

## EDITORIAL

## Papers from the 7th International Conference on Dendrochronology – Cultural Diversity, Environmental Variability

### Introduction

The 7th International Conference on Dendrochronology – Cultural Diversity, Environmental Variability was held in Beijing, China from 11 to 17 June 2006. The conference was organized and hosted by the Institute of Botany, Chinese Academy of Sciences (IB\_CAS) in conjunction with the International Union of Forest Research Organizations (IUFRO) Working Group 5.01.07 (Tree-Ring Analysis) and under the auspices of the Tree-Ring Society (TRS) and the European Association for Tree-Ring Research (ATR). It was also sponsored by the National Natural Science Foundation of China (NSFC), the Chinese Academy of Sciences and Past Global Changes (PAGES). The conference was a major international gathering which included almost 300 scientists from 35 countries who use tree rings to study various issues. The conference sessions included over 200 oral presentations and around 100 posters which covered all aspects of tree-ring studies including the following broad subject areas: chemical and physical properties of tree rings (including isotopes, chemical and elemental analyses and their applications); the biological basis of tree rings (including physiology, biology, and wood anatomy); climatology and hydrology; ecology (including forest dynamics, disturbance studies, animal population dynamics, etc.) and geology (including geomorphology). The conference was intended to strengthen communication and cooperation among tree-ring researchers all over the world and to demonstrate the use of dendrochronology to better understand changing global environments and human cultures. Another aim of the conference was to encourage tree-ring research and education in China and other Asian countries.

The diversity of papers presented here demonstrates the utility of dendrochronology in providing retrospective information to answer science questions and solve problems. The first paper by André Billamboz reports on heteroconnections and short tree-ring series at different levels of dating in the dendrochronology of

southwest German pile-dwellings. A study of pile-dwellings in southwestern Germany at the Neolithic lake-shore site of Hornstaad-Hörnle I, demonstrated a 20-year occupation around 3900 BC. After an initial building phase with ash wood (*Fraxinus excelsior* L.), oak (*Quercus robur* L./*Quercus petraea* [Matt] Liebl.) and beech (*Fagus sylvatica* L.) were used. The timber supply was apparently based principally on coppicing, and defoliation damage caused by the cyclic appearance of the cockchafer could be detected in the young oak series.

Kevin Smith, Jean Balouet, and Gil Oudijk present an interesting paper on the use of dendrochronology in environmental forensics. They demonstrate how energy dispersive X-ray fluorescence (EDXRF) can be used for dendrochemical analysis. This method provides essentially non-destructive, simultaneous detection of a number of elements with an adjustable spatial resolution, typically from 0.1 to 0.3 mm. The most commonly targeted elements are S and Cl as markers for fossil fuels, Cl for solvents, and Pb for leaded gasoline. Other metal elements may also be used as indicators of mining and smelting. They concluded that EDXRF can be a reliable tool for dendrochemical analysis although the cost may be a problem, and sufficient trees may not be available at some contaminated sites.

Dendrochemical analysis is also the subject of the paper by Jean Medeiros et al. Little is known about the utilization of dendrochronology for environmental monitoring in tropical areas. The authors present the results of a study of wood anatomy, X-ray densitometric analysis and determination of Pb concentration in *Arucaria columnaris* from two sites exposed to air pollution in the state of Sao Paulo, Brazil. They concluded that wood anatomy and X-ray densitometric analysis of the wood samples were useful and appropriate and that the synchronization of the araucaria annual tree rings provided information to build a series of tree-ring indices, with potential for dendrochronology. Pb analysis of the araucaria tree rings was efficient for local environmental monitoring and indicated the occurrence of Pb during a 30-year growth period.

Tomasz Zielonka, Jan Holeksa, and Szymon Ciapała reconstructed flood events in a small stream in the Tatra Mts. of Poland, using cross-dated flood scars found in Norway spruce trees growing along the stream banks. The scars were most likely formed by woody debris and stones transported during floods. Fifty-eight scars indicated 17 flood years between 1928 and 2005. The large number of reconstructed flood events demonstrates that the stream discharge is highly variable, and that intensive mid-summer rainfall and rapid snow melting may induce stream flooding, but high winter and spring precipitation do not. This research made possible the detection of past flood events which were not identifiable from the climate data alone.

One session focused on the biology of trees, and here Kevin Smith offers the paper from his keynote talk at that session. He reviews fundamentals of cambial growth and response to external stimuli with recent references and the perspective of a tree biologist. He reminds us that tree rings are a record of tree survival and of our need as dendrochronologists to remember that trees are individual organisms with unique histories. That is, the environmental histories derived from tree rings are affected by trees' internal processes and responses to external stimuli, and we should interpret tree-ring data from within that framework.

Also in the biology session, Philipp Duncker and Heinrich Spiecker offer a detailed study of the relationship of cross-sectional compression wood and eccentric growth in stems of Norway spruce (*Picea abies* [L.] Karst.) to provide a better understanding of the interaction of environmental factors on the tree's growth response reaction. They examined samples of 56 trees from sites differing in slope and exposure to the prevailing wind, and applied circular statistics to describe and quantify their relationship and to test both

phenomena for a common stimulating environmental factor that stressed the tree. The results in total suggest that a common initiating environmental factor can be assumed for both compression wood and eccentric radial increment phenomena. Confidence ellipses proved to be very helpful for retrospectively identifying this factor at a given site.

These papers reveal the breadth and power of tree-ring analysis in understanding not only environmental history but also environmental processes. Far from providing only static, place-based histories, the authors illustrate the role of dendrochronology in understanding process and pattern. They demonstrate the relevance of our discipline in understanding and providing predictions about changing environments in a changing world.

## Acknowledgments

We thank the anonymous reviewers, who provided helpful suggestions for the manuscripts, and the scientists from around the world who participated in the 7th International Conference on Dendrochronology and who contributed to this issue.

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