



## **Dendrochronological comparison of Carpathian stone pine tree-ring width chronologies and biogeochemical reason of their recent deviation**

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Recently two multi-centennial stone pine (*Pinus cembra* L.) tree-ring chronologies were developed from timberline sites of the Eastern Carpathians. Lala Valley (Rodna Mts) site is located in a remote area with negligible human disturbance, but Rachitis site (Calimani Mts) is situated in the vicinity of the largest opencast mine of the Eastern Carpathians. The mine had been functioned between 1972 and 1992.

The Calimani series covers the period from 996 to 2005, the Rodna spans between 1386 and 2005. Both are composite chronologies built from living and subfossil samples. The Calimani dataset comprises 410 individual series from 207 trees (65 series from living trees and 355 series from dead trees). The Rodna data set has 212 individual series from 129 trees (106 series from living trees and 106 series from dead trees). The Regional Curve Standardization (RCS) technique was used to preserve the low frequency climatic signal of ringwidth fluctuation. A comparative analysis was done for the cambial age-aligned mean growth curve for each subset to evidence potential differences.

Expressed Population Signal (EPS) exceeds 0.85 from 1200 and 1450 for Calimani and Rodna, respectively. It means that the common period with EPS over 0.85 is from 1450.

A scrutiny investigation revealed that the growth-climate relationship of Calimani-chronology breaks down after 1972 coinciding with the sulphur exploitation. In addition, the Rodna and Calimani chronologies also significantly diverge for this period.

The aims of present work are:

1. testing the synchronies and discrepancies between the Rodna and Calimani chronologies and to assess the potential to build a regional chronology. Graphical parallelism and statistical tests (correlation coefficient, Gleichläufigkeit and t-value) by running windows of 100 years were applied in this comparison.
2. searching for experimental evidence by dendrochemical analysis on stone pine increment cores to determine if the degraded growth-climate relationship of pine over the past three decades at the Calimani site is connected to the coinciding mining activity.