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Chairmen

Prof. Dr. habil. Eng. Mihai Emilian Popa
Prof. Dr. Eng. Cristian Mărunțeanu
Dr. Marin Palcu

PROGRAMME

Speakers	Title	Schedule
Popa, M. E., Mărunțeanu, C., Palcu, M.	Opening remarks	09.00 – 09.10
Dragomir, G. M.	Evaluating geotechnical properties of cohesive soils through spt and laboratory tests in Suceava Siret Motorway lot 4	09.10-09.25
Dragoș, A. G.	Implementing photogrammetry in archaeology for 3d modeling of ancient settlements	09.25-09.40
Lăcătuș, A.	Ammonoid collection from Deșli Caira section (North Dobrogea Orogen)	09.40-09.55
Livanov, O.	2023-2024 Magnetometry field campaign results	09.55-10.10
Mihalcea, V.	Considerations regarding Romania's leveling network	10.10-10.25
Pitea, F. S.	Taxonomy and paleoecology of Cenomanian corals from the Grădiștea Muncelului-Cioclovina region	10.25-10-40
Răuță, V.	Preliminary data on microfacies analysis of the carbonate succession from Deșli Caira (Northern Dobrogea Orogen), GSSP candidate for the base of the Middle Triassic	10.40-10.55
Stelea, L.	Seismic threats in the Gorj region: a geological and seismological perspective	10.55-11.10
Stoica, A.	Origin and significance of garnet from South Apuseni Neogene magmas: insights from trace element composition	11.10-11.25

Talmaciu, A.	Assessing the effectiveness of electrical resistivity tomography for subsurface investigation in a seashore karst setting	11.25-11.40
Tatoi-Niță, C. C.	Depositional models in the western part of the Dacian Basin. A case study from Oltenia	11.40-11.55
Mârza-Ene, A.	Orogen-parallel extension in the North Dobrogea Orogen	11.55-12.10
Popa, A.	Detection of underwater sulphurous springs in Mangalia area with geophysical and geochemical methods	12.10-12.25
Dogaru, I. G.	Contributions and applications of multidisciplinary investigation methods in geohazard identification	12.25-12.35
Popa, M. E., Mărunțeanu, C., Palcu, M.	Concluding remarks	12.35-12.45

ABSTRACTS

CONTRIBUTIONS AND APPLICATIONS OF MULTIDISCIPLINARY INVESTIGATION METHODS IN GEOHAZARD IDENTIFICATION

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Keywords: geohazard, geological setting, field campaign, infrastructure, Sibiu-Pitești Highway

The aim of this work is to identify all geological hazards that may occur before, during or after the execution of engineering infrastructure projects. The case study concerns a section of the Sibiu-Pitești highway. In terms of geological and tectonic setting, the highway, along the 50 km of its route, crosses through significant geological formations, including the Getic Depression, the Subcarpathian thrust belt and the Post-tectonic Cover of South Carpathians and cuts through a stratigraphic column from Palaeocene sandstones to Quaternary alluvial deposits. These formations are influenced by deep intra-Moesical faults and shallow thrust faults due to their proximity to Vrancea seismic zone, creating blocky fractured shapes in the upper deposits. In order to assess the geohazard, a series of investigations were carried out, including boreholes, standard penetration tests (SPT), heavy dynamic penetration tests (DPH), static cone penetration tests (CPT), seismic measurements (MASW) and electrical resistivity tomographies (ERT). Complex investigations carried out on a 20 km segment of the Pitești-Sibiu highway revealed the following: geomorphologically, the route varies between slopes and valleys, with instability already evident in the northern section due to erosional processes; hydrogeologically, the northern highlands have non-permanent aquifers that can lead to internal displacements, while the southern section has potential artesian manifestations that could induce erosions in foundation soils; geological features include overconsolidated rocks in the north that may be susceptible to sliding processes and expansive soils with a high mineral content in the south that can lead to considerable swelling pressures. The area is also at risk of seismic activity due to its proximity to a seismic epicenter, with a dense tectonic network of faults further increasing the hazard. Overall, the investigations revealed various natural and anthropic factors that could pose challenges for the large-scale project in the future.

EVALUATING GEOTECHNICAL PROPERTIES OF COHESIVE SOILS THROUGH SPT AND LABORATORY TESTS IN SUCEAVA SIRET MOTORWAY LOT 4

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Keywords: marl, SPT, Suceava, parameters, correlation.

This study investigates the correlation between Standard Penetration Test (SPT) N-values and laboratory-derived geotechnical parameters for cohesive soils in Suceava Siret Motorway Lot 4. Soil parameters such as physical, chemical, and strength properties are crucial for soil classification. Cohesion and friction angle are key factors in understanding soil behavior. The SPT is widely used in the field to determine soil strength before conducting laboratory tests. Data were collected from 51 boreholes drilled to depths ranging from 6 to 30 meters. The lithology of the site comprises silty clay, sandy clay, clay with gravel, and sandy gravel, predominantly found between depths of 5 to 15 meters. Laboratory tests were conducted to determine key geotechnical parameters, including cohesion, liquid limits, compressibility, and shear strength. The research enhances the understanding of geotechnical properties in the Suceava Siret Motorway Lot 4 area, offering practical applications for foundation design and soil classification. The findings contribute to more accurate and efficient geotechnical assessments, supporting successful infrastructure development in Romania.

IMPLEMENTING PHOTOGRAMMETRY IN ARCHAEOLOGY FOR 3D MODELING OF ANCIENT SETTLEMENTS

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Keywords: UAV, photogrammetry, DTM, settlement.

Photogrammetry is a scientific method of remote sensing that enables the extraction of precise spatial information from photographic images. It involves creating 2D and 3D models or measurements of physical objects by using a series of overlapping images. Dobrogea, a region located in eastern Romania, has a rich cultural and historical heritage, predominantly influenced by the classical Greek, Hellenistic, and Roman periods. The archaeological sites in Dobrogea primarily consist of tumuli and ancient settlements, including forts, fortresses, towns, and cities. These sites are located both on land, where they are easily accessible, and underwater, where they are more difficult to reach. Two of the most important ancient settlements are the Argamum fortress—considered the oldest Greek settlement on Romanian territory—and Adamclisi, the largest ancient Roman city in the province of Scythia Minor. At the Argamum and Adamclisi archaeological sites, exposed and defined areas of 4.62 and 9.67 hectares, respectively, were surveyed using an unmanned aerial vehicle (UAV), specifically the DJI Phantom 4 Pro V2.0 drone. This technology allows for the collection of extensive information by

capturing images from distances and angles impossible to achieve at ground level. Using UAVs and photogrammetry in archaeology enables more precise documentation, enhances visualization and analysis, and aids in the preservation and interpretation of cultural heritage. The photogrammetric products generated from images collected during UAV missions—such as orthomosaics, digital elevation models (DEMs), digital terrain models (DTMs), contour maps, 3D meshes, and textured 3D meshes—can improve access to areas previously inaccessible without invasive methods. Additionally, these detailed models can guide archaeologists in planning future excavations by identifying the most promising areas for digging.

AMMONOID COLLECTION FROM DEŞLI CAIRA SECTION (NORTH DOBROGEA OROGEN)

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Keywords: Ammonoid, taxonomy, taphonomy, Triassic, North Dobrogea.

Deşli Caira locality from the North Dobrogea Orogen is well known in the geological literature since the beginning of 20 century, for the Lower – Middle Triassic carbonate successions rich in ammonoids. An impressive collection containing 959 ammonoid specimens from this locality is housed by the Collection of the Laboratory of Palaeontology, Faculty of Geology and Geophysics, University of Bucharest. During the last 25 years, professor Eugen Grădinaru, collected and prepared 832 ammonoid specimens from Deşli Caira section, but unfortunately the fossil material was left in disorder and have never been published, excepting few abstracts. Starting with 2023, our team resume the study of Grădinaru' collection and detailed study of Deşli Caira section collecting from the site and preparing 127 specimens. The material was arranged in separate cupboards, each specimen was inventoried and arranged according to the stratigraphic position of the bed from which the specimen was extracted. The fossils preservation of the studied ammonoid specimens reveal taphonomic features indicating accumulation or rare re sedimentation of the specimens: usually the specimens are preserved as internal moulds preserved in 3 dimensions, with the recrystallized shell; the phragmocone preservation is different between the specimens from complete dissolution of the septa and filling with sediment, or partially filling with sediment followed by cementation to partially dissolution of septa or complete preservation of it, but the most common is preservation of the innermost whorls. The Deşli Caira ammonoids do not exhibit criteria for reelaboration. Until the present we identified and described in detail several Aegean taxa: *Stenopopanoceras transiens* Tozer, 1972, *Paracrochordiceras denseplicatum* Fantini Sestini, 1981, *Aegeiceras ugra* (Diener, 1895), *Leiophyllites pradyumna* (Diener, 1895) and *Leiophyllites pseudopradyumna* (Welter, 1915), *Grădinaruites aegeicus* Balini and Lăcătuş, 2024, *Robinsonites simionescui* Balini and Lăcătuş, 2024, and *Acrochordiceras* sp. The size of the specimens is usually around 8-10 cm diameter. The dominant type of ornamentation is weak, most of the specimens being smooth, but there are also few specimens with strong ribs, nodes or spines. From the studied part of the collection, most of the specimens are from order Ceratitida, and few from order Phylloceratida, and all of them are of Anisian age, the Olenekian specimens of the collection are still under study.

2023-2024 MAGNETOMETRY FIELD CAMPAIGN RESULTS

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Keywords: Noviodunum, magnetometry, archaeology

Noviodunum was a strategically important settlement on the Danube, serving as a key point for defence, trade, and cultural exchange. Initially established as a Roman settlement, it later came under various rules, reflecting its enduring significance across centuries. Its rich history highlights its role as a military stronghold and a vital economic and religious centre. The archaeological diversity of the Noviodunum area, encompassing necropoleis, public baths, kilns, or fortifications, underscores its complex historical development and multi-layered significance. Given the extensive and varied nature of the site, magnetometry has proven indispensable for local archaeology, enabling the rapid investigation of large areas while preserving subsurface structures. In recent years, significant magnetometric investigations have been conducted at Noviodunum. In 2020, a section of the intramural area of the fortress was surveyed. In the subsequent years, from 2021 to 2024, several extramural areas were investigated, including southern and southeastern perimeters near the fortress, as well as a more distant southwestern sector within the broader Noviodunum region. These studies have provided valuable insights into the archaeological complexity and spatial organization of the site.

OROGEN-PARALLEL EXTENSION IN THE NORTH DOBROGEA OROGEN

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Keywords: orogen-parallel extension, metamorphism, high temperature conditions, North Dobrogea

In different tectonic settings, orogenic extension has been documented to create lower crustal domes with a variable syn- and/or post-thickening structure. The orogen parallel domes formed during the final stages of continental collision at high geothermal gradients are difficult to constrain due to the juxtaposition of several mechanisms such as crustal thickening, mantle lithospheric removal, and syn- to post-kinematic magmatism. In the North Dobrogea orogen it is recognized the orogen parallel extension mechanism. In Macin unit, it is observed a significant contrast of metamorphism, high-grade (upper amphibolitic metamorphic facies) in the centre and low-grade (anki- to greenschist metamorphic facies) over its flanks. We use field and microstructural kinematic observations to characterize the main structures associated with nappe stack burial and extensional exhumation. The results demonstrate two main stages of deformation, a first one associated with burial of a mafic protolith up to amphibolitic conditions that took place by top-to-NE nappe stacking, and a second deformation characterized by

extensional exhumation, top-to-SE shearing, and retrograde metamorphism. This second deformation created an orogen-parallel extensional dome with a significant tectonic omission across a major detachment. The exhumation in the footwall of the detachment started in high temperature conditions, demonstrated by pervasive migmatization and emplacement of syn-kinematic plutons. The extension and the associated formation of the metamorphic dome is likely coeval with the Early-Middle Triassic rifting magmatism. These results demonstrate the need to reinterpret the structure of the Macin unit to include a typical ophiolitic suture zone overlaid by forearc sediments, metamorphosed in greenschist to upper amphibolitic facies and thrust by an upper continental plate. Based on a few similarities with worldwide analogues, these results demonstrate that orogen-parallel extensional domes can also develop at high temperature conditions during / after the late stage of continental collision.

CONSIDERATIONS REGARDING ROMANIA'S LEVELING NETWORK

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Keywords: normal altitude, ellipsoidal altitude, geoid undulation.

The present paper wishes to draw attention to the fact that the leveling network of Romania was determined between 1960 and 1965 by the Military Topographic Directorate and continued by the Institute of Geodesy, Photogrammetry, Cartography and Territorial Organization. Now the current topography, cadastre and photogrammetry works are based on the permanent stations of the National Agency for Cadastre and Land Registration (ANCPI) for both planimetric and altimetric positioning. These stations were linked to the national leveling network. The study aims to establish the degree of precision of altitude determination using the network of permanent stations managed by ANCPI in different areas of Romania. The accuracy of determining the altimetric position in surveying works is $\pm 5 - \pm 7$ centimeters for the points in the geodetic network. For the Digital Terrain Model, the accuracy is $\pm 20 - \pm 30$ centimeters. ANCPI through the ROMPOS application provides altitudes referenced to the nearest permanent station for any point within its range. In practice, on station the GNSS receiver on any point and get directly the altitude. The accuracy check is carried out by directly stationing the GNSS receiver on a point in the national leveling network and comparing the values: measured and from the inventory. If this is not possible, a nearby point is chosen. Here the elevation will be determined directly from the grid point by geometric or trigonometric leveling. The purpose is to determine whether the accuracy of determining point attitudes differs from one area to another. Romania did not always have access to the Black Sea. Over time, the country was divided into three provinces: Wallachia, Moldova and Transylvania. The Danube was and is a transport corridor for goods from the Black Sea to Western Europe. A big part of the river is Romania's border with neighboring states. Navigators needed a system of altitudes that would allow them to constantly know the water level against a fundamental zero. Thus, the first initiative to establish a fundamental zero was taken by the European Commission of the Danube (CED) in 1586. Three hydrometric gauges were installed, two at the mouths of the river in the Black Sea Sulina and Sfântu Gheorghe and one in Tulcea. Transylvania, which was under the rule of the Habsburg Empire, was connected to the zero level of the Adriatic Sea. Thus, in 1838, the first altitude referred to the Adriatic Sea was brought to the Danube port of Orșova. Later, in 1854, the altitude of Drencova port was also determined. After 1877, when Romania became independent from the Ottoman Empire, it

became a country bordering the Black Sea and owner of the mouths of the Danube, studies could be started to determine the zero altitude. The Military Geographical Institute installed a mean tide gauge in Constanța, near the Genovese Lighthouse. Based on two readings per day between 1896 and 1903, the average value of the level of the Black Sea was established, considered the zero level Constanța and reference plan for the general leveling of Romania. In 1910, another tide gauge was reinstalled. Unfortunately in 1916 it was destroyed in the first world conflagration. In December 1932 the Directorate of Marine Ports installed a margraph that still works today. This remained as the basis for establishing zero sea level by daily readings. After 1955 the Black Sea datum was changed to the Kronstadt datum on the Baltic Sea. The reason was related to Romania's membership of the bloc of communist countries and the Warsaw Pact. Since 1974, civil society has returned to zero on the Black Sea, the fundamental point of Constanța.

TAXONOMY AND PALEOECOLOGY OF CENOMANIAN CORALS FROM THE GRĂDIȘTEA MUNCCELULUI-CIOCLOVINA REGION

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Keywords: Upper, Cretaceous, Cenomanian, corals, Romania.

Upper Cretaceous coral faunas are poorly documented in Romania. The lack of proper resources to study the corals in the 1900s gave no hopes of publishing a complete taxonomical study with detailed description of their morphological complexities, former publications being mostly focused on macroscopic observations. Therefore, a revision of the Upper Cretaceous coral faunas from Romania is necessary. A coral fauna from the Grădiștea Muncelului - Cioclovina area was previously mentioned in the geological references from the Fizești Formation (Cenomanian) and a high diversity of coral taxa has been collected from this area by one of the authors (IL). An important collection consisting of 108 specimens from this location is housed by the Collection of the Laboratory of Palaeontology, Faculty of Geology and Geophysics, University of Bucharest. The fossil samples have been studied first macroscopically and then microscopically, with significant focus on the septa morphology and its microstructure observed in thin sections. With this methodology we have identified 15 coral taxa, both colonial and solitary forms: *Hydnophora* sp., *Hydnophora styriaca*, *Placocoenia major*, *Complexastrea* sp., *Aulosmia cuneiformis*, *Aulosmia* sp., *Brachyphyllia dormitzeri*, *Astraraea multiradiata*, *Brachycoenia* sp., *Thalamocaeniopsis explanata*, *Eosiderastrea* sp., *Astraeofungia* cf. *barcenai*, *Astraeofungia* sp., *Eocomoseris* sp., *Heliopora radiate*. The study focus on documenting a detailed description of this diverse Cenomanian coral fauna not studied so far in Romania. The microfacies study of the mixed (carbonate-siliclastic) rocks in which fossil corals are found in abundance, suggest a harsh environment, with high siliclastic input, unfavorable for coral blooms and buildups formation.

DETECTION OF UNDERWATER SULPHUROUS SPRINGS IN MANGALIA AREA WITH GEOPHYSICAL AND GEOCHEMICAL METHODS

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Keywords: Black Sea, Mangalia, sulphurous springs

Mangalia area, southern Romanian Black Sea Coast, hosts a unique habitat with sulphurous springs supporting a distinct association of flora and fauna. The springs are easily identified due to the white or yellowish microbial mat halo surrounding them. They originate from two aquifers which intersect the Sarmatian, pyrite rich limestone. Onshore, they are known since a long time, flowing in lakes near Mangalia (e.g. Kara-Oban complex, Hergheliei marsh) or nearshore in waters less than 2 m deep. In 2020, sulphurous springs were detected in waters up to 15m deep, while CTD measurements indicate a temperature of 21-27° C and a lower salinity relative to their surroundings. In 2021 and 2023, GeoEcoMar research cruises identified underwater sulphurous springs offshore Mangalia and Saturn resorts, 4 km from the coast, at 21-24 m water depth, seeping both from rock outcrops and from unconsolidated sediments such as shell debris, sand or muddy sands. In the southern part of the study area, pockmarks associated with fluid escaping from the sea bottom were discovered, some of them revealing active seeping. The pockmarks indicate a continuous or at least seasonal fluid seeping activity. The detection of the sulphurous springs was possible with a multibeam echosounder system (MBES). The MBES system recorded bathymetry, backscatter and water column data. A gas analyzer which sampled water from 1,5 m below sea surface was used in parallel. The gas analyzer detected a higher concentration of CH₄, a gas associated with sulphurous springs, where the highest density of fluid seeps was recorded by the MBES. However, where the seep activity was lower, CH₄ levels were not significantly elevated, likely due to gas dissolution in the water. The combined use of geophysical and geochemical methods highlights their value for correlation purposes but also reveal their limitations, particularly in areas with lower seeping activity. In the southern and northern parts of the study area, fluid seeps were recorded aligned along multiple survey lines, suggesting the occurrence of fault lines below the sea bottom, even if these features were not evident for bathymetry or backscatter data obtained from the MBES.

PRELIMINARY DATA ON MICROFACIES ANALYSIS OF THE CARBONATE SUCCESSION FROM DEȘLI CAIRA (NORTHERN DOBROGEA OROGEN), GSSP CANDIDATE FOR THE BASE OF THE MIDDLE TRIASSIC

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Keywords: Triassic, microfacies analysis, carbonate platform, Northern Dobrogea.

The Triassic carbonate successions cropping out on large surfaces in Tulcea Unit of the North Dobrogea Orogen are well-known in the scientific literature for the rich and diverse fossil faunas as well as for the complex distribution of the carbonate lithofacies. During the Triassic period, large areas of the Tulcea Unit were covered by an extensive carbonate platform, composed of shallow marine limestones (less than 50 m depth) in the east and deep-water basinal lithofacies (over 200 m depth) in the west. The studied section is located in the central part of the Tulcea Unit, on the western slope of Deșli Caira Hill, and consists of a carbonate sequence, approximately 60 meters thick, deposited directly on the Permian granitoid basement. According to the paleontological studies on the ammonoids, brachiopods, ostracods and conodont assemblages, the deposition of these limestones occurred continuously from the Lower Triassic (Olenekian) up to the Middle Triassic (Anisian), making this section the most complete geological section in the world for this time interval and therefore the best candidate for a Global Stratotype Section and Point (GSSP) defining the base of the Middle Triassic. The objective of our study is focused on the microfacies analysis of the Triassic carbonates succession from Deșli Caira section. A 30-meter-thick interval was analyzed, comprising nodular, medium bedded limestones; the base of the succession (almost 6 meters thick) is affected by fractures filled with radiaxial cements and stromatolite-type structures and is overlain by Hallstatt-type limestones. Based on field observations and microscopic analysis of thin sections, the following microfacies were identified: bioclastic wackestone with ammonoids, planktonic bivalves, rare crinoids, calcispheres and radiolarians, alternating with bioclastic packstone with planktonic bivalves. The 1,1 m transitional interval from the Olenekian to the Anisian is marked by packstone with numerous planktonic bivalves, foraminifera and ostracods, while the base of the Anisian is characterized by an alternance of mudstone and wackestone with a micropeloidal matrix, containing numerous ammonoids, brachiopods, ostracods, calcispheres and rare gastropods. At different intervals there are numerous microcavities and geopetal structures, indicating the microbial origin of the carbonate muds. The identified lithofacies suggest a depositional paleoenvironment corresponding to sedimentation on a pelagic swell developed in the distal part of a carbonate platform and are similar to Hallstatt-type facies described from the Middle and Upper Triassic in the Eastern Alps. The project was funded by ICUB: FDI grant 0690/2023 and CPI grant 835/2024–2025.

SEISMIC THREATS IN THE GORJ REGION: A GEOLOGICAL AND SEISMOLOGICAL PERSPECTIVE

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Keywords: seismic hazard, Gorj area, earthquakes, OpenQuake.

The earthquake sequence that occurred in the Gorj County, Romania, starting with 13 February 2023, was for many people an unexpected event, although earthquake catalogues indicated previous events in the area, decades of years prior. The 2023 sequence consisted of two moderate-magnitude earthquakes (5.2 and 5.7 Ml), followed by thousand of aftershocks, at depths down to 22 km. The main earthquakes produced slight and moderate damage to some of the buildings in the area. The presentation examines the underlying geology of the seismogenic area in the northern part of Gorj County, which is located at the contact of Carpathian Mountains with the Getic Depression. We analyze the distribution of

earthquakes in this area, in relation also with the fault systems. By combining geotectonic and slope mapping with seismic hazard modeling using OpenQuake software and various ground motion prediction equations, we provide a preliminary assessment of potential seismic threats in the Gorj region.

ORIGIN AND SIGNIFICANCE OF GARNET FROM SOUTH APUSENI NEOGENE MAGMAS: INSIGHTS FROM TRACE ELEMENT COMPOSITION

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Keywords: almandine garnet, peritectic phase, trace element components, LA-ICP-MS mapping.

Evaluating the origin of garnet in calc-alkaline magmatic rocks, although challenging, can impart critical information on open-system magma evolution, often obscured by near-surface processes at a whole-rock level. We present a detailed characterisation of trace element composition and patterns on garnets from five garnet-bearing intrusive, calc-alkaline rocks, belonging to the Neogene magmatic province, in South Apuseni, Romania. The mode of garnet occurrence ranges from single anhedral phenocrysts, annealed aggregates forming 5-8 cm long garnetite pods, to single anhedral grains included in plagioclase-rich magmatic enclaves. Most garnets show disequilibrium features, such as concave resorption edges and reaction coronas of variable thickness, consisting of fine grained, interlocked chlorite and feldspar with oxide and apatite inclusions. All studied garnets are almandine-rich (59-63 mol%) with highly variable chemical zonation in terms of the Mg-rich pyrope (12-20 mol%) and Mn-rich spessartine contents (5-15 mol%), at relatively constant grossular component (12-15 mol%). Within the analysed garnet population, a subpopulation of composite garnet phenocrysts preserves within their major and trace element pattern, a polyphase evolution, with higher temperature magmatic cores (higher pyrope and lower spessartine content, lower REEs, but higher incompatible trace element content, ~160 ppm P, ~100 ppm Zr, ~2000 ppm Ti), and lower temperature magmatic overgrowth (higher Mn, REEs, lower Ti, P, Zr). Trace element abundances in garnetite lenses show abrupt concentration gradients, with HREEs, Y, Ti depletions coupled with Sm, V, Zr enrichments in the inner domain, while the outer domains are HREEs and Y enriched, up to an order of magnitude (in chondrite-normalised values). These features were interpreted as indicative of an incongruent melting event at deep crustal levels, involving dehydration-melting of biotite- and amphibole-rich lithologies, leading to the nucleation of peritectic garnets characterised by relative depletion in compatible trace elements (MREEs, HREEs, Y). Subsequent segregation and extraction of peritectic garnets from the source, resulted in new growth of igneous garnet (with MREE, HREE, Y enrichment), enveloping the peritectic, and rarely entrained, pelite-derived metamorphic garnet xenocrysts, characterised by low grossular component and HREE content, and high P (800 ppm), Sc (500 ppm), Zr (200 ppm) and L-to MREE contents.

ASSESSING THE EFFECTIVENESS OF ELECTRICAL RESISTIVITY TOMOGRAPHY FOR SUBSURFACE INVESTIGATION IN A SEASHORE KARST SETTING

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An extensive karst and thermal mineral springs system is developed within Sarmatian (late Middle Miocene) limestones in the area of Mangalia port city and resort, on the Black Sea coast of Romania. The ascending springs yield hypothermal, hydrogen sulfide-rich mineral groundwater with therapeutic properties, which is presently exploited and used only on a limited scale. Brought by these springs, the groundwater feeds several sinkholes (dolines), forming ponds and lakes to the north, northwest, and west of the city. Such a feature of particular interest is the Mangalia Marsh, a 98 hectares coastal wetland formed in a large collapse sinkhole (> 1 km in diameter) which is fed at the bottom by multiple underground springs. The influence of local tectonics and degree of karstification on the flow paths of thermal mineral groundwater is uncertain and has not been studied through geophysical methods until the first geoelectrical investigations were conducted from 2021 to 2023. This study presents preliminary results of the most recent Electrical Resistivity Tomography (ERT) survey carried out in August 2023 to image the subsurface around the Mangalia Marsh. Three ERT lines (1345 m total length) were acquired utilizing an AGI SuperSting R8/IP resistivity meter with 64 electrodes placed at 5 m spacing, using Schlumberger and dipole-dipole array configurations. The models obtained from the 2D inversion of apparent resistivity data allowed delineating the top of Sarmatian limestones generally at 7–10 m depth, underneath Quaternary loess and shale deposits. Anomalous low-resistivity zones (6–12 Ωm) with an isometric or an elongated and inclined appearance were identified within the limestones, indicating possible karst voids or open fracture/fault zones where groundwater circulation likely occurs. Some of these voids for which very low resistivities (0.5–1 Ωm) were obtained could be filled with saline water, thus implying subsurface connections with the Black Sea. The geoelectrical findings, in conjunction with satellite/aerial imagery, also point to the presence of a significant fracture or fault lineament with NW–SE orientation, potentially influencing the hydrodynamic regime of the area.

DEPOSITIONAL MODELS IN THE WESTERN PART OF THE DACIAN BASIN A CASE STUDY FROM OLTENIA

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The sedimentary succession of a continental foreland basin bears the imprint of the tectonic processes that, on one hand, generates the subsidence creating the accommodation space and, on the other hand, uplift in the source areas, which through erosion provides the sediments to fill the basin. By studying the resulted sedimentary succession, useful insights over the tectonic processes can be derived, like in the case of the Dacian Basin, the late stage collisional basin of the Carpathians. The aim of this thesis is to delineate the geometry of depositional bodies and to define the patterns of sediment partitioning in the Sarmatian-Dacian interval (with focus on the Maeotian-Pontian clinofolds) of the Western Dacian Basin, in order to understand routing systems and large-scale basin processes specific to individual depositional conditions (lowstand, transgressive and highstand). In order to achieve this goal, an

integrated interpretation workflow is required, that links essential subsurface data (logs and lithologies described in wells; structural, thickness and attribute maps/volumes derived from seismic data) with outcrops and models obtained through analogue and numerical modelling. Sedimentation in the Upper Sarmatian interval was highly controlled by the distribution of structural features of the Getic Depression fold and thrust belt (Subcarpathian Nappe). The oldest Sarmatian strata, as inferred from 3D seismic data, in the study area are represented by massive slope-basin floor sequences, characterized by subtle submarine fan systems with N-S or E-W transport, that onlap the fold and thrust belt. Overall, the Upper Sarmatian succession is represented by both shallow and deep environments, ranging from shelf deposits to the aforementioned turbidites. The Upper Sarmatian is covered by the lowstand clinofolds of the Upper Maeotian. These complex systems show a large variety of sedimentary environments, from delta dominated topsets, to well defined canyons and channel-levee systems along the slope (foresets), and proximal/distal basin floor fans in the bottomsets that feature a E-W sediment routing, along with mass transport complexes that developed in the slope-basin floor setting. The Maeotian is followed by a highstand period during the Lower Pontian, which was characterized by well-defined turbidite systems on the slope. Clinofold sedimentation ends with the lowstand sequences of the Middle Pontian and is followed by the transgressive cycle of the Upper Pontian. The beginning of the Dacian interval is marked by the arrival of multidirectional (E-W, W-E, N-S, NE-SW), sand-rich, deltaic systems that steadily filled the basin.