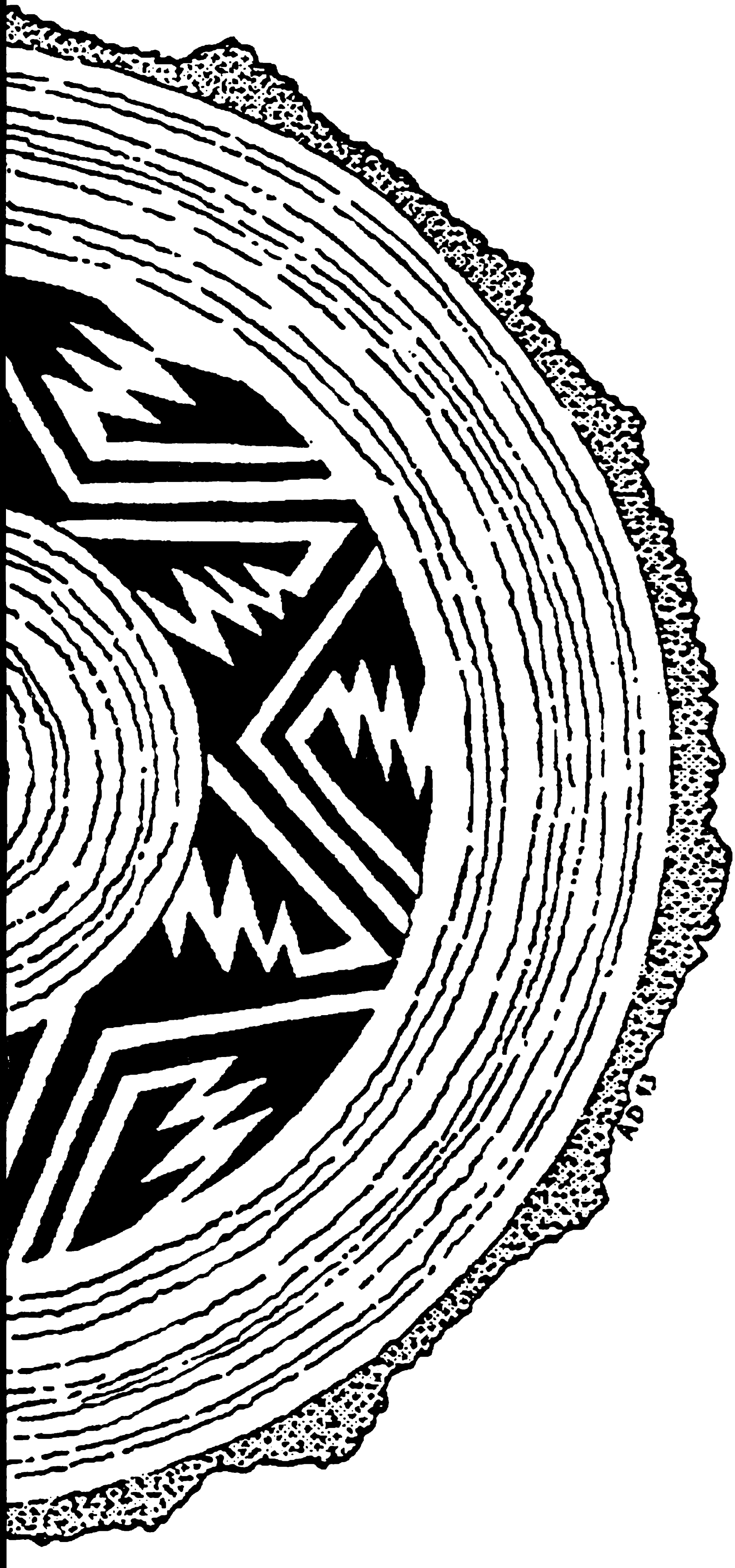

International Conference on Tree Rings, Environment, and Humanity: Relationships and Processes

May 17-21, 1994
Hotel Park Tucson
Tucson, Arizona, USA

ICTREH, Tucson, AZ, May 17-21, 1994

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Organizing Committee: Franco Biondi, Jeffrey Dean (Chair), Lisa Graumlich, Katherine Hirschboeck, Malcolm Hughes, Steven Leavitt, David Meko, Thomas Swetnam
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On Similarities Between Tree-Ring Chronologies in Nepal and West Germany

B Schmidt (Labor für Dendrochronologie, Institut für Ur- und Frühgeschichte, Universität Köln, 50923 Köln, Germany)
W Gruhle (Institut für Kernphysik, Universität Köln, 50923 Köln, Germany)

With a new method using fluctuations of tree ring width (mobility index, MI) in certain periods significant correlations were identified between trees of California, Germany and Nepal.

Further correlations of MI-values of German climate records, water level of the river Rhein with MI-values of different tree ring chronologies of California and Nepal, give additional evidence for a climate signal over an unexpected long distance.

Climatic Fluctuations of the Last 600 Years in the Light of Global Change - A Dendroclimatological Study in Canyonlands National Park, Utah

E Schwartz (Mozartstr. 17, 66111 Saarbrucken, Germany, 0681-398434)

Two stands of moisture-limited Douglas fir in Canyonlands National Park were studied in the light of global change.

Dendroclimatic analysis showed a substantial difference in climate before and after 1800. Climatic extremes were more pronounced before 1800. The 19th century was relatively dry with many negative pointer years but no exceptional drought period. The 20th century was exceptionally moist especially in the first part. Minor droughts occurred after 1930. 1977 is a negative pointer year unequaled in the whole record.

A clean-cut directional climate change could not be found, but indications for a change of precipitation patterns and therefore pressure systems exist.

Spatial Distribution of Extreme Years and Growthtrends in Chronologies of a Cicumpolar Densitometric Network in the Northern Hemisphere

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Densitometry of ring densities and widths in conifers from cool-moist areas at the subalpine and arctic forest limits in North America and Eurasia allows reconstruction of annual mean summer temperatures and long-term growth trends. The distribution of extreme years, e.g. 1816/17 and 1912 is illustrated by 250 chronologies from the circumpolar boreal zone. These data also form a basis for assessing the biological influence of the expected greenhouse effect.

The Effect of the Eruption of Mt. Pinotubo on Treeline White Spruce: an Analogue of 1816?

P A Scott (Centre for Atmospheric Research Experiments, Atmospheric Environment Service, R. R. #1, Egbert, ON, L0L 1N0, Canada, 705-458-3316)
D C F Fayle (Faculty of Forestry, University of Toronto, Toronto, ON, M5S 3B3, Canada, 416-978-4638)

The eruption of Tambora in 1815 coincided with a decline in ring width and density in high latitude white spruce. Our studies at Churchill, Manitoba revealed that the main impact of the climate anomaly on forest trees occurred in 1816 and 1817. However, in exposed trees beyond the treeline, the main impact occurred in 1817 and 1818.

The eruption of Mt. Pinotubo coincided with severe summer conditions during 1992 in many high latitude locations. Summer at Churchill was limited to a frost-free period between August 18 and September 7. In forest trees, frost damage was noted in elongating shoots during 1992 resulting in poor growth and poor or no buds being developed for the 1993 growing season. By the end of 1993 the bud formation was normal and recovery was underway. Trees beyond the treeline did not suffer frost damage during 1992 but elongated as normal. By fall freeze-up the current years needles along with many older needles turned yellow and dropped off. The bud scales that normally protect the overwintering buds were absent and consequently the buds that were to result in the 1993 growth died. Over 93% of the terminal buds died along with many branch ends and little growth occurred during 1993. Over the winter of 1993/94 needle abrasion by wind driven ice crystals increased in the thinned out crowns indicating that the post-volcanic decline will continue for at least a third year. The different pattern of decline in forest and tundra trees parallels the 1816 record.

The Climate-Tree Ring Analysis Cooperative in Canada

P A Scott (Centre for Atmospheric Research Experiments, Atmospheric Environment Service, R.R. #1, Egbert, ON, L0L 1N0, Canada, 705-458-3316)
D C MacIver (Atmospheric Environment Service, 4905 Dufferin St., Downsview, ON, M5H 5T4 Canada, 416-739-4391)

The Climate-Tree Ring Analysis Cooperative (CTRAC) was formed to foster links between climate and tree ring studies in Canada. As part of that initiative CTRAC offers a resource centre where there are modest facilities to measure and study tree rings - mostly oriented to teaching and public information sessions. CTRAC primarily offers a centre of information about tree ring research, researchers, and funding sources. This includes sponsorship of "The Frost Ring", a newsletter for tree ring research in Canada. Finally, the Cooperative seeks to encourage climate oriented tree ring research by in cooperation with university programs as well as organizing and sponsoring meetings.

Radial Growth of Picea from the Eastern Extreme of Tibet Plateau and Its Response to Climate

X. Shao (Institute of Geography, Chinese Academy of Sciences, Beijing 100101, China; 861-491-1533)

Tree-ring data of Picea from the eastern extreme of Tibet Plateau are analyzed to explore their potential for dendroclimatic study. The ring-width chronologies developed cover a maximum period from A.D. 1550 to 1993. Of the two forms of chronologies, residual chronologies showed higher common variance than standard chronologies. However, response analyses reveal that the percent of chronology variance accounted for by monthly climate data is slightly higher for standard chronologies than for residual chronologies. Positive correlations of ring-width indices with mean minimum temperature during spring and summer months exist, indicating low temperature in spring and summer to be a limiting factor for Picea growth at the study area.

Physiologically Based Simulation of Tree-Ring Growth and the Formation of Cellular Structure.

A.V.Shashkin and H.C.Fritts (Institute of Forest SB RAN, Akademgorodok Krasnoyarsk 660036, Russia; e-mail: dndr@ifor.krasnoyarsk.su; Dendrochronological Modeling, 5703 N. Lady Lane, Tucson, AZ 85704-3905, USA: 603 887 7291; E-mail:fritts@arizvm1.ccit.arizona.edu)

The seasonal dynamics of cambial activity, xylem cell proliferation, differentiation, and maturation of conifers are modeled as functions of intrinsic regulation mechanisms including the basic physiological processes and the environmental conditions that limit them. The resulting simulations of tree-ring structure are tested and verified using actual cell measurements from trees on northern and semi-arid sites. The model can then be applied to questions about the effects of climate changes, pollution and other environmental factors affecting tree-ring structure and growth. The possibility of using structural measurements of tree rings to reconstruct past environmental changes is discussed.

Applying Light-Imaging Techniques in a Dendroclimatological Re-analysis of Red Spruce Cores From Elephant Mt., Maine

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L E Conkey (Department of Geography, Dartmouth College, Hanover, NH 03755 USA; 603-646-3381; laura.e.conkey@dartmouth.edu)

An earlier dendroclimatological analysis of Elephant Mt., Maine, red spruce cores resulted in a temperature reconstruction based on ring width and latewood density. Our re-analysis resulted in a similar reconstruction, but we replaced latewood density with latewood value – the neutral gray component of color – which we measured using a light-imaging system and a process that are straightforward and easy to repeat. This study demonstrates the potential of applying light-imaging techniques in tree-ring analysis. Given that the relationship between latewood density and value holds true elsewhere, then light-imaging techniques should be applicable throughout tree-ring science.

Decrease in Tree Growth Between 1800 and 1840 in Various Subarctic and Mountain Regions of Russia

S G Shiyatov (Institute of Plant and Animal Ecology, Ural Division of the Russian Academy of Sciences, Ekaterinburg 620219, Russia)

In many subarctic and mountain regions of Russia a deep decrease in tree growth between 1800 and 1840 has been observed. This decrease was caused by summer cooling which is often connected with catastrophic eruption of the Tambora volcano in 1815. Growth variability analyses of more than 80 tree-ring chronologies has shown that there is a shift in the beginning and ending of this cooling. In some regions the growth decrease took place before or much later of the eruption year. The deepest decrease in tree growth just after 1815 occurred at high latitudes and at longitude range of 58-80 E.

Temporal and Spatial Climatic Reconstruction by Tree-Ring Data at the Polar Timberline in Siberia.

S.G.Shiyatov and V.S.Mazepa (both at: Institute of Plant and Animal Ecology, Ural Division of the Russian Academy of Sciences, Eketerinburg 620219, Russia; 3432-29-40-80)
E.A.Vaganov (Institute of Forest, Siberian Division of the Russian Academy of Sciences, Krasnoyarsk 660036; 3912-43-14-29; e-mail evag@ifor.krasnoyarsk.su)
F.H.Schweingruber (Swiss Federal Institute for Forest, Snow and Landscape Research, CH-8903 Birmensdorf, Switzerland)

A large area from the Polar Urals to Chukotka Peninsula in Subarctic zone of Siberia was covered by network of more than 60 tree-ring chronologies. Sampling from old living trees of four coniferous species for this network was carried out by the Russian-Swiss expedition in 1991-1992. An analysis of climate-growth relationships was undertaken. The variance explained by climate (air monthly temperature) accounts for 40-60%. Reliable reconstructions of summer temperatures for some sites were developed. Spatial patterns of the climatological application of these data are being presented.

Little Ice Age Glacial Activity in Peter Lougheed Provincial Park, Canadian Rocky Mountains

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M.E. Colenutt (Department of Geography, University of Western Ontario, London, Ontario, Canada, N6A 5C2; e-mail colenutt@sscl.uwo.ca)

Dendrochronologic research at glacier sites in Peter Lougheed Provincial Park, Alberta (Lat. 50° 40'N, Long. 115° 10') was used to describe Little Ice Age moraine formation and ice front activity. Glacial histories were established using tree-ring records from living trees, standing snags and subfossil specimens of Engelmann Spruce (*Picea engelmannii* Parry) and alpine larch (*Larix lyallii* Parl.).

Our dendrochronologic records describe a general period of glacial advance in the 14-15th century, followed by interval of recession until a pulse of renewed activity ca. A.D. 1670-1710. Ice fronts subsequently receded to expand ca. A.D. 1820. The data suggest terminus positions remained at or near these

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