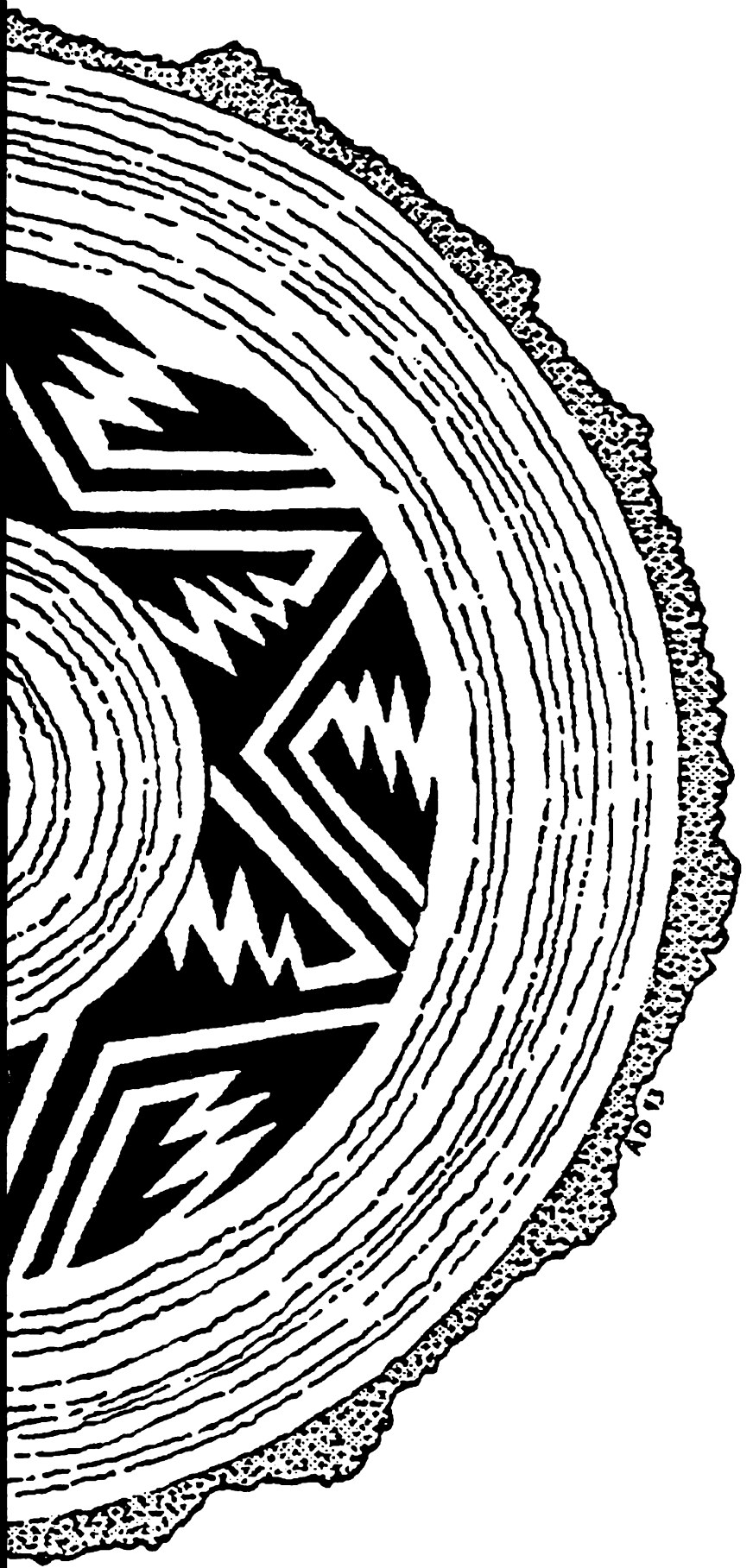

International Conference on Tree Rings, Environment, and Humanity: Relationships and Processes

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

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

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Problems and Prospects of Absolute Tree-Ring Dating for the Saiano-Altai Archaeological Monuments (I millennium BC)

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D J Hookk (Museum Informancs Department, (7-812)-219-86-94
Both at: the State Hermitage Museum, 34, nab. Dvortsovaya, St.-Petersburg 191065 Russia; FAX: (7-812) 3119180)

Unique wood samples excavated in permafrost by archaeologists Gryaznov and Rudenko were investigated by Zamotorin, Zakhareva, Marsadolov, Hookk. Today a floating 634-year dendrochronological scale (1000-400 BC) is build (Arzhan, Pazyryk, Bertek). Three main approaches were applied to make this relative dendrochronology absolute: archaeological, radiocarbon, crossdating. In future the floating dendroscale for Saiano-Altai should be compared with a one for White Mountains in USA and for Gordion in Turkey, possibly using 1850-,120-, 60-,12-year natural biorythms. The periods of C-14 dates discrepancy for the first millennium BC appears to be synchronous for them.

Comparative analysis of crossdating methods is realized. Digital filters are explored for removing the low-frequency variance in ring-width series before the high-frequency elements of a sample against a master chronology are compared. The results show that a range of methods must be explored to find the best match according to the "majority vote".

A new Bronze-age oak Chronology for Northern Italy

N Martinelli (Istituto Italiano di Dendrocronologia, Corso Cavour 11, 37121 Verona, Italy)

Since 1983 in the Istituto Italiano di Dendrocronologia we have been carrying out a research on oak piles coming from numerous bronze-age pile-dwellings in the Lake Garda area (Northern Italy), in order to build a chronology for the 2nd millennium BC.

The material collected produced a 336 year chronology including 142 sample series coming from five settlements: Barche, Bande, Lucone , Cisano and Lanse-La Quercia.

Attempts to date the curve with the South German Oak Chronology have failed. Although the curve is still floating it allows to define the different felling phases and gives informations about the settlements dynamics during Bronze-age.

Reconstruction of Spatial Variations in Summer Temperatures Using Network of Chronologies From the Polar Timberline in Siberia

V S Mazepa and S G Shivatov (Institute of Plant and Animal Ecology, Ural Division of the Russian Academy of Sciences, 8 Marta Street 202, Ekaterinburg 620219, Russia; 3432-29-40-80; e-mail: plant@insec.quorus.e-burg.su)

The primary goal of this study is to make avilable a preliminary series of maps showing past summer (June-July mean) temperatures over the most northern forest islands in Subarctic Zone of Siberia (from the Polar Urals to Chukotka Peninsula). The maps are plotted as anomalies from the mean surface temperature field.

Samples were collected by the Russian-Swiss expedition in 1991-1992 in their main part. The reconstruction was produced using a spatial regression technique.

Dendroclimatic Potential in the Northern Great Plains of the United States

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D Meko (Laboratory of Tree-Ring Research, University of Arizona, Tucson, AZ 85721, USA; 602-621-3457; e-mail: dmeko@ccit.arizona.edu)
A T DeGaetano (Northeast Region Climate Center, 1115 Bradfield Hall, Cornell University, Ithaca, NY 14853, USA; 607-255-0385)
W Ni (Hydrogeologic Team of Sichuan Geologic Bureau, Date Lane, Xian Rd., Chengdu City, Sichuan Province, People's Republic of China)

Global circulation models (GCMs) predict that summer soil moisture in the northern Great Plains will decline under greenhouse warming. Tree-ring data can be used to place such predicted declines in the context of natural climate variability. To evaluate dendroclimatic potential, a 2-year field search was undertaken, resulting in 24 chronologies of oak, pine and juniper (*Quercus macrocarpa, Pinus ponderosa, Juuperus scopulorum* from North Dakota and South Dakota. Chronologies were analyzed for internal consistency of ring-width variations and relationship with climate variables. Results indicate that the greatest potential for long, climatically sensitive chronologies rests in pine from the Black Hills.

Spatial and Temporal Variability of Precipitation in Central and Southern California

Joel Michaelsen (Department of Geography, University of California, Santa Barbara, CA 93106; 805-893-2296; joel@elvis.geog.ucsb.edu)
Laura Haston (Department of Geography, California State University, Northridge, CA)

A 400-year spatial reconstruction of precipitation has been developed for twenty-nine stations in central and southern California by reconstructing the first two precipitation principal components. The first precipitation principal component is essentially a regional average, and the second component represents north-south contrasts. Southern stations are reconstructed most reliably.

The results indicate that over the last 400 years there have been larger fluctuations in spatial patterns of precipitation anomalies than in region-wide averages. Modern atmospheric circulation data suggest these spatial variations might be related to shifts in the frequency of meridional and zonal flow over the eastern North Pacific.

Pine-Ring/Climate Relationships and Robust Statistical Procedures

S Mirtchev and I Vakarelov
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10 Kl.Ochridsky boul.,1156 Sofia, Bulgaria
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66 Tsarigradsko Shaussee, 1784 Sofia, Bulgaria

The growth trends estimation in dendrochronology is a standard non-linear regression technique, while the method of response function analysis is a principle component regression on tree-ring/climate relationships.

It is well known, however, that the classical statistical methods based on the least squares are extremely influenced by non typical values (outliers, gross-errors) which may occur in data or non-normally distributed data. In the contrary the robust procedures are little influenced by such values as they consist in downweighting the impact of outlying observations. Thus they can be attractive tool for solving practical dendrochronological problems.

A comparative analysis between the classical against robust techniques is made to some ring-width chronologies of Bulgarian pines.

Spruce Budworm Outbreaks Impact on the Forest Dynamics and the Development of the Root System of Balsam fir in the Boreal Zone, Québec, Canada.

H Morin, D Laprise and C Krause (Département des Sciences fondamentales, Université du Québec à Chicoutimi, Chicoutimi, Québec, Canada, G7H 2B1; 418-545-5062)

Age structures and growth curves were used to determine the origin and to follow the development of 17 balsam fir stands. Sixteen root systems were also dated. Unimodal even-aged stands regenerated from balsam fir advanced growth following known spruce budworm outbreaks which rapidly defoliated the trees and caused openings occuring between 1944-53 (one stand), 1909-23 (6 stands) and around 1860-1900 (7 stands). Bimodal and uneven-aged stands were associated with two outbreaks (3 stands). The age of the root system shows its adventitious nature and its synchronous and rapid development following the same outbreaks.

Spatiotemporal Pattern of Caribou Activity as Inferred From Tree Rings

C Morneau and S Pavette (Centre d'Études Nordiques, Université Laval, Sainte-Foy, Québec, Canada, G1K 7P4)

The relationship between caribou and its habitat condition needs to be established in a historical perspective. We show that past caribou activity can be documented by using trampling scars formed on exposed conifer roots (and layers) in caribou paths. The spatiotemporal pattern of caribou activity was evaluated for a recently expanding herd in northeastern Québec-Labrador by examining the age frequency of trampling scars at 40 open spruce stands. The analysis of scar-age data suggests that increased caribou activity started in the mid-1970s and peaked in the mid and late 1980s over most of the herd traditional summer range.

The Region of Chernobyl (1986) Catastrophy: Peculiarities of Tree-Ring Growth and Wood Anatomy Changes in *Pinus Sylvestris* L. (Dendrochronological Analysis).

E K Mousaev (Lab. of Ecological Monitoring of NPP-Regions, Severtsov Institute of Evolut. Morph. and Ecol. of Animals, Russian Academy of Science, Leninsky Prospect 33, 117071 Moscow, Russia 095-135-9816; FAX: +7-095-135-9816; e-mail: sevin@sovamsu.sovusa.com)

Forests at different distances from Chernobyl NPP were investigated. The climatic influence in size of tree rings and tracheids blocked due to opumal climatic model. In tree-ring growth the abrupt reduction in 1986 at remote sites, weak change in trees with broken crowns near epicentre and abrupt rise for dead trees observed. As for tracheids: On cuts 1986 - confluence of tracheid-rows, hesitations in size, resin ducts. False ring 1986 caused by breakdown of cell-division: growth at the expense of cell-stretching. Real size of 1986-tracheids near the epicentre is almost similar to calculated on the base of daily climate data ones, due to nutritions, stored in 1985, and removal of "competition" with killed needles and shoots.

Image analysis of tracheid dimensions for dendrochronological use.

M A R Munro M K Hughes P M Brown and E Garcia (Laboratory of Tree-Ring Research, University of Arizona, Tucson, AZ 85721;602-621-2191;e-mail: mmunro@ccit.arizona.edu)

An image analysis system measures cell widths and wall thicknesses with a resolution and precision of ca. 0.25 micrometers. We avoid the distortion and preparation problems of thin sections by epifluorescence microscopy on cut wood surfaces. A CCD camera and frame grabber capture microscope images, which we combine into a mosaic spanning a ring with the NIH-Image program. We select lines along radial cell files, which the program measures by taking the areas above a manually specified brightness threshold as cell walls and those below it as lumina. Measurement errors are small relative to the variability of files within a ring.

The Application of new Technology in Wood Characterization to Dendrochronology

Rob Evans and Geoff Downes (both at: CSIRO Division of Forest Products, Private Bag 10, Rosebank MDC, Clayton, Victoria 3169, Australia)
John Murphy (Victorian Institute of Earth and Planetary Sciences, Centre for Computational Mathematics, Monash University, Clayton, Victoria 3168, Australia)

The Silviscan system combines customised image processing algorithms with X-ray densitometry to generate pith to bark profiles of wood density, radial and tangential tracheid diameter and wall thickness. Information such as ring width, minimum, maximum and mean values for each of the variables within annual rings can then be extracted. The system is fully automated.

This presentation explores the application of Silviscan to the measurement of core samples within the context of dendrochronology. The system has the advantage of allowing the latewood/earlywood boundary to be more clearly defined and in addition, the cell diameter and wall thickness traces contain information that could assist in cross-matching cores.

Reconstruction of Spatial Variations in Summer Temperatures Using Network of Chronologies From the Polar Timberline in Siberia

V S Mazepa and S G Shiyatov (Institute of Plant and Animal Ecology, Ural Division of the Russian Academy of Sciences, 8 Marta Street 202, Ekaterinburg 620219, Russia; 3432-29-40-80; e-mail: plant@insec.quorus.e-burg.su)

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