TRACE 2013
Tree Rings in Archaeology, Climatology and Ecology
Viterbo 8-11 May 2013
ABSTRACT SUBMISSION

ERRATA CORRIGE - ABSTRACT TO BE ADDED TO POSTER SESSION I

TREE-RING ANALYSES OF THE TIMBERLINE DYNAMICS IN THE POLISH TATRAS

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Keywords: Polish Tatras, timberline, age structure, GIS, *Picea Abies* L. Karst

The Tatras are a mountain region (785 km2) of the longest (360km) and best-developed timberline ecotone in the Carpathians. The characteristics and location of the timberline result from a long-term interaction between natural and anthropogenic factors. The aim of the study was to assess spatial changes of the timberline in 20th century and to define tree ring records dynamics of this ecotone. Detailed GIS analyses of the timberline existing in 1955 and 2004 were carried out with the use of orthophotomaps. Based on this study 12 *Picea Abies* L. Karst sites of a different character (stable, regressive, progressive) were selected to investigate tree ring records of the timberline changes. The dendrochronological analyses of 20 chronologies (~1200 tree ring series) were performed by means of standard techniques. Most of the changes of the studied ecotone are related to land use modification resulting from the establishment of a national park in 1955. Restrictions on pasturing and logging led to a rapid advance of the tree line (up to 800m) during the last 60 years. The influence of geomorphologic processes (mainly avalanches) seems to be reduced as a consequence of a rapid succession of *Pinus mugo*, which stabilises potential avalanche sites. The sites characterised as climate-driven do not reveal distinct changes, a direct influence of climate change might be concealed by factors related to a radical alternation of human impact. The age structure and growth patterns showed by chronologies differ for stable and advancing sites. One common characteristics for all the sites is a significant response to climate. Summer temperature (June – July) was the main tree growth factor for all the studied sites irrespectively of the site type and location.

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Preliminary results of micro-FTIR analysis to detect traces of organic contaminants in poplar (*Populus nigra*) tree rings from the Sacco river valley (Lazio Region, Italy)

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Keywords: micro-FTIR spectroscopy, organic contaminants, Sacco's Valley, chlorinated compounds.

Trees can take up and assimilate contaminants from the soil, subsurface, groundwater, and overflowing water. Contaminants in the transpiration stream can become bound into the annual rings of the trees so the chemical analysis of precisely dated tree rings, called dendrochemistry, can be used to interpret the past plant interactions with contaminants (Balouet *et al*., 2012).
The aim of this study is to test the possible application of the micro-Fourier Transform Infrared spectroscopy to detect traces of organic contaminants in the tree rings of poplar (*Populus nigra*) wood. The potentiality of this technique is due to its application directly on the cores without any treatment of the samples. In this way it is possible to date the contamination events.
This preliminary investigation, aimed at finding chloro-organic contaminants in poplar wood sampled in the Fiume Sacco's valley considering a time windows ranging from 1992 to 2012. This study is a part of a wider Research Program addressed to study the occurrence of the hexachlorocyclohexane (HCH) isomers in the agro-ecosystem of the Sacco river area due to the toxicity of this compound and to its great chemical stability.
Infrared spectra were obtained using a Nicolet IR microscope Centaurμs equipped with a MCT detector and connected to a Nicolet Avatar 360 Fourier transform spectrometer.
The infrared spectra obviously show the bands due to poplar wood constituents that were attributed according to the literature (Moore and Owen, 2001; Colom *et al*., 2003; Pandey and Pitman, 2003).
The infrared spectra, compared with those of uncontaminated poplar wood and with HCH isomers as pure compounds, put in evidence the presence of bands probably due to the chlorinated compound and also to other organic substances especially during the years following a river overflow event.
These results demonstrated the potentiality of micro-FTIR as non-invasive technique able to detect organic contaminants in the tree rings encouraging to deepen the research in this direction. Further studies are in progress to chemically validate the occurrence of the HCH's isomers in poplar wood samples belonging to the River Sacco's valley.

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