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## TREE-RINGS OF DIFFERENT SPECIES AND ENVIRONMENT

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Dendroclimatochronological laboratory of Vytautas Magnus University, Kaunas Botanical gardens, has been working since 1968. A lot of information about annual growth dynamics as tree-ring series of *Pinus sylvestris*, *Picea abies*, *Quercus robur* and other tree species was collected during that time. Dendrochronological material originated from living tree stands, archaeological timber and died trees, preserved *in situ* under anaerobic conditions by growing peat or river gravel. Material about radial growth dynamics of living trees was collected not only from the territory of Lithuania but also from other regions: different parts of Russia, Ukraine, the Caucasus region, Mongolia. The total amount of tree-ring measurements exceeds 2.5 mln rings than 300 sites.

The gathered information is kept in laboratory in different ways: in books of measurements, in perfo-tapes, in magnetic tapes and since recently - in PC magnetic discs. Of course, it would be nice to have all the material unified in PC discs, but due to the lack of human and computer equipment resources it is an impossible task for the nearest future.

For management of dendrochronological data a special database and data analysis programs are necessary. At present dendrochronologists in different countries use special dendrochronological programs: International Tree Ring Data Bank program library, developed in the University of Arizona for analysis and standardization of tree-ring sequences and construction of chronologies. The program CATRAS created in Germany by R. Aniol is meant for preparing raw measurements, synchronizing and computing average chronologies. Many laboratories use their own programs for data management.

There are specific programs, that work with special equipment for ring-width and wood density measurement based on image processing. Such programs are Dendro 2003, created in Walesch Electronic firm (Switzerland) for wood density and ring width measurements: the program library developed in Regent Instruments Its. (Canada) for measurements of biological parameters. Mac/WinDendro™ from this library is for scanning and measuring of tree-ring width. In Denmark E. Rytter created the program Dendro-Dk 4, which scans and measures tree-ring width, and makes it possible to synchronize measured series with existing masterchronologies.

Besides these programs, here in Lithuania we successfully use standard computer programs - Excel, WinWord - for correlation and regression analysis, synchronization, graphs creation and for generalization of information and creation of accounts. Some of the specific programs are created in our laboratory, for example the database program DendroS (author S. Veinšneideris), which is used for dendrochronological data inventory and selection according to specific parameters.

The collected dendrochronological material is a source for investigation of regularities in annual growth dynamics of different tree species (*Pinus*, *Picea*, *Quercus*). Connections between tree-ring width fluctuations and the Solar activity, weather temperature, precipitation, the ground water level and other factors have been studied.

A construction of long-term chronologies revealed fluctuations in climate of Lithuania and other Baltic regions during some centuries and millennia. Such information came from bog pine timber preserved in peat and oak timber from river gravel. The Analysis of tree-ring width fluctuations can reveal the extent of influence of other natural and antropogenic factors to radial increment dynamic. For example: tree fruiting, pests and fungi attacks, droughts up, fires, industrial pollution. Some time before a methodical approach was proposed and successfully used to reveal such factors by eliminating climatic signal.

Interesting results were gained from the research on the connections between tree-ring width and harvests of agricultural crops.

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Tree-ring series are of a unique importance as proxy data to reconstruct fluctuations in the past climate, because instrumental records of climatic parameters are not very old. Ascertained relations and periodic fluctuations, characteristic to tree-ring series, are the basis for evaluation and forecast of future environment.

Still many important and unanswered questions remain. Global future climate tendencies, influence of antropogenic factors to the climate, impact of rain forests extinction, etc. are among them. Information from tree-rings, enlarging our knowledge about climate history, helps to establish long-term regularities and to make these questions more clear.

