

ROMANIAN ASSOCIATION OF GEOMORPHOLOGISTS

REVISTA DE GEOMORFOLOGIE

SPECIAL ISSUE 1

**PROCEEDINGS OF THE 39TH ROMANIAN NATIONAL SYMPOSIUM
ON GEOMORPHOLOGY**

Iași, 19-21 September, 2024

EDITURA UNIVERSITĂȚII DIN BUCUREȘTI



BUCHAREST UNIVERSITY PRESS

2024

Revista de Geomorfologie Special Issue 1/2024

Editors:

Mihai Niculiță, Nicușor Necula, Alexandru Ioan Cuza University of Iași, Romania

Mirela Vasile, University of Bucharest, Romania

Editorial Board:

Achim Beylich, Geological Survey of Norway

Armelle Decaulne, Université de Nantes, France

Aurel Perșoiu, Institute of Speology Emil Racovita, Romania

Dan Dumitriu, Al I Cuza University of Iași, Romania

Daniel Germain, Université du Québec à Montréal, Canada

Dănuț Petrea, Babeș Bolyai University of Cluj-Napoca, Romania

Floare Grecu, University of Bucharest, Romania

Florin Pendea, Lakehead University, Orillia, Canada

Florin Tătui, University of Bucharest, Romania

Hans-Balder Havenith, Université de Liège, Belgium

Ian Evans, Durham University, United Kingdom

Jean-Philippe Malet, Université de Strasbourg, France

Laura Comănescu, University of Bucharest, Romania

Lucian Drăguț, West University of Timisoara, Romania

Marta Jurchescu, Institute of Geography, Romania

Mauro Soldati, Università degli Studi di Modena e Reggio Emilia, Italy

Mihai Micu, Institute of Geography, Romania

Mihai Niculiță, Al I Cuza University of Iași, Romania

Mircea Voiculescu, West University of Timisoara, Romania

Nicolae Cruceru, Institute of Speleology Emil Racovita, Romania

Olimpiu Pop, Babeș Bolyai University of Cluj-Napoca, Romania

Paola Reichenbach, Istituto di Ricerca per la Protezione Idrogeologica, Consiglio Nazionale delle Ricerche, Italia

Petru Urdea, West University of Timisoara, Romania

Piotr Gebica, University of Rzeszów, Poland

Philip Deline, Université de Savoie, France

Sandu Boengiu, University of Craiova, Romania

Sipos Gyuri, University of Szeged, Hungary

Sunil Kumar De, North Eastern Hill University, India

Zofia Raczowska, Institute of Geography and Spatial Organization, Poland

Technical Board:

Journal manager: Florin Tătui, University of Bucharest, Romania

Layout editor: Sanda Roșca, Babeș-Bolyai University, Cluj-Napoca, Romania

Proofreading: Florin Zăinescu, Răzvan Popescu, University of Bucharest, Romania

Copyeditor: Mirela Vasile, Research Institute of the University of Bucharest, Romania

Cover Photo: Mihai NICULIȚĂ

Address: Bd. Mihail Kogălniceanu 36-46 București, România,

Phone: 0760013746, E-mail: editura@g.unibuc.ro,

Online bookshop: <http://comenzi-eub.unibuc.ro>,

Web: www.editura-unibuc.ro

ISSN 1453-5068

ISSN online 2285-6773

©2024 Revista de geomorfologie. All rights reserved.

CONTENTS

ABSTRACTS

The geomorphologic study of Suceava Municipality territory

Mihai BARBACARIU, Marcel MÎNDRESCU 5

Extending natural hazard impacts: Huşnicioara landslide monitoring and disruptions on road transportation network (Mehedinţi County, Romania)

Sandu BOENGIU, Daniel SIMULESCU, Oana MITITELU-IONUŞ 6

Gully erosion mapping and analysis of gully distribution in the Jijia Hills, Moldavian Plateau, using high resolution spatial data and semi-automated techniques

Ionuţ-Costel CODRU, Lilian NIACŞU 7

An automated approach in estimating gully head erosion volume

Alex-Andrei CUVULIUC, Denisa-Elena URSU, Mihai NICULIŢĂ 8

Hydrodynamic Modelling of the Danube Delta: Present vs Natural Conditions

Răzvan-Laurenţiu DOGARU, Otilia-Andreea COTELIN, Florin ZĂINESCU, Florin TĂTUI, Florin MIRON, Ştefan CONSTANTINESCU 9

Estimating the changes of river bed levels using hydrometric data

Dan DUMITRIU 10

Riverbed dynamic evolution of the Suceava River

Iulian FALTINSCHI, Marcel MÎNDRESCU 11

Sectorization as a method of analysis in river dynamics. Case study Buzau River (Carpathian Mountains) and Rhumel River (Atlas Mountains)

Florina GRECU, Adriana MANEA-ILIE, Robert DOBRE, Mădălina TEODOR, Manel YAKHLEFOUNE, Carmen BIZDADEA 12

The role of landforms in shaping vegetation patterns in the Rarău Massif

Dan LESENCIUC, Andrei URZICĂ, Cristian SECU 13

Ruiniform landform from the mountainous Suceava River catchment

Ioan Adrian LUNGOCI, Marcel MÎNDRESCU 15

SWOT Data insights in the Danube Delta

Florin MIRON, Florin ZĂINESCU, Florin TĂTUI, Edward ANTHONY 16

EGMS Insights – A data management tool for processing and managing EGMS products

Nicuşor NECULA, Mihai NICULIŢĂ 17

Radiocarbon dating of landslides in dry climates - opportunities of using paleosoil organic matter

Mihai NICULIŢĂ 18

Snow avalanches in the Eastern Carpathians reconstructed with tree rings

Olimpiu POP, Ionela-Georgiana RĂCHITĂ, Iulian-Horia HOLOBĂCĂ, Mihai HOTEA, Horváth CSABA 19

New data for the cold screes from Romanian Carpathians

Răzvan POPESCU 20

Adaptation to coastal erosion on the Romanian Black Sea beaches – poor implementation of a necessary action	
Florin TĂTUI, Florin ZĂINESCU, Florin MIRON, Alfred VESPREMEANU-STROE	21
The challenge of classifying forms of linear erosion in Romanian geomorphological literature	
Denisa URSU, Mihai NICULIȚĂ.....	22
Identifying the main drivers of grassland degradation in the Moldavian Plateau	
Georgiana VĂCULIȘTEANU, Mihai NICULIȚĂ, Nicușor NECULA	23
Activity of deep-seated landslides in Buzău Mountains (Vrancea seismic region) based on ¹⁰Be surface exposure dating	
Mirela VASILE, Mihai MICU, Flavius ȘÎRBU, Daniela PASCAL, ASTER Team	25

The geomorphologic study of Suceava Municipality territory

Mihai BARBACARIU^{1*}, Marcel MÎNDRESCU¹

¹Department of Geography, Faculty of History and Geography, "Ștefan cel Mare" University of Suceava, Universitatii St. 13, 720229 Suceava, Romania

*Correspondence to: Mihai BARBACARIU; e-mail: mihaimihai464si@gmail.com

The present research aims to identify and present the current geomorphological processes on the territory of Suceava municipality. Thus, in the perimeter of Suceava municipality there is a multitude of lands degraded by the current geomorphological processes (pluvio-denudation and mass wasting). The pluvio-denudational processes studied are sheet erosion and rill erosion. In the case of land surfaces affected by sheet erosion, they are located on hillslopes with fairly small slopes (under 4° on average), in the extremes of the studied territory: in the southern part (near the Tătărași neighborhood), in the northeastern part (in the area of Mănăstirii Hill), but also in the northwest (around Lake Dragomirna). Rill erosion acts on considerably smaller surfaces, the resulting forms being located in the Burdujeni district, in the perimeter of Viei and Mănăstirii Hill, where they develop mainly on slopes with average inclinations of 7-8°, but there are also some torrential formations, which developed in areas with slopes of more than 20°. They have average lengths of 60 meters, average widths of 6-7 meters and average depths of 2-3 meters. All torrential formations are currently plugged and stabilized. The gravitational processes observed on the territory of Suceava municipality and addressed in this work are soil creep and landslides. Lands degraded by the action of soil creep were identified on the northwestern slope of Dealului Viea, but also of Dealului Mănăstirii, where it is more developed, consisting of terraces of approximately 30-40 cm and accentuated by flocks of sheep, which transits the perimeter. Regarding landslides, the areas most affected by these processes over time were mapped, but we were also interested in their effects on homes (houses + annexes) and communication routes. The territory where the most land displacements have been recorded over time, in the municipality of Suceava, is the Șeptilici Coast, located between the streams Șcheia and Târgului, where with excessive urbanization (the appearance of heavy and intense traffic, the construction of buildings, damage to water pipes) a series of such processes were registered, started but also documented with the 1900s. Aspects related to the largest area degraded by landslides in the municipality of Suceava (the northwestern slope of the Mănăstirii Hill), but also of an older landslide (northwestern slope of Viei Hill). Finally, we made a geomorphological map of the studied territory and also offered a range of solutions for controlling and reducing the presented geomorphological processes (e.g. contour crops, agricultural terraces, chicanes, slope drainage systems, terraces with retaining walls, gabions, etc.).

KEYWORDS geomorphological processes, land degradation, pluvio-denudation, mass wasting, sheet erosion, rill erosion, soil creep, landslides

Extending natural hazard impacts: Huşnicioara landslide monitoring and disruptions on road transportation network (Mehedinţi County, Romania)

Sandu BOENGIU^{1*}, Daniel SIMULESCU¹, Oana MITITELU-IONUŞ¹

¹Department of Geography, Faculty of Sciences, Craiova University, Al. I. Cuza St., No. 13, 200585, 1100 Craiova, Romania

*Correspondence to: Sandu BOENGIU; e-mail: sboengiu@central.ucv.ro

Disruptions caused by landslides on transport systems are quantified in direct (physical) and indirect (socio-economic) losses. The present study concerns the landslide produced on May 24, 2016, within the radius of Huşnicioara commune (Mehedinţi County) which destroyed the road network in the area, complicating traffic between Cerneţi and Prunişor localities, and blocking access to Oprăneşti village. The landslide and the associated processes affected both the roadway, embankments and all the other elements previously built to stabilize the slopes, collect rainwater, combat and mitigate erosion (cassettes, retaining walls, concrete ditches, etc.). The greatest damages were caused to 607A county road over a length of 443 m, the 17A communal road over a length of 131 m and the local electric transportation network (by the collapse of the poles supporting the electric cables).

The GPS monitoring of the landslide was done through field measurements carried out between 02-16 June 2016 using the South S82-T GPS. The collected data were processed with the help of ArcGIS 10.5 software, obtaining the numerical model of the landslide, the slope and slope orientation maps, the soil texture map and land cover/use map. With the help of these data, the landslide susceptibility map of the affected and limitrophe area was obtained. Statistical geospatial data were subsequently obtained annually to see the evolution of the landslide.

The results of field measurements were validated with specialized literature and thematic maps of the physical-geographical conditions in the affected area, finding that the road network was completely destabilized, resulting in the impossibility of restoring it on the current site. In this sense, measures were proposed to stabilize the terminal part of the landslide by building retaining walls (dry stone and concrete walls), in order to stabilize the landslide.

The importance of the study consisted in the fact that the documentation produced was used by the competent regional authorities. Thus, one of the solutions, which presented the lowest risk and vulnerability, was taken over by the Mehedinţi County Council, which constructed a detour through the villages of Valea Copcii-Dedoviţa Veche-Marmanu in order to reopen the county road between Cerneţi and Prunişor (607A). The second solution concerned the communal road 17A, by building a new variant, north of the old destroyed road, in an area with reduced susceptibility to landslides, to connect Oprăneşti village to the county road.

Considering the above, the study is part of research that reveals communities exposed to natural hazards and the need to solve their problems in a timely manner by the competent authorities.

KEYWORDS landslides, transport systems, socio-economic losses, road network, gps monitoring, retaining walls, detour construction, natural hazards, community exposure, field measurements

Gully erosion mapping and analysis of gully distribution in the Jijia Hills, Moldavian Plateau, using high resolution spatial data and semi-automated techniques

Ionuț-Costel CODRU^{1*}, Lilian NIACȘU¹

¹ Department of Geography, Faculty of Geography and Geology, "Alexandru Ioan Cuza" University of Iași, Carol I, 20A, 700505, Iași Romania

*Correspondence to: Ionuț-Costel CODRU; e-mail: codruionutcostel@gmail.com

The Moldavian Plateau is one of the most affected relief units in Europe when it comes to gully erosion. The Jijia Hills is one of the largest subunits of the Moldavian Plateau and one of the most affected by this form of erosion. Although an inventory of gullies was previously conducted by Maria Rădoane and her collaborators in the years 1990-1999, the emergence of new spatial data, such as high-resolution digital models derived from LiDAR point clouds, more advanced GIS software, and free access to these in recent years, has triggered the need to create a new, more precise inventory that reflects the current situation. This work does not aim to challenge the results obtained so far in this field, but rather to update them using more detailed spatial data, more advanced software and semi-automated inventory techniques that can provide much more accurate results regarding the number of gullies, their distribution, and volume. Results were obtained regarding the gully index, gully density, statistics on gully surface area, the proportion of forested gully areas, the distribution of gullies by soil type, gully volume, and the average gully depth.

KEYWORDS gully erosion, inventory, spatial data, LIDAR point clouds, GIS software

An automated approach in estimating gully head erosion volume

Alex-Andrei CUVULIUC^{1*}, Denisa-Elena URSU¹, Mihai NICULIȚĂ¹

¹ Department of Geography, Faculty of Geography and Geology, "Alexandru Ioan Cuza" University of Iași, Carol I, 20A, 700505, Iași Romania

*Correspondence to: Alex-Andrei CUVULIUC; e-mail: cuvuliucalexandrei@gmail.com

The study proposes a new methodology for estimating the volume of gully head erosion using high-resolution datasets obtained through LiDAR technology and/or Structure from Motion (SfM), along with satellite images from Google Earth archives and orthophotos. Manual extraction of the boundaries of four active reservoir bottom gullies was performed across three different time periods: for 2003 – the boundaries were extracted from orthophotos; for 2012 – a high-resolution digital elevation model (0.5 m) derived from LiDAR data was utilized; for 2019 – the satellite images from Google Earth and orthophotos were employed. With the topographical data from 2012, a Geographic Information System (GIS) methodology was developed to estimate the eroded volume for the time periods 2003-2012 and 2012-2019. The reconstruction of the 2019 topography was achieved by interpolating the gully boundary and the centerline of the boundary, maintaining the shape of the gully head from 2012. By using a high-resolution digital elevation model from 2019 obtained through SfM, the estimated volume was compared with the actual volume, proving that the methodology is robust enough to be applied to the data from 2003.

The automation of this process was implemented in Python, resulting in a package that includes various classes and functions for estimating the volume of the aforementioned gullies. The package utilizes several libraries: GeoPandas for spatial operations and data handling, Ruptures for identifying the boundary between the gully head and the channel along the flow path profile, and Centerline for generating the centerline of the polygons. Additionally, various tools from the SAGA GIS program were employed in a Python environment. Future work aims to extend this methodology to hillslope gullies, to develop a Graphical User Interface (GUI) to assist users in applying this package, and optimize the created algorithms.

KEYWORDS gully head, erosion, automation, Python

Hydrodynamic Modelling of the Danube Delta: Present vs Natural Conditions

Răzvan-Laurențiu DOGARU¹, Otilia-Andreea COTELIN¹, Florin ZĂINESCU^{1,2}, Florin TĂTUI¹, Florin MIRON¹, Ștefan CONSTANTINESCU¹

¹Faculty of Geography, Bucharest University, Bucharest, 1 Bd. N. Bălcescu, Romania

²Aix-Marseille University, CEREGE, Europôle Méditerranéen de l'Arbois, France

Correspondence to: Răzvan-Laurențiu DOGARU; e-mail: razvan-laurentiu.dogaru@s.unibuc.ro

In the last 60 years, agricultural works and intense exploitation of the natural resources have shaped the Danube Delta that we see today. Presently, 2500 Km of dikes decreased the connectivity of the delta plain and are used to protect human activities from floods. Moreover, *channelization of water for transport and fisheries* and *dredging of the main branches* have altered the *water flow* and, together with it, the sediments that are crucial in keeping a resilient delta in the face of climate change and sea level rise. In an attempt to understand the details of the hydrological factors that play in the area of the Danube Delta, we have set up a detailed and complex water flow simulation using *Mike21 by DHI* that encompasses the fluvial and marine delta from the apex at Isaccea to the mouths of the Danube. For this objective, we have created a flexible mesh simulation which supports variable element sizes covering canals as small as 10m and which allows visualizing the effects of dikes and channels in the overall hydrosystem. We analyze two different time periods of the Danube Delta: *pre 1960* (a delta in which human involvement is minimal and little to no dikes and channels are built) and *contemporary conditions* (a large area of the Danube Delta is covered in agricultural lands that are being isolated with a complex system of dikes and channels to transfer the water to a flood zone). Validation was done using *satellite imagery and altimetry* that can show the flooded areas, together with the *water elevation* compared to the absolute zero sea level. By the end of this study, we plan on having a fully functional digital twin of the Danube Delta.

KEYWORDS hydrology, delta simulation, scenarios, satellite altimetry

Estimating the changes of river bed levels using hydrometric data

Dan DUMITRIU^{1*}

¹ Department of Geography, Faculty of Geography and Geology, "Alexandru Ioan Cuza" University of Iași, Carol I, 20A, 700505, Iași Romania

* Correspondence to: Dan DUMITRIU; e-mail: dndumitriu@yahoo.com

The analysis of the temporal change of channel bed levels revealed that over short term, major flood events represent main control factor. Whereas the behavior of channel bed level change varied at each station, three evolution patterns could be distinguished depending on the reference year: (i) a category where channel degradation was nearly continuous; (ii) another one where initial aggradation of the channel bed occurred, ensued by continuous degradation, without recovery of the initial state, and (iii) a group with oscillating aggradation-degradation evolution resulting in the eventual recovery of the initial state.

The short-term average deepening rate for analyzed channel beds was 2.2 cm/yr, comparatively much higher than the rates determined elsewhere in the Carpathians. The elevated values documented for the rivers from the central area of the Eastern Carpathians can be attributed to two major traits: the peak activity exerted in this area by the retrograde cyclones of the Black Sea which resulted in a higher flood event frequency and the relative vicinity of the seismic area of Vrancea which is reflected in the high deepening rates of channel beds on the long-term (Dumitriu, 2019). Channel bed level changes were ranked in two categories (acute and chronic), depending on which the recovery time varied in relation to these shifts. Thus, the recovery time for "acute" changes ranged between one and nearly 10 years, whereas in the case of "chronic" changes the recovery time was one year at most. While over long term the evolution trend of channel level is highly sensitive to environmental controls shifts and anthropogenic influence, on short term flood events drive the direction and intensity of bed elevation adjustments.

KEYWORDS Bed elevation; flood; channel bed level change; recovery time; Eastern Carpathians

Riverbed dynamic evolution of the Suceava River

Andrei FALTINSCHI^{1*}, Marcel MÎNDRESCU¹

¹Department of Geography, Faculty of History and Geography, "Ștefan cel Mare" University of Suceava, Universitatii St. 13, 720229 Suceava, Romania

* Correspondence to: Andrei FALTINSCHI; e-mail: faltinsky123@gmail.com

This work provides an in-depth analysis of the morphological changes that the Suceava River has undergone over the course of more than 150 years. By utilizing a variety of data sources, including historical maps from 1869-1887, orthophotoplans from 2006 and 2011, as well as satellite imagery from 2021, this study tracks the evolution of key geomorphological parameters such as minor and major channel widths, sinuosity, and braiding indices.

The Suceava River, located in northeastern Romania, has been influenced by a combination of natural hydrological events and human interventions, including deforestation, agricultural activities, and urbanization. The study reveals that over time, the river's morphology has been shaped by significant fluctuations in its flow patterns, sediment transport, and channel dynamics. These variations are reflected in the widening and narrowing of the riverbed, changes in its sinuosity, and the degree of channel braiding.

Between 1869 and 2021, the river experienced periods of increased fluvial activity, characterized by significant alterations in channel dimensions and a complex interplay between erosion and deposition processes. For instance, during certain periods, such as the late 19th and early 20th centuries, the river's channels expanded significantly, while in other periods, such as in 2006, there was evidence of stabilization and narrowing in certain segments. The braiding index, which measures the complexity of channel splitting, and the sinuosity index, which tracks the degree of meandering, both showed notable fluctuations, further illustrating the river's dynamic behavior over time.

The research also emphasizes the impact of anthropogenic factors, such as land use changes and infrastructure development, on the river's evolution. By comparing different time periods, the study provides insights into how human activities and urbanization on the river banks have influenced the river's natural processes, particularly in terms of sediment load and flow regime changes.

In conclusion, this work highlights the importance of sustainable river management in the context of ongoing human impact and climate change. The findings of this research contribute valuable knowledge to the broader field of river morphology and provide practical guidance for future efforts to manage and protect the Suceava River and similar river systems.

KEYWORDS morphological changes, historical maps, satellite imagery, sediment transport, braiding index, sinuosity index

Sectorization as a method of analysis in river dynamics. Case study Buzau River (Carpathian Mountains) and Rhumel River (Atlas Mountains)

Florina GRECU^{1*}, Adriana MANEA-ILIE², Robert DOBRE², Mădălina TEODOR², Manel YAKHLEFOUNE³, Carmen BIZDADEA¹

¹University of Bucharest, Faculty of Geography, Bucharest, Romania

²University of Bucharest, Faculty of Geography, Bucharest, Romania and Ministry of Transport and Infrastructure, Bucharest, Romania

³Department of Urban Techniques and Environment, Institute of Urban Techniques Management, University of Constantine3, Constantine, Algeria.

* Correspondence to: Florina GRECU; e-mail: greco@geo.unibuc.ro

The river bed dynamics parameters sectorization, with development in several geographical units is included in the methodology with data that can be compared. On the Buzău River the external Subcarpathian sector (upper and the middle course) was analyzed and for the Rhumel river it was taken into the analysis of the upper and middle courses.

The diachronic analysis of the bed dynamics was carried out on the Buzău River, the upper course, respectively the sector between the source and its confluence with the Crasna River, which is approximately 52 km long. Thus, from a geographical point of view the analyzed unit is included in the Curvature Carpathians, the subunits of the Ciucaș-Buzău Mountains and Clăbucetele Întorsurii focused on the meridian of 26 degrees and the parallel of 45.5 degrees.

In the case of the Buzău River, the sectorization used coincides with that made by other authors, for the sectors that take into account the large relief units. The subsectorization took into account hydro geomorphological characteristics of the Buzău River, especially morphometric and morphographic characters dependent on the dynamics and evolution of the river.

Although the length of the sectors has different values, the morphological aspects are well highlighted. The shortest sector, sector A, of about 8 km, presents a valley with terraces, with a meadow that widens downstream, towards the entrance to the Cislau depression. In sector B, of about 12 km, the meadow widens, the Buzau River, through the confluence with the Bisca, at high flow and reduced slope, meanders, but with turns of reduced radius, proving a recent activity. Downstream of Badila, the valley narrows, being the most representative subsector for the transversal character of Buzău River in the external Subcarpathian area. Subsector D, downstream from the confluence with Balaneasa to Berca and further the valley widens, evolves on the alluvial cone that opens towards the Romana Plain until the confluence with Calnaul, downstream from the town of Buzau. The map of superficial formations, shows the diversity of formation types resulting from the dynamics of the Buzau bed, tributaries and neighboring slopes.

KEYWORDS river dynamics, morphology, diachronic analysis

The role of landforms in shaping vegetation patterns in the Rarău Massif

Daniel LESENCIUC^{1*}, Andrei URZICĂ¹, Cristian SECU¹

¹ Department of Geography, Faculty of Geography and Geology, "Alexandru Ioan Cuza" University of Iași, Carol I, 20A, 700505, Iași Romania

* Correspondence to: Daniel LESENCIUC; e-mail: dlesenci@yahoo.com

The Rarău Massif belongs, from a morphostructural point of view, to the crystalline-Mesozoic zone of the Eastern Carpathians, being a very well-individualized mountainous area in relation to the neighboring mountain units. The maximum altitude is 1651 m at the Rarău Peak, and the minimum is 590 m on the Moldova Valley, totaling an area of 165 km².

The aim of this work is to highlight a series of particularities of the vegetation distribution within this area, in relation to the specific characteristics of the relief. The influence of morphometric characteristics related to altitude and slope is noticeable, as well as a series of morphogenetic characteristics in relation to the presence of limestones and dolomites, and the distribution of the periglacial scree area, usually located at the base of the carbonate cliffs.

The methodology used in this context was based on obtaining morphometric characteristics by developing a digital terrain model and compiling hypsometric, slope, and aspect maps. Over these, cartographic materials with the distribution of different forest and secondary grassland associations were overlaid. The delimitation of forest associations was carried out according to forest management plans, and the boundaries of secondary grasslands were updated based on recent satellite imagery.

Results indicate that the distribution of forest vegetation in the Rarău Massif deviates from the typical altitudinal zonation found in the Eastern Carpathians. The most well-developed is the spruce forest (*Picea abies*), which occupies 68% of the total forest area of the Rarău Massif, with development from 640 m to 1651 m. The extensive development of the spruce forest level is a consequence of the position of the Rarău Massif in the central area of the Eastern Carpathians, in relation to its eastern and western extremities. Another explanation is of an anthropogenic nature, as large-scale plantations were carried out during the communist period, with spruce as the main specie

In terms of surface area, spruce-beech mixed forests (*Picea abies* – *Fagus sylvatica*) rank second, occupying 19% of the massif's total forest area. These forests predominantly develop in the southeastern and southern sectors between 670 and 1340 m. Within this perimeter, the Slătioara Virgin Forest Reserve is located, one of the few virgin forests in Romania.

Other forest associations such as silver fir-spruce (*Abies alba* – *Picea abies*), silver fir (*Abies alba*), beech (*Fagus sylvatica*), and Scots pine-birch (*Pinus sylvestris* – *Betula pendula*) occupy smaller areas, totaling 13% of the total forest area. It is noteworthy that beech forests develop in the southeastern sector of the massif between altitudes of 835 and 1318m on south-facing slopes, while the Scots pine-birch forest association develops in close relation to the porphyroid gneiss cliffs of Pietrosu on the slopes of the Bistrița Gorge at Zugreni, between the elevation of 760 and 950 m.

Forests cover 63.5% of the Rarău Massif, with the remaining 36.5% being secondary grasslands formed through natural or human-induced deforestation. There is a clear relationship between deforested areas and altitude, with 78% of the area occupied by secondary grasslands located below 1000 m, in the vicinity of human settlements situated in the Moldova, Bistrița valleys and their tributaries. Areas with slopes less than 22 degrees

have been particularly deforested, as they were suitable for agricultural use as hayfields and pastures. The terraces of the main valleys, adjacent valley slopes, and slopes located in the axis of the Rarău syncline were targeted, totaling 84% of the total deforested area. The remaining 16% of the total area of secondary grasslands overlaps with slopes gradient greater than 22 degrees.

It is remarkable that, over time, locals have preferentially deforested areas of forest below 1000 m, especially on slopes with gradients less than 22 degrees, and near human settlements. At the same time, slopes with steeper gradients, as well as those with gentler slopes but numerous rock fragments (micro and macro scree), have remained well-forested.

The relief also favors the development of mountain pine (*Pinus mugo*) vegetation, found within the Pietrele Doamnei reserve at altitudes between 1510 and 1625 m. In the Rarău Massif, there is no subalpine subzone, and coniferous forest reaches a maximum altitude of 1651 m. The mountain pine can be considered strictly dependent on the periglacial relief constituted by the macro scree at the base of Pietrele Doamnei. The mountain pine in the Rarău Massif is a pioneer species that has established itself on areas with poorly developed soil. As organic matter accumulates on these areas occupied by mountain pine and soil forms, the pioneer species will be replaced by spruce.

Currently, it can be observed that the relief, in various forms, strongly conditions the distribution of forest and herbaceous associations in the Rarău Massif.

KEYWORDS vegetation distribution, morphometric characteristics, digital terrain model, forest associations, spruce forest, anthropogenic influence, secondary grasslands, deforestation

Ruiniform landforms from the mountainous Suceava River catchment

Ioan Adrian LUNGOCI^{1*}, Marcel MÎNDRESCU¹

¹Department of Geography, Faculty of History and Geography, "Ștefan cel Mare" University of Suceava, Universitatii St. 13, 720229 Suceava, Romania

*Correspondence to: Ioan Adrian LUNGOCI; e-mail: lungoci.i.adrian@gmail.com

The objective of this work is to identify, map, measure, describe and analyze the geomorphosites with scientific value and tourist potential in the upper catchment of the Suceava River. The isolated rocks and rocky assemblages in the mountain basin of the Suceava River, waterfalls and other types of rugged, spectacular relief with scientific value and tourist importance were taken into analysis. Starting from this premise, the work proposes a scientific, morphological, aesthetic, cultural, historical and touristic evaluation of the ruiniform landforms and morphological discontinuities (waterfalls, steep slopes, overhangs, etc.). In the context in which the ruiniform landforms has not been mapped and cataloged until this moment, its study becomes necessary to the geomorphology of the geographical area studied and for its touristic exploitation. Some arguments regarding the necessity of carrying out this study are: mapping the ruiniform landforms to give us an image of its size and magnitude, determining the type of rock, age, genesis, morphological aspect, typology, recent history, but also the tourist potential with the inclusion of historical information and data as well as toponyms.

Through the mapping carried out in the mountain sector of the Suceava River catchment, the inventory of geomorphosites has been improved and completed. Following the field research, the presence of a number of 42 isolated rocks or part of an ensemble, waterfalls, cobblestone pavements, to which a spatial delimitation was applied, being recorded data regarding geographical coordinates, altitude, hydrographic basin, dimensions, exposure, position relative to the valley and the axis of the interfluvium. The shape of these rocks from the upper part (rocks/eolopyclites), their size and position in the territory as well as the presence of erosion alveoli (tafoni type) can provide important paleoclimatic information regarding the mountain environment in the past. From a tourist point of view, these rocks are evaluated according to several attributes (scientific, aesthetic, historical and cultural).

KEYWORDS geomorphosites, tourist potential, rocky assemblages, morphological evaluation, mapping, isolated rocks, waterfalls, paleoclimatic information, scientific value, aesthetic attributes, historical significance

SWOT Data insights in the Danube Delta

Florin MIRON^{1*}, Florin ZĂINESCU², Florin TĂTUI¹, Edward ANTHONY²

¹ Faculty of Geography, Bucharest University, Bucharest, 1 Bd. N. Bălcescu, Romania

² Aix-Marseille University, CEREGE, Europôle Méditerranéen de l'Arbois, France

* Correspondence to: Florin MIRON; e-mail: florin.miron@s.unibuc.ro

Deltas are among the most dynamic ecosystems, shaped by complex hydrological processes driven by river discharges, which periodically flood the delta plain, bringing sediments, nutrients, and pollutants. Monitoring these processes is critical for understanding the functioning of these systems and their adaptation to climate change. The Surface Water and Ocean Topography (SWOT) satellite mission offers a novel approach to observing water surfaces with high spatial and temporal resolution, making it ideal for studying river deltas and coastal environments. It represents a significant advancement in satellite remote sensing by providing detailed 2D maps of altimetric data on surface water bodies at 100m resolution. SWOT is essential for monitoring river deltas because it can detect changes in water levels even beneath vegetation. This feature allows flood monitoring in locations that were previously unreachable because of dense reed marsh vegetation obscuring the water. Conventional techniques for estimating water levels usually depend on in-situ measurements, which have spatial limitations, whereas SWOT products permit the examination of water elevation globally. This study shows the potential of how SWOT data can revolutionize our knowledge of hydrological processes, especially in areas that are challenging to observe using conventional methods. We present an initial study conducted in the Danube Delta, where 1-year satellite data were validated with daily water level measurements collected at key locations such as Isaccea, Tulcea, Sulina, and Sfântu Gheorghe. This combination of satellite and in-situ data yielded a comprehensive dataset for studying hydrological processes. The initial validation of SWOT data against in-situ measurements revealed a high level of accuracy, demonstrating its potential for monitoring water levels and floods in the Danube Delta. However, care needs to be taken to correct and filter potential errors that are often prevalent on flat, highly reflective water bodies. Preliminary analyses revealed that SWOT data can help to inform models evaluating river-sea interactions along the Black Sea coast. This study presents the preliminary results of the first application of SWOT data in the Danube Delta, with a focus on flood extent and water levels.

KEYWORDS: Danube Delta, SWOT satellite, hydrology, floods, remote sensing

EGMS Insights – A data management tool for processing and managing EGMS products

Nicușor NECULA^{1,2*}, Mihai NICULIȚĂ²

¹Tulnici Research Station, “Alexandru Ioan Cuza” University of Iași, Romania

²Department of Geography, Faculty of Geography and Geology, “Alexandru Ioan Cuza” University of Iași, Carol I, 20A, 700505, Iași Romania

*Correspondence to: Nicușor NECULA; e-mail: neculanicusor93@gmail.com

European Ground Motion Service (EGMS) offers ground motion velocity and displacement measurements across the Copernicus Participating States. The millimeter-accuracy products comprise processed Sentinel-1 SAR images subjected to Multi-temporal Differential SAR Interferometry algorithms and are available for visualization and download. EGMS was developed in response to numerous requests from users for access to free InSAR data over Europe. The service is managed and implemented by the EEA, and it forms part of the CLMS portfolio. The EGMS provides an annual update of ground motion over the entire European territory, with a time series beginning in February 2015 and comprising full-resolution spatial data of ascending and descending orbits of the Sentinel-1 SAR mission. Access to the EGMS data facilitates a range of capabilities across various fields of interest, including monitoring critical infrastructure and buildings or complementing other methods for investigating and assessing slow-moving landslides, land subsidence, sinkholes, groundwater exploitation, and volcano activity. However, the biggest issue with these products is their management and downloading as easy-to-use spatial data, given they are provided as CSV files.

To overcome this problem, we introduce in this work the R-based EGMS Insights tool, which has been developed with the Shiny package and is available as a desktop application for the downloading, transformation, and exporting of EGMS products into customized geospatial ESRI shapefiles. The workflow consists of two main modules: (i) downloading the archives from the EGMS Explorer platform, data extraction and conversion to shapefiles, and (ii) data processing and computation of horizontal and vertical displacement components, the latter being still in development. The value of this service lies in its ability to enhance the user experience for the management of Multi-temporal Differential SAR Interferometry data across Europe. In particular, the EGMS Insights application allows users to also crop the EGMS products based on a region of interest (RoI). The application's user-friendly interface encourages the use and growth of potential users interested in the applications of EGMS data and interferometric products. Moreover, the second module's important capability is to extract the horizontal and vertical displacement components based on the ascending and descending InSAR data.

KEYWORDS InSAR data, ground monitoring, hazard assessment, ShinyR

Radiocarbon dating of landslides in dry climates - opportunities of using paleosoil organic matter

Mihai NICULIȚĂ^{1*}

¹Department of Geography, Faculty of Geography and Geology, "Alexandru Ioan Cuza" University of Iași, Carol I, 20A, 700505, Iași Romania

* Correspondence to: Mihai NICULIȚĂ; e-mail: mihai.niculita@uaic.ro

Landslide absolute dating is crucial for establishing long term temporal hazard, especially considering the climatic changes that might come in the near future. Landslides are a widespread phenomenon in the Moldavian Plateau today, but it seems that they were also in the past. Based on generalised landslide inventories that harvested high-resolutions DEMs and the relation of the landslide topography to archaeological sites with continuous occupation from Paleolithic times to present day, in 2016 and 2019 a relative age scheme was setup. This scheme is based on the general model of evolution of landslides during Lateglacial and Holocene. Despite the large variability of causal factors, but also a specific pattern of distribution of landslides related to the monoclinic structure and extension of cuesta scarp slopes, river incision before and after the last glacial maximum controlled the magnitude of landslide events. The glacial river incision triggered huge landslides, which evolved transgressively toward the ridges. The magnitude decreased during time, and the activity moved toward to present day scarps. Through this retrogressive evolution extensive compound and complex landslides appeared, covering entire hillslopes. Since many complex and compound landslides bodies contain pluri-stratified deposits of slid materials and buried soils we tested the usability of buried soil radiocarbon organic matter dating. Beside that, the Holocene aggradation of the floodplains, fossilized floodplain soils covered by landslides, where the method of soil dating was also tested. Soil organic matter appear in different fractions, with different ages, as an open system for carbon incorporation. When the soil is buried, the last organic material that is incorporated as plat material, will become the clock that shows when the landslide triggered. The biggest organic matter age also gives information about the soil age and formation, and when the soil is developed on a former landslide, will indicate an upper bound age for the landslide.

The results show that by dating multiple organic matter fractions upper and lower bounds of soil age can be established, thus revealing the age of the landslide that covered the soil, but also an upper bound for the landslide on which the soil developed. We managed to date landslides from the Bronze Age, to Roman period, Early Medieval and Modern period, but also confirm an Upper Pleistocene age. This approach is of practical importance regarding temporal hazard estimation, because the age can be transferred to similar geomorphologic situations which are mapped, and generalized across landslide inventories.

KEYWORDS fossil soils, hillslopes, floodplains, Holocene, Upper Pleistocene

Snow avalanches in the Eastern Carpathians reconstructed with tree rings

Olimpiu POP¹, Ionela-Georgiana RĂCHITĂ¹, Iulian-Horia HOLOBĂCĂ¹, Mihai HOTEĂ¹, Horváth CSABA¹

¹Laboratory of Dendrochronology, Faculty of Geography, Babeş-Bolyai University, Romania

* Correspondence to: Olimpiu POP; e-mail: olimpiu.pop@ubbcluj.ro

Snow avalanches (SAs) represent a widespread phenomenon in the Carpathians, being one of the main debris transfer processes on steep slopes of alpine and subalpine belts in this high-mountain areas. In remote areas, where SA activity is poorly documented, the SA hazard assessment is hampered by the lack of information regarding the past frequency of SA events. This is the case in Eastern Carpathians, where the archival records of the past SAs are missing. As the recreational activities in high-mountain areas have increased in the last decades, there is an urgent need to establish an accurate SA hazard zonation. In this context, we aimed to improve our knowledge about the history of snow avalanches in the Carpathians by using tree-ring dating methods. For this purpose, multiple avalanche paths located in the highest mountain areas of the Eastern Carpathians have been investigated. Both coniferous and broadleaved trees disturbed by the past SAs were sampled within the selected paths. Growth anomalies (e.g., scars, tangential rows of traumatic resin ducts, compression wood and growth suppression sequences) caused by the mechanical impact of SAs were identified within annual rings of disturbed trees and served to reconstruct spatial extent, frequency, and return periods of SAs within each of the investigated paths. A better understanding of snow-avalanche history, which may be gained through dendrochronological reconstructions, will further contribute to a snow-avalanche hazard assessment in the studied areas and improve the knowledge of the avalanche regime at a regional scale.

KEYWORDS tree-ring reconstruction, snow avalanches, Eastern Carpathians

New data for the cold screes from Romanian Carpathians

Răzvan POPESCU¹

¹Faculty of Geography, University of Bucharest, Romania

*Correspondence to: Răzvan POPESCU; e-mail: razvan.popescu@geo.unibuc.ro

Low and mid altitude screes are vegetation free, openwork and steep landforms that reflect past colder conditions. They were formed by rockwall weathering and accumulation of the resulting rock fragments at the slope foot. Some of these talus slopes display a unique environment characterized by overcooled ground conditions with cold adapted species of plants and insects. Previous investigations revealed that chimney effect is the main cause of cold conditions. It manifests through cold air adsorption in the winter and evacuation in the summer in the lower parts complemented by warm air evacuation in the winter in the upper parts. Its controlling factors are insufficiently understood but it is obviously related to the density difference between cold and warm air from outside and inside the talus and the assumed high porosity of the deposits. In Romania, Detunata Goală is the only known cold scree with potential extrazonal permafrost in spite of well above 0°C mean annual air temperature. The aims of this work are to better understand chimney circulation in cold screes and to verify if such landforms can be found in Romanian Carpathians or Detunata is rather unique.

We installed ultrasonic anemometer in Detunata site and we present here almost three years of high resolution and high accuracy air movements data. The data basically reveal how thermal thresholds for air circulation reversal increases throughout the warm season indicating probably the gradual warming of the talus interior. For the second objective, we inventoried via Google Earth openwork talus slopes in the forest altitudinal level from Romanian Carpathians and checked field evidences, thermal conditions and internal structure of several talus slopes from Jieț Valley (Parâng Mountains) and Buila Mountains in order to detect cold conditions and chimney effect. We found clear signs of thermal anomaly in the granitic taluses from Parâng but normal conditions in the limestone screes from Buila. Drone thermal pictures taken at the beginning of the cold season revealed nicely the outlines of the warm air evacuation areas while ERT survey helped determining the talus depths.

KEYWORDS cold screes, extrazonal permafrost, low altitude permafrost, chimney effect

Adaptation to coastal erosion on the Romanian Black Sea beaches – poor implementation of a necessary action

Florin TĂTUI, Florin ZĂINESCU, Florin MIRON, Alfred VESPREMEANU-STROE ²

¹Faculty of Geography, University of Bucharest, 1st N. Bălcescu Blv., Bucharest, Romania

²Aix-Marseille University, CEREGE, Europôle Méditerranéen de l'Arbois, France

* Correspondence to: Florin TĂTUI; e-mail: florin.tatui@geo.unibuc.ro

The Romanian Black Sea coast is a complex geographical area subjected to multifaceted challenges. It faces extensive environmental issues related to pollution, eutrophication and biodiversity loss, problems shared across the wider Black Sea basin. Additionally, it grapples with coastal erosion that is primarily driven by human activities such as dam construction and coastal engineering works, which disrupt river and longshore sediment connectivity. 37% of the Romanian coast is retreating, especially the low-lying areas along the Danube Delta coast, while 43% of the entire coast is sensitive to erosional processes. Moreover, the recent analysis of the automatically extracted shorelines from satellite images showed an extension of erosional processes in the last three decades.

In this context, the present-implemented costly engineering works for adaptation to coastal erosion, yet necessary on specific areas, were implemented widely on the entire Southern Coast and created dissatisfaction among scientists, tourists and local stakeholders. Here we discuss the last 15 years history of preparation and implementation of this erosion management strategy and the implications of the related engineering works on coastal dynamics and beach safety. We argue that the extensive beach nourishment (creating excessively wide beaches), using unsuitable coarse sediment, changed the beach configuration and its morpho- and hydro-dynamic behavior, with steeper beaches and higher wave energy in the bathing areas. Moreover, the use of oversized hard protection structures (long perpendicular dykes) changed the nearshore currents circulation and enhanced rip currents formation on a wider spectrum of wave directions, creating conditions for decreased beach safety.

This urges for better communication and cooperation between coastal scientists, engineers, decision makers and public authorities for optimum management of coastal hazards on the Romanian coast.

KEYWORDS: coastal erosion, rip currents, coastal management

The challenge of classifying forms of linear erosion in Romanian geomorphological literature

Denisa URSU^{1*}, Mihai NICULIȚĂ¹

¹Department of Geography, Faculty of Geography and Geology, "Alexandru Ioan Cuza" University of Iași, Romania

* Correspondence to: Denisa-Elena URSU; e-mail: ursu.denisaelena@gmail.com

Classification is considered an initial and indispensable stage in developing a comprehensive understanding of any subject. Romanian geomorphological literature referring to research on forms of linear erosion currently faces issues due to non-standardized, incomplete, or scientifically unclear classifications. There is an abundance of sources proposing classifications for these forms of erosion based on the description and characterization of landforms and the observation of the impact of environmental factors on the emergence of various categories. In the absence of coherent and consistent classifications in both national scientific literature and in relation to international literature, the dissemination of conclusions, results, or comparisons between studies becomes inaccurate or impossible, thus slowing progress in researching the phenomenon.

Current classifications in Romanian scientific literature regarding forms of linear erosion are based on an unclear theoretical context and numerous less consistent definitions. Therefore, this paper aims to provide a synthesis study by reviewing and arguing the classifications formulated to date, supplemented by relevant mentions from international literature. In this context, the study will not only assess existing classifications but also propose a framework that integrates international perspectives to address gaps and inconsistencies in the current Romanian literature. The goal is to develop a unique and generic classification scheme for forms of linear erosion in Romania. Ultimately, the proposed classification scheme will provide a solid foundation for future research and practical applications in soil erosion management.

KEYWORDS classification, linear erosion, scientific literature

Identifying the main drivers of grassland degradation in the Moldavian Plateau

Georgiana VĂCULIȘTEANU^{1,2*}, Mihai NICULIȚĂ¹, Nicușor NECULA³

¹Department of Geography, Faculty of Geography and Geology, "Alexandru Ioan Cuza" University of Iași, Carol I, 20A, 700505, Iași Romania

²RECENT AIR (RA-10) Geography and Earth Physics Laboratory, Tulnici Research Station, Alexandru Ioan Cuza University of Iași, 627365 Tulnici, Romania

³Tulnici Research Station, Alexandru Ioan Cuza University of Iași, 627365 Tulnici, Romania

*Correspondence to: Georgiana VĂCULIȘTEANU; e-mail: georgiana.vaculisteanu@gmail.com

In the Anthropocene era, grassland ecosystems face constant stress from ongoing degradation driven by climate change and anthropogenic interventions. Globally, grasslands have never been seen as a priority, whether we refer to competent authorities who can make sustainable decisions or to isolated and individualized communities. From this perspective, this study identifies the current state of pasture degradation in the context of rudimentary management, which has been practiced for centuries and recently replaced through mismanagement practices typical for rural Romanian communities.

The Normalized Difference Vegetation Index has been widely used to identify grassland-related issues regarding the evolution of greening or browning trends. Starting from that, all the pasture areas from the Moldavian Plateau region affected by degradation were successfully identified by the NDVI products satellite derived from Landsat (30m), MODIS (250m), and PKU GIMMS NDVI, downloaded over seven years for Landsat, 24 years for MODIS, and 40 in the case of the AVHRR – MODIS fused images, available through the PKU GIMMS collection.

Starting from the Moldavian Plateau region and expanding towards the montane and submontane areas, the analysis aims to identify the NDVI trend, using the R greenbrown package within the R Core Collection through the Seasonal Trend Model (STM) and the Annual Aggregate Trend (AAT). The method has been applied to different land use types to exemplify the differences and similarities. Based on the NDVI trend change typology, fully triggered by a specific breakpoint recorded at a particular time during the time series, we could identify the possible driver found responsible for pasture degradation.

Overall, the results indicate a positive trend of vegetation vitality, with slight intrusions of negative examples. The climatic factor positively influences pastures, some of the main preoccupations addressed by anthropogenic interventions. Additionally, considering the particularities of the study area, three more drivers have been identified: geomorphological, geological, and hydrological.

The geomorphological factor has a visible imprint on grassland patterns since almost all the hilly grassland overlaps with areas affected by landslides or gullies, and the floodplain areas are affected by recurrent floods. The geological patterns have triggered some particular characteristics, such as the frequent insertions of salt content in the soil. The hydrological factor of the pastureland areas has been notably registered along the floodplains, where the water regime fluctuation constitutes the essence of the ecosystem dynamics.

In the current context of global climate change, with increasing anthropogenic impacts, the quality of existing resources in the Moldovan Plateau needs to improve due to poor management, attributed to the indifference of local authorities and a general lack of awareness and information. Following all the global trends in grassland management, the desirable solution counts on correct and appropriate mitigation of the problem based on sustainable solution improvement.

Thus, this study calls for taking all the necessary measures to conserve grassland areas, which are considered

natural treasures with vital functions for maintaining the global ecosystem balance.

KEYWORDS degradation, grassland degradation, NDVI, degradation drivers

Activity of deep-seated landslides in Buzău Mountains (Vrancea seismic region) based on ^{10}Be surface exposure dating

Mirela VASILE^{1*}, Mihai MICU², Flavius SÎRBU³, Daniela PASCAL^{1,4}, ASTER Team⁵

¹Research Institute of the University of Bucharest, Romania

²Romanian Academy Institute of Geography, Bucharest, Romania

³Advanced Environmental Research Institute, West University of Timișoara, Romania

⁴Horia Hulubei National Institute for R&D in Physics and Nuclear Engineering, Măgurele, Romania

⁵Aix-Marseille Univ., CEREGE, CNRS-IRD-Collège de France, Aix-en-Provence, France

* Correspondence to: Mirela VASILE; e-mail: mirela.vasile@geo.unibuc.ro

Landslides are frequent elements in the landscape of the Curvature Carpathians, bearing a significant importance in the dynamics of slope processes in the region, particularly in the context of hazard and risk assessment. Based on general morphology and morphometric indices, numerous high-magnitude processes (more than half of the presently-existing inventories) have been identified as relict or dormant deep-seated landslides, with estimated volumes of millions to tens of millions of cubic meters, as revealed by recent geophysical investigations in the area. Although these high-magnitude events have been outlined based on geomorphological mapping and geophysics, there is no certitude about their temporal occurrence, hindering the effort of establishing the environmental conditions that may or may not contributed to the trigger of these mass movements. Surface exposure dating by terrestrial cosmogenic nuclides has proved to be a useful tool in assessing the age of rock slope failures in European mountain areas. Based on this method, deep-seated landslides and deep-seated gravitational slope deformations from the Czech Flysch Carpathians, with similar litho-structural features as large areas of the Curvature Carpathians (e.g. the Paleogene flysch in the Buzău Mountains), have been shown to be highly-active during Mid- to Late-Holocene. Here we aim to provide preliminary data of absolute ages on four deep-seated landslides from the Buzău Mountains, using a total of 14 absolute ages derived from ^{10}Be terrestrial cosmogenic nuclides. Our preliminary results highlight Mid- and Late Holocene landslides activity (in terms of both first-time failures as well as reactivations), which we correlate with paleo-temperatures reconstructed from nearby Mocearu Lake, while two ages recorded outside this range could be attributed to Early Holocene. The potential implication of seismicity is also discussed in terms of more recent, historical time reactivations.

KEYWORDS deep-seated landslides, cosmogenic nuclides, Buzău Mountains, Holocene, absolute dating
