http://www.polsl.pl/rif/>



The Committee for Quaternary  
Research  
Polish Academy of Sciences  
<http://www.kbcz.pan.pl/>



<http://www.polsl.pl/>

*The conference is sponsored by*



CANBERRA PACKARD Sp. z o.o.  
<https://www.cpce.net/>



miDose Solutions Sp. z o.o.  
<http://udose.eu/>

Poster no 38

**Inter- and intra-annual carbon isotope fluctuations in *Pinus sylvestris* tree ring cellulose in north-eastern Lithuania**

Darius Valūnas<sup>1</sup>, Jonas Mažeika<sup>1</sup>, Rūtilė Pukienė<sup>1</sup>, Miglė Stančikaitė<sup>1</sup>, Žana Skuratovič<sup>1</sup>

<sup>1</sup> Nature Research Centre, Vilnius, Lithuania

Contact: Darius Valūnas, [darius.valunas@gamtc.lt](mailto:darius.valunas@gamtc.lt)

In temperate regions trees typically exhibit growth sensitivity to climatic conditions during the growth season. Annual tree ring growth increments correlate with a variety of factors, including air temperature, cloudiness, winter precipitation and summer rainfall. Along with ring width chronologies, carbon isotope ratios in tree ring cellulose can be used as a proxy to allow a more accurate interpretation of environmental factors critical for the tree growth. As an index of water use efficiency,  $\delta^{13}\text{C}$  records describe changes in climate patterns, variation in the availability of different seasonal moisture sources and exposure to sunlight and anthropogenic factors. We assume that isotopic differences within individual tree rings are likely to produce seasonal isotope fluctuations in the chronology. The assumption is based on the potential of the changes in water availability to induce variability in cellulose composition, enabling identification of seasonal changes in the chronology. Year-to-year variability is expected to be manifested in variations of the mean value of the annual isotope cycle triggered by changes in precipitation, humidity temperature, relative humidity, cloudiness and moisture advection during the growth season whereas interannual variability should be visible in  $\delta^{13}\text{C}$  chronologies of individual rings. Here we investigated the influence of environmental changes on the growth and physiology of *Pinus sylvestris* L. trees in boreal latitudes, north-eastern Lithuania, Zarasai region, with the aim to compare the obtained data with equivalent patterns collected in other regions subjected to a different climatic regime and a different degree of anthropogenic impact. We used carbon isotope measurements as a proxy to examine tree and ecosystem responses to environmental changes and reviewed 13  $\delta^{13}\text{C}$  seasonal cycles in tree-ring cellulose consisting of 13 sample series each to identify inter- and intra-annual patterns of isotopic composition. A solitary tree with extremely wide rings was chosen for cellulose extraction in expectation to obtain sufficient intra-ring samples and reduce the component of respiratory  $\text{CO}_2$  in the  $\delta^{13}\text{C}$  signal.