Past Global Changes (PAGES)
http://www.pages-igbp.org/

Mountain Research Initiative Europe (MRI)
http://mri.scnatweb.ch/networks/mri-europe/

Department of Geography, University of Suceava, ROMANIA
http://atlas.usv.ro/www/geografie/prima_pagina_eng.php
http://usv.ro/

Applied Geography Association GEOCONCEPT
http://fig.usv.ro/www/geoconcept/

On Behalf of the Workshop Organizing Committee, we would like to welcome you to the **1st Workshop** on Regional Climate Dynamics:

CLIMATE CHANGE IN THE CARPATHIAN-BALKAN REGION DURING THE LATE PLEISTOCENE AND HOLOCENE

in SUCEAVA, Romania, 9-12 June 2011
http://atlas.usv.ro/www/climatechange/
http://www.pages-igbp.org/calendar/upcoming/1-pages-sponsored/18-balkan-carpathian

On Behalf of the Workshop Organizing Committee, we would like to welcome you to the 1st Workshop on Regional Climate Dynamics "**Climate Change in the Carpathian-Balkan Region During the Late Pleistocene and Holocene**" (University of Suceava, Romania, June 9-12, 2011).

The Purpose of this PAGES and MRI-Sponsored Workshop is to bring together an international group, as well as local researchers, in order to discuss and promote opportunities for collaboration on topics such as glaciations, palaeolimnology, history vegetation, speleothemes, dendrochronology, geoarcheology, palaeorivers and paleosoils in the Carpathian-Balkan region, one of the least studied and promoted areas in Europe. Furthermore, this workshop aims at an educational role, by providing scientific training for young researchers and students. The workshop will focus on interdisciplinarity and international cooperation.

The Workshop is centered on open debates, round-table discussions and exchange of ideas on a wide range of topics related to the Regional Climate Dynamics during the Pleistocene and Holocene in the mountain environments of the Carpathian and Balkan regions - the least studied mountain areas of Europe. The contributions shall focus mainly on palaeoenvironment and the main objective is to bring together researchers interested in sharing latest advances in the study of these regions, and for providing synergies for interdisciplinary international collaborations.

Field Excursion to the formerly glaciated alpine ranges of the Northern Romanian Carpathians as well as to several large peat-bog accumulations and wetland ecosystems are also planned.

The Workshop is held in the venue of University of Suceava (http://www.usv.ro/index.php/en), in the historic capital of the province of Bucovina, a land famous for picturesque landscapes and for the highest density of UNESCO monuments in Eastern Europe

Oral/poster Presentations addressing mainly the following scientific subjects:

1. Characteristics and extents of former glaciation(s) in the Balkan-Carpathians Mountains
2. Lake Sediments and Peat-Bogs deposits as palaeoenvironmental archives
3. Past climates, History of Vegetation Changes and Human Impact
4. Karst and Cave Records as recorders of Climate Change
5. Dendrochronology
6. Geoarchaeology
7. Climate variations and fluvial dynamics
8. Loess-Paleosoil complexes

The Workshop combines keynote presentations, talks, posters and working group sessions.

Workshop Organizing Committee

Chairman:
PhD. Marcel Mîndrescu, Department of Geography, University of Suceava, Romania

Deputy Chairmen:
PhD. Daniel Vereş, "Emil Racoviţă" Institute of Speleology-Romanian Academy/Babeş-Bolyai University, Cluj, Romania
Prof. PhD Bogdan P. Onac, "Emil Racoviţă" Institute of Speleology-Romanian Academy/Babeş-Bolyai University of Cluj Napoca, Romania and Dept. of Geology, University of South Florida, Tampa, USA

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PhD. Ionel Popa, Head of the Experimental Station for Spruce Silviculture, Câmpulung Moldovenesc, Romania
PhD. Ioan Tanţău, Geology Department, University Babes-Bolyai of Cluj Napoca, Romania
PhD. Angelica Feurdean, Senckenberg Research Institute and Natural History Museum & LOEWE Biodiversity and Climate Research Centre (BiK-F), Frankfurt am Main, Germany and "Emil Racoviţă" Institute of Speleology, Romanian Academy of Science, Cluj Napoca, Romania
PhD. Cristian Panaiotu, Atmospheric and Earth Physics, Astrophysics Department, University of Bucharest, Romania
PhD. Ionuţ Alexandru Cristea, Department of Geography, University of Suceava, Romania

WORKSHOP PROGRAMME:

Climate Change in the Carpathian-Balkan Region During the Late Pleistocene and Holocene

Day 1 - June 9, 2011. Location: Building E, Conference Hall, University of Suceava		
Registration Desk 8:00-9:00		
Open Ceremony 9:00-10:00		
Keynote lectures, 10:00-13:15		
No	**Time**	**Author/Authors and Title**
i	10:00-10:25	*Thorsten Kiefer- PAGES Europe* Past Global Changes (PAGES): Coordinated paleoscience greater than the sum of its parts
ii	10:25-10:50	*Björnsen Gurung Astrid- MRI Europe* The Mountain Research Initiative: Global change research networks in Central and Eastern Europe
1	10:50-11:15	*Feurdean Angelica, Tămaş Tudor, Tanţău Ioan, Fărcaş Sorina* Elevational variation in the biotic response to repeated climate changes in the Carpathians
Coffee Break, 11:15-11:45		
2	11:45-12:15	*Filipova-Marinova Mariana* Quaternary Palynostratigraphy of the Bulgarian Black Sea coastal area
3	12:15-12:45	*Tudor Tămaş, Bogdan P. Onac* Late Quaternary climatic history of NW Romania: results from Th/U dating of speleothems
4	12:45-13:15	*Magyari Enikő K., Buczkó Krisztina, Vennemann T., Kern Zoltán, Fórizs I., Demény A., Braun Mihály , Vereş Daniel* A 14,000-year diatom oxygen isotope record from the Romanian South Carpathians reflect changes in the seasonal distribution of precipitation and temperature
Lunch, Restaurant USV, 13:30-15:00		
Presentations/Part 1, 15:10-19:00		
Moderators: Bogdan P. Onac, Enikő Magyari , Gikov Alexander		
5	15:10-15:30	*Vereş Daniel, Lane, C.S., Timar-Gabor, A., Constantin, D. ,Szakacs, A., Panaiotu, C.G., Onac, B.P.* The Campanian Ignimbrite tephra layer - a regional stratigraphic marker for the MIS 3 loess deposits of Romania
6	15:30-15:50	*Hutchinson Simon M., Akinyemi Olusola, Mindrescu Marcel , Rothwell James J.* An overview of the recent palaeolimnology of selected lakes in the Romanian Carpathians
7	15:50-16:10	*Höhn Maria, Gugerli Felix, Cseke Klara, Salzer Kristina, Vendramin Giovanni Giuseppe* Spatial genetic structure in Swiss stone pine suggests a region-specific population history of the species along the Carpathian range

8	16:10-16:30	*Popa Ionel, Nechita Constantin* Multicenturies summer temperature reconstruction for Southern Carpathians
9	16:30-16:50	*Gikov Alexander, Nedkov Stoyan, Gachev Emil* Key issues for advancing of Paleoenvironmental Reconstructions in Bulgarian High Mountains
Coffee break, 16:50 – 17:20		
10	17:20-17:40	*Dimofte Daniela, Panaiotu Cristian G., Panaiotu Cristina E.* Paleoclimatic signal of the Dobrogea loess-paleosol sections (Romania)
11	17:40-18:00	*Gębica Piotr, Jacyšyn Andrij, Starkel Leszek, Krąpiec Marek* Medieval accumulation in the Upper Dnister river valley and its connection with colonization of the Eastern Carpathians Foreland (Western Ukraine)
12	18:00-18:20	*Romanescu Gheorghe, Bounegru Octavian* The Archaeology of the Ancient and Medieval Danube Delta: Modeling Environmental and Historical Change
13	18:20-18:40	*Vígh-Tarsonyi Gergő* Environmental changes at the lower border of the periglacial zone in the Călimani Mountains
14	18:40-19:00	*Popescu Răzvan, Vespremeanu-Stroe Alfred, Urdea Petru, Vasile Mirela* Rock glaciers permafrost and Paleoclimatic implications in Retezat Mountains, Southern Carpathians
Dinner, Restaurant USV, 19:15		
Day 2 – June 10, 2011. Location: Building E, Conference Hall, University of Suceava		
Presentations/Part 2, 9:00-13:30		
Moderators: Simon Hutchinson, Hambach Ulrich, Petru Urdea		
15	9:00-9:20	*Hughes P., Woodward J.C., van Calsteren P.C., Thomas L.E., Adamson K.* Pleistocene ice caps in the western Balkans: implications for cold stage atmospheric circulation in southern Europe
16	9:20-9:40	*Urdea Petru* New opinions concerning the Quaternary glaciations in the Romanian Carpathians
17	9:40-10:00	*Kuhlemann Joachim, Gachev Emil, Gikov Alexander , Nedkov Stoyan* Glacial Extent in the Rila mountains (Bulgaria) during the Last Glacial Maximum
18	10:00-10:20	*Gheorghiu Delia, Fabel Derek, Xu Sheng* Cosmogenic ^{10}Be constraints on the deglaciation history in the Rodna Mountains, Northern Romania
19	10:20-10:40	*Braun Mihály, Hubay Katalin, Bálint Miklós, Papp István, Magyari Enikő* Reconstruction of Lateglacial climate change based on sediment geochemistry of a glacial lake Tăul dintre Brazi, South Carpathians, Romania
20	10:40-11:00	*Chiriloaei Francisca, Rădoane Maria, Perşoiu Ioana, Popa Ionel* Reconstruction of the fluvial activity in the last 3000 years for the Moldova River (Romania)
Coffee break, 11:00-11:30		
21	11:30-11:50	*Hambach Ulrich, Jovanović M., Marković S.B., Gaudenyi T.* The Titel Loess Plateau case study: a unique European palaeoclimatic record covering the last 600 kyrs

22	11:50-12:10	*Vereş Daniel, Onac, B.P., Perşoiu, A., Polyak, V., Atlas, Z.D., Asmerom, Y.* Signals of natural cycling of elements and anthropogenic environmental impact in a cave ice deposit – a geochemical perspective
23	12:10-12:30	*Kern Zoltán, Patkó Mónika, Fekete József, Kele Sándor, Pályi Zoltán, Kázmér Miklós* Multiple tree-ring proxies (earlywood width, latewood width and δ13C) from pedunculate oak (Quercus robur L.), Nyírség, NE Hungary
24	12:30-12:50	*Tudor Tămaş, Bogdan P. Onac* Stable isotope variations between 59 - 46 kyr BP recorded in a stalagmite from NW Romania
25	12:50-13:10	*Tóth Mónika, Heiri Oliver, Brooks Stephen J., Braun Mihály, Buczkó Krisztina, Bálint Miklós, Magyari Enikő K.* Lateglacial and Early Holocene summer temperatures in the Southern Carpathians (Romania): a chironomid-based reconstruction
26	13:10-13:30	*Krisztina Buczkó, Enikő Magyari, Éva, Soróczki-Pintér, Mihály Braun, Katalin Hubay, Mónika Tóth, János Korponai* Response to cooling: Late Glacial and Holocene changes of diatom assemblages and lake acidity in mountain and lowland lakes in the Carpathian Basin
Lunch, Restaurant USV, 13:30-15:00		
Presentations/Part 3, 15:00-19:30		
Moderators: Brancely Anton, Angelica Feurdean, Braun Mihály		
27	15:00-15:20	*Brancelj Anton* Biological remains in lacustrine sediments as indicators of paleo-environment (a case study of lake Iezer-Feredeu, Romania)
28	15:20-15:40	*Geantă Anca Daniela, Tanțău Ioan, Tamaş Tudor* MCA, LIA and human impact recorded by the vegetation of NW Romania – palynological analysis of a 800 years old bat guano deposit
29	15:40-16:00	*Vespremeanu-Stroe Alfred, Tătui Florin, Urdea Petru, Cruceru Nicolae* The estimation of the sedimentation rates within the glacial lakes from the Romanian Carpathians – preliminary results
30	16:00-16:20	*Smolková Veronika, Pánek Tomáš, Hradecký Jan* Sedimentary record of fossil landslide lakes: contribution to landslide chronology and Holocene paleogeographical conditions in the Outer Western Carpathians
31	16:20-16:40	*Holobâcă Iulian* Temperature variability in Romanian Carpathians
Coffee break, 16:40- 17:10		
32	17:10-17:30	*Ignéczi Ádám, Balázs Nagy, Zoltán Kern* Examination of the accumulation-area ratio method in the case of non-typical glacier types
33	17:30-17:50	*Pop Olimpiu Traian, Buimaga – Iarinca Stefan, Stoffel Markus, Anghel Titu, Pandia Iulia, Surdeanu Virgil* Reaction of Norway spruce (Picea abies) to sedimentation by toxic debris in the Calimani Mountains
34	17:50-18:10	*Takács Katalin, Nagy Balázs* Changes in river ice regime in the Carpathian Basin
35	18:10-18:30	*László Peter, Nagy Balázs, Kern Zoltan*

		Palaeoglaciation of western Rodna Mountains - preliminary model for the last deglaciation of the area
36	18:30-18:50	*Daniel Bejan, Ursachi Laurentiu* Paleosoils from quarry north of Barlad
Posters Session, 18:50-19:30		
Moderators: Gębica Piotr, Tamaş Tudor, Tóth Mónika		
37	*Ridush Bogdan, Bondar Ksejiia* Late Pleistocene - Holocene climate changes records in loamy sediments of Bukovynka Cave	
38	*Bondar Ksenija, Ridush Bogdan* Late Pleistocene - Holocene water dynamic and climate changes recorded in loamy sediments of Bukovynka Cave (Chernivtsi region, Ukraine)	
39	*Lócskai Tünde, Hupuczi Júlia, Sümegi Pál* The Late Pleistocene paleoenvironment and paleoclimate of Katymár section (S Hungary) based on preliminary results	
40	*Pall David Gergely, Persaits Gergő, Sümegi Pál* New investigations at Tokaj-Csorgúkút II. loess section, Northeast Hungary	
41	*Sümegi Pál, Magyari Enikő, Molnár Mihály* 28,000-year record of environmental change in SE Hungary: terrestrial response to Dansgaard-Oeshger	
42	*Veres Zsolt, Páll Dávid Gergely, Sümegi Pál, Törőcsik Tünde* Geoarcheological examinations of Selyemrét (Ócsa)	
43	*Perşoiu Ioana, Rădoane Maria* River responses to Late Quaternary climate changes. Case study: Somesu Mic River, Romania	
44	*Feurdean Angelica, Tanțău Ioan, Fărcaş Sorina* Holocene variability in the range distribution and abundance of *Picea abies* in Romania	
45	*Necula Cristian, Panaiotu Cristian, De Ridder Fjo* Independent and continuous chronology for a Romanian loess-paleosol complex spanning the last 350ka	
46	*Mihaila Dumitru, Briciu Andrei Emil, Roibu Cătălin-Constantin* Actual climate evolution in the NE Romania. Hidrological and biogeographical consequences	
47	*Budui Vasile, Niculică Bogdan, Simalcsik Angela* A prehistoric habitat model: the archaeological site from Adâncata, Suceava County	
48	*Ferk Mateja* Paleofloods on karst poljes, Slovenia	
49	*Panagiotopoulos Konstantinos , Aufgebauer Anne, Schäbitz Frank, Wagner Bernd* Late Glacial and Holocene vegetation and environmental history of Lake Prespa	
50	*Vasiliniuc Stefan,. Vandenberghe1 Dimitri A.G, Timar-Gabor Aida, Cosma Constantin* The potential of luminescence signals from polymineral fine grains for dating Romanian loess	
51	*Fărcaş Sorina, Tanțău Ioan, Feurdean Angelica* Lateglacial and Holocene distribution of *Pinus Cembra* in the Romanian Carpathians	
Festive Dinner, 20:00		
Day 3 and 4, June 11 & 12: Field trip		
Coordinators: Marcel Mindrescu & Ioan Tanțău		
Field Excursion to the formerly glaciated alpine ranges of the Northern Romanian Carpathians as well as to several large peat-bog accumulations and wetland ecosystems. Also is planned to visit some UNESCO monuments.		

1. Feurdean Angelica[1,2*], Tămaş Tudor[2,3], Tanțău Ioan[3], Fărcaş Sorina[4]

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Elevational variation in the biotic response to repeated climate changes in the Carpathians

ABSTRACT: Alarming predictions and contrasting results regarding species loss consequence of climate change are offered by the coarse-scale vs. fine scale models. In this work fossil records were used to explore patterns of change in vegetation composition, turnover, and diversity along an elevation gradient during the Lateglacial - early Holocene, and to locate the most sensitive elevations to past climate changes. Compositional change appears to be strongest at the Lateglacial/Holocene transition (c. 11,500 cal. yr BP), but significant shifts also occur approximately at ~14,700 cal. yr BP, 13,800 cal yr BP and 12,700 cal. yr BP. Turnover is greater at sequences from mid elevation (730-1100 m) than at low and high elevations. Intervals of greater palynological richness are recorded approximately from 11,500 cal. yr BP, and between 13,800 and 12,500 cal. yr BP; intervals of lower pollen richness occur between 12,900 and 11,500 cal. yr BP, and before 14,000 cal. yr BP. However, given that pollen can travel long distances our results were likely affected by long distance transported pollen. Moisture availability and winter temperature appear to have driven the most sustained compositional changes in the region. Comparison with modelling results reveals that our finding concurs with other palaeoecological and local-scale model studies in reporting the small-scale species survival in microrefugia within larger unsuitable areas, features not captured by wide-scale model predictions. It also demonstrates the need of an integrated approach (palaeo-data, observation, modeling) in order probably better prepare to handle the future impact of climate change.

2. Filipova-Marinova Mariana*

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Quaternary Palynostratigraphy of the Bulgarian Black Sea coastal area

ABSTRACT: The palynological method is one of the main biostratigraphic methods. Pollen analysis of marine sediments offers the possibility of obtaining long and presumably continuous records of coastal vegetation that are the source of plant microfossils found in the marine basins. Such sequences provide opportunity to develop complete and high-resolution records of terrestrial events. The stratigraphic subdivision of sediments from the western Black Sea area is based on qualitative interpretation of the pollen and spore assemblages, and the vertical and spatial distribution of selected indicator taxa. The pollen assemblage zones distinguished are based entirely on the percentage abundances of the predominant and indicator pollen and spores in the assemblages. Pollen spectra delimited for each assemblage zone were obtained from several samples in each sediment core and provide a picture of vegetation changes for the period

represented by sediments. Because these zones are present in two to several sediment cores in adjacent areas, they are delimited as regional pollen assemblage zones (RPAZ) and can be correlated in time and space with concurrent chronostratigraphic scales. The palynological record comes from the 12 most representative cores from the western Black Sea zone. Fifty LPAZ are grouped into nine RPAZ that are tentatively correlated to the regional Black Sea stratigraphic scale and to the traditional Northern European climatostratigraphy. These RPAZ are defined corresponding to the European intervals marking the end of Günz Glacial, Riss I Stadial and Riss I–II Interstadial of the Riss Glacial, Plenigalcial and Late Glacial of the Würm Glacial (including Oldest, Older and Younger Dryas Stadials and Bølling and Allerød Interstadials), and the Preboreal, Boreal, Atlantic, Subboreal and Subatlantic chronozones of the Holocene.

3. Tudor Tămaş[1*], Bogdan P. Onac[1,2]

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Late Quaternary climatic history of NW Romania: results from Th/U dating of speleothems

ABSTRACT: Speleothems are secondary minerals that precipitate in caves, most commonly as stalagmites, stalactites and flowstones. They are primarily composed of calcium carbonate, precipitated by slow degassing of carbon dioxide from supersaturated waters entering the cave gallery. Trace elements may be transported in solution and co-precipitated in calcite. One of these, uranium, when in concentration that exceeds 0.01 ppm allows precise age determination by U-series dating methods. Speleothem growth is a sensitive indicator of both temperature and humidity, and changes in either one or both of these can cause periods of enhanced or reduced growth. Furthermore, the worldwide karst landscape distribution and the study of speleothems growth interval enable regional chronologies to be drawn up. Uranium concentration in speleothems depends on several factors: uranium content of the host rock, residence time in the underground water, HCO_3^- availability etc., and thus is highly variable from one speleothem to another or even in the same speleothem. The dating technique is based on the precipitation of small quantities of uranium in speleothems, in the desirable absence of thorium. After the deposition, a gradual increase in ^{230}Th occurs in the speleothem, resulted from the disintegration of ^{234}U. The age of the speleothem depends on the $^{230}Th/^{234}U$ ratio measured. In this presentation we discuss ages obtained through alpha, mass spectrometry, and MC-ICP MS on speleothems from caves in the Bihor and Padurea Craiului Mountains, covering the whole dating interval for the $^{230}Th/^{234}U$ method. Growth intervals may be assimilated with climate periods favorable for speleothem deposition (existence of diffuse groundwater recharge and biogenic production of CO_2 in soil). The speleothem growth frequency record provides a well-dated terrestrial chronology for the past 350,000 yr B.P., which directly reflects regional paleoclimatic conditions in NW Romania. Our study should prove very useful in understanding the regional nature of climate variability in a geographic area that is under-represented by current Upper Pleistocene high-resolution data, providing at the same time the means for comparing our regional data with

data from Western Europe and its possible linkage to NAO and other large-scale atmospheric circulation systems.

4. Magyari Enikő K.[1], Buczkó Krisztina[2], Vennemann T.[3], Kern Zoltán[4], Fórizs I.[4], Demény A.[4], Braun Mihály [5], Veres Dan[6]

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A 14,000-year diatom oxygen isotope record from the Romanian South Carpathians reflect changes in the seasonal distribution of precipitation and temperature

ABSTRACT: Oxygen isotope records from lacustrine sediments have the potential to reflect short-term and long-term changes in temperature, seasonal changes in the distribution of precipitation and changes in lake water budget determined by the evaporation to inflow ratio. This proxy has widely been used in the Alps and NW Europe to provide high-resolution temperature or evaporation records, but similar studies in the Carpathians are missing. Here we provide a continuous Lateglacial and Holocene record of diatom silica oxygen isotope changes ($\delta^{18}O_{DIAT}$) in a subalpine lake sediment sequence coming from the northern flank of the Retezat Mts (Taul dintre Brazi, TDB, 1740 m a.s.l.). This through-flow, shallow, high-altitude lake with a surface area of only 0.4 ha has short water residence time, is predominantly fed by snowmelt and to some extent by rainwater. Its $\delta^{18}O_{DIAT}$ record principally reflects the oxygen isotope composition of the winter and spring precipitation as diatom blooms occur mainly in the spring and early summer. Changes in $\delta\ ^{18}O_{DIAT}$ were interpreted by us to reflect past changes in the contribution by winter precipitation. We found low oxygen isotope values (from 27 to 28.5 ‰) during the Lateglacial until 12,300 cal yr BP, followed by a sharp increase. In the Holocene $\delta\ ^{18}O_{DIAT}$ values ranged from 29 to 31 ‰ until 3200 cal yr BP, followed by generally lower values during the Late Holocene (27 to 30 ‰). Short-term decreases in the isotopic values were found at 9000-8500, 8200, 6300-5100, 4400, 4000, 3100-2500 and 2100 cal yr BP. After 1900 cal yr BP $\delta\ ^{18}O_{DIAT}$ values showed a gradual decrease up to the present day. The general trend in the record suggests that contribution by winter precipitation was generally lower between 12300 and 3200 cal yr BP, followed by increased contribution after 3200 cal yr BP. An alternative interpretation of the record is that the higher $\delta\ ^{18}O_{DIAT}$ values in the early and mid Holocene reflect changes in annual mean $\delta\ ^{18}O_P$ and thus indirectly infer higher annual mean temperatures. Short-term decreases in the isotopic values were interpreted to denote episodic increases in the contribution of winter precipitation that can either be achieved by increased snowfall (cold and wet winters) or enhanced seasonality with longer ice-cover season. Our late Holocene decrease in $\delta\ ^{18}O_{DIAT}$ show good agreement with the speleothem $\delta\ ^{18}O$ records from the S Carpathians that also indicate gradual decrease in average regional temperatures after 3200 cal yr BP. The 8.2 and 4.2 cold events are also prominent in both the speleothem and our $\delta\ ^{18}O_{DIAT}$ records. The first significant decrease in our $\delta\ ^{18}O_{DIAT}$ record occurred between 6300 and 5100 cal yr BP and

coincided with a major terrestrial vegetation reorganization (spread of hornbeam at lower altitudes), a local ecosystem productivity decrease as reflected by decreasing sediment organic content, and also with a major diatom floristic change towards the dominance of low pH indicator benthic and tychoplanktonic assemblages. Altogether these data suggest that orbitally-driven solar forcing had a major impact on the terrestrial and aquatic environments: decreasing summer and increasing winter insolations in the second half of the Holocene resulted in a less productive environment in the subalpine belt of the Retezat Mts. Longer and likely wetter winters, however, only prevailed steadily after the 3.3 warm event (also recorded in TDB) as suggested by our depleted $\delta^{18}O_{DIAT}$ values afterwards.

5. Vereş Daniel[1*], Lane, C.S.[2], Timar-Gabor, A.[3], Constantin, D.[4], Szakacs, A.[5], Panaiotu, C.G.[6], Onac, B.P.[7]

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The Campanian Ignimbrite tephra layer - a regional stratigraphic marker for the MIS 3 loess deposits of Romania

ABSTRACT: Loess deposits are widespread in Romania and many open profiles are found along the river valleys crossing the southern plains of the country, and these records are important resources for understanding paleoclimate dynamics and the Paleolithic cultural dispersal at the continental scale. However, loess deposits show significant lateral compositional variations, which bring about regional stratigraphic uncertainties, especially when site-to-site correlations still rely mainly on stratigraphic relationships, and only a handful of profiles having been investigated with more precise dating methods. Therefore, the synchronization of loess records using climate-independent marker horizons such as tephra layers currently holds the highest potential for the accurate point alignment of profiles/strata on common time-scales. Several well-marked decimeter-thick tephra layers are found in the loess-paleosol complexes of southern Romania and their investigation could help to overcome the chronological and stratigraphical limitations encountered in loess studies. Here we present results from ongoing chemical and chronological investigations of several upper Pleistocene tephra layers embedded in the loess and alluvial deposits of southern Romania. The microprobe chemical analysis of volcanic glass of the tephra deposits from three locations along the lower Olt and Jiu valleys, as well as new OSL data, confirm that the tephra layers represent the Campanian Ignimbrite/Y5 tephra (ca. 39-40 cal ka BP). This tephra originated from the largest eruption of the Campi Flegrei caldera and is one of the most important Marine Isotope Stage 3 chronostratigraphic

markers, with crucial importance in linking marine, lacustrine, loess, cave and archaeological records from the Mediterranean Sea to the steppe plains of western Eurasia. The occurrence of this tephra layer in all the studied profiles provides a strong basis for developing a regional tephrostratigraphic framework in Romania, but also challenges previously established stratigraphic relationships for these sites and calls for the reevaluation of the regional stratigraphic and chronological frameworks.

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An overview of the recent palaeolimnology of selected lakes in the Romanian Carpathians

ABSTRACT: Lake sediments can act as sensitive monitors of environmental change and human impacts. The Romanian Carpathians hold a significant number of glacial lakes and transverse a region of considerable environmental concerns, but relatively sparse environmental data and little recent lake sediment based research. Findings from selected lakes in two of the highest sections of these mountains in Romania are presented. In addition the palaeolimnological record held in the surficial sediments of other lower elevations sites in the Eastern Carpathians is also discussed. These sites are situated in contrasting sites comprising a volcanic crater lake (Lacul Sfânta Ana, Harghita Mountains) and a lake dammed by land sliding (Lacul Iezer-Feredeu, Obcina Feredeului).

Glacial lakes in the Rodna, Maramures and Făgăraş Mountains. Surficial lake sediment cores from ten mountain lakes have been characterised in terms of their mineral magnetic and geochemical properties, providing an initial, country-wide assessment of the potential of these mountain lakes' sediment records as a retrospective monitor of atmospheric pollution. The mineral magnetic characteristics suggests that recent sediments have been affected by atmospheric particulate pollution associated with fossil fuel combustion and vehicle emissions, although the properties may also reflect within lake processes. Metal enrichment factors for contemporary sediments also reveal that remote mountain lakes in this region appear to have been impacted by the long-range atmospheric transport of metallic pollutants. Furthermore, the results of geochemical analysis (via ICP-OES) suggest that sites in the Southern Carpathians are most impacted, although trace metal levels are relatively modest. This pattern is illustrated in Figure 1 in the case of Pb enrichment. At a key site (Lacul Capra, Făgăraş Mountains) a core has also been ^{210}Pb dated and SCP analysis undertaken providing a more detailed chronology. Whereas some of the lakes studied may ultimately be suboptimal as sites for recent palaeoenvironmental reconstruction due to the apparent post depositional disturbance of their sediments, initial findings suggest that others may have the potential to provide lake sediment-based pollution histories that will thereby contribute to a fuller, Europe-wide understanding of the impact of atmospheric pollutants in upland regions.

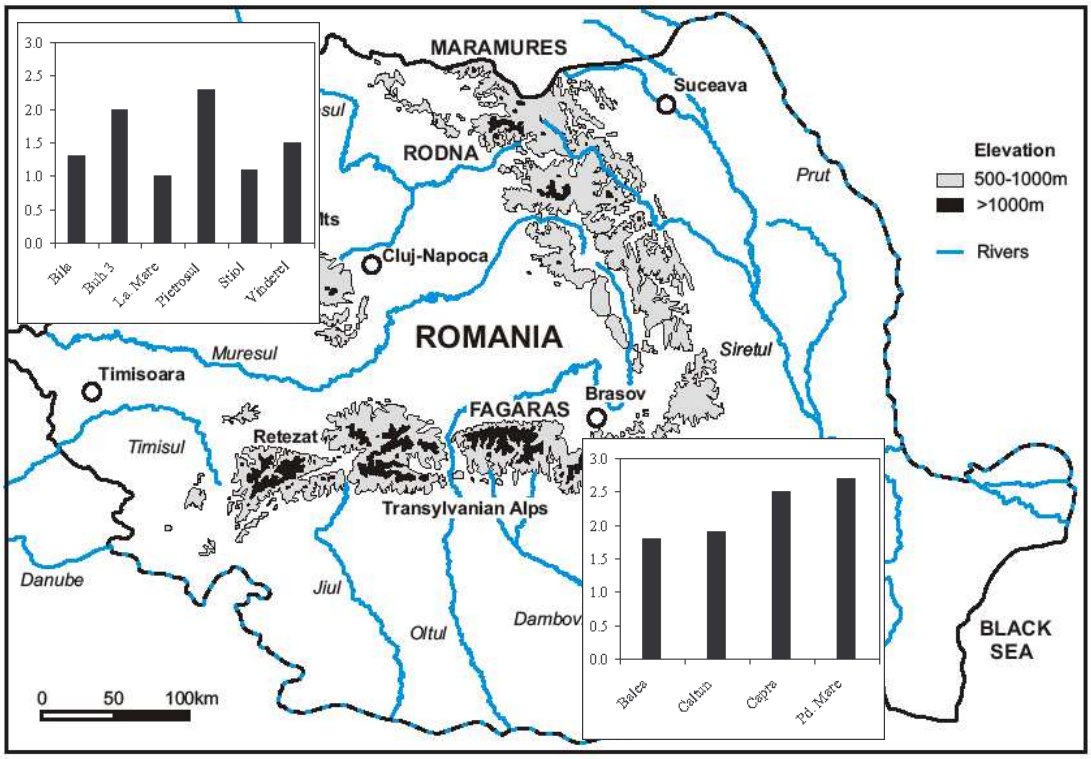

Figure 1. Pb enrichment factors at sites in the northern (top left insert) and southern study areas (bottom left insert).

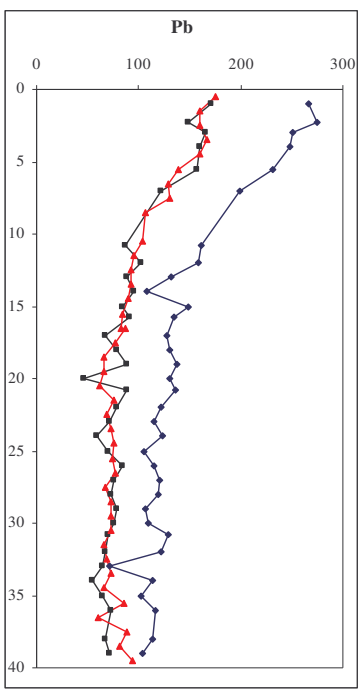

Figure 2. Down core Pb profiles from Lacul Sfânta Ana. (Key; 2007 core determined by pXRF (blue line) and ICP-OES (black line). 2010 core via pXRF (red line) (Units: mg kg-1)).

A recent environmental record from Lacul Sfânta Ana. At Sfânta Ana in the Harghita Mountains recent sediment profiles of their magnetic properties and trace metal characteristics appear to provide a relatively unperturbed record of an atmospheric input of contaminants related to human impacts such as industrial activity and vehicle emissions. However, recent human impacts within the catchment may also have impacted upon this signal. The geomorphology of the site (a volcanic crater lake with no significant inflow and no surface discharge points) suggests that this site should provide optimal conditions for sediment - based environmental reconstruction. However, the surface sediments at this site have a relatively low density making sampling near the sediment - water interface problematic. Nevertheless, cores taken in 2007 and 2010 can be correlated via their trace metal profiles (using pXRF and ICP-OES) providing confidence as to the veracity of their record of recent sedimentary inputs (see Figure 2). These preliminary data may also contribute to the

environmental management of this popular and significant site suggesting the merit of further investigation.

Lacul Iezer-Feredeu - a land slide dammed lake. A range of historical evidence is available that indicates that Lacul Iezer-Feredeu (Obcina Feredeului, Eastern Carpathians) may be the oldest water body formed by a land slide dam in Romania. The lake may be over 400 years old. Coring from ice with a Russian - type corer its sediments have been found to be highly banded throughout a profile of over 4m in length. Preliminary analysis (organic content, particle size, mineral magnetic properties and geochemistry (pXRF based)), suggests that these laminations predominantly reflect changes in sediment particle size. The sediments also provide further evidence of lake level and catchment input changes during the lifetime of the lake. However, the environmental archive held by these deposits is currently limited by the lack of a chronology.

Summary. This paper illustrates some of the findings of a period of collaborative research that has focussed on the potential for environmental reconstruction (in particular of recent human impacts) held within the recent sediments of a range of lacustrine environments. Whereas there is a long tradition of palaeoecological study within the region, the Carpathian Mountains in Romania have been identified as a region where there is a relative paucity of (recent) sediment based studies. Such studies have the potential to contribute significantly to the effective environmental management of an important and sensitive area.

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Spatial genetic structure in Swiss stone pine suggests a region-specific population history of the species along the Carpathian range

ABSTRACT: Recently reported evidence supports the existence of ancient populations of cold-tolerant boreal forest species in the upper ranges of the Carpathians. Studies on allele length polymorphism designated several glacial refugia for Norway spruce (Picea abies) in the South Carpathians. Former molecular studies performed on live remnant populations of Swiss stone pine (Pinus cembra) and Scots pine (Pinus sylvestris) suggest that the Carpathians are important in terms of accumulation of genetic diversity. Moreover, the population genetic structure of Swiss stone pine reveals contrasting post-glacial histories of the Carpathian stone pine populations compared to those from the Alps. The Retezat Mountains and the High Tatras, which preserved a rich gene pool, may thus represent a glacial refugium from where Swiss stone pine presumably colonized the ecotones towards the Eastern Carpathians. Accordingly, the tackled multiple refugia and colonization routes reflects a region specific population history for Swiss stone pine in the Carpathians. Here, we show how two types of molecular markers with differential types of inheritance and degrees of polymorphisms reveal the spatial genetic

structure of P. cembra, a keystone species of the timberline ecotone. Our current findings reveal an ambivalent position of the Retezat populations; UPGMA clustering based on nuclear microsatellites positioned Gemenele apart from all the other populations, even from those of the South-Carpathians. However this position was not supported by paternally inherited chloroplast microsatellite evaluation. At the same time both markers studied indicate that UPGMA clusters are not correlated with the geographic position of the populations. In the time of the fast changing climate conditions, the results of population genetic studies, indicative of past processes, can provide valuable information for better understanding the response of populations to the major directions of community dynamics.

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Multicenturies summer temperature reconstruction for Southern Carpathians

ABSTRACT: The first 600 years long tree-ring width chronology for Southern Carpathians was established based on living and subfossil Swiss stone pine (Pinus cembra L.) samples from an upper timberline forest located in Retezat Mts. (Romania). Study area is located in Retezat Mts. where we can find the most expanded population of stone pine from Southern Carpathians. The timberline is represented by a mixed stands of Norway spruce and stone pine which is replace by mountain pine toward higher altitude. We have compiled the longest tree rings chronology from Carpathians using samples from dead and living trees of stone pine (Pinus cembra). To preserve the low frequencies in the tree ring chronologies the Regional curve standardization method (RCS) was used. The samples without an important inner part were excluded from the chronology building. Very few cores and disks have missed the pith about 5-10 rings. Since the RCS curve for living and dead trees are significantly different we chose processing the standardization separately for the two subsets. In order to extend the instrumental data we use the temperature data from 0.5°x0.5° resolution CRU2.1 grid data-basis. The correlation between grid and instrumental normalized temperature is over 0.90 for March to September and range from 0.70 to 0.89 for October to February. To assess the influence of monthly temperature of radial tree growth we have computed the correlation between tree-ring index and May previous year to October of current year of tree ring formation. Also multiple monthly temperature means of current summer was included: June-July, June-July-August and July-August. To avoid the loss of variance we have decided to use the scaling method for reconstruction of summer temperature.The derived tree-ring width chronology covers the period 1361 to 2009, having a total length of 649 years, been the longest chronology for the Southern Carpathians.

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Key issues for advancing of Paleoenvironmental Reconstructions in Bulgarian High Mountains

ABSTRACT: The environment of the high mountains is very sensitive to any kind of impact; therefore they are appropriate case study areas for an investigation of the impact of global changes. The Pleistocene glaciations are the main landform and environment formation factor of the high mountains in Bulgaria. The paleoenvironmental reconstructions in these mountains would be very useful to solve issues related to contemporary impact on these complexes. Rila (2925 m) and Pirin (2914 m) are the highest Bulgarian Mountains which have been glaciated during the Pleistocene. The paleoglacial relief forms and lake sediments in these mountains contain valuable information for the paleoenvironment. Although, there are particular achievements in the investigations so far, there are still unresolved scientific issues. The paper makes a review on the state of the art of the investigation of high mountain landscapes in Bulgaria and outlines four main objectives facing the researchers studying the development of these landscapes during late Pleistocene and Holocene. **Keywords:** *Cosmogenic Nuclide dating (10Be), Luminescence dating, Periglacial geomorphology, Radiocarbon dating*

1. Application of Cosmogenic Nuclide dating (10Be) on moraines in parts of Rila and the silicate part of Pirin

During fieldwork of the authors, conducted in 2007, the main catchments in Rila Mountain were checked, and 53 samples for obtaining ^{10}Be exposure age were taken. Part of them have been analysed and the results are ready to publish. Although, most of the mountain was observed during the 2007 campaign, there are still some important parts which are still not sampled (Kuhlemann et al., 2008). One of them is the north-western part of Rila in the area of Otovitsa valley. A complex of glacial forms was observed in this valley more than half a century ago (Ivanov, 1954). There are still no samplings also from some right tributaries of Maritsa river valley and the Blagoevgradska Bistritsa valley, where there are also traces of Pleistocene glaciations (Glovnia, 1958).

It is very important to date moraines in the silicate part of Pirin mountain, where there are no ^{10}Be samples taken so far. There is a stadial moraine above the town of Bansko at about 1000 m a. s. l. which contains big boulders appropriate for ^{10}Be sampling. The potential objects for sampling were marked during a preliminary investigation conducted in 2009. There is a large size boulder which most likely stays unmoved on the surface since the time of its accumulation.

There are possibilities to discover moraines, formed during the last stages of the glaciers retreat, in the upper-stream parts of the rivers Banderitsa and Demianitsa. The middle stream parts of these rivers are too narrow and it is unlikely to find appropriate sampling objects there. Some wide valleys, located to the south-west from the main drainage divide are more perspective for finding good sampling materials. Special attention should be paid on the river Mozgovitsa valley, where a large moraine at about 1650 m has been described. The neighbouring valleys of Begovitsa and Bashlitsa also contain a complex of stadial moraines described by Velchev and Kenderova (1994).

There are also traces of exaration and ablation activity within the valley of Pirinska Bistritsa. A very well preserved terminal moraine made by boulders is located at 1600 m within this valley (Choleev, 1981). The same author considered its formation during the last glaciation. There are large size marginal moraines located upper-stream, which can be observed even in the satellite images. The glacial accumulation forms there are very well preserved due to the slant stream direction inclination and the length of the river. Therefore, this valley should be investigated in details and the moraines should be dated. Thus, it can be used as a main reference site for the Würmian glaciation stages in Pirin Mountain.

2. Detailed investigation of sediment layers at the foot of Rila and Pirin mountains by Luminescence dating and correlation with the older glaciations

There are several authors that investigate the age and number of the Pleistocene glaciations (Цвијић, 1897; Јанкович, 1904; Radev, 1920; Louis, 1930; Annaheim, 1939; etc). Some of them, who consider that the high mountains in Bulgaria have been glaciated more than once, present as an argument traces of glacial erosive activity in form of input tray cirques and trough shoulders (Gerasimov, 1949). But there are no dating analyses conducted in these areas. This is because any subsequent glaciation destroys the previous accumulation forms. The sediments accumulated at the foot of the mountains are the only object that could be used for dating samples. The method of Luminiscence dating is an appropriate tool for the investigation of such sediments. At the foot of both Rila and Pirin mountains there are deep sediment deposits which can be correlated to the glacial and interglacial periods. The left tributaries of the Struma River are deeply cut into these sediments and in some places there are very good sediment profiles which present almost the whole Pleistocene. Such profile can be found near the village of Ploski at the western foot of Pirin Mountain. The sixth horizon is the only one dated so far. The analyses of the Luminescence dating, made 20 years ago, shows an age of 117k (Velchev and Kenderova, 1994). The other ten horizons have never been dated.

We believe that such profiles can be found also at the foot of Rila Mountain. Interesting results could be obtained by drilling of the extensive fluvio-glacial cone of the Iskar River in Samokov Plain, which is located north of the Rila Mountains. Along with this in future studies it is worth to try the application of dating with a modern optical stimulated luminescence (OSL).

3. Investigation of Holocene periglacial geomorphology

Significant progress has been observed in the pollen analysis based investigations during the last two decades. Several high mountains vegetation reconstructions during different stages of the Holocene have been conducted (Bozilova, 1981; Bozilova et al. 2002; Tonkov et al. 2000; 2005; 2006; Tonkov, 2003; Stefanova and Ammann, 2003). Detailed investigations of the periglacial forms were performed by M. Glovnia (1959; 1962; 1968) but their results correspond to the scientific achievements in this field from the mid last century. Although, there are some new investigations focused on the periglacial geomorphology (Velchev, 1999; Gikov and Dimitrov, 2010), the research on postglacial morphology is far from being considered as satisfactory. The rocky glaciers are widely represented in Rila and Pirin and they have relict character in both mountains. Some of the rocky glaciers have been formed as a result of accumulation of firn glaciers. From that point of view they can be valuable source for Holocene paleoreconstructions. Attempts to date the time of their formation and the active phase have never been taken so far. It is necessary to conduct new dating methods and approaches to solve these important paleoenvironmental issues.

4. Application of Radiocarbon dating (^{14}C) on high resolution sediments from glacial lakes in different parts of Pirin and Rila mountains

There are Radiocarbon dating samples applied for pollen vegetation analyses in some lake sediments in Rila and Pirin (Bozilova et al. 2002; Tonkov et al. 2000; Tonkov, 2003). However, the samples are usually taken only from the bottom, middle and upper part of the profile. High resolution dating (sampling from every horizon of the profile) will give the opportunity to detect the stages of development of the high mountain complexes during the Holocene more in details.
Such investigation will help resolving the open question about the formation of embryonic glaciers in the highest-lying cirques of Rila and Pirin during cold spells prior to 8,2 k and 3 k years. An appropriate object for such investigation could be Ledenoto Ezero (Ice Lake), which is the highest lake in Rila situated at 2700 m close to the Mousala peak. There is a shallow negative form close to its southern coast which is surrounded by underwater moraine north of (Gachev et al. 2008). The dating of the lake sediments in this area will help to date the underwater moraine.

Conclusion

A team of Bulgarian geomorphologists formulated six main issues directed to clarify the development of the glacial and periglacial forms in the Bulgarian mountains (Glovnia, 1964). Some of them like pollen analyses of the sediments have been realized. A question still remains for the coordination of the glaciations in Rila and Pirin and the accumulation of loess in the Danube plain.
The application of a set of modern dating methods will allow answering the question about the number and age of the glaciations in Rila and Pirin. The debate on the Rissian or even Wurmian age of some low stream located moraines in the valley of Mozgovitsa (Pirin) and the valley of Razhavitsa (Rila), expressed recently by some researchers, would find its confirmation or dismiss.

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Paleoclimatic signal of the Dobrogea loess-paleosol sections (Romania)

ABSTRACT: The investigated area is located in Dobrogea (SE Romania). One site is near the village of Mircea Vodă; the section is ~26 m thick; it comprises six well-developed palaeosols and intercalated loess layers. The second studied site is near Costinesti village, on the Black Sea coast; the section is 12.7 m thick; it comprises five well-developed palaeosols and intercalated loess layers. Samples were collected at 5-10 cm interval. For each sample granulometry was measured with a Horiba laser instrument (LA950) and magnetic susceptibility was measured on a MS2B Bartington susceptibility meter. Throughout the entire sections, the airborne dust (silt and fine sand above 16 µm) is present in large amount (generally over 50%). The pedogenic processes which involve hydrolysis of silicate minerals leading to formation of new clay-sized minerals (< 5 µm) can also be seen throughout the entire section with values always above 10% in the loess layers and values above 20% in the paleosol layers, suggesting that even during loess deposition, weak pedogenesis was present. Fine silt, coarse silt and fine sand material are present in substantial amount in the loess layers (above 10%, above 30% and above 10% respectively). This shows that the wind transportation competency was quite high at the time of loess

deposition. Most of the grain-size distributions in the loess layers are bi-modal or even three-modal distribution, reflecting multiple sources of the clastic material. The studied loess sections are of Chinese loess type with a significant enhancement of magnetic susceptibility in paleosol horizons and low values in loess units. The new results from the Costişti section confirm change in the climate during the last two interglaciar stages (paleosols S1 and S2) with respect to the previous ones (paleosols S3, S4 and S5). This transition toward a dryer interglacial is reflected both in the amplitude of the magnetic susceptibility and the type of the paleosols.

Introduction. Most of the Romanian Plains and low hilly areas outside the Carpathian arc are covered with loess and loess-like deposits. The most complete and the thickest loess – paleosol sections can be found in the Danubian Plain and in the Dobrogea Plateau. Two sections (Fig. 1) have been studied in detail up to now: the Mostistea lake section situated in the eastern part of the Danubian plain (Panaiotu et al., 2001; Balescu et al., 2010; Vasiliniuc et al., 2010) and the Mircea Voda section situated the Dobrogea (Dobrudja) Plateau, at about 15 km from the Danube river (Buggle et al., 2009; Timar et al., 2010; Timar-Gabor et al., 2010; Balescu et al., 2010). The Romanian loess is of Chinese loess type with a significant enhancement of magnetic susceptibility in paleosol horizons and low values in loess units (Panaiotu et al., 2001, Buggle et al., 2009). Recent results using Infrared Stimulated Luminescence (IRSL) dating (Balescu et al., 2010) have proved without a doubt that the first three loess units both at the Mostistea section and the Mircea Voda section are deposited during MIS2-4, MIS6 and MIS 7. Detailed Optical Stimulated Luminescence (OSL) ages both for the Mircea Voda section (Timar et al., 2010) and the Mostistea section (Vasiliniuc et al., 2011) have shown that the deposition of L1 loess unit took place during Marine isotope stages 2-4. In this paper we present new results from two loess section from Dobrogea: Costineşti and Mircea Voda (Fig. 1).

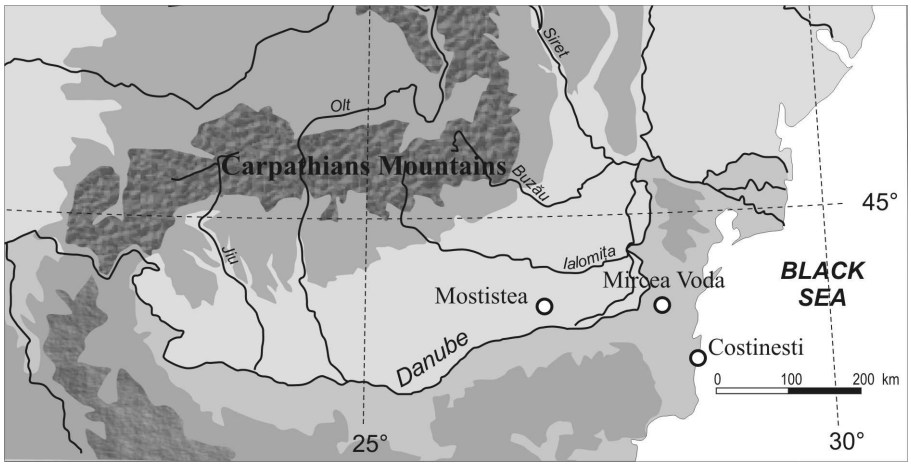

Fig. 1 Location of the studied loess sections

Sampling and laboratory methods. The Costinesti loess section consists of 5 paleosols and intercalated loess layers. The total length of the section is around 12 m. The section was sampled at 5 cm interval. Mircea Voda loess section is approximately 26 m thick and consist of six well-developed palaeosols (S0-S5, with S0 representing the Holocene soil) and intercalated loess layers (L1-L5), with no apparent evidence of remarkable hiatuses. It was sampled at 10 cm interval. In laboratory we measured for each sample both the granulometry and the magnetic susceptibility. The treated samples (with H_2O for removal of organic matter; with HCl at pH 4

for removal of carbonates and dispersed with hexametaphosphate) were measured for grain size distributions with a Horiba laser instrument model LA950. Magnetic susceptibility was measured using a MS2B Bartington susceptibility meter. All measurements were performed at the University of Bucharest.

Results. Variations in the magnetic susceptibility are equivalent to the alternations of loess and palaeosol layers, with high magnetic susceptibility corresponding to weathered palaeosol layers and low magnetic susceptibility corresponding to the loess layers. The grain-size distribution is very consistent with the magnetic susceptibility variations – the pedogenic fraction (<5 µm) is concentrated in the layers exhibiting high magnetic susceptibility and the airborne fraction (>16 µm) is concentrated in the layers with lower susceptibility values (Fig. 2).

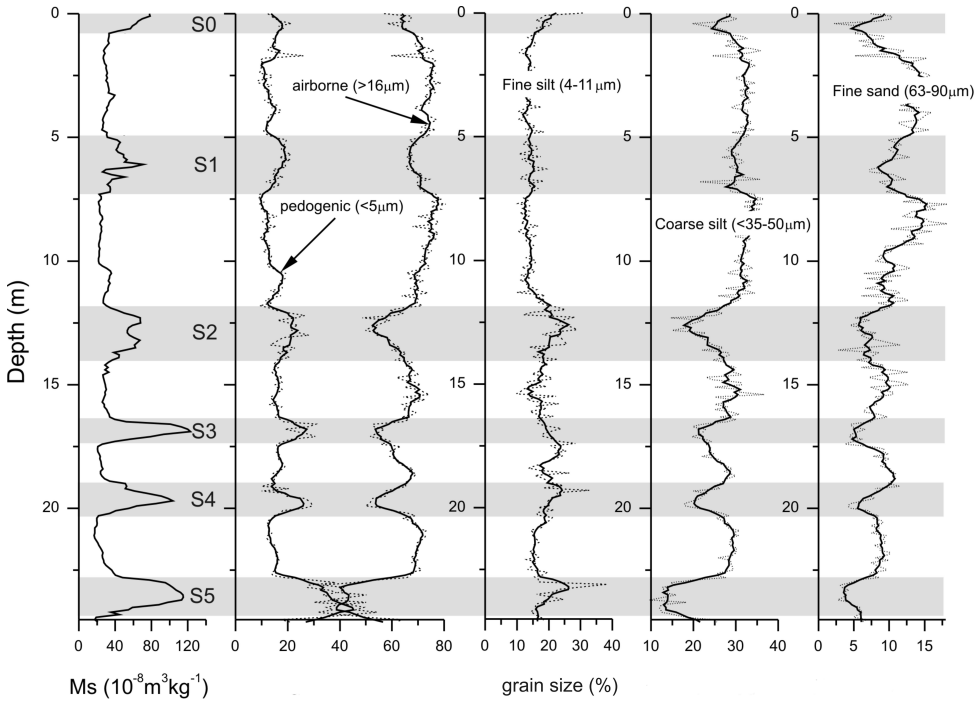

Fig. 2 Magnetic susceptibility (Ms) and granulometry for the Mircea Voda loess section. Paleosol are marked with gray boxes.

Throughout the entire section, the airborne dust (silt and fine sand above 16 µm) is present in large amount (generally over 50%). The pedogenic processes which involve hydrolysis of silicate minerals leading to formation of new clay-sized minerals (< 5 µm) can also be seen throughout the entire section with values always above 10% in the loess layers and values above 20% in the paleosol layers, suggesting that even during loess deposition, weak pedogenesis was present. Larger amount of clay-sized material was observed in lower part of the section. Fine silt, coarse silt and fine sand material are present in substantial amount in the loess layers (above 10%, above 30% and above 10% respectively). This shows that the wind transportation competency was quite high at the time of loess deposition. Most of the grain-size distributions in the loess layers are bi-modal or even three-modal distribution, reflecting multiple sources of the clastic material . The coarse silt and fine sand material could have proximal source, while the fine and medium silt could have a distant source. Such bimodal sources have been also suggested

by recent geochemical investigations on the loess section from Mircea Vodă (Buggle et al, 2008). They discussed about a local sedimentary source from the sand dunes fields along the lower Danube alluvium and a second source from the Ukrainian glaciofluvial deposits. We cannot confirm whether that the fine silt fraction originated from Ukrainian deposit, but certainly from a distal source where from was transported by long term suspension.

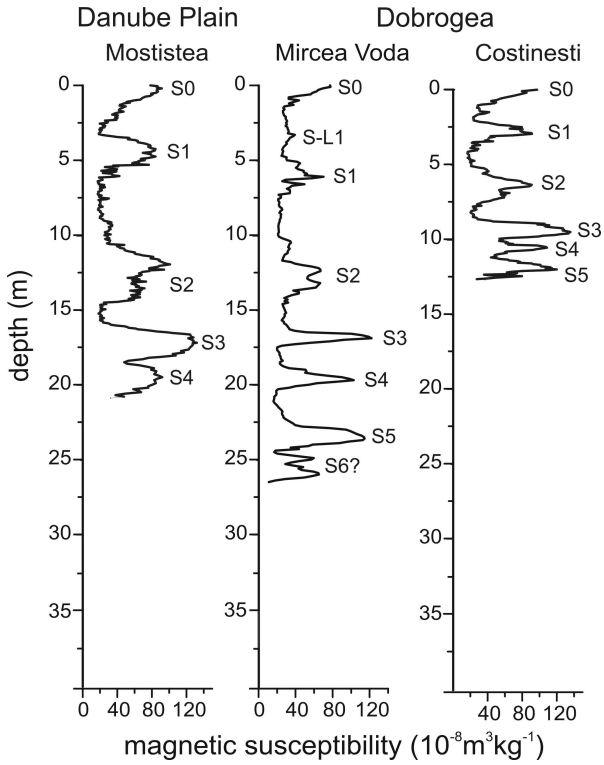

Fig. 3 Corelation of Romanian loess section based on magnetic susceptibility. Paleosols are marked with S (1-5) and S0 is the recent soil.

In figure 3 we present the correlation of studied Romanian loess section based on the magnetic susceptibility variations. The new results from the Costişti section confirm change in the climate during the last two interglaciar stages (paleosols S1 and S2) with respect to the previous ones (paleosols S3, S4 and S5). This transition toward a dryer interglacial is reflected both in the amplitude of the magnetic susceptibility and the type of the paleosols.

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Medieval accumulation in the Upper Dnister river valley and its connection with colonization of the Eastern Carpathians Foreland (Western Ukraine)

ABSTRACT: Study of the Holocene terraces and alluvia filling the Dnister river valley and its tributary Strwiąż river, between the Carpathians' margin and graben of the Upper Dnister Basin and covered by the extensive peat-bogs, has been performed for slightly more than last ten years. Within the Dnister valley, below the gravel terrace-fan 10-11 m high, the terrace 5-7 m high occurs. They are formed of channel sediments of various age (from the Late Glacial to the Neo-Holocene) and overbank sediments which top parts, often separated by peat layers are dated at the last millenium. In the outlet of the Upper Dnister Basin these sediments are usually younger. Covers of the lower terrace levels, bearing older, redeposited black oaks are inserted into this main terrace. In the valley outlet from the Carpathians, in the vicinity of Sambor town, the terrace 3-4 m high, formed of gravels and sands was deposited during frequent floods during the 9-10th centuries. In the valley of the left tributary of the Strwiąż river the youngest datings obtained from the tree trunks buried within the top of the terrace 5 m high range the 12th century. In the same time in the Upper Dnister Basin at the Krużyki site, the cut-off channel sediments were covered with silt-sand flood alluvia after 890±70 BP, whereas in the proximity of the Strwiąż river outlet overbank alluvia were deposited upon the peat layer around 620±110 BP. Deforestation and the increase of agricultural activity in the 14-15th centuries stimulated the overbank deposition. At the Krużyki site, at the bottom of the younger insert within the main terrace cover, the oak trunk processed by man and dated at 400±35 BP was buried. It is accurately correlated with dendrochronologically dated sequence of trunks felled or cut during the floods in the 14th century in the Wielki Łukawiec stream valley (tributary of the Bystrzyca

Sołotwińska river). Downstream the Upper Dnister Basin, deposition of overbank alluvia of the terrace 3 m high at the Żurawno site took place also during the Medieval flood phase and intensification of colonization in the 12-14th centuries, which is confirmed by earlier datings of trunks obtained by German reaserchers. The youngest datings of the trunks felled during floods within the Dnister cut-off maender near Żurawno range from 18th to the beginning of the 19th century.

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The Archaeology of the Ancient and Medieval Danube Delta: Modeling Environmental and Historical Change

ABSTRACT: The Danube Delta is a dynamic interface between the geological history – the deltaic morphogenesis and the anthropic diachronic extension. The Danube Delta complex is one of the most important geo-political and cultural entities that can be described as a compound geographical unit which provides an exceptional biodiversity. This enabled it to be counted among the UNESCO biosphere reservations, thus presenting the image of a continuously huge developing area with a scientific potential yet unilaterally approached for the time being upon prevailing geographical or biological research directions. In spite of the fact that this area has been intensely inhabited during the envisaged historical periods, a fact otherwise underlined in the case of several ancient and medieval sources, only several archaeological sites have been identified up to the present and they are affected by the permanent extension and mobility of the Danube Delta. Among them, the Greek cities of Istros – Histria Orgame - Argamum, colonies established by Miletus, which later continued their development as Roman cities, were located in the lagoonal region on the coast, while the Roman fortification Halmyris was situated on the Danube Delta's southern branch and the small bastion was located on the island called "Bisericuta". Another two Medieval fortresses, Heraclea, probably a Genovese fortress (present day Enisala) and the Ottoman fortification of Vadu, both situated at the western and respectively southern limit of Razim-Sinoie lagoon were identified. All these settlements were exposed, in different manners, to the influences exerted by the deltaic morphogenesis and its lagoonal system. There are still numerous scientific debates regarding the origin and evolution of the Danube Delta. The specific studies on recent evolution at the Danube's mouths (Antiquity and the Middle Age) can provide essential and significant contributions to the habitat's dynamic in relation to the deltaic geomorphology. Therefore, if the existence of the Beibugeac passage is either highlighted or refuted, the location of the famous island of Peuce will be clarified. From the geomorphologic point of view, it is known that human settlements placed at the littoral level have been strongly influenced by the oscillations of the Planet Ocean. This is why the old littoral settlements of the Black Sea (10000-20000 years BP) were covered by waters, as consequence of the gradual increase in the Planet Ocean level. The waters of the Mediterranean Sea burst extremely fast through the Bosporus Strait, in the Black Sea, with an increase of several cm/day. The rapid change in the shoreline determined the massive exodus of the populations from the areas covered by water. The Milesian colony of Histria and Argamum disappeared because of

the rise of the sea level and because, in front of the Halmyris Gulf, a barrier beach was built, determining the formation of the Razim-Sinoie lagoon. This study proposes a brief review of the main evolution stages of the deltaic area, according to the most recent discoveries in the field, as well as an emphasis on the new delimitating criteria for the hinterland in the ancient and medieval time. This is the reason for which a cartographic delimitation model for the studied settlements hinterlands was created. This model takes into account the physico-geographical realities of the surrounding field, and mostly that of the Razim-Sinoie lagoon complex. This model can also be applied for other settlements, which may lead to comparisons and to drawing certain conclusions regarding the way harbour settlements were chosen. The general research perspective that we promote is that of a discipline which intertwines methods and principles pertaining to the previously mentioned subjects, which is called limnoarchaeology. It is a well-known fact that the limnology is a border discipline between geography and biology, made up of two branches. One belongs to geography (physical limnology) in the sense that it studies the depression, its means of formation, the physical-chemical characteristics and the water dynamics, and the other belongs to biology (biological limnology) in the way that it studies the flora and fauna of the still waters (biohydrocenosis). Due to this context, our approach aims to develop a new holistic viewpoint over the human habitat from the neighboring area of the deltaic and lagoonary complex of the Danube Delta, by implying methods specific to the limnological archaeology related to the whole aforementioned sciences and connected subjects. Last but not least it is worth mentioning that, as the Delta is the most dynamic area of Europe where the nature-human interrelationships can be genuinely studied, the forwarded research is meant to provide important interpretative analogies of the past.

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Environmental changes at the lower border of the periglacial zone in the Călimani Mountains

ABSTRACT: The highest part of the Calimani Mountains (Munții Călimani, Eastern Carpathians, Romania) is located at the lower border of the mountain periglacial zone because of its geographical position, and its altitude. Because of it, the geomorphic processes are very sensitive for the climate change. I examine with several disciplines (eg. dendrochronology, statistics, geomorphology) if there are still active periglacial processes on the study site. More than ten years of monitoring of the Pietricele debris lobe shows that this form is still moving, and behaves like solifluction lobes. The recorded data from loggers – placed into the lobe, and the soil – show that there aren't ice under the surface, so the movement is not because of permafrost. Junipers on the front and the side of the examined lobe are settled during the last century. It means that the velocity of the movement is decreased and the settlement of these plants is permitted because of it. Nowadays these geomorphic processes – that were dominant in the Little Ice Age - are partly or completely inactivated because of a fast warming period in the early 20th century. These changes represent the reactions for the global warming and explain the evolution

of the surface. Based on the results periglacial processes in the Calimani Mountains are present maximum sporadically.

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Rock glaciers permafrost and Paleoclimatic implications in Retezat Mountains, Southern Carpathians

ABSTRACT: Thermal regime of seven rock glaciers from Retezat Mountains which was analyzed by monitoring the ground surface temperature (GST), the bottom temperature of snow (BTS) and the late-summer spring water temperature suggested that permafrost exists within their debris bodies. This was also confirmed by DC resistivity measurements. Based on these investigations, the altitudinal limits for permafrost occurrence and for the activity of rock glaciers in Retezat Mountains are considered to be at 2000 m and 2100 m respectively. Also, the calculation of rock glaciers debris volumes and of the corresponding source rock walls surfaces permitted the estimation of apparent denudation rates of rock walls (0.4 – 1.1 mm/yr) and of rock glaciers ages (11-7 ka BP). The major differences between the denudation rates are unlikely to produce in similar weathering conditions and are probably due to the same reference period initially considered for all rock glaciers (10 ka BP). The apparently smaller denudation rates of Judele and Ştirbu rock glaciers (0.4 – 0.6 mm/yr), which are probably underestimated, along with their unique topographic conditions, suggest younger ages for the two currently assumed active rock glaciers. The possible occurrence of a last isolated glacial episode within the highest glacial cirques during the 8.2 ka cold climate event seems probable. **Keywords:** *rock glaciers, permafrost, denudation rates, Retezat Mountains.*

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Pleistocene ice caps in the western Balkans: implications for cold stage atmospheric circulation in southern Europe

ABSTRACT: Ice caps once covered large areas of Montenegro in the western Balkans. The largest ice caps covered an area of >1400 km2 and covered large areas of central Montenegro, including the Durmitor, Sinjajevina and Morača massifs. A smaller ice cap, yet still covering an area of 165 km2, covered Mount Orjen on the Adriatic coast. More than 30 U-series dates from secondary carbonates cementing moraines across Montenegro indicates that the most extensive glaciation occurred during the Middle Pleistocene, correlating with a major phase of glaciation in

Greece to the south during MIS 12 (c. 480-430 ka). Later, less extensive, glaciations are also recorded in the cirques and valleys and correlate with glaciations during MIS 6 (190-130 ka) and MIS 5d-2 (110-11.7 ka). The formation of large ice caps over Montenegro on mountains reaching altitudes of only 2500 m a.s.l. indicates sustained moisture supply during Pleistocene cold stages – especially on the lower mountains of the coast such as Mount Orjen. Such sustained precipitation supply during Pleistocene cold stages is likely to have been facilitated by major temperature contrasts between the European landmass and the Mediterranean Sea, which are likely to have sustained lee-side vortices to the south of the Alps, in the Gulf of Genoa and Adriatic Sea, forming weak moisture-bearing depressions which tracked across the eastern Adriatic coastal mountains. Large ice caps on the Dinaric Alps would have blocked the inland penetration of these depressions, resulting in much drier conditions in the Balkan interior, creating favourable conditions for the deposition of thick accumulations of loess. In the Durmitor massif, the highest in Montenegro, valley glaciers were present during the Younger Dryas (12.9-11.7 ka) and confirm the influence of North Atlantic Ocean circulation on Pleistocene climate change in this part of the Mediterranean. In this same massif, only one small cirque glacier survives today and exists under conditions strongly controlled by local topoclimatic controls.

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New opinions concerning the Quaternary glaciations in the Romanian Carpathians

ABSTRACT: Tacking into account that, in our opinion, the Carpathian Mountains represent a key region for the understanding of the spatial link between the eastern part of the Scandinavian Ice Sheet and Alpine glaciers, new investigation are necessary to cover in detail all mountains units, especially the middle mountains. This necessity is motivated because for the Romanian's geomorphologist the problems of Quaternary glaciation in the middle mountains area is still very controversial or is presented in a unsatisfactory manner (Mac et al., 1990) and, by other point of view, this problem is in contrast with some aspects reveal for the middle mountain of Central Europe - e.g. Bavarian Forest (Raab, Völkel, 2003), Bohemian Forest (Vočadlová, Křižek, (2005), Krkonoše (Giant) Mts. (Carr et al., 2007), Risnjak Mts., Croatia (Bognar, Prugovečki, 1997). The aim of this paper therefore is to present a synthesis including the new observations and images concerning the presence and extent of Pleistocene glaciers in some mountain areas of the Romanian Carpathians. Our results are based mainly on own investigations and also on new data presented in many doctoral thesis, focused on the geomorphological aspects of different mountains area (Mîndrescu, 2004; Ancuța, 2005; Nedelea, 2006; Szepesi, 2007; Simoni, 2008; Murătoreanu, 2009; Constantinescu, 2009). In the Romanian Carpathinas, like in other mountain areas, the coupling of regional Pleistocene climatic conditions - the intensity of freezing, the availability of snow fall - , with the topographic setting (altitude, exposure, slope and mean curvature) have a major role in the appearance of a range of glacier types, from niche glaciers, cirque glaciers, valley glaciers, snow fields, ice aprons, wall-sided glaciers, to mountain ice caps

and plateau ice fields, types very different in sensitivity, characteristic which explain the variation in the equibrium-line altitudes (ELAs) of different glaciers in the same region (López-Moreno et al., 2006). Following field investigations and mapping - using topographic maps (1:25 000), aerial photographs (1:10 000), digitally ortorectified aerial photographs (2005 edition, 0.5 m resolution) and satellite images (2003 edition, 2.5 m resolution).-, the reconstructions were based on moraine elevations and the apparent upper elevation limit of glacial features, as determined by glacially sculpted bedrock on the valley walls. The equilibrium-line altitude of each palaeo-glacier was estimated using a toe-to-headwall altitude ratio or THAR (cf. Porter, 2001). The toe (minimum) and headwall (maximum) elevation for each glacier was determined and the ELA was calculated as 0.45 of the vertical distance from the toe to the headwall (ELA = lowest elevation of glacier + vertical range x ratio). The area, length and ELA of each palaeo-glacial unit were determined by overlaying the mapped glacial extents on the best available topographic maps 1:25 000 produced by Direcția Topografică Militară. Based on the examination of the 570 reconstructed palaeo-glaciers, at 17 mountain units from the Romanian Carpathians, the estimates of average ELA are 1610 m, with an average standard deviation of 62.61. Analysing the characteristic values for each Romanian Carpathian branch we find that there is a low amount of intra-regional variance in the ELA (Table 1), with values ranging over 100 m, from a minimum value of 1540 m for the Apuseni Mountains, to a maximum of 1664 m, for Southern Carpathians. Most of the variance in ELAs can be explained by the climatic conditions – the differences between the western part, more humid, and the eastern part, and between the south and the north, cooler - and by the local topographic context (cf. Nesje, 1992). For example, within the Eastern Carpathians investigated areas, the values range from 1561 m in Maramureş Mountains and 1714 m in Călimani Mountains, or within the Southern Carpathians, between 1497 m in the Straja area (Vâlcan Mountains), situated in the western part, and 1719 m in the Leaota Mountains, situated in the eastern part. Because the ELA value of Straja is the lowest value of all reconstructed ELAs, this can be explained by the topographic-climatic conditions of the composite palaeoglacier, ice apron and avalanche-cone glacier, orientated towards the north, on a shaded area. The concept of the local topographic temperature-precipitation-wind-ELA (TPW-ELA) can be applied to the particular situations described here, and the cirque glaciers may have existed well below the regional temperature-precipitation-ELA (TPELA) (Dahl & Nesje, 1992). On the basis of the results presented and recent investigations, the Pleistocene glaciation pattern in the Romanian Carpathians was more extensive and complicated than previously thought. The most frequent surface orientation of these glacial entities' was consistently towards the north, north-east and north-west, 42.7 %, differentiated by each branches: 49 % in the Eastern Carpathians, 47.5 % in the Southern Carpathians and 31.5 % in the Apuseni Mountains. Under the general climatic conditions during Pleistocene cold periods, the development of glaciers in the Romanian Carpathians was controlled by the pre-glacial relief, the orientation of the main slopes and interfluves – which had a direct influence on the appearance of the specific topographic-climatic conditions -, and the magnitude of climatic

continentality, in connection with the westwardly air masses circulation during the Pleistocene time (Mîndrescu et al., 2010).

Table 1. Summary of the reconstructed Pleistocene glaciers of major mountain units of Romanain Carpathians.

No	Variable		Eastern Carpathians	Southern Carpathians	Apuseni Mountains
1	No. of glacial entities		315	219	36
2	Surface (km2)	average	0.25	0.25	0.46
		overall	101.52	60.98	22.09
3	ELA THAR0.45		1627	1664	1540
4	ELA STDEV		58.75	68.96	60.13
5	ELA THAR0.45	North	1587	1662	1542
		South	1627	1671	1557
6	Volume (106 m3)	average	6.95	9.27	84.58
		overall	5136	2313	1090
7	Longest glacier (km)		4.4	4	.
8	Aspect (%)		N-16.8;NE-15.6;E-12.2;SE-9;S-11.2; SV-9.1;V-14.5;NV-16.7	N-24.2;NE-7.3;E-7.8;SE-11.9;S-17.8; SV-7.3;V-7.8;NV-16	N-20;NE-8.6;E-25.7; SE-14.3;S-8.6;SV-5.7;V-14.3;NV-2.9
9	Type of glacial entities		194 n.g. 77 i.a. 41 g 3 p.g.	138 n.g. 54 i.a. 27 g	23 n.g. 6 g 6 i.a. 1 p.g.

* n..g. -niche glacier; i.a.-ice apron; g.-glacier; p.g.-plateau glacier

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Glacial Extent in the Rila mountains (Bulgaria) during the Last Glacial Maximum

ABSTRACT: The high mountains Rila (2925 m a. s. l.) and Pirin (2914 m a. s. l.) are the only places in Bulgaria where classical relict glacial forms and landscapes are found. Cvijic (1897) was the firs to scientifically describe these features as a result of the action of former glaciers. Since then glacial landforms have been subject to numerous studies – in the mid-war period such were the works of Radev (1920), Louis (1933) and after WWII detailed descriptions of glacial landform complex especially in Rila were done by Ivanov (1954) and Glovnia (1958, 1962, 1968) mainly for the purposes of socialist government planning. All of these authors found and described geomorphic traces from more than one glaciation phase during the Pleistocene. Most of them mentioned two glaciations (usually Riss and Würm) and some researchers, such as Velchev (1995) even three (including the Mindel). Almost all of these studies relied most of all on relative geomorphic evidence found on the field, but did not discuss the exact age of glacial landforms. With the recent progress of dating techniques at global scale it has become possible to estimate exact (absolute) ages of landform formation in many parts of the world. What concerns glacial landforms, latest researches carried out in the Alps, the Himalaya, the Rocky mountains, in Scandinavia and Britain, in correlation with data from Greenland and Antarctic ice cores made possible to unravel in detail the environmental history of these areas during the Pleistocene and the Holocene, including age estimations with an accuracy of several centuries to several millennia. In this aspect Bulgarian territory is still insufficiently researched. The most frequently applied among absolute daiting techniques has been the ^{14}C dating, performed most of all in pollen analyses. Studies of the biologists Bozhilova (1972), Stefanova, Ammann (2003), Tonkov, Marinova (2005), Tonkov et al. (2008) and others contributed to reveal the evolution of the mountain environment during the last 12,000 years. But what concerns the history of Pleistocene glaciations such a time period is too young and quite short. Other techniques should be applied to solve the problem. The problem of maximum glaciation is the issue to start with when revealing history of formal glaciations and is the main topic of the study here presented. Field evidence have shown that under most favorable conditions (northern aspect, large catchment area) during their maximal extent the valley glaciers in Rila and Pirin reached down to altitudes of 1100 – 1400 m a. s. l.. As even then glaciers did not come out of mountain valleys, the extent of maximum glaciation is marked by the terminal moraines in those valleys, or can be suggested by the change in valley cross section profiles. The locations of terminal moraines in Rila mountain are shown in figure 1.

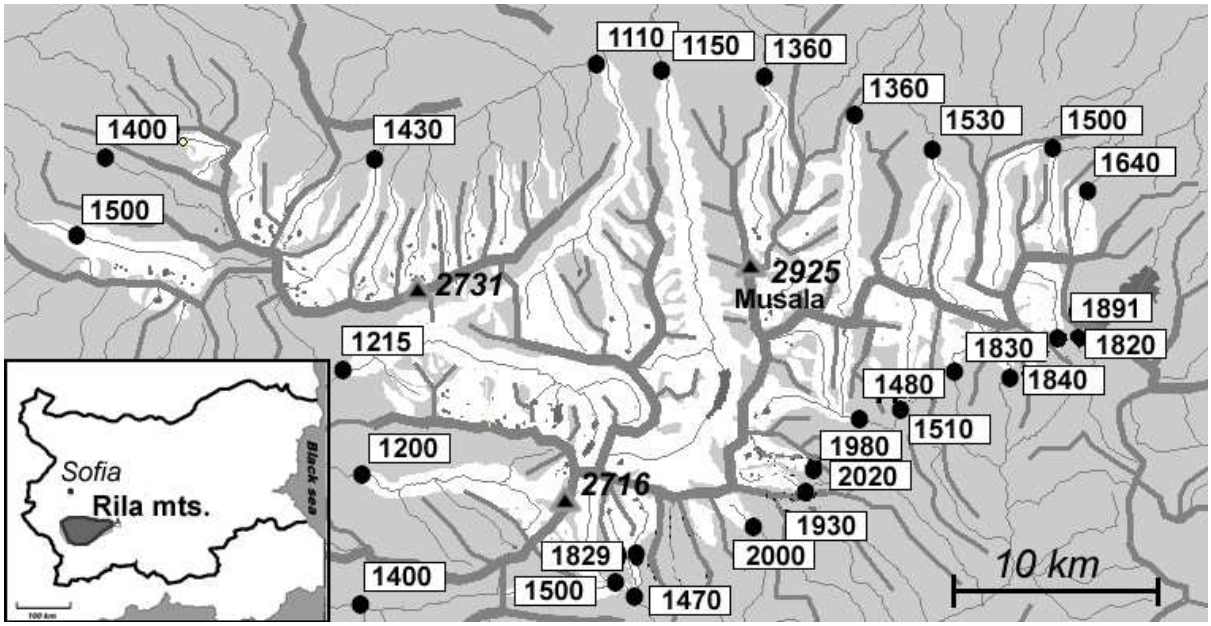

Figure 1. Distribution of terminal moraines in Rila mountains (black dots), altitude above sea level (white labels) and suggestible ice extent during the maximum glaciation (white areas)

Age of the maximum glaciation in Rila mountain

The first key question is about the age of the maximum glaciation in Rila mountain which can be possibly addressed also to the neighboring massif of Pirin. The age determination problems stated above have led to the idea to use cosmogenic nuclide (CRN) dating as a tool to concretize glaciation times. The method used – ^{10}Be measures the time of exposition of a rock under sunlight, and thus it can be used to date surfaces of moraine boulders and roche moutinnee which were buried by ice during the glacial stage. The method requires a proper selection of rocks rich in quartz (as granites and gneisses which build up Rila mountain) and as old as possible rock surfaces. During the fieldwork in August 2007, taken up by the authors of the present publication 22 samples were taken from terminal moraines from different parts of the Rila massif and were processed in a laboratory at ETH Zurich following the method described by Kohl and Nishiizumi (1992), Von Blanckenburg et al. (2004), Balco et al. (2008), Dunai (2000), Pigati and Lifton (2004). The result obtained from the terminal moraine near Beli Iskar, which is one of the lowermost and best preserved in Bulgaria, indicates that the maximum glaciation in Rila matches the period 18-24 ka BP known to global science as the Last Glacial Maximum (LGM).

Spatial pattern of the maximum glaciation

As can be seen on figure 1 the altitude of deposition of terminal moraines is in the range of 1110 to 2020 m a. s. l. i. e., it is quite a big difference. In spatial aspect the lowest moraines are observed in the N and NW part of the mountain (1100 – 1400 m a. s. l.), in contrast to the SE and S slopes, where glaciers ended at 1800 – 2000 m a. s. l. There are two reasons for these differences: 1) the influence of aspect and temperature, and 2) the ridge and valley network asymmetry – valleys heading to W and NW have much bigger catchment areas than those that descent to S and SE.

Estimation of ELA during the LGM

The estimation of the former altitude position of the equilibrium-line (ELA) is among the main tasks in environmental reconstruction of glaciated areas. The equilibrium line marks the margin between accumulation and ablation zone of a glacier, it is determined by climate and that is why it is often used for estimation of climate condition during glacial phases. Observation of landforms in Rila led Louis (1933) to the conclusion that the snow line during the last (Würmian) glaciation laid at about 2200 m a. s. l. According to Glovnia (1958, 1962), Velchev (1995), Georgiev (1990) and others the height of the Würmian snow line in Rila was between 2100 m a. s. l. to the north and 2200 m a. s. l. to the south.

In the present work the ELA during the LGM was calculated in GIS on the basis of field evidence, analysis of topography maps and aerial photos. Calculations were done following the accumulation-ablation ratio (AAR) method (Benn et al. 2005). The range of ELA - 2050 to 2290 m a. s. l., is quite small despite for the big difference in the altitude of LGM terminal moraines. The values obtained are compatible to Pleistocene snow-line altitudes that were mentioned by most of the previous researchers. If comparing the ELA distribution, the scatter of data shows hardly any clear trend within the geographic frame. If regional ELA averages are calculated, there is only a slight ELA depression towards the north and hardly any gradient in west-east direction.

Conclusion

Newest researches of glacial landforms in Rila mountain proved that the mountain glaciers had reached their maximum extent during the Last Glacial Maximum (Late Würmian, 24 – 18 ka BP). The absolute altitude of LGM terminal moraines shows some N/W – SE gradient: The lowest elevations are found on the north- and west-exposed valleys (1100 – 1400 m a. s. l.), while in the southeast terminal moraines are found as high as 1800 – 2000 m a. s. l. The great difference in the levels of LGM terminal moraines are due to geomorphic rather than to climatic reasons, which is proved by the quite low N-S gradient of ELA during the LGM. The valleys heading north and west had larger catchments at altitudes above the ELA during the LGM. This caused the great length of the valley glaciers and the far descent of the glacier tongues. An additional contribution to this asymmetry may be due to snow drifts on the summit surface of Rila massif. The evidence and data collected are still insufficient to make proper estimations about the character of the regional atmospheric circulation during the ice age.

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Cosmogenic ^{10}Be constraints on the deglaciation history in the Rodna Mountains, Northern Romania.

ABSTRACT: During the last maximum glaciation, the pattern of climate cooling from the western high latitudes towards eastern mid latitudes was complicated, triggering different responses of local climates that appear to have been out of phase with the broader northwestern European trend. In the Romanian Carpathians, located at the southern periphery of the European ice sheet, there was only limited coverage of ice, mostly at higher elevations as mountain glaciers. Glacial advances and retreats due to climatic oscillations at the end of the Devensian glaciation were asynchronous across Europe. Field evidence suggests that during the last maximum glaciation ice reached lower elevations (~ 700 m) in Rodna Mountains than previously suggested. Boulders were abandoned at 37.2 – 26.6 ka (n = 4) at an elevation of ~900 m. Glacial erratics and bedrock samples (n = 27) provide a good chronology for deglaciation during the Late Glacial, suggesting that ice retreated to high elevations between 18.3 – 13.2 ka (1100 – 1800 m altitude). Final deglaciation took place at 12.5 - 11.2 ka (n = 9). This study provides new palaeoenvironmental information for the most easterly glaciated region of southern Europe and addresses the temporal and spatial variability of Late Glacial climate fluctuations. The new evidence gives an insight into the past climatic gradient across the continent at the close of the last glaciation.

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Reconstruction of Lateglacial climate change based on sediment geochemistry of a glacial lake Tăul dintre Brazi, South Carpathians, Romania

ABSTRACT: The multi-proxy approach is widely used for reconstructing climatic change in alpine lake sediments. In this study we applied sediment geochemistry to reconstruct Lateglacial and Early Holocene climatic change at Lake Taul dintre Brazi (1740 m a.s.l.), a glacial lake in the Retezat Mts, Southern Carpathians. During the Würm glaciation, the most extended ice accumulation was in this part of the Southern Carpathians leaving behind numerous lakes with sediments dating back to ca. 16,000 cal yr BP. A 6 m long core was recently obtained from Lake Brazi and high-resolution geochemical analysis was done on the lower part of this core (10,000-15,755 cal yr BP) to study soil development an in-lake processes in response to high-frequency and high-amplitude climatic changes within the Lateglacial and Early Holocene. We determined LOI, mobile and immobile and the total element concentrations. Bulk analysis of major elements was used (Al2O3, SiO2, TiO2, C aO, MgO, K2O, Na2O, Fe2O3, MnO2, P2O5) to infer chemical changes in response to rapid warming and cooling. Using 6 AMS14C dates on terrestrial plant macrofossils a well-constrained depth-age model was developed using weighed nonlinear regression. Warm and cold periods were determined and compared with the NGRIP δ18O. Each sample was then classified prior to a warm or a cold group according to their ages. Results of the discriminant analysis showed significant differences in the composition of

sediment in warm and cold periods. The concentration of TiO2, Al2O3, Fe2O3 increased significantly in the cold period, while the amount of LOI, SO3, CaO in the warm period. Calculated discriminant scores indicated climatic fluctuations. The results showed that this is a well functioning proxy because our study area is close ly circumscribed (granite bedrock that has a small catchment zone). In the Retezat Mts there are more than 50 similar lakes, therefore we want to test our methods on some of them in the future.

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Reconstruction of the fluvial activity in the last 3000 years for the Moldova River (Romania)

ABSTRACT: The current fluvial processes led to surface numerous tree trunks, identified in various places in between the Locality Molid and Timisesti (86 km of the river length) of which 6 were selected for ^{14}C dating. The sediment layer thickness above the trunks varied between 2 and 3 m, the composition being mostly formed of bed material of the same calibre as the current river bed (gravel with diameter from D50 = 69 mm at Molid and up to D50 = 10 mm at Timisesti). The age of the fossil trunks varied from 410 years BP to 3100 years BP. Numerous hydrogeological profiles along the valley of Moldova River, as well as openings at the front of fluvial terraces permitted the calculation of the volumes of sediments accumulated over the level of fossil tree trunks. These varied between 300 m^3/m and 5500 m^3/m. Therefore, it was possible to calculate the rates of sedimentation of Moldova River floodplain in the last 3000 years which varied between 0,4 m^3 /year (within the Molid section, localized in the mountain area of the valley, at 44 km from the river spring) and 13,3 m^3/year (within Vadu Moldovei section, of maximum development of the alluvial plain, at 125 km from the river spring). The obtained values were discussed in relationship with the palaeo-climatic variability of the last period of the Holocene, intensification of human activity and with other records of the same nature on Holocene history of Romanian rivers.

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The Titel Loess Plateau case study: a unique European palaeoclimatic record covering the last 600 kyrs

ABSTRACT: Loess deposits are considered to be some of the most detailed and long-term records of Pleistocene climate change. In Eurasia, a unique mid-latitudinal loess-belt ranging

from China to South-Eastern Europe provides insights into climate evolution since the Pliocene, at least. Whereas loess deposits in Western and Central Europe are temporarily and spatially discontinuous, in the Lower and Middle Danube Basin, at the western edge of the Eurasian loess belt, one can find true loess plateaus providing almost continuous archives of Pleistocene palaeoclimate. In the region called Vojvodina (North Serbia), we find loess deposits dating back at least to the younger Early-Pleistocene and reaching thicknesses of more than 50 m. A most remarkable morphological feature is the Titel Loess Plateau (TLP), situated in the interfluve of the Danube and Tisa rivers. The loess sequences are comprised of multiple couplets of loess and palaeosol units. 5 palaeosol complexes can be distinguished separated by several metres thick loess layers. Based on inter-profile correlation between three sites at the northern bluffs of the plateau a synthetic TLP profile was built. A detailed magnetic susceptibility (MS) record in combination with palaeopedological observations forms the backbone of the relative stratigraphy. The pattern of MS variation and absence of any erosion sign in the profiles suggest a correlation of paleosol complexes V-S5, V-S4, V-S3, V-S2 and V-S1 with the MIS 15-13, 11, 9, 7 and 5. The distinct and characteristic MS record of the TLP loess-paleosol sequences provides important and significant similarities to the environmental magnetic records observed in other Eurasian loess sections. Due to high accumulation rates, the Middle and Late Pleistocene loess-paleosol sequences of the TLP preserve a unique European continental record of climate and environmental changes for the last c. 600 kyrs.

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Signals of natural cycling of elements and anthropogenic environmental impact in a cave ice deposit – a geochemical perspective

ABSTRACT: The geochemical analysis of natural archives (peat, lake sediments, ice) provides useful information on natural sources of elements and their cycling, as well as on the magnitude of human-related environmental impact. For example, the geochemical chronologies of various metallurgical indicators from different sedimentary archives have recently provided important insights into the temporal development of metallurgy, in many cases complementing the archeological and historical reports. Studies of this extent have been carried out intensively in western and northern Europe, but to our knowledge, no such results are yet available from the Carpathian-Balkan region, although here exceptional evidence of long-lasting resource extraction and processing (including metal and non-metal ores, timber, water, land) emerges from numerous archeological or paleoenvironmental sources. Here we present results of a detailed geochemical and isotopic investigation of a 6000-year-old ice-core section from Scărişoara Ice Cave, Apuseni Mountains, Romania. The concentration of trace elements (i.e., Cu, Pb, As, Sb,

Sn, Au, Te, Pd, Pt, Rh) was determined at high resolution by means of ICP-MS techniques. The results indicate that the ice deposit from Scărişoara Cave archives a detailed record of elements representing both natural in wash signal from local soils, but also atmospheric deposition of volatized metals usually related to anthropogenic activities. On-going lead isotope studies, and the new data are expected to provide an accurate evaluation of emission source regions, as well as clear insights into the developments of metallurgy in one of the oldest mining regions of Europe. The new data are likely to provide one of the first long records of anthropogenic pollution in Romania and central-eastern Europe. Compared with archeological data, the new results could have immediate implications in better constraining the timing, magnitude, and extent of regional mining activities and anthropogenic impact.

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Multiple tree-ring proxies (earlywood width, latewood width and $\delta^{13}C$) from pedunculate oak (*Quercus robur* L.), Nyírség, NE Hungary

ABSTRACT: The Nyírség is a relatively elevated region of the northeastern part of the Great Hungarian Plain (Alföld). The region is characterized by sandy soils. Naturally the mixed common hornbeam (*Carpinus betulus* L.) forest type was the climax forest association of this region. The pedunculate oak (*Quercus robur* L.) has become the dominating tree species in the region, only in the Middle Ages, by the 15th century, owing to multiple values (industrial, economical) of oaks. However, due to the extensive cropland agriculture these seminatural oak forests have been restricted only to a few survival patches. One of these small patches is situated near the town of Baktalórántháza (N 47.98°, E 22.05°). The environmental information recorded in tree rings has never ever been studied earlier in the forests of Nyírség. We have collected disk samples from 10 dominant pendunculate oak trees in August 2009. Earlywood and latewood width were measured separately on each disk. In addition, two disks were chosen and latewood stable carbon isotope composition was also analysed. The final tree-ring chronology spans from 1730 to 2008 and more than 3 trees are included from 1786. Earlywood, latewood and total ringwidth series have been standardized (67% spline) and the average index was calculated as biweight robust mean for each variable. The raw $\delta^{13}C$ data were corrected to account for changes in $\delta^{13}C$ of the atmospheric CO_2 due to fossil fuel combustion and the arithmetic average of the two isotope chronology was computed. Each chronology has been correlated to monthly mean temperature, precipitation totals and self-calibrated Palmer Drought Severity Index. Addressed key questions are:
- What is the main climatic regulator for the different oak tree-ring proxies?
- Are there any difference in the temporal stability of the proxy-climate relationship for the different oak tree-ring proxies?
- Can we obtain superb transfer function for climate reconstruction if proxies are combined?

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Stable isotope variations between 59 - 46 kyr BP recorded in a stalagmite from NW Romania

ABSTRACT: V11 Cave is located in the Bihor Mountains (NW Romania), at 1254 m a.s.l. The cave is formed in Anisian limestones and dolomites, is 1166 m long and has a vertical extension of 67 m. The cave area is a typical karst plateau, with vegetation mainly consisting of spruce stands and alpine herbs. The present-day climate is predominantly influenced by west-northwest oceanic air masses. The mean annual temperature is 5°C and the mean annual precipitation exceeds 1200 mm. The mean annual temperature and the relative humidity in the cave are 6.5°C and 97–98%, respectively. S22, a stalagmite from V11 Cave, has been dated by thermal ionization mass spectrometry and has several growth intervals, separated by hiatuses, between 124 and 5.6 kyr BP. Stable isotope analyses were performed on a 40 mm sequence corresponding to the interval 59 - 46 kyr BP. The chronology is based on four U-Th ages obtained by thermal ionization mass spectrometry. Variations in O isotopes can be correlated to Dansgaard-Oeschger events recorded in the Greenland ice cores. On the sequence studied, growth periods were determined at 59 – 56 and 52 – 46 kyr BP, with one more hiatus occurring before 46 kyr BP. Two cold intervals are covered, separated by a hiatus at 56 – 52 kyr BP and followed by a warm period between 50 and 46 kyr BP. The maximum variations in the $\delta^{18}O$ record are ca. 1.5‰. Oxygen values recorded during the cold intervals, averaging -8.2‰, are close to the ones documented during the Younger Dryas (GS-1) on the same sample, while values recorded between 49 – 46 kyr average present day calcite values, around -7‰. The data demonstrates that seepage water was available for stalagmite growth even during colder periods within the MIS 3 stadial, whereas hiatuses may be associated in this case to warmer/wetter periods and are due to corrosion by unsaturated dripping water.

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Lateglacial and Early Holocene summer temperatures in the Southern Carpathians (Romania): a chironomid-based reconstruction

ABSTRACT: Several lakes that formed during the last glaciation can be found in the Southern Carpathian Mountains, but very few proxy records are available from this region. However, these records could be important in improving the understanding of continental-wide climatic changes during the Lateglacial. Here we present a chironomid-based July temperature reconstruction covering the Lateglacial and Early Holocene from a small glacial lake, Lake Brazi (1740 m a.s.l.), in the Retezat Mountains. The pattern of temperature changes in the Brazi record shows many similarities, but also some differences in comparison with the NGRIP δ18O record and other European chironomid-inferred temperature reconstructions. At the Oldest Dryas/Bølling transition (GS-2/GI-1) summer air temperature increased by about 2.8°C and reached 8.1–8.7°C during the Bølling/Allerød interstadial (GI-1). A striking feature in our chironomid-based temperature reconstruction was the apparent weak cooling during the Younger Dryas (GS-1), while from the same profile pollen analysis indicated regional decrease in wood cover and expansion of steppe-tundra vegetation. However, the macrofossil and stomata records suggested that the lake remained in the treeline ecotone. Later on, during the Early Holocene, summer temperature increased in two steps, altogether by an amplitude of ca 3.8°C, and reached ca 12.0–13.3°C by 9970 cal yr BP. Two short-term cold events were also detected during the Early Holocene that are apparent in the Greenland ice core records and in other European temperature reconstructions. Between 11,480–11,390 cal yr BP a slight cooling of about 0.7°C was visible, which may coincide with the Preboreal oscillation. Another short cooling event occurred between 10,350-10,190 cal yr BP when temperature decreased by about 1°C. In the near future this chironomid record will be compared with other proxies from the same sequence and a palaeoenvironmental reconstruction will be presented for the region.

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Response to cooling: Late Glacial and Holocene changes of diatom assemblages and lake acidity in mountain and lowland lakes in the Carpathian Basin

The study of Late Quaternary vegetation dynamics has a long tradition in the Carpathian Basin, but non-pollen evidence of climatic change is still sporadic. Recently, intensive studies have been conducted in some mountain lakes (Lake Saint Anna – Harghita Mts, Lake Brazi and Lake Gales - Retezat Mts.) and lowland lakes (Lake Zalavári, Lake Balaton) for tracing siliceous algae evidences of climatic changes - as they preserved in the lake sediments. Despite contrasting geomorphic histories and markedly different diatom and chrysophyean cysts floras, several similar patterns were detected in these lake sediments during the Late Glacial and Holocene. The most characteristic feature in the diatom profiles was a sharp difference between the Late Glacial and the Holocene periods (if preserved), while this sharp climatic boundary is sometimes obscured in the diatom records. In the Late Glacial, the fluctuations of diatom assemblages were rapid and sharp. In the Holocene the amplitudes of changes were smaller, but some well-defined shifts were found. Our studies focused on diatom responses to the major cooling anomalies. In the last couple of years it became widely accepted that climate change has been the primary cause of the lake acidity (pH) shift in high alpine lakes. Cold air temperatures induce a lowering of lake-water pH, and vice versa, rising temperatures result in the increase of pH. We found, that the diatom assemblages responded with the shift of acidity as shown by diatom-inferred pH reconstructions, and/or based on the growing abundance of acidophilous and acidobiontic taxa. In all of the studied lakes we found the same shift: the so-called fragilaroid taxa were overgrown by Aulacoseira taxa as a response for climate deterioration. At least four; well-dated, rapid climate changes (RCC) are known in our regions, namely between 8.6–8.0 ka, 6.0–5.2 ka; 4.2–4.0 ka and 3.1–2.9 ka cal BP before the Little Ice Age). Our results suggest that a direct link exists between climate and lake acidity in the studied lakes in these RCC periods, but the expression of response is different or sometimes missing. The preservation of diatoms can also influence the climate reconstruction. Furthermore we have found evidence for changes in other climate factors, like seasonality, the length of ice-coverage and windiness.
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Biological remains in lacustrine sediments as indicators of paleo-environment (a case study of lake Iezer-Feredeu, Romania)

ABSTRACT: Organisms, living near a lake or in it, after death sink on the bottom. Their soft parts are decomposed by bacteria and their more resistant parts become part of sediment and can stay there well preserved for centuries or millenia. Remains of organisms represent a cross-section of communities inhabiting the lake and/or its surrounding in a certain period. With appropriate techniques the remains can be extracted from the sediment and determined to the species / genus level. As ecological requirements (temperature, pH, oxygen, nutrients, depth, etc.) of the organisms are known, reconstruction of paleo-environment of the lake is possible.

The most abundant and informative in the sediments are remains of terrestrial plants (spores & pollen), algae (groups Chrysophycaeae, Bacillariophyta = diatoms), aquatic animals (Cladocera, larvae of Chironomidae), which are accompanied by remains of some less abundant groups, like shells of protozoans (Amoebae) or cysts of moss animals (Bryozoa). Analyses of abundance of remains of certain group of organisms, combined with other information (physical properties of sediment: wet weight, dry weight, loss-on-ignition, grain size, age,…) can help in complex reconstruction of the paleo-environment of the lake. Analyses of sediment of the lake Iezero (the Carpathians) revealed that in the top 160 cm of sediment several groups of animals were present in the lake with different abundance. The most common are remains of Cladocera: three benthic (Pleuroxus truncatus, Alona affinis, Alona guttata) and one planktonic species (Daphnia cf. hyalina), along with some other groups of animals (Bryozoa, larvae of Chironomidae). Distribution of remains along the core is very un-even, indicating a lot of fast and radical changes in the lake.

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MCA, LIA and human impact recorded by the vegetation of NW Romania – palynological analysis of a 800 years old bat guano deposit

ABSTRACT: Pollen analysis of a 300 cm deep guano deposit from Magurici Cave, N.W. Romania was performed in order to highlight the vegetation dynamics and the influence of deforestation and agricultural activities that unfolded in the area over the last 800 years. The obtained data is consistent with the known vegetation history over the late Subatlantic period, with well known climatic events recorded, such as MCA (Medieval Climate Anomaly) and LIA (Little Ice Age). Agriculture's influence on vegetation is also shown, especially in modern times, by the decrease of arboreal pollen, increase of herbaceous taxa related to grazing and the occurence of cereal taxa. Further studies and comparison with other guano sites are required to identify the long-term ecological response of bats to environmental changes. Keywords: Pollen analysis, vegetation history, bat guano, MCA, LIA, Transylvania, Romania.

Introduction. The pollen record from bat guano deposits is a relatively new field of research that can provide information about vegetation responses to climate and environmental changes. The chronology of guano deposits may be used to show the presence of bats in a cave, and thus the habitat and environmental changes in a region, while pollen analysis will provide information about vegetation responses to climate and environmental changes. The Magurici Cave guano deposit is the first one in Romania that has been radiocarbon dated and is studied for fossil pollen.

Materials and methods. A "Russian" corer was used to extract the 300 cm long sequence from the deposit in Magurici Cave. The samples were chemically prepared using a simplified procedure. They were consequently studied using an optic microscope for counting the pollen

and spores and identifying the present taxa. The diagram was plotted using the GpalWin software. Based on vegetation dynamics and C14 dates, eight LPAZ were highlighted.

Study site. Măgurici Cave is located near Rastoci village, at 319 m altitude (47.36 ºN, 23.55 ºE), in the Northern part of the Somesan Plateau, in North-Western Romania (Transylvania). The guano was collected from the Circular Room, which is a mating and nursing roosting site and the largest guano accumulation in the cave (Fig.1). The foraging habitat of bats includes orchards, pastures, crops (mainly maize), oak forests and riverbanks.

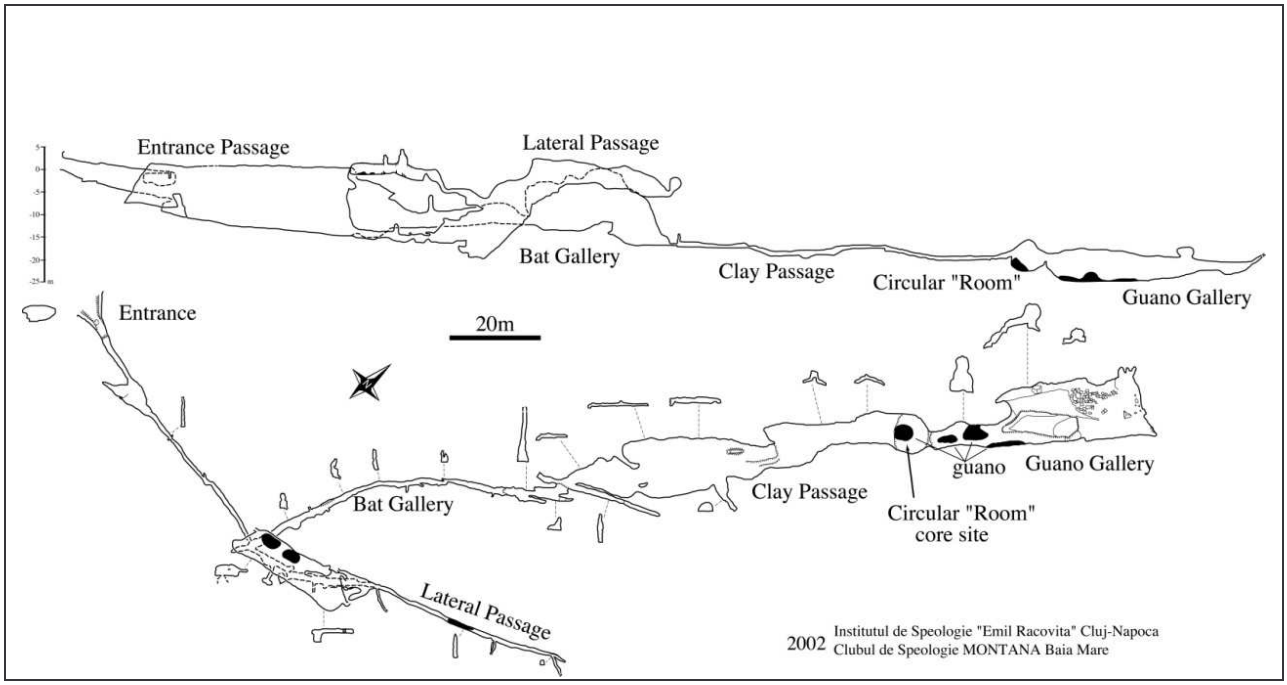

Fig.1 Magurici Cave map with the location of the guano deposits

Chronology. Seven calibrated 14C-ages were used to obtain an age-depth model. The curve shows that the sedimentation rate is not constant. A gap in sedimentation of the guano (seen also in the extracted profile) is proof that a deposition hiatus is present in the profile from Magurici cave.

Results. The extracted core reached a depth of 300 cm, the first 29 cm of which being silty clay (cave fill), while the rest is guano of various colors and textures. Apparent deposition rates of the guano vary between 0.2 cm/year at the bottom of the sequence and 2.5 cm/year in the upper part. 37 samples were analyzed and 72 taxa were identified. The sampled guano contained, besides pollen grains, mineral particles, insect and vegetal remains. Some samples were poor in pollen and many grains were deteriorated (Fig.2).

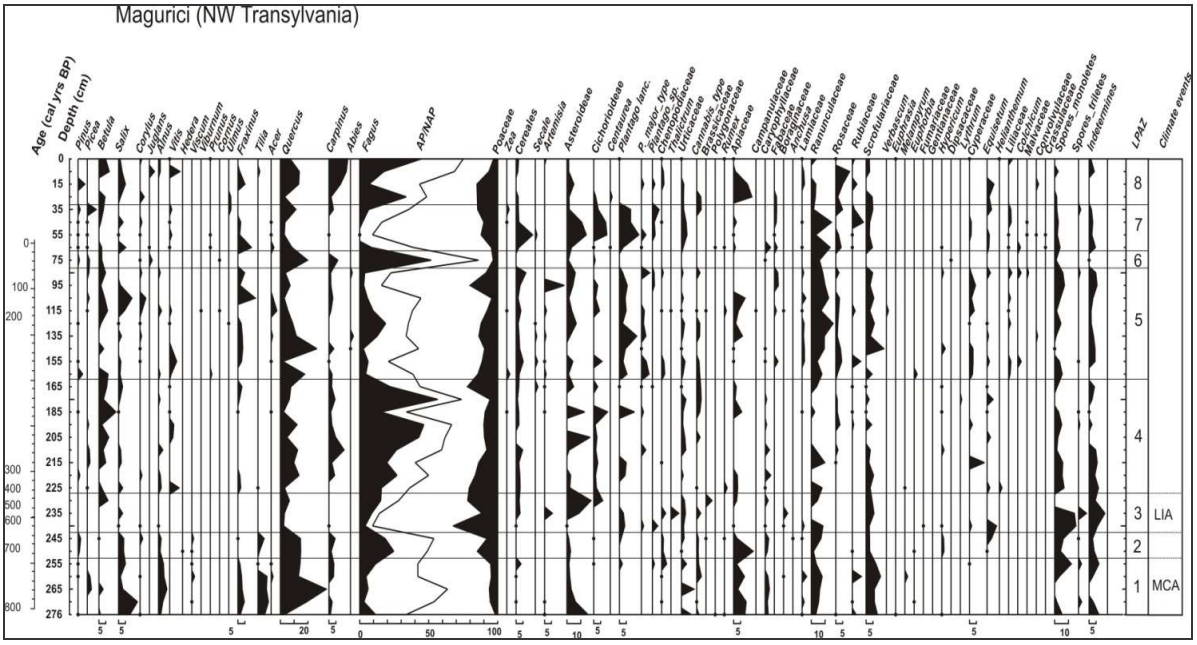

Fig.2 Pollen-spores diagram for the Magurici Cave guano deposit

Discussions/Conclusions:

- The bat guano deposition in Magurici Cave starts around 800 cal B.P. (1150 A.D.).
- The identified pollen assemblages show that guano was deposited during the last part of the Subatlantic period. During this time the vegetation in Romania was dominated by Fagus forests (Tantau et al. 2006, 2009; Feurdean et al. 2007). In the Rastoci area trees like Quercus, Carpinus, Betula, Salix and Fraxinus were also common.
- Two climatic events - MCA and LIA - and a recent human-induced event are reflected in the vegetation dynamics captured in the pollen record.
- Bat habitation between 800 cal yrs B.P. and 630 cal B.P. appears to coincide with the Medieval Climate Anomaly (MCA), when European temperatures were relatively warm.
- Based on the radiocarbon data, stratigraphic hiatus and the palynologic data from the guano deposit, we can assume that sometime during the 450-280 cal. B.P. interval, the bats left the roost site, signaling a regional cold period linked to the Little Ice Age (LIA), and returned when local temperatures increased.
- Human impact in the Rastoci area is more evident after 1800 AD and is mainly related to deforestation, grazing and agriculture.
- Fluctuations in the frequency of the arboreal pollen in LPAZ 5, 6, 7 and 8 can be interpreted as a sign of human induced changes in local vegetation. In recent times, mechanized agriculture produced more dramatic changes in the vegetation.
- Further studies and comparison with other guano sites are required to identify the long-term ecological response of bats to environmental and human-induced changes.

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The estimation of the sedimentation rates within the glacial lakes from the Romanian Carpathians – preliminary results

ABSTRACT: Despite their great number (more than 200) and the paleo-environmental significance given by the lacustrin basin morphology and by the lacustrin sediments, the glacial lakes from the Romanian Carpathians have been the subject of only a few studies, mainly dealing with the determination of the major geomorphological and hydrological characteristics. In this context, we have initiated a pilot study regarding the sedimentation processes in the glacial lakes, aiming to evaluate their potential for paleo-environmental reconstruction approaches, and to create a general image on the sedimentation rates (R_s). Cores were taken from 9 lakes and clogged lacustrin basins grouped in 4 mountainous massifs (Retezat, Şureanu, Făgăraş and Rodnei Mountains), by means of vibro-coring and split-spoon. The cores were geochemically analzyed (XRF scanning) and subsequently, where possible, the core bases and the transitions between the sedimentary sequences wit and without organic matter were dated by $C_{14.}$ The sedimentation rates obtained for the 9 locations correspond to different lenght time-scales which hide the differences of the sedimentation intensity that depend on the climatic variability occured. The registered values range from 0.2 to 0.8 mm/yr, with at least three classes correspondent with the morpho-lithological typology of the source-areas: a) lakes within suspended cirques and lakes without tributaries (small catchment basins): $R_s < 0.25$ mm/yr; b) lakes with medium and large catchment basins: R_s: 0.25 – 0.6 mm/yr; c) lakes with very large catchment basins, often the lower edges of succesive lakes: $R_s > 0.6$ mm/yr (0.7-0.8). The geochemical analysis of the cores indicates the evolution of the concentration for various chemical elements, of which a high importance has the Inc/Coh report, used as proxy for the organic matter concentration. Thus, for three of the investigated locations, the absolut ages were obtained for the transition from predominantly anorganic sediments to the ones that indicate the vegetal colonisation around the lacustrin basins. **Keywords:** *cores*, *sedimentation rates, C_{14},, XRF*

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Sedimentary record of fossil landslide lakes: contribution to landslide chronology and Holocene paleogeographical conditions in the Outer Western Carpathians

ABSTRCT: Analysis of sedimentary records of fossil landslide-dammed lakes is one of a few approaches to get information about paleogeographical conditions in Outer Western Carpathians (OWC). Study of these key sources brings possibilities of dating of the causal landslides, study of the local palaeoenvironmental conditions, quantification of the local sediment budgets and understanding risks connected with landslides. From several landslide-dammed reservoirs in the Czech and Slovak part of OWC we acquired complete sedimentary profiles. By radiocarbon dating of the basis of 12 landslide-dammed reservoirs we supplemented the landslide chronology in the Czech part of OWC. In study area, landslide dams originated during whole Holocene, with increased frequency in Subatlantic chronozone. Generally, landslide damming phases well correlate with landslide activity and increased river dynamics in Polish part of OWC stated by Margielewski (2006) and Starkel (1990). Sedimentary profiles consist of various sediment types, as lacustrine anorganic clay and silt, organic gyttja and peat of swampy facies with often minerogenic intercalations, fluvial sand and gravel, etc., which well document dynamic changes of geomorphic processes in the surroundings. Using radiocarbon dating and palynological analysis we were able to characterize depositional conditions connected with the palaeoenvironmental changes during the Holocene. Phases of homogenic lacustrine or swampy sedimentation are often intercalated by layers indicating increased erosional and fluvial activity, which with several erosional hiatuses well correspond with more humid periods. Presence of anthropogenic indicators gives evidence of intensive land use by men in the Middle and Upper Subatlantic.

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Temperature variability in Romanian Carpathians

ABSTRACT: The main goal of this paper is to detect changes in seasonal variability of temperature in Romanian Carpathians. Two weather stations (Varful Omu and Ceahlau Toaca) have been selected for this study. The mean, maximum and minimum temperature daily data sets have been used for 22 index calculations. For comparison, two periods (1961 – 1985, 1986 - 2010) were restrained. Wilcoxon and Mann – Kendal tests have been performed in order to detect statistical significant changes and trends in recent temperature variability. The high confidence changes were observed for maximum temperatures in the summer between the two periods and high significant growing temperature trends were observed for the 1985 – 2010 period for all seasons.

32. Ignéczi Ádám[1*], Nagy Balázs [1], Kern Zoltán[2]

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Examination of the accumulation-area ratio method in the case of non-typical glacier types

ABSTRACT: The accumulation-area ratio method is a climate reconstruction technique. The accumulation-area ratio (AAR) is the ratio between a glacier's accumulation area, and total area. The steady-state AAR (AAR0) is associated with zero net annual mass balance (bn). The AAR method is based on the assumption that the AAR0 of a glacier occupies a fixed proportion of the total glacier area. If we know the AAR0's value and former extent of the glacier, it is possible to estimate the paleo-snow-line. However the AAR0 isn't a universal constant. It varies depending on characteristics of glaciers. It is possible to establish typical AAR0 values by using linear regression on several bn, AAR datasets. During my work I examined the AAR method on two non-typical glacier types: outlet glaciers, and tropical glaciers. The non-typical adjective can be explained by the scarce researches that studied these glacier types. In the case of outlet glaciers besides establishing typical AAR0 value for that glacier type, I also studied the bn, AAR relationship. Researchers use linear formula to describe bn, AAR relationship because it is well applicable in the case valley glaciers. However it is visible in some cases that the bn, AAR relationship is not strictly linear on outlet glaciers. My main objective was to prove that in case of outlet glaciers the bn, AAR relationship is non-linear instead of linear. This was possible by modifying the classical procedure of the regression analysis. This own developed method was able to determine the applicability of different functions in approaching the bn, AAR relationship. In the case of tropical glaciers my goal was determining the characteristic difference between the AAR0 of mid-latitude and tropical glaciers. My secondary goal was to detect the influence of size on the AAR0 in the case of tropical glaciers. My research's most significant results are connected to the examining of outlet glaciers. The statements in this work are well applicable in climate reconstructions in regions where outlet glaciers are common. These results could be interesting from the view of environment reconstructions in the Carpathian Mountains because former outlet glaciers are known in this region. In the case of tropical glaciers there are promising achievements. However further investigation is needed, because lack of data.

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Reaction of Norway spruce (Picea abies) to sedimentation by toxic debris in the Călimani Mountains

ABSTRACT: The waste dumps of the sulphur mines on the Negoiul Românesc volcanic cone (Călimani Massif, Romania, 2100 m a.s.l.) are intensely reworked by geomorphic processes (e.g., flows, slides and falls), which affect a Norway spruce (Picea abies (L.) Karst.) forest located lower than 1700 m a.s.l. Next to the Dumitrelul retention basin, trees are covered with more than 30 cm of toxic, sulphur-rich sediments originating from the waste dump deposits. This study aims at using sedimentological and dendrochronological methods to analyze the reaction of trees to sedimentation by toxic debris and to determine the time and depth a tree can support in such an environment. Spatial distribution of features relating to the deposition of toxic debris-flow material and the precise determination of tree position were performed by topographical measurements using a total power station. The dendrochronological study was performed with 20 buried trees. Another 20, non-affected P. abies trees were sampled to obtain undisturbed reference tree growth. Preliminary results show that the affected trees reacted severely during or following years with sedimentation events. In addition, data shows that the intensity and persistency of growth reactions in trees are positively correlated with sediment depth and granulometry of deposits.

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Changes in river ice regime in the Carpathian Basin

ABSTRACT: In the Carpathian Basin river ice is a regular phenomenon on the rivers in winter. Seasonal ice cover on rivers is a small, but very important part of the cryosphere. The occurrence of river ice phenomena are directly controlled by winter temperature conditions, so it is a good indicator of climate change and variability. Increasing number of researches detects long term changes in river ice regime in the Northern Hemisphere. Historical dates of freeze-up and break-up show significant trends: later freeze-up and earlier break-up was observed on many Eurasian and North-American rivers. The characteristic features of river ice regime have been recorded for a long time on numerous rivers in the Carpathian Basin. On the basis of an approximately 125 years long dataset, similar changes were found in the ice regime of the Danube, Drava and Raba rivers, like other rivers in the Northern Hemisphere. Freeze-up dates shifted 4–12 days later and break-up dates became 10–20 days earlier on 100 years average. The date of first ice appearance and final disappearance also changed: ice drifting started average 11–24 days later and ended average 16–20 days earlier per a century. These changes result that the ice-covered and ice-affected season shortened. The length of the ice-covered season decreased average 14–19 days per 100 years and the total number of ice-affected days became 27–33 days per a century on average. River ice regime is fundamentally determined by winter weather conditions, so the winter temperature regime of this part of the Carpathian Basin was also analysed. The mean winter temperature increased 0.95–1.43°C per 100 years. Correlation analysis confirmed that the winter temperature conditions and river ice regime are in strong relationship. So this warming winter climate could be hold responsible for changes in ice regime of rivers in the Carpathian Basin.

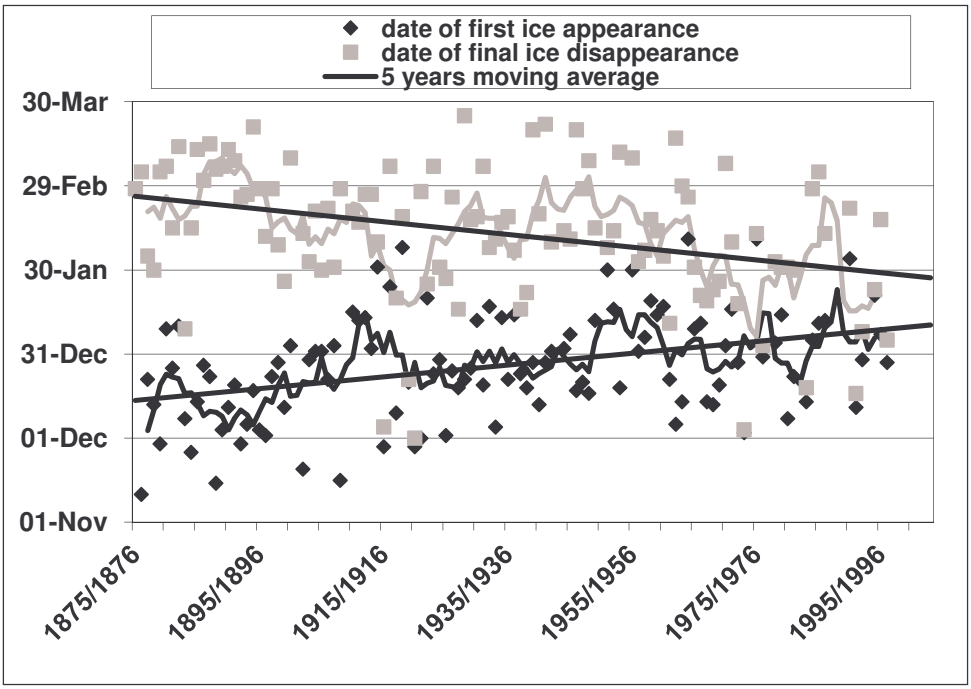

Figure 1. The dates of first ice appearance and final disappearance on Danube Rivet at Budapest, 1876–2004.

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Palaeoglaciation of western Rodna Mountains - preliminary model for the last deglaciation of the area

ABSTRACT: Fluctuations of glaciers are excellent evidence of altered past environmental conditions. Prime trigger of these fluctuations is the climate. Hence the palaeoglaciological records are always among the highly ranked evidences of past climatic changes.
The main scopes of this study are 1. to re-evaluate glacial landscape/landforms of western Rodna Mts (Eastern Carpathians, Romania) applying modern glaciogeomorphological methods 2. compile and integrate field observed and remotely sensed information a GIS environment to create an up-to-date background for the application of advanced dating techniques (e.g. exposure dating by cosmogenic isotopes). Detailed geomorphological mapping was carried out in western Rodna Mts. in three N/NE faced valleys: Zanoaga Mare, Zanoaga Iezerului and the western part of Buhaescu Valley, where the higher mountain region is characterized by glacier forms such as well developed cirques, roche mountonées, lateral and terminal moraines. Glacial and periglaical forms were carefully separated. In this context we focused on determining Late Pleistocene glacial environment to evaluate former glaciers' extent so as to calculate glacier area, ice thickness, ice volume and palaeo-equilibrium line altitudes.Several glacial stages were found at

each site. Reconstructed surface area of past glaciers varied from 0.1 to 4.5 km^2. For a more precise palaeo-equilibrium-line estimation a modified AAR method the size-specific approach was used. Estimated pELA data suggest that deglaciation of the investigated three valleys were accompanied with gradual rising of snowline. Mean pELA at the most glacierized studied stage was 1745 m a.s.l. while at the last stage it has receded to 2060 m asl. The region is ice free today.

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Paleosoils from quarry north of Bârlad

ABSTRACT: In Plateau of Barlad the fossil soils are mixed together with the quaternaries deposits. Such a situation occurs north of Barlad, on The Sododau's Hills. The Quaternary sequence involves the loess deposits inserted in three fossil soils, which emerge as continuous layers, stratified and well distinct and with thickness varying between 70 and 110 centimetres.
Keywords: *The Plateau of Barlad, loess deposits, fossil soils, Quaternary*.
Introduction. The Plateau of Barlad (Martiniuc, 1960) consists in quaternary deposits, on wide surfaces, which cover the older formations (Ionesi, 1994). The altitude where the quarry from north of Barlad is to be found (N 460 16' and E 27041') is up to 100 metres and has an outcrop height of nearly 11.50 metres, while in wideness is of nearly 50 metres (Fig.1). The flow of loess deposits is in fact the main rock of soil formation for the actual soil cover. Within these deposits, we acknowledged several layers of dark colour, from rusty brown, in the upper side of the profile, to dark brown, into the basic outcrop. Due to our field researches, we concluded that these layers are in fact fossil soils or paleosoils (Bucur et al., 1960). These paleosoils consist of fossil organic matter and clearly contrasts with upper and underlying material. There are the stratigraphic sequences, which throughout their physicochemical characteristics, especially biostratigraphic, have their own peculiarities.
Method. Morphological study of the quarry paleosoils from north of Barlad was accomplished based on field observations and macroscopic physic-chemical results. Morphological traits of the fossil soil cover: their thickness, the genetic horizons, the presence of different reservoirs, storage of the morphological status. We determined three levels of paleosoils with variable thickness, i.e. 70 centimetres, 100 centimetres and 110 centimetres. Switching from fossil deposits above ground and underlying net is achieved at the bottom and gradually, at the top. Regarding the degree of morphological differentiation, we determined the first fossil soil horizon as a moderate stage of development and, then, the next two horizons with advanced stage of development. Morphologically differentiated fossil soil horizons had been delineated based on observed characteristics measured on the soil profile: colour, texture and structure, quantity of humus, the presence or absence of carbonates.
Analytical data revealed:
• Humus has higher values in the layers of fossil soils, compared to upper and underlying deposits. The presence of high quantities of humus stats an important contribution of plant material during soil formation.

• The content of alkali-earth carbonates has low values in loess deposits, which consist of fossil soils. In paleosoils carbonates have low values (0.5-5.6 %).
• The substance of fine particle size, compared to the upper and underlying deposits, thereby it facilitated the accumulation and preservation of organic matter over time.
• Total of Nitrogen content is in the range 0.039-0.127 % in paleosoils. These values provide information about increasing moisture index parallel with the decrease temperature.
• Carbonates / Nitrates ratio, by its values (10-11), show the presence in these paleosoils of a mull-calcic humus type. This means that the origin of the steppe vegetation type with intense accumulation biological processes. Therefore, hard humic acids are closely related to clay and lead to the formation of a high quality humus.
• In the fossil soils pH values are between 7.5 - 7.8, with a slightly alkaline soil reaction. In the upper and underlying deposits, values of the pH are higher than 8.2.

Discussions. The paleosoils quarry from north of Barlad include three continuous layers and are fading into the edge of Meadow of Barlad. These layers are embedded in the loess. Genesis and evolution of the paleosols was highly conditioned to loess formation properties. According to Cazacu (2001), from a systematically studied point of view, there are paleosoil steppes as they have large thicknesses, have a high content of humus and macro elements which shows that it were developed under the conditions of an abundant vegetation and relative humid warm climate. Therefore, the quantity, composition and humus type, is specific to morphological characters. Also, its qualitative composition in paleosoils, guide us towards the paleoclimatic and paleofloristic conditions during it's genesis.The age of the studied deposits from the quarry of interglacial stages correspond to the second half of the Medium Pleistocene and early Superior Pleistocene environment (Panaiotu et al. 2001).

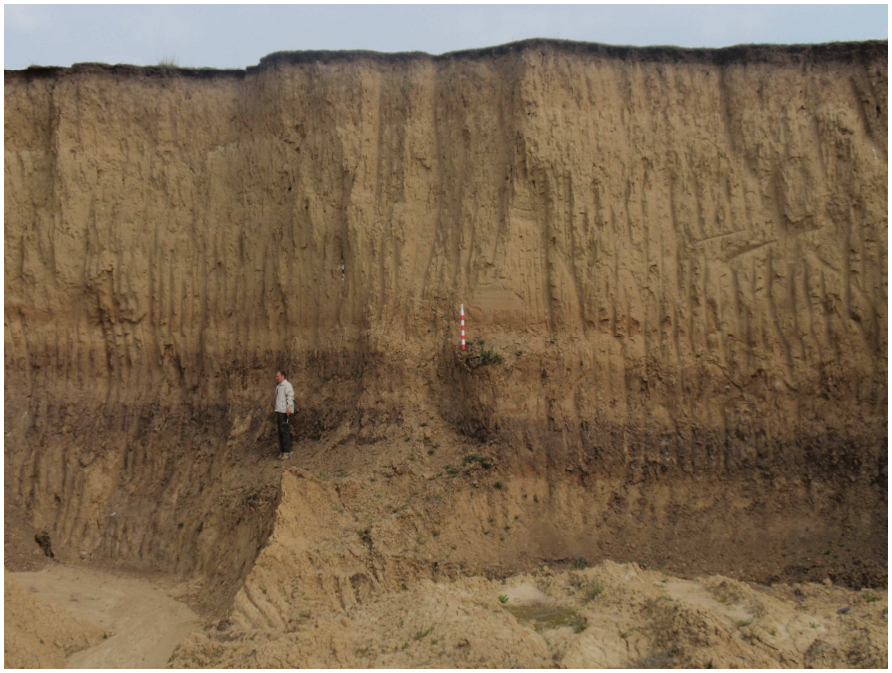

Fig. 1. The quarry from north of Barlad

Conclusions. Studied paleosoils distinguish by color, texture, porosity and chemistry, providing from a biostratigraphic point of view, an interesting study material. Their characteristics express genesis conditions different from the actual ones. The researches show that paleosoils are being incorporated in loess deposits.Paleosoils emerge as layers with thicknesses ranging between 70 - 110 centimetres and are darker than the composing sediments. Compared to the existing soils, paleosoils thickness is smaller, which stats that its' time evolution was short, being frequently interrupted by a new deposit. The Quaternary debut brought changes both in terms of wildlife and vegetation as to the soils. These accurately reflect the paleoclimatic and paleomedium changes caused by climate oscillations.

Acknowledgements. This work was supported by the European Social Fund in Romania, under the responsibility of the Managing Authority for the Sectorial Operational Program for Human Resources Development 2007-2013 [grant POSDRU/88/1.5/S/47646] and the Romanian Ministry of Education, Research and Innovation under a PN-II-IDEI No. 975/2008 research grant, directed by Professor Mihai Brânzilă. Also, the authors wish to thank the reviewers for their extremely useful comments.

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37. Ridush Bogdan[1*], Bondar Kseniia[2] (poster)

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Late Pleistocene - Holocene climate changes records in loamy sediments of Bukovynka Cave

ABSTRACT: Bukovynka Cave is situated at the south-eastern part of Podillja-Bukovynian karst area (Ukraine), in the Prut R. valley. It is a maze cave with total length of 5500 m, developed on three levels inside the upper part of the 30-m thick Miocene gypsum strata. The cave encloses various uncemented deposits containing Late Pleistocene – Holocene palaeoclimate records. Some data about Late Pleistocene palaeonthological finds in the cave was presented before (Vremir et al., 2000; Ridush, 2004) as well as general description of the cave (Ridush et al., 1998; Ridush & Kuprich, 2003; Ridush & Levytska, 2005). Research performed for loamy sediments from the cave, comprises rockmagnetic, palaeomagnetic and palaeonthologic study. Magnetic susceptibility examined along four sections indicates that material transported into the

cave by wind or temporary water flows is significantly less magnetic than fluvial sediments presumably derived from inside the massive. Slight enhancement of magnetic susceptibility, indicating warm outdoor conditions, is observed in sediments containing hyena bones in the Entrance Chamber. Both fluvial and alluvial (aeolian?) sediments are excavated in the deepest section (2,2 m) in the Dry Chamber. Variation of magnetic susceptibility, NRM intensity and Keonigsberger ratio reflects rather lithological than palaeoclimatic changes. Study of the deepest section reveals presence of two separated intervals of direct and anomalous polarity corresponding to upper fluvial and lower alluvial (aeolian?) layer respectively. Craniums of Holocene marmot (Marmota bobac) and brown bear (Ursus arctos) were excavated accordingly from -1,1 m and from the base of fluvial layer (-2,0 m). Palaeomagnetic features of fluvial deposits are dated according to correspondence to archaeomagnetic master curves for Ukraine and Moldova for the period of 5500 yrs. Loamy alluvial (aeolian?) layer probably has been formed during one of Pleistocene geomagnetic excursions. Thus, five water dynamic stages can be distinguished in the cave during Late Pleistocene-Holocene.

38. Bondar Ksenija[1*], Ridush Bogdan[2] (poster)

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Late Pleistocene - Holocene water dynamic and climate changes recorded in loamy sediments of Bukovynka Cave (Chernivtsi region, Ukraine)

ABSTRACT: Bukovynka Cave is situated at the south-eastern part of Podillja-Bukovynian karst area (Ukraine), in the Prut R. valley. It is a maze cave with total length of 5500 m, developed on three levels inside the upper part of the 30-m thick Miocene gypsum strata. The cave encloses various uncemented deposits containing Late Pleistocene – Holocene palaeoclimate records. Some data about Late Pleistocene palaeonthological finds in the cave was presented before (Vremir et al., 2000; Ridush, 2004) as well as general description of the cave (Ridush et al., 1998; Ridush & Kuprich, 2003; Ridush & Levytska, 2005). Research performed for loamy sediments from the cave, comprises rockmagnetic, palaeomagnetic and palaeonthologic study. Magnetic susceptibility examined along four sections indicates that material transported into the cave by wind or temporary water flows is significantly less magnetic than fluvial sediments presumably derived from inside the massive. Slight enhancement of magnetic susceptibility, indicating warm outdoor conditions, is observed in sediments containing hyena bones in the Entrance Chamber. Both fluvial and alluvial (aeolian?) sediments are excavated in the deepest section (2,2 m) in the Dry Chamber. Variation of magnetic susceptibility, NRM intensity and Keonigsberger ratio reflects rather lithological than palaeoclimatic changes. Study of the deepest section reveals presence of two separated intervals of direct and anomalous polarity corresponding to upper fluvial and lower alluvial (aeolian?) layer respectively. Craniums of Holocene marmot (Marmota bobac) and brown bear (Ursus arctos) were excavated accordingly from -1,1 m and from the base of fluvial layer (-2,0 m). Palaeomagnetic features of fluvial deposits are dated according to correspondence to archaeomagnetic master curves for Ukraine and Moldova for the period of 5500 yrs. Loamy alluvial (aeolian?) layer probably has been

formed during one of Pleistocene geomagnetic excursions. Thus, five water dynamic stages can be distinguished in the cave during Late Pleistocene-Holocene.

39. Lócskai Tünde*, Hupuczi Júlia, Sümegi Pál (poster)

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The Late Pleistocene paleoenvironment and paleoclimate of Katymár section (S Hungary) based on preliminary results

ABSTRACT: 26 species and more than 26.000 specimens were collected and identified from 257 samples of loess profile of old brickyard at Katymár According to the changes of the mollusk fauna composition 9 malacological – paleoecological zones can be identified in the loess profile. The Quaternary malacological data from loess section of Katymár suggest that the Middle and Late Pleniglacial development of the mollusk fauna and local climatic and environmental changes in this area differed from the other loess regions in Europe.

40. Pall David Gergely*, Persaits Gergő, Sümegi Pál (poster)

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New investigations at Tokaj-Csorgúkút II. loess section, Northeast Hungary

ABSTRACT: Micromorphological studies of Quaternary research play a vital role. They are important for two main reasons, i.e for the examination of buried soils and for palaeoenvironmental reconstruction. The genetic evaluation of soil micromorphological studies can help to clarify certain developmental processes. Each calcium carbonates feature, textural pedofeatures (clay coatings), chambers, channels or the combination of these refer to buried soil. In soil horizons different coatings can be seen on each of the cavities and blisters, and the disparate coatings were formed under different environmental parameters. Samples derive from Tokaj-Csorgókút II. were analysed by a micromorphological and a phytolitical point of view. In the research of Quaternary vegetation reconstruction phytolits, pollen, seeds have important function. Phytolits derive from loess profiles give information about vegetation composition.

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28,000-year record of environmental change in SE Hungary: terrestrial response to Dansgaard-Oeshger

ABSTRACT: Forty (22 freshwater gastropod, 14 gastropod, 4 bivalves) species and 3428 Specimens of molluscs were collected and identified from a 6.3 m sequence, obtained from a core profile, of lake and fluvial sediments at Kardoskút, South Hungary. According to changes in the molluscan fauna, six malacological–palaeoecological zones can be identified in this profile. The Quaternary malacological data from the Lake Fehér core profile suggests that the Late Pleniglacial and Early Holocene development of the molluscan fauna, and local palaeoclimatic and palaeoenvironmental conditions in this area, differed from other regions in Europe.

42. Veres Zsolt [*], Páll Dávid Gergely, Sümegi Pál, Törőcsik Tünde (poster)

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Geoarcheological examinations of Selyemrét (Ócsa)

ABSTRACT: Selyemrét is a moor and this moor is the northernmost part of a big moorland sequence in centre of Hungary. The area is situated near to the heart of Hungary. The whole moorland are a dinamic system and this system were changed the last 10-20 000 years. We wanted to know more from the history of Selyemrét. Therefore we drilled undisturbed cores in the moor. The examinations – what we used- are accepted in the International Quaternary Geology. The undisturbed cores are taken the laboratory and we examined here the cores. Samples were taken at 4 cm intervals vetically from the continuous undisturbed core and we were analyzed with sedimentological, geochemical, macrobotanical, palinological and malacological methods. The chronological analysis was based on radiocarbon dating. In our presentation are showed the environmental changes of the area from the Pleistocen to nowadays.
Keywords: *moorland (láp), geoarcheological (geoarcheológia), malacological (malakológia).*

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River responses to Late Quaternary climate changes. Case study: Somesu Mic River, Romania

ABSTRACT: Until recently, two different visions dominated the long-held traditional view on the Quaternary fluvial evolution at mid-latitudes: aggradation (braided rivers, coarse gravel sediments) during glacials, incision and erosion of sediments (meandering rivers) during interglacial versus incision during glacials and aggradation during interglacials. Detailed studies on fluvial terraces and floodplains (morphology, sedimentary structure, age) performed over the past two-three decades, have challenged these paradigms, by demonstrating that aggradation can occur both in glacial and interglacial periods. The new vision indicates that the short intervals at the transition periods between warm – cold and/or dry – humid climates, and vice versa, are the main periods of major fluvial transformations. It further shows that not every climatic transition

period should be associated with an important incision phase. If the amplitude of forcing factor (climatic oscillation, vegetation and permafrost reaction etc) is placed under the response time of a particular fluvial system, the transition phase will determine only minor adjustments, not evident in morphologic and sedimentary evidences. The existing models on Quaternary evolution of Romanian fluvial systems continue to be in accordance with the traditional concepts. In this paper, we present new morphologic, sedimentary and chronologic information on the fluvial dynamics in the Late Quaternary, in a region uncovered by recent palaeohidrological investigations, i.e., the floodplain of Someşu Mic River, located in the NW part of Romania. Based on our findings and previous studies in the area, we suggest that the moment of large scale fluvial incision (ca. 10-13 m) responsible for the detachment of the first strath - terraces (T II) and the formation of valley bottom, has occurred at 28000 cal. yrs. BP, at the transition between the Middle and Late Pleniglacial, when the river has changed from braided to a supradimensioned meandering one. The next stage consisted in river methamorphosis to an anabranched one, most probably functional for a few millennia. Before the beginning of LGM (~24000 cal. yrs BP), the river became braided again. This behavior was maintained until the Holocene, without visible changes during the Lateglacial. The moment of change to underfit meandering river is not well established, sparse data indicating a possible age of ca. 10600 – 10200 cal. yrs. BP, with a delay of at least 1000 years after the beginning of Holocene. In the new temperate conditions established after 11700 cal. yrs. BP, the effects of local geological conditions on channel behavior became more visible, now responsible for local development of sinuous, meandering and anabranching reaches. Data on the fluvial reaction to Holocene climate changes are still sparse, but some moments of higher fluvial activity (avulsion, vertical aggradation of floodplains, palaeochannel reactivations) occurred at 9795 - 9370, 4740 ± 19, 1500 ± 16, 1030 ± 72, 800 – 630, 537 ± 51, 436 ± 31, 392 ± 29 and 260 ± 40 cal. yrs. BP. There are no evidences on large scale floodplain aggradation starting with the Neolithic, as a consequence of land use practices. This finding could suggest the maintenance of human interventions under the internal threshold of the fluvial system.Our data suggests that Somesu Mic River is not a very sensitive river to climate changes, at least since the Late Pleniglacial. A working hypothesis for this behavior is the slightly higher slope of the graded profile downstream from a 400 m high knickpoint, which induce a higher potential energy of flow, and in consequence, an increased resistance of channel during climatic transitions. A higher river predisposition to incision during warm-could climatic transitions is noticeable, but new evidences are necessary to validate it.

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Holocene variability in the range distribution and abundance of *Picea abies* in Romania

ABSTRACT: This paper examines fourteen fossil pollen datasets from Romania and aims to investigate the temporal and spatial variability in the range distribution and abundance of *Picea abies* during the Holocene. This is essential for understanding its current status in the forests of Eastern Europe, the conditions under which it arose, and the timing and processes responsible for its variability. Results from this synthesis do not indicate any apparent time lag in the establishment of *Picea abies* across Romania within the limits of the dating resolution. However, the onset of the mass expansion of *Picea abies* was not uniform, spreading earlier from sites in the western and north-western Carpathians (11,000-10,500 yr BP) than in the east (10,000 yr BP). We found that sites from the western, north-western, and northern Carpathians contained higher abundances of *P. abies,* and this is probably connected with the occurrence of moisture climate condition in these regions. On an elevation results indicate a greater abundance of *Picea abies* at mid to high elevations. *P. abies* has persisted in large abundances at higher elevations (above 1000 m) until the present day, proving a good competitive abilities, and resilience to climate change and disturbance. However, this long-term dominance of *P. abies* appears to have been spatially constrained, as populations below ca. 1000 m were replaced by *F. sylvatica* from *ca.* 4000 years ago, Recently, *P. abies* have both experienced range expansions locally, a consequence of forest management.

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Independent and continuous chronology for a Romanian loess-paleosol complex spanning the last 350ka

ABSTRACT: Assuming that the magnetic susceptibility is periodic we obtained a completely independent time base for a Romanian loess profiles spanning the last 350ka. In addition the new time base has for the first time a continuous character suggesting that loess accumulation is a continuous process. The new independent chronology was confirmed by optical ages. The new time base revealed that indeed paleosols were developed during interglacial periods supporting thus the correlation between the magnetic susceptibility and marine δ18O. Spectral analysis highlighted the dominance of eccentricity associated 100ka periodicity. The lack of 41ka in the new time series spectrum suggested that this cycle could be an artifact induced from the target proxy. Keywords: Dating, Loess, Magnetic Susceptibility.

Introduction. Magnetic susceptibility measured along the loess-paleosol profiles reflects accurately the glacial/interglacial successions and thus can be used as a proxy for major climatic oscillations during the Quaternary. The most common techniques used to build a reliable chronology for loess-paleosol deposits are based on a tuning procedure with a known target proxy using several anchor points (e.g. Sun et al., 2006, Ao et al., 2010). This approach leads to a stepwise accumulation rates. Recently the OSL absolute ages determinations showed that, loess deposition is episodic with high inputs of wind-blown dust alternating with periods with calm or even no depositions (e.g. Stevens et al., 2007, Timar et al., 2010). Thus a constant accumulation rates might not be a reliable hypothesis in case loess accumulation.

This study aims to provide a completely independent time scale for a Romanian loess-paleosol sequence. For this purpose we applied the phase demodulation technique combined with time base distortion approach (De Ridder et al., 2004, de Brauwere et al., 2009) on the magnetic susceptibility recorded at Mircea Voda loess deposit. Using this technique neither target proxy is needed nor are anchor points used. In addition the new time base has for the first time a continuous character reflected in the continuous behavior of the accumulation rates.

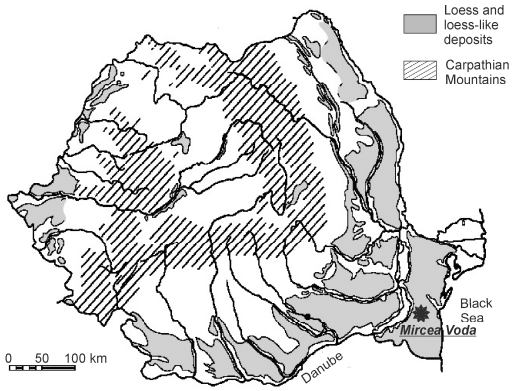

Fig. 1 Map showing the distribution of loess-and loess-like deposits in Romania and the location of the studied loess sequence from SE Romania: Mircea Voda

Regional settings

The loess sequence under study is situated near the Mircea Voda village, in the Dobrogea (Dobrudja) Plateau, at about 15 km from the Danube River (Fig. 1). The loess sequence comprises five well-developed paleosol (S1 to S5) with five intercalated loess layers (L1 to L5). The section has around 26m thick with apparently no breaks or erosions (Timar et al., 2010). Several time scales were built for Mircea Voda loess section tuning the magnetic susceptibility data to various target proxies (Buggle et al., 2009, Timar et al., 2010). These chronologies proved that the paleosols were developed during the odd numbers of Marine Isotopic Stages whereas loess was accumulated during the even MIS numbers. IRSL (Infrared Stimulated Luminiscence) ages performed on feldspar grains from the first three loess layers by Balsescu et al.(2010) support the accumulation of wind-blown dust during the glacial stages confirming thus the above chronologies. Also a broadly agreement was found between both time scales and the OSL (Optical Stimulated Luminiscence) dating on silt (4-11 μm) quartz (Timar et al., 2010).

The method. The method used to estimate a time scale for magnetic susceptibility describes the variations in accumulation rates in terms of a distortion from a linear behaviour through the following equation:

$$t(n) = (n + \delta(n))T_s$$

where n represents the number of measurements, T_s is the average time between two subsequent observations and the deviations of the time base from linear behaviour are modeled by the function $\delta(n)$ named time base distortion (De Ridder et al., 2004, de Brawere et al., 2009).

The phase demodulation method is used then in order to estimate the time base distortion. Assuming that the signal is periodic, phase demodulation technique models the periodic time series by a number of harmonics in the frequency domain. The time base can be separated by isolating a window around the first harmonic in the spectrum (more details about phase demodulation technique in De Ridder et al., 2004, de Brauwere et al., 2009).

The magnetic susceptibility was limited to the first three paleosols (S1 to S3) because the oldest independent age available from IRSL was measured in L3 loess. This way a more appropriate comparison between the optical ages and the new time base is possible.

Results and discussions. Fig. 2 shows the magnetic susceptibility data on the new time base. The new time base indicates that the paleosol S1 was developed during MIS5 interglacial stage, S2 during the MIS7 and S3 was formed during MIS9 interstadial. The beginning and the end of the paleosol almost are more or less synchronous with the inceptions and terminations of the corresponding MIS stages. This represents thus the first independent evidence that indeed the paleosols were developed during interglacial stages whereas loess was accumulated during cold periods for the last 350ka. The new time base shows good match with the IRSL and OSL ages.

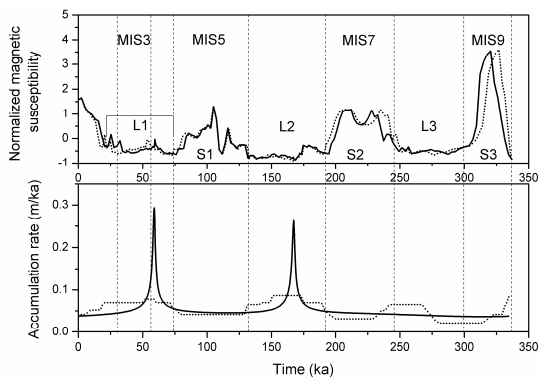

Fig. 2 Magnetic susceptibility from Mircea Voda loess section on the new time base (solid black line) together with the continuous accumulation rate (solid black line). The oxygen tuned time scale as well as the corresponding accumulation rate is displayed with short dotted line. Vertical dotted lines mark the borders of the MIS stages.

The continuous representation of the accumulation rate reconstructed using phase demodulation method (Fig. 2) suggests that loess deposition is a continuous process. Maximum accumulation rate of approximately 30cm/ka was reached around 60ka ago during MIS4 glacial period. This is in good agreement with the accumulation rate derived from OSL ages by Timar et al. (2010) which showed that MIS 4 glacial was characterized by a more intense loess accumulation of around 21cm/ka. For comparison an anchor points time series for magnetic susceptibility was built as in the study of Timar et al. (2010): paleosols were correlated with interstadials whereas loess layers were assigned to glacial stages of the stack of 57 globally distributed benthic δ18O records (Lisiecki and Raymo, 2005). A reasonable good match can be noticed between the anchor points time series and the phase demodulation based one (Fig. 2). This agreement justifies thus the correlation between the magnetic susceptibility and the proxy of global ice volume. However the new time base shows that the maximum of magnetic susceptibility enhancement inside L1 loess layer does not fall between the MIS3 borders (Fig. 2). Thus according to both the new time base and OSL determinations the magnetic susceptibility enhancements inside L1 cannot be assigned to the MIS3 warming phase. An almost constant sedimentation rate is indicated by the anchor points time series for loess layers.

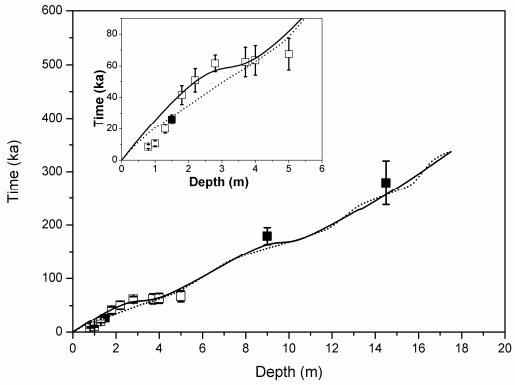

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Fig. 3 Time-depth model resulted from the new time base (solid black line). Solid squares mark IRSL dates and open squares mark OSL ages. The inset highlights the L1 loess unit and OSL ages

Harmonic analysis displays similar spectral content for both time series (Fig. 4). Most of both spectra are explained by the 100ka periodicity associated with eccentricity cycle. However, a significant 41ka periodicity associated to obliquity cycle is visible in the anchor points spectrum whereas in the continuous time base spectrum the same peak is three time weaker. The presence of the 41ka cycle detected in the anchor points could be explained as an artifact due to tuning procedure which can transfer the obliquity frequency from the oxygen time series into the magnetic susceptibility time series. This is supported by the results of Necula and Panaiotu (2008) which found that different frequencies can be easily induced by tuning in the resulted time series depending on the target curve used.

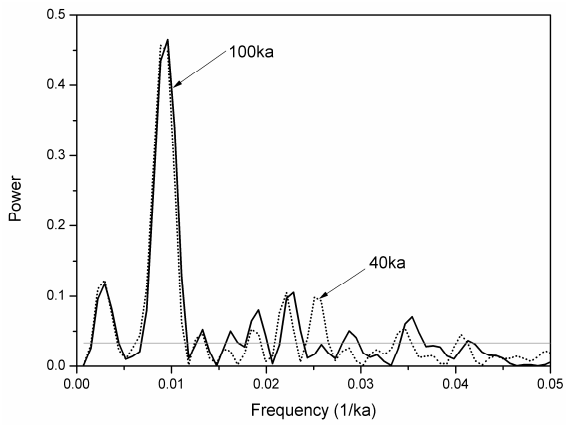

Fig. 4 Power spectra for the new time series (solid black line) and for the marine $\delta^{18}O$ tuned one. Horizontal line marks the 95% confidence level.

Conclusions. Using the time base distortion coupled with phase demodulation technique (De Ridder et al., 2004, de Brauwere et al., (2009) we provided for the first time a completely independent and continuous time scale spanning the last 350ka for Mircea Voda loess profile. The sole supposition we made was that the magnetic susceptibility time series is periodic. This represent a more reasonable assumption than that the magnetic susceptibility correlates with marine isotopic oxygen. The new time base indicated that the paleosols were formed indeed during interglacial stages whereas loess was deposited during cold periods for the last 350ka. However according to the new time base corroborated with the OSL ages suggest that the enhancement in the magnetic susceptibility inside L1 loess cannot be associated with MIS3 warming pulse. A good agreement was found also between the new time base and IRSL and OSL ages. In addition the continuous accumulation rate derived from the new time base shows that loess accumulation occurred at a significantly faster rate during MIS 4 as the optical ages pointed out as well. Spectral analysis showed that both anchor points and the new time series are dominated by 100ka periodicity. However the lack of 41ka cycle in the new time series spectrum suggested that this periodicity could be an artifact being induced by the tuning method from the target proxy.

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Actual climate evolution in the NE Romania. Hydrological and biogeographical consequences

ABSTRACT: During the last 50-60 years the climate in the north-eastern Romania (North-East Region: Suceava, Neamt, Botosani and Iasi districts) has some undergone significant changes, which were important enough to catch our attention, in order to determine the consequences on the various components of the environment. In terms of temperature evolution, by working with average values, we have determined that the general trend is upward, with most values within the 1.5-2°C range in the stations we have taken into account. Winter was determined to be the season when the greatest number of significant changes has occurred in terms of temperature, while summer and spring are also characterized by an upward trend, but at a smaller scale as to the variation of the values. The fall season has had a contrasting evolution and in most locations the temperatures during this season show a downward trend. The duration of spring and autumn seasons has greatly reduced and the transition periods from the cold season to the warm one and vice versa have also become increasingly shorter during the last 50-60 years. Mutations have also occurred in the variation of other relevant thermal parameters, as well. The number of frosty nights, winter days and frosty days, respectively, has decreased in the last 50-60 years. The number of summer days and tropical nights has increased during the last decade, such weather occurring at present in the mountainous area, as well, which is a significant change, considered

the fact that such occurrences had not been reported during the previous decades. The dynamic of the atmosphere has been amplified and the violence of horizontal and vertical spatial transfer of air has increased, as a consequence. The frontal activity and especially the thermal convection are developing at higher rates and the precipitation is becoming increasingly more random and intense, as well as more difficult to predict. The dry periods occur for longer periods of time and are often interrupted by episodes of violent rainfall that generate devastating floods (2006, 2008, 2010). The climate and its current evolution have an immediate effect on the hydrology (reserves, volumes of drained water, flow parameters, etc.) and on the vegetation of the study area (the bioaccumulation of vegetal mass and the annual volume of growth). The hydrologic regime of the area shows a temporal dynamic similar to that of the climate in the same area. The rivers have fluctuating flow rates reflecting the increasing frequency of torrential rains. The description of the relationship climate-tree (studied in 8 points, 4 for spruce, 4 for beech tree) allowed us to identify the local climate parameters that influence the bioaccumulation processes. Concerning the thermal regime, in the case of the beech tree, the negative influence of the temperatures in April and June was documented in most analyzed series. Regarding the rainfall regime, the positive influence of rainfall during the spring (April and May) and summer months (June and July) on the bioaccumulation processes has been confirmed. In conclusion, we have stated that the auxological processes of beech trees located near the eastern boundary of the area have rhythm variations caused by the thermal fluctuations (during the first stage of the annual ring formation) induced by late frosts, as well as by the variations of the pluviometric regime, which amends the water reserve in ground early in the growing season. Any thermal (April and June) and rainfall (April-July) change has a strong impact on the development and evolution of this species. These intervals will be further taken into account in an attempt to demonstrate the impact of the current climate evolution on the biogeographic level.

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A prehistoric habitat model: the archaeological site from Adâncata, Suceava County

ABSTRACT: The archaeological site Adâncata (Adâncata village, Suceava County) is located on a slightly sloping plateau, corresponding to a cuest reverse. The field research was carried out between 2000-2005 and consisted of archaeological excavations in the Komariv tumulus necropolis, the only necropolis of its type which has been thoroughly investigated throughout Romania. The research included complex interdisciplinary investigations aimed at bringing out (emphasizing) the landscape features with potential for human habitation and identifying some anthropological features. In this respect, we proceeded with the geographical analysis of the region, using the following resources: topographical maps and schemes, orthophotos and field research (observations, measurements and GPS locations). All the results were integrated in the ArcGIS 9.2 geographical information system, which allowed us to analyze the space distribution of the geomorphometric parameters (hypsometry, slope, aspect) and the solar radiation, as well several topographical profiles through the Adâncata site, based on the digital elevation model.

The analysis of the field data and the spatial analyses carried out in the programme ArcGIS revealed the fact that the terrain in which the necropolis was placed has favourable geographical references for habitation: quasi-horizontal surfaces with a slight southern exhibition, the occurrence of shallow groundwater (3-5 m), easy access to food and wood resources. According to our investigations regarding the soil, the terrain was formerly covered by forest vegetation, with the inhabited area and tumulus building unfolding in glade spaces. This accounts for the location of the Komariv settlement – about 300 m NE from the necropolis; the archaeological excavations carried out here allowed us to identify some habitation structures, probably hut-like, without foundation and a significant amount of ceramics specific for Komariv culture.

48. Ferk Mateja[*] (poster)

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Paleofloods on karst poljes, Slovenia

ABSTRACT: In the Classical Karst region in western Slovenia several karst poljes are formed. In present hydrological conditions most of them are periodically flooded. On Cerknica and Planina karst poljes the usual annual floods cover the whole flattened floors and reach the depth of approximately 10 meters. On the other hand floods in the Pivka Basin are less extensive and cover usually just the lowest parts of the basin in front of the main ponor (better known as Postojna Cave) of the Pivka River. The extent of floods varies seasonally and annually. However, the maximal variability of duration and extent (meters a.s.l.) of present floods stays approximately within the range of ± 5 %. Investigations of the inflow and outflow areas of karst poljes and speleological and sedimentological analyses of the epiphreatic caves between karst poljes revealed that traces of early floods are preserved on essentially higher elevations than the recent floods reach. Loamy sediments that are deposited in surface and subsurface karst features were found up to 50 meters higher than the maximum present day piesometric level reaches. Radiocarbon dating of flowstone from Planina Cave showed that the last extreme floods most likely occurred around 6000 years BP. Due to preserved evidences in the morphology of karst poljes and loamy sediment remnants in caves it can be assumed that in the past (most likely Holocene) different hydrological processes were active, which could be a consequence of different climate conditions. Especially, as it seems that the much higher paleofloods occurred in a wider region and were not limited to a local phenomenon.

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Late Glacial and Holocene vegetation and environmental history of Lake Prespa

ABSTRACT: A new multiproxy record from Lake Prespa (40°46'-41°00' N, 20°54'-21°07' E), one of the largest and oldest lakes of the Balkan Peninsula, reveals substantial environmental changes on a regional scale. In this paper, we examine the Late Glacial and Holocene vegetation and environmental history using pollen analysis for the top 320 cm out of a 1575 cm sediment sequence. The age-depth model, based on radiocarbon dating and tephrochronology, indicates continuous sedimentation for the last 17.9 cal ka BP (cf. Aufgebauer et al., in review). During the Late Glacial, typical stadial conditions with open herb vegetation, composed of cold-resistant species, open forest of Pinus and isolated patches of Abies and Quercus are recorded. The presence of oaks along with other deciduous trees suggest their survival likely in sheltered and favorable habitats (refugia). The increase of Pinus and the subsequent drop in herb values point at the expansion of pines at higher elevations and the possible formation of closed forest patches during the Bølling/Allerød chronozone. The coeval expansion of oaks and the increase of tree diversity suggest rising temperatures and/or an increase in moisture availability. A reversal to stadial conditions marked by the re-advancement of mountain-steppe herb vegetation and the decrease of trees characterize the Younger Dryas chronozone. Climate change during the Late Glacial/Holocene transition resulted in the expansion of mixed deciduous woodland dominated by the pronounced increase of Quercus at the expense of herb vegetation. An abrupt short-lived reversal marked by a distinct increase in Artemisia and a subsequent drop of tree percentages can be associated with the 8.2 ka cal BP cooling event documented clearly in the sedimentological and geochemical proxies (cf. Aufgebauer et al., in review). Regional vegetation recovers fast, returning to values preceding the perturbation and herbs retreat. Consequently, the mixed deciduous forest expands and diversifies. The continuous presence of Mediterranean species, such as Pistacia and Phillyrea, points at higher mean annual temperatures as well as rising winter temperatures during the early Holocene. Increasing anthropogenic activity including deforestation, grazing and agriculture account for the rising herb percentages during the late Holocene. The appearance of walnut trees and the expansion of cereals and other anthropogenic indicators suggest the intensification of agriculture in the lowlands surrounding the lake and can be traced back to 2.7 cal ka BP. **Keywords**: *Lake Prespa, Balkans, Eastern Mediterranean, Late Glacial, Holocene, pollen analysis, palaeoecology.*

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The potential of luminescence signals from polymineral fine grains for dating Romanian loess

ABSTRACT: The loess-palaeosol sequence near Mircea Voda (SE Romania) is one of the most complete palaeoclimate archives in Romania. Samples collected from this sequence were predominantly used in our continuous investigations into the potential of luminescence dating for establishing a reliable chronology for Romanian loess-palaeosol sequences. In this paper we focus on luminescence signals from polymineral fine grains. Infrared stimulated luminescence (IRSL) and post-IR blue stimulated luminescence signals (UV detected) are investigated using a modified single aliquot regenerative-dose protocol (double SAR). This protocol allows the observation of two luminescence signals in a single SAR cycle: one IRSL signal that should sample most of the feldspathic component from the mineral mixture and a blue-OSL signal (post-IR OSL) expected to be dominated by the quartz component. SAR built-in checks and anomalous fading measurements are discussed for both signals in order to describe their stability. Fading measurements indicate a feldspar contribution to the post-IR OSL signal. Nevertheless, a generally good agreement was obtained between the two sets of ages and the fine-grained quartz OSL ages obtained by Timar et al. (2010). These results support recently reported observations that the fading correction of Huntley and Lamothe (2001) may provide accurate results even for samples older than 50 ka. They also indicate that the double SAR protocol might be a useful tool for obtaining reliable age results for loess deposits in Romania without chemically separating the quartz fraction from the polymineral mixture, therefore allowing for a faster sample preparation.

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Lateglacial and Holocene distribution of *Pinus Cembra* in the Romanian Carpathians

ABSTRACT: The relict populations of Swiss stone pine (Pinus cembra) from the Romanian Carpathians are very important because their haplotypes show higher variation than those belonging to populations from the Alps, as recent molecular genetics studies have proved (Belokon et al. 2005, Höhn et al.2005, 2009, Gugerli et al.2009, Casalegno et al. 2010). This suggests a postglacial re-colonization of the Alps from Carpathian glacial refugia. The present distribution of P. cembra in Romania is drawn in its latest distribution maps (Ulber et al. 2004, Blada 2008). Currently, Blada (2008) reports it from several ranges of the Carpathians: Rodna, Calimani, Bucegi, Fagaras, Iezer-Papusa, Cindrel, Sureanu, Parang, Lotru, Latorita, Retezat, Tarcu, Godeanu. In most of them P. cembra has an insular presence. Cited in the Maramuresului Mts. in the beginning of the 20th century (Fekete & Blattny 1913), P. cembra has not been found recently in the region, even though it grows north of these mountains in Ukraine. Its current

absence in some mountain ranges from the Romanian Carpathians is linked to the massive clear cuttings of dwarf stone pine (*Pinus mugo*) for economical purposes, such as the extraction of active principles used in the pharmaceutics. The clear cuttings of *P. mugo* and *P. cembra*, combined with fires on extended areas, have also been intensely used in the last century in order to enlarge pastures. The presence of *P. cembra* in the Romanian Carpathians has been proved by pollen analysis even in locations that are not cited in botanical literature, e.g. Apuseni, Poiana Rusca, Maramuresului Mts. Its presence in pollen diagrams from Lateglacial/Postglacial ages is not very strong, suggesting small, isolated populations, similar to the present situation. We consider that the restricted distribution of P. cembra in the Romanian Carpathians compared to the Alps is mainly caused by the climate, as we know that an ecological requirement of the species is relatively high humidity (U=3).