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

ABSTRACTS VOLUME



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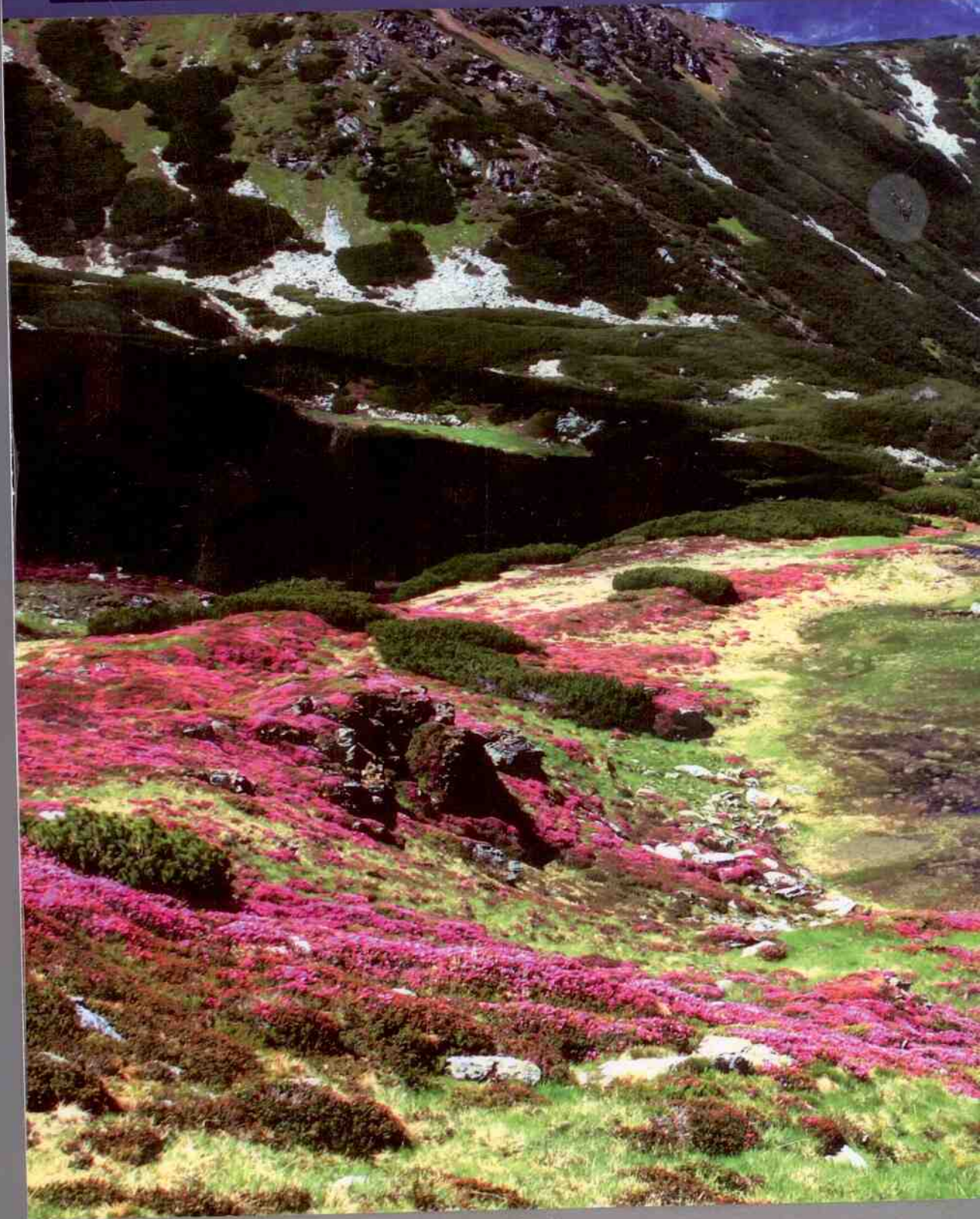
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720229 Suceava, Romania
str. Universității, nr. 13
tel: 0230 216147
0230 522978
fax: 0230 520080



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marcel.mindrescu@gmail.com

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BACKGROUND, AIMS AND SCOPE

Late Pleistocene and Holocene climatic variability in the Carpathian-Balkan region 2014 (CRW 2014) is an interdisciplinary and multidisciplinary scientific event tackling climate and environmental changes in the Carpathian-Balkan region since the Last Glacial. The workshop aims to support the collection of data and evidence from the region in order to produce a major palaeoenvironmental synthesis. We envisage that this event will provide more insight into the most recent advances in palaeosciences and help enhance regional collaboration in research, which has been rather understated thus far. CRW2014 is a follow up on the first PAGE5-supported workshop in 2011, "Climate Change in the Balkan-Carpathian region during the Late Pleistocene & Holocene" which has marked an important step in scientific research in this region, and provides a framework for further investigation of the hitherto neglected Carpathian - Lower Danube - Balkan region.

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Front cover image: Grope cirque and glacial lake, Rodna Mts., Northern Romanian Carpathians (Photo: Marcel Mindrescu).

CONTENTS

1 Holocene flood influenced by sea level rise
ANSELMETTI Flavia
3 Dendrochronology of tree-ring widths from
excavated from
ARVAI Mátya, Péter
8 Rockmagnetic correlation of
in Piedmont Crin
Karasu-XIX)
BONDAR Kseniia,
11 Environmental correlation of
Balkan region, A
LEHKUHL Frank
16 Recognition and dating of
Transylvania Dep
BUDU Vasile and
18 SAR-OSL dating of
CONSTANTIN Dani
TIMAR-GABOR Aida
23 Recent changes in
CROITORU Adina-E
24 Reconstruction of
Danube Plain based
CRISTEA Ionuț Alexan
28 Trends of Summer
Correlated Errors M
CROITORU Adina-Eli
29 Contributions of Hun
Romania
DIANA Annamaria
32 Late Holocene soil an
the study of pedoch
DMYTRUK Yurij, GER
37 Vegetation, climate a
FEURDAN Angelica
39 Palaeoecology and ge
FILIPOVA-MARINOVA

- 1 Holocene flood frequency as reconstructed by lake sediments from multiple archives: A record influenced by solar forcing and atmospheric circulation patterns
ANSELMETTI Flavio S., WIRTH Stefanie B., GLUR Lukas and GILLI Adrian
- 3 Dendrochronological assessment and radiocarbon dating of subfossil coniferous macroremains excavated from a peat bog, Maramures Mts, Romania
ARVAI Mátys, POPA Ionel, MINDRESCU Marcel, NAGY Balázs and KERN Zoltán
- 8 Rockmagnetic correlation between Holocene cave sediments at the mountain and loess soil deposits in Piedmont Crimea (on example of the trap cave Emine-Bair-khosar and archaeological site Biyuk-Karasu-XIX)
BONDAR Kseniia, RIDUSH Bogdan, MATVIISHYNA Zhanna and STEPANCHUK Vadim
- 11 Environmental conditions on the corridor of human migration between 40,000 and 14,000 a BP in the Balkan region. A multi-proxy approach on loess-paleosol profiles
BÖSKEN Janina, OBREHT Igor, ZEEBEN Christian, KLASSEN Nicole, SÜMEGI Pál, MARKOVIC Slobodan and LEHMKUHL Frank
- 16 Recognition and interpretation of paleosols sequences in a floodplain from the low tableland of Transylvania Depression, Romania
BUDUI Vasile and PERȘOIU Ioana
- 18 SAR-OSL dating of Late Pleistocene loess in Southern Romania using fine and coarse-quartz
CONSTANTIN Daniela, CAMENIȚĂ Andra, PANAIOTU Cristian, NECULA Cristian, CODREA Viad and TIMAR-GABOR Alida
- 23 Recent changes in precipitation extremes in Romania
CROITORU Adina-Eliza, PITICAR Adrian and BURADA Doina Cristina
- 24 Reconstruction of the Late Holocene river channel shifts in the North-Eastern part of the Lower Danube Plain based on historical data
CRISTEA Ionuț Alexandru and CRISTEA Cristina
- 28 Trends of Summer Air Temperatures in the Romanian Carpathians Detected by Using a Serially Correlated Errors Model
CROITORU Adina-Eliza, DRIGNEI Dorin, IMECS Zoltan and BURADA Doina Cristina
- 29 Contributions of Human Osteo-archaeology to the reconstruction of climatic shifts in medieval Romania
DIANA Annamaria
- 32 Late Holocene soil and vegetational changes in the foothills of the SE Carpathians (Ukraine), based on the study of pedochronocatenas
DMYTRUK Yuri, GERASYMENKO Natalia and LIASHYK T.
- 37 Vegetation, climate and fire: new insight from palaeoecological records from the Romania
FEURDEAN Angelica
- 39 Palaeoecology and geoarchaeology of the Varna Lake, northern Bulgarian Black Sea coast
FILIPOVA-MARINOVA Mariana, PAVLOV Danail, SLAVCHEV Vladimir and GIOSAN Liviu

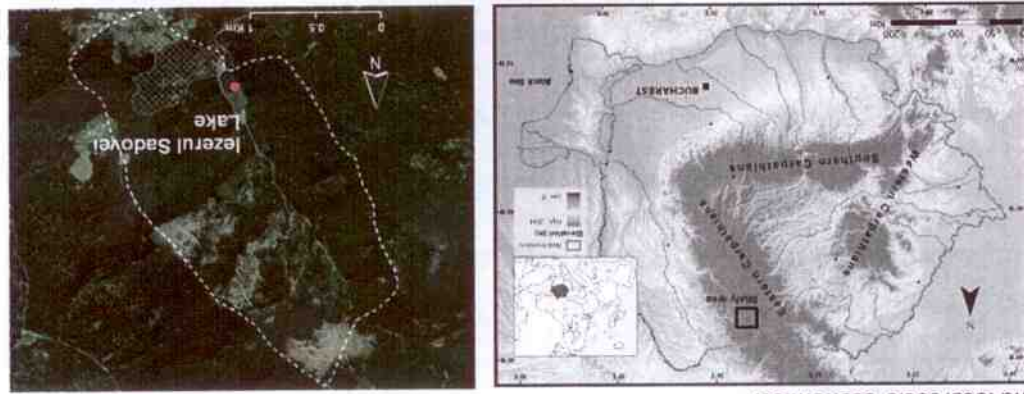
- 101 Snow avalanche history in Parâng Mountains (Southern Carpathians) revealed by dendrogeomorphic analyses
MEŞEŞAN Flaviu, GAVRILĂ Ionela-Georgiana, TALPOŞ Raluca, HOLOBĂCĂ Iulian Horia and POP Olimpiu
- 104 Land surface water balance east of the Romanian Carpathians
MIHĂILĂ Dumitru, BISTRICEAN Petruţ-Ionel and LAZURCĂ Liliانا Gina
- 106 Geoarchaeological investigations at Sormás-Török-földek, in Southwestern Transdanubia, Hungary
NÁFRÁDI Katalin, BARNA Judit P. and SÜMEGI Pál
- 107 Subfossil oaks from alluvial deposits and their role in past fluvial activities analysis: case study East Carpathian rivers, Romania
NECHITA Constantin, RĂDOANE Maria, CHIRILOAIEI Francisca, RĂDOANE Nicolae, POPA Ionel, ROIBU Catalin and ROBU Delia
- 111 550 years in sedimentological record from a varved type lake (Bolăţau, Bukovina, NE Romania) - changing storm frequency and climate fluctuation
NÉMETH Alexandra, MINDRESCU Marcel, GRĂDINĂRĂ Ionela, BIHARI A., FEKETE Jozsef and KERN Zoltan
- 114 The influence of negative climate changes on physical development of urban and rural areas in Bosnia and Herzegovina
NURKOVIC Rahman
- 115 Proxy records of annual/decadal temperature- and hydroclimate variability from the Carpathian-Balkan Region for the past two millennia, a literature review
NÉMETH Alexandra, HATVANI István Gábor, GULYÁS Margit Horozné and KERN Zoltan
- 119 Preliminary results on sediment and settlement dynamics in the environs of the fortification enclosure Cornesti-Iarcuți, western Romania
NYKAMP Moritz, HEEB Bernhard, HOELZMANN Philipp, SCHÜTT Brigitta and SZENTMIKLÓSI Alexandru
- 122 Research on morphological characteristics of endokarst in Rarau Massif. Premises for local palaeoclimatic records
OPREA Dinu and BUTA Georgiana
- 128 The impact of the 8.2 ka rapid climate change event on the vegetation and lake ecosystem of the South Carpathian Mountains, Romania
PÁL Iona, MAGYARI Enikő, BUCZKÓ Krisztina, BRAUN Mihály, PÁLFI József, MOLNÁR Mihály and FINSINGER Walter
- 129 Assessing anthropogenic impact on soil genesis through archaeological data
PIRNÁU Radu Gabriel, PATRICHE Cristian-Valeriu, ROŞCA Bogdan and BODI George
- 130 Changes of the hydrodynamic conditions in the braided river
PLESINSKI Karol and RADECKI-PAWLAK Artur
- 137 Regional distribution and relevance in paleoenvironmental studies of lakes in the Tatra Mts. (Western Carpathians)
POCIASK-KARTECZKA Joanna, GAJDA Agnieszka and FRANCAZAK Pawel
- 144 Permafrost response to the post Little Ice Age climate variability in the Romanian Carpathians
POPESCU Răzvan, VESPREMEANU-STROE Alfred, CRUCERU Nicolae and POP Olimpiu
- 145 Paleoenvironmental Malakofaunistic Records of Late Pleniglacial on the Upper Paleolithic Site Doroshivtsi 3 (the Middle Dniester Basin)
POPIUK Yana
- 149 Historic Gold Mining in the Apuseni Mountains Recorded in Stalagmite Geochemistry
PUŞCĂŞ Cristina Montana, STREMIAN Cristian C. and ONAC Bogdan P.
- 151 New data concerning the Late Quaternary drainage evolution on the Someş River alluvial fan
ROBU Delia-Elena, NIĞA Ionuţ-Bogdan, PERŞOIU Ioana and RĂDOANE Maria

- 152 (Un)Resolved contradictions in the Late Pleistocene glacial chronology of the Southern Carpathians - new samples and recalculated cosmogenic radionuclide age estimates
RUSZKICZAY-RÜDIGER Zsófia, KERN Zoltán, URDEA Petru, BRAUCHER Régis and SCHIMMELPFENNIG Irene
- 157 Environmental change indicated by a site-specific grain size ratio - the example of the Semlac loess-paleosol sequence (Romania)
SCHULTE Philipp, LEHMKUHL Frank, KELS Holger and KLASSEN Nicole
- 161 Human impact on Mid-Holocene vegetation and landscape development in the Carpathian region using a fuzzy approach
SCHUMACHER Martin, SCHIER Wolfram and SCHÜTT Brigitta
- 162 A speleothem perspective on millennial-scale climate change in south-eastern Europe during the last glacial
STAUWASSER Michael, DRÄGUSJIN Virgil, ASSONOV Sergey, HOFFMANN Dirk L., ERSEK Vasile, ONAC Bogdan P. and VERES Daniel
- 163 Seasonal behavior in the water quality of the River Tisza around the turn of the 21st Century
TANOS Péter, HATVANI István Gábor, KOVÁCS Solt, ANDA Angéla and KOVÁCS József
- 168 Late Pleistocene millennial scale cycles of aeolian sedimentation in the Dunaszekcső loess record, south Hungary: preliminary data and interpretations
JUVÁRI Gábor, KOVÁCS János, VARGA György, MOLNÁR Mihály and NOVOTHNY Ágnes
- 170 Assessing the suitability of Scartsoara cave ice for glaciochemical research: a coupled chemical and water isotopic approach
VERES Daniel, SAVARINO Joel, JOURDAIN Bruno, ONAC Bogdan P., FORRAY Ferenc, MOLNAR Mihály, BEGY Robert and GINOT Patrick
- 172 The cyclic development of St. George (Danube) asymmetric deltaic lobe and present adaptations to man-induced sediment depletion and climate variability
VESPERMEANU-STROE Alfred, PREOTEASA Luminița, TĂȚUI Florin, TIMAR-GABOR Alida and CĂRDAN Ionela
- 174 A high-resolution Early Holocene-late MIS 3 environmental rock- and palaeomagnetic record from Lake St. Ana, Carpathian Mts, Romania
VERES Daniel, MAGYARI Enikő, ST-ONGE Guillaume, WENNRICH Volker, BRAUN Mihály, KARATSON David, BORMANN Marc and SCHÄBITZ Frank
- 176 Archaeological sites on large river's islands as records of Holocene climate and fluvial changes. A geomorphological case study in the Danube river section between Komárom and Paks, Hungary
VICZIAN István
- 180 Rapid shifts in environmental conditions inferred from geochemical analyses of Lake Sticci lacustrine record, Transylvanian Lowlands, Romania
VERES Daniel, HUTCHINSON Simon M., HALUC Artina, FRANTIUC Alexandru and FEURDEAN Angelica
- 183 Drivers of Holocene treeline and timberline changes in the Retezat Mountains (South Carpathians, Romania)
VINCE Ildiko, ORBÁN Ildiko, MARINOVA Elena, JAKAB Gusztav, BIRKS Hilary H., FINSINGER Walter and MAGYARI Enikő K.
- 185 Electrical resistivity tomography (ERT) surveys on glacial deposits in Romanian Carpathians
ZAMOSTEANU Andrei, CRISTEA Ionuț A. and MINDRESCU Marcel
- 189 Towards modelling of loess-paleosol sequence formation
ZEEDEEN Christian, HAMBACH Ulrich, MARKOVIC Slobodan, OBREHT Igor and LEHMKUHL Frank

We found that the obtained climate reconstructions propose an expansion causing dry/wet conditions compared to the Alps indicate a blocking over the from 4.2 to 2.2 provides a quantitative. Additionally, in Central America consistent with the ITCZ, drive shorter-term fluctuations.

Holocene flood archives: A review of patterns
Flavio S. Anselmi¹, Institute of Geology, Bern, Switzerland,
² Geological Institute Eawag, Swiss Federal Centre for Hydrology, Switzerland

Fig. 1 Location of the study site (Iezerul Sadovei Lake) (left); aerial photo of lake and catchment in 2013 (right); the watershed is marked with white, dashed line; the landslide that led to the formation of the lake is represented by the gridded, grey area.



Climate changes and anthropogenic activities are projected to have a significant impact on mountain environments. This is because of their ecosystems' sensitivity and increased response to the extreme weather events and natural catastrophes (Beniston, 2000). The modification of climatic conditions can therefore impact heavily on mountain ecosystems. Furthermore, human impact has been shown to modify environmental response to climatic stressors (Beniston, 2003; Jones & Mann, 2004). This holds particularly true because mountain regions are usually at the border of conflicting interests between economic development and environmental conservation (IPCC, 1996). Deciphering the relation between local mountain environment, climate variability and human components therefore becomes of great importance for both regional climate study and local socio-economies.

Background

Gabriela Florescu¹, Angelica Feurdean², Simon M. Hutchinson³, Marcel Mindrescu¹ and Zoltan Kern⁴
 1 Stefan cel Mare University of Suceava, Department of Geography, Universitatii Street 23, Suceava, Romania, gabriella.florescu@yahoo.com
 2 Biodiversity and Climate Research Centre BIK-F, 25 Senckenberganlage, D-60325, Frankfurt am Main, Germany
 3 School of Environment & Life Sciences, University of Salford, Salford, Greater Manchester, M5 4WT, UK
 4 Institute for Geological and Geochemical Research, MTA, H-1112, Budapest, Hungary

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Our preliminary results (of which selected proxies are presented in Fig. 3) show three distinct stages in the development of local environmental conditions over the past 1000 years: i) a warmer, wetter phase than today between 1050 and 1300 AD (411-270 cm depth) suggested by detrital input (Zirconium and Rubidium), in conjunction with grain size changes, geochemistry, magnetic properties and tree macrofossil profiles; ii) colder and drier conditions between 1450 to

Fig. 3 Zirconium - Rubidium, SIRM and median grain size profiles for the entire sediment sequence in Iezerul Sadovei Lake, rendered as concentration vs. depth (cm).

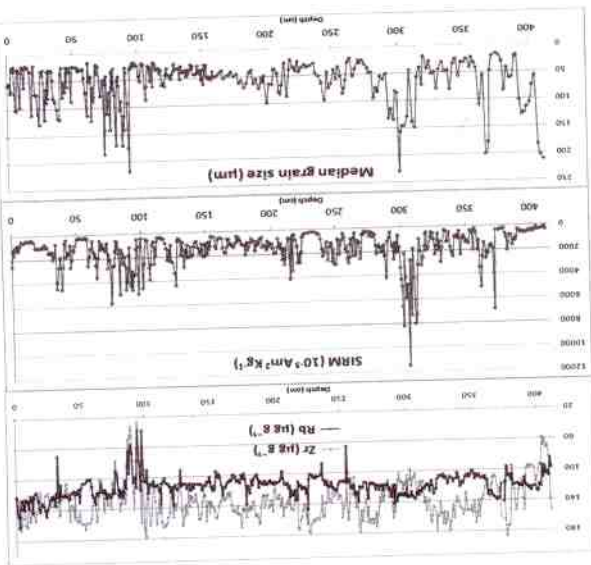
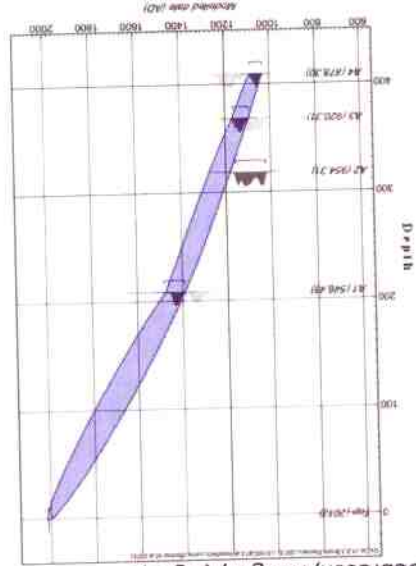


Fig. 2 Age-depth model for Iezerul Sadovei Lake; A1, A3, A4 - radiocarbon dates used for the construction of the model; A2 - radiocarbon date excluded from the model.



The methods employed in this study are sediment geochemical characteristics (elemental composition, organic matter and carbonate content), physical properties (water content of sediment, mineral magnetic properties, grain size), as well as biological indicators (tree macrofossils and pollen). The chronology of the entire sequence was established on four AMS radiocarbon measurements performed at Hertelendi Laboratory of Environmental Studies in Debrecen, Hungary (Fig. 2).

Methods and results

From this perspective, a sedimentary lacustrine sequence located in the Eastern Carpathians, Northern Romania, has been subjected to multi-proxy analyses with the purpose of reconstructing local environmental changes in response to climatic variability and human impact. The sequence (4.1 m long) covering the last millennium is layered throughout and offers an excellent opportunity for high-resolution past environmental reconstruction. The study site, formed by landsliding, is located at 930 m asl (N 47° 36' 13", E 25° 26' 58"); it has an area of 0.75 ha, with 4.4 m maximum water depth (in 2010) (Mindrescu et al., 2013). The lake catchment and surrounding area (Fig. 1) are highly susceptible to slope movement due to their geology (i.e., flysch), terrain gradients and climate parameters (heavy and prolonged rainfall, especially during early spring and summer; high soil moisture levels ensured by the generally cool climate).

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The impact of rapid climate change and anthropogenic disturbance on local mid-elevation mountain forest composition, distribution and catchment erosion is ongoing. This study provides an excellent prospect to extend palaeo-environmental reconstruction into a hitherto neglected region of central-eastern Europe (North-Eastern Romanian Carpathians). This particular region also proved to be highly sensitive to past climatic variations. Combining the site geochemical and palaeoecological proxies has led to an enhanced understanding of the complex interactions between climate, local environment responses and human influence on local environmental change. It offered greater predictive capacity of future environmental changes at both an extra-local and a regional scale.

Conclusions

This multi-proxy analysis suggests that local environment reacted very sensitively to the climatic factors from 1050 to 1450 AD and during the recent period (where anthropogenic forcing compounded the effects of the climate). Due to the sensitive geological setting, the environment responded to the warm and wet climate by slope instability and soil erosion. On the contrary, during the 1450-1800 AD period there was a reduction in sediment yield delivery into the lake. The local environment appeared to have undergone a process of stabilisation. Human presence through recent deforestation of large areas and related activities seems to have enhanced the impact of climate, and thus contributed to a marked increase in erosion processes. These phases appear to correspond well to the main local to hemispheric scales climatic conditions of the last 1000 years: the termination of Medieval Warm Period (950-1200 AD); cold and dry conditions during the Little Ice Age (1450 to 1850 AD) and the recent climatic warming (the last 100 years) (Jones & Mann, 2004).

1800 AD (220-90 cm depth) as highlighted by stability in the minerogenic input, marked reduction in median grain size, low SIRM in conjunction with the values of other magnetic parameters and also shown by the pollen (iii) and the recent climatic warming over the last 100 years (top 90 cm) characterized by increased proportion of large diameter grains, high organic matter content cumulated with the total absence of tree macrofossil, variation in magnetic parameters and low preservation of pollen grains.

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