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Tree-rings and People - A "Pointer Year" for the Tree-ring Community?

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"Pointer year" means a very unusual year when most trees within a large area form a particular ring, creating a distinct mark for crossdating and reconstructions. The year 2002 probably represents a "pointer year" for the international dendrochronological community. Indeed, in September 22-26, 2001, the members of this community met in Davos, Switzerland.

The general discussion was focused on the past achievements and future challenges for tree-ring research.

The main take-home messages from the talks given during the different sessions are the following: a) We need to better understand the physiology of wood formation, and to communicate these research results to forestry planners to increase the quality of forest products b) The enormous climatological potential contained in tree rings in archaeological remains is still underestimated, and c) better cooperation between archaeologists and climatologists is highly desirable.

More than twenty new reconstructions based on ring width, wood density and isotopic ratios were presented during this session. Other posters displayed studies of solar variability and of the influence of environmental factors such as elevation and continentality on tree growth.

New approaches revealed the potential of parts of trees usually neglected in climate reconstruction, such as roots and needles. Shrubs and even mosses were found to be potentially useful to dendrochronology.

A flowering application of dendrochronology is the use of tree-ring studies in forest ecology. Here, tree rings are used to detect the effect on the tree growth of aging, genetics, gender, as well as external non-climatic disturbances. Natural and anthropogenic disturbances like fire or hurricane frequency can also be studied.

Tree-ring studies may be used to reconstruct the past severity of pollution events in heavily-polluted areas. For example, heavy-metal air pollution in the Urals has an influence on rates of trunk decay. Proton Induced X-ray Emission was used in the Mexican basin to trace element content in tree-rings and soil samples. The historical trend in metal and monomeric lignin constituents from 1940s was studied in Aosta Valley, Italy. In contrast to the acidification processes ongoing in Central Europe, alcalisation is the most important problem in the industrial areas of Estonia, where reduced radial increment and high concentration of lignin is found in conifers growing in polluted areas.

37 violins made by Antonio Stradivari were dated using an Alpine spruce chronology. He discovered that on many occasions Stradivari used wood 4-5 years after felling. Martinelli reported an early medieval chronology from Venice, which reveals a maximum building activity in Venice during the second half of the 7 century AD. According to tree-ring data the Ljubljana Moor in Slovenia was inhabited in the 4th and the 3rd millennium BC.

Tree rings enable the past history of debris flows, landslides, thermokarst, ground instability, glaciers, rock glaciers, floods, river flows, coastal erosion, lake level, and even extra-terrestrial disturbance to be reconstructed. The availability of supra-long multi-millennia chronologies will hopefully enable soon a considerable extension of time frames covered by dendrogeomorphological records in many regions.

At the same time that traditional branches of tree-ring analysis are developing and numerous "side" branches are expanding, the use of tree-ring techniques, namely crossdating to develop charcoal or mollusk chronologies shows that the use of multiple proxies is both possible and fruitful. When will the link within different disciplines using different proxies and methods to study the Holocene become a reality? If it happens, the resolution of these new multi-proxy reconstructions based on carefully crossdated time series, and thereby our knowledge about past climatic conditions will be increased dramatically.

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