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Late Pleistocene and Holocene Climatic Variability in the Carpathian-Balkan Region

ABSTRACTS VOLUME

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Dendrochronological assessment and radiocarbon dating of subfossil coniferous macroremains excavated from a peat bog, Maramures Mts, Romania

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Fifty-six subfossil samples have been collected from a peat bog located on the Vinderel plateau, Farcău massif, Maramureș Mountains (Romania). The majority of wood-remains are Norway spruce (*Picea abies*) and Silver fir (*Abies alba*). The samples have been subjected to dendrochronological analysis and 7 samples were selected for AMS radiocarbon analysis. Seven floating chronologies have been developed from these subfossil samples, so far. The longest floating chronology contains 166 years and the shortest spans 47 years. Radiocarbon age obtained for the oldest and youngest samples are 1717 ± 19 yr ^{14}C BP (255 – 388 cal AD) and 1039 ± 16 yr ^{14}C BP (985 – 1023 cal AD), respectively.

Introduction

Investigations of subfossil tree trunks from geological formations employing dendrochronological techniques are rather scarce in Hungary (Grynaeus 2004), but similar researches have been initiated in the recent past elsewhere in the Carpathian-Pannon region (Gebica & Krapiec 2009, Chiriloaei et al. 2012). Wood remains were found in several Romanian Carpathian mountain ranges (e.g. Semenic Mountains). This paper presents the result of investigations carried out on subfossil trunks collected in 2010 from a peat bog located on the Vinderel plateau, Farcău massif, Maramureș Mountains (Romania), in the vicinity of the Ukrainian border. The peat bog lies (1530 m altitude, latitude N47°54'11", longitude E24°26'37") below of Rugașu range (approx. 1820 m) and the locality serves as a conservation area for the fallen down coniferous trees (Fig. 1).Peat deposits were formed into a landslide concavity ("slope pocket") on the western slope of Farcău massif. Most likely the landslide either occurred shortly after deglaciation during the melting of underground ice, or during heavy storm events which affected the thick superficial deposits. Farcău massif was glaciated during Late Pleistocene and the most conclusive evidence to support this are the cirques and moraines located on the north-eastern slopes (Mindrescu, 2006) (Fig. 1).

Materials and methods

Sample collection, preparation and dendrochronological analysis

During the past 4 years – since the conservation site was explored –56 wood samples have been collected (Fig. 2). The majority of wood-remains are Norway spruce (*Picea abies*) and Silver fir (*Abies alba*). The samples have been subjected to dendrochronological analysis. Sample surfaces were processed by machine operated abrasive belts with gradually finer grit size until tree-ring structure became clearly visible. Tree-ring sequences were carefully checked and rings were counted. A LINTAB digital-positioning table and TSAP Win 4.68 software (Rinn, 2005) were used to measure the annual ring widths with a precision of 0.01 mm, as well as for cross-dating the growth series by graphical comparison against each other (Popa, 2004). Two radius were measured on each disk. Measurement and crossdating was done using the facilities of the Budapest Tree-Ring Laboratory (Eötvös University, Dept. of Palaeontology) (Kázmér & Grynaeus, 2003).

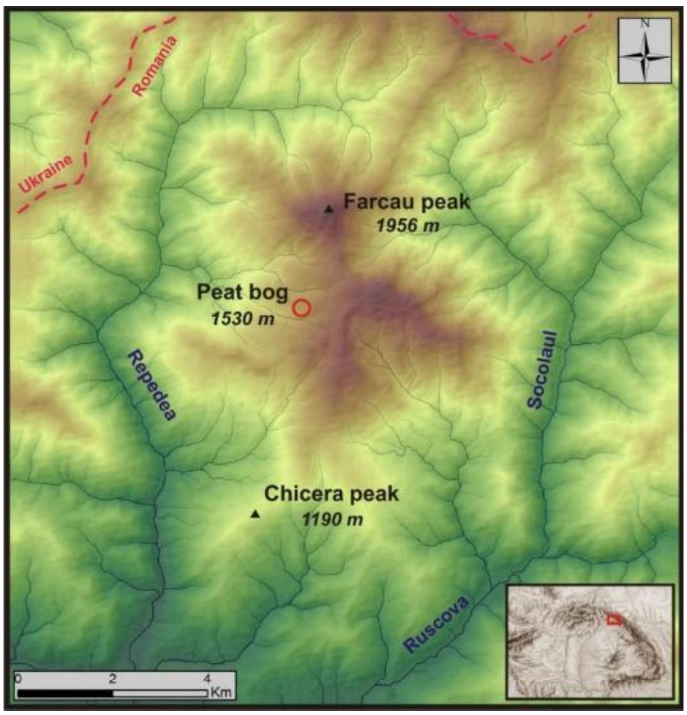

Fig. 1 Location of the peat bog

Radiocarbon analysis

Seven samples were selected for AMS radiocarbon analysis. Samples were preteated by the conventional acid-alkali-acid (AAA) treatment. Measured targets were prepared using a sealed-tube graphitization method (Rinyu et al. 2013). The $^{14}C/^{12}C$ ratio and $^{13}C/^{12}C$ ratio were measured by accelerator mass spectrometry on the EnvironMICADAS ^{14}C facility in the Hertelendi Laboratory of Environmental Studies in Debrecen, Hungary (Molnár et al. 2012, 2013a,b). The radiocarbon ages were calculated according to Stuiver & Polach (1977). Calibration of ^{14}C dates to calendar years was performed by the OxCal v.4.2 (Bronk Ramsey, 2009) program in conjunction with the Northern Hemisphere IntCal13 (Reimer *et al*., 2013) dataset.

Results and discussion

One of the seven samples (MAR 033) subjected to radiocarbon analysis, came from a wooden construction showing signs of human processing. Thus ^{14}C date of this wood sample can be treated separately as it is not relevant for the natural forest dynamics around the peat bog. The oldest natural wood sample (MAR 025) radiocarbon age is 1717 ± 19 yr BP (Fig. 2), whereas the youngest (MAR 003) is 1039 ± 16 yr BP. Calibrated age obtained for the above mentioned oldest and youngest samples are 255 – 388 cal AD, and 985 – 1023 cal AD, respectively.

These natural coniferous-samples – supported with ^{14}C dates – serves as reference samples and matched with several other wood remains by dendrochronological cross-dating. Seven floating chronologies have been developed so far. The longest floating chronology contains 166 years and the shortest spans 47 years. Unfortunately these tree-ring-series are still not long enough to fill up the time gaps and built a joint long chronology. In addition, the regional Norway Spruce master chronologies date back to the beginning of the 18th century (Popa 2003, Popa & Kern 2007, Timis & Popa, 2010), thus the peat bog's floating chronologies cannot reach the end date of the regional master chronologies.

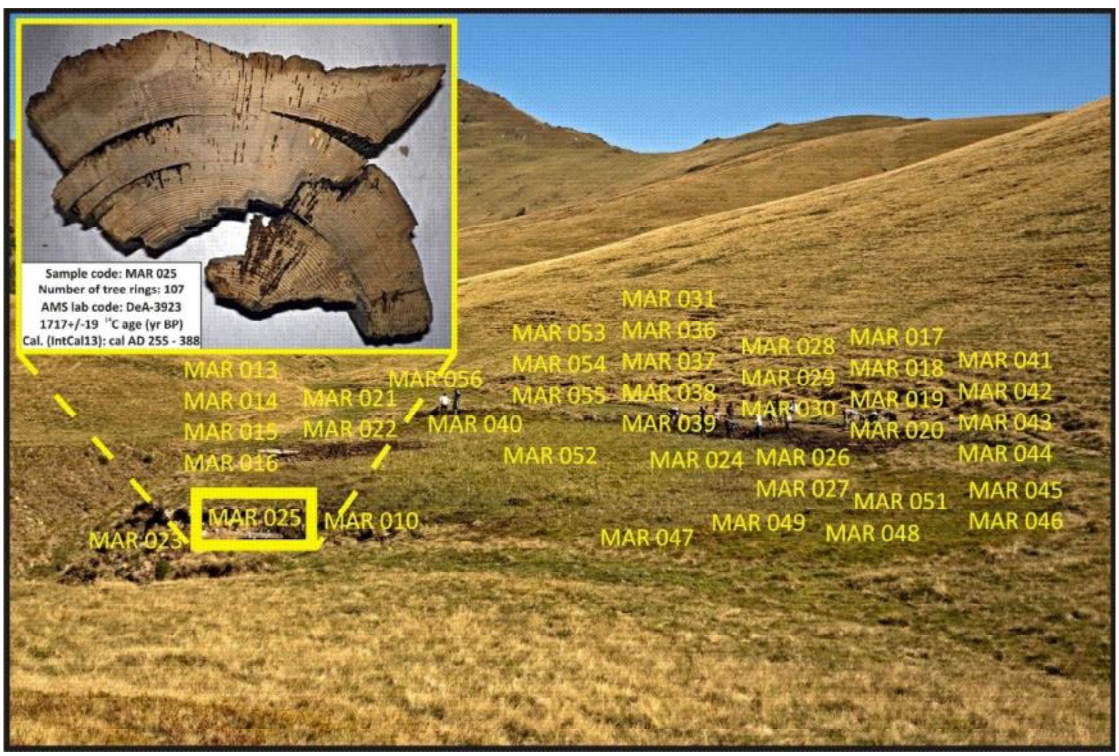

Fig. 2 Position of the last 40 excavated wood-samples and the result of radiocarbon analysis of the oldest dated coniferous sample

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