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ABSTRACT BOOK

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WORKSHOP: EVOLUTION OF THE EURASIAN MEGALAKES WITHIN THE PALEOGENE-QUATERNARY INTERVAL: ISOLATION AND CONNECTION IN THE PARATETHYS AND BLACK SEA

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FOUR DECADES OF ROMANIAN SHORELINE CHANGE: LANDSAT MAKES HISTORY

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To quantify long term erosion on the Black Sea Romanian coast (ROC, 245 km) we used CoastSat to process LANDSAT multispectral imagery from 1984 to 2023. The ROC has primarily sandy beaches with gentle slopes. The most southern portion is characterized by small seasonal and annual accretion/erosion cyclic episodes of few meters a year that gradually progresses towards erosion. The middle part of ROC underwent two major beach nourishment campaigns in 2015 and 2022. In 2015, the beach nourishment extended 120 m offshore in Eforie Nord and Constanta – Mamaia Sud areas. Here, after the rapid redistribution of sediments along the shoreline and offshore during the first two winters resulting in about 20 m erosion, the coastline has been relatively stable. In 2022, a massive 250 m nourishment project was completed in Mamaia-Centru beach to build a “sand machine” to allow sediment redistribution northwards to compensate for the erosion. The beaches in Eforie South and the Tekirghiol littoral bar were nourished between autumn 2022 and 2023.
The north ROC is comprised of two major sedimentary cells, part of the Danube Delta (DD) front: (1) the south cell includes the barrier beaches separating the Razelm – Sinoie Lagoon System (RSLS) from the Black Sea; and (2) the north cell represents the coastline between the two Danube branches of Sulina (SU) and Sfantul Gheorghe (Sf.G) with an associated spit (Sahalin) at the southernmost part.
The RSLS narrow sandy barrier beach exhibits seasonal accretion / erosion cycles, with erosion being predominant. The Sf. G branch of the DD is the only asymmetric active lobe associated with a river-sea confluence with a barrier island and spit system on Romanian territory. During the 1985 -2023 period this system extended spatially approx. 3.5 km to the west while rotating about 1.5 km to the south. The LANDSAT time series also highlights the large breach in the barrier island system of approximately 3 km after the storm season of 2013. The northernmost part, close to

SU branch, shows a slight accretion due to the presence of the 8 km offshore SU jetties, a coastal engineering structure generating an eddy-like current trapping the sediment. The erosion of the ROC-DD coast is heavily influenced by anthropogenic factors, related to the drastic reduction in sediment supply and changes in sediment resources pathways (due to damming, embankments, and new canals) and climate change acceleration, in addition to natural factors such as subsidence and episodic extreme storm events.

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ENAMEL MICROWEAR STUDY OF PLIO-PLEISTOCENE PROBOSCCIDEAN DIETS FROM THE CARPATHIAN FORELAND BASIN OF ROMANIA

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We have investigated the paleodietary ecology of Late Pliocene to Late Pleistocene proboscideans (*Anancus arvernensis*, *Palaeoloxodon antiquus*, *Mammut borsoni*, *Mammuthus meridionalis*, *Mammuthus trogontherii*, and *Mammuthus primigenius*) from two localities from the Republic of Moldova and eight from Romania through enamel microwear analysis. Our findings indicate significant dietary flexibility, with a temporal shift towards increased grass consumption over time. The microwear patterns of *Anancus arvernensis*, *Mammut borsoni* (Late Pliocene), and *Mammuthus meridionalis* (Early Pleistocene) suggest a browsing diet primarily based on leaves and twigs. *Palaeoloxodon antiquus* also shows a strong reliance on browse, while *Mammuthus trogontherii* (Middle Pleistocene) and *Mammuthus primigenius* (Late Pleistocene) exhibit mixed browsing and grazing behaviors, with some *Mammuthus primigenius* individuals exclusively grazing.

The taxa with diets consistent with pure browsing (e.g., *Mammut borsoni*, *Anancus arvernensis*, *Mammuthus meridionalis*) display larger average scratch widths and more homogeneous scratch textures, indicating a narrower dietary niche focused on twigs and bark. In contrast, mixed-feeding taxa (*Palaeoloxodon antiquus*, *Mammuthus trogontherii*, and *Mammuthus primigenius*) show smaller scratch widths and more heterogeneous scratch textures, reflecting a broader dietary range that included leaves, twigs, bark, and grass. These results highlight a generalist dietary strategy in proboscideans with derived hypsodont and lophodont dentition, suggesting that the evolution of hypsodonty did not limit their ability to consume relatively non-abrasive food items.

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PALEOGEOGRAPHY OF THE NORTHERN SECTOR OF THE DNIESTER-PRUT INTERFLUVE DURING THE VOLHYNIAN

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The study sector is part of the Paratethys Euxino-Caspian basin. The Lower Sarmatian (Volhynian) has been less studied on the territory of the Republic of Moldova, that's why we decided to focus specifically on this period of time. It is known that the territory of the Dniester-Prut interfluve is at an important paleobiogeographic intersection. Therefore, both palaeogeographical processes and faunal transformations different from those in the adjacent territories took place on this small territory.

The Sarmatian in the study area begins with a transgression that came from the West and headed to the East, in the form of two bays: Ribnitsa and Comrat. The palaeogeographical conditions, for the study territory, during the Volhynian (early Sarmatian) could be reconstructed by studying the lithological, paleofloral and palaeofaunal content of the formations that are part of this basement. Along with the Volhynian transgression, this space is enriched with new euryhaline species, with new morphological features that have adapted and flourished in the new environmental conditions – a brackish environment. In addition to the endemism of the euryhaline species in the Volhynian, there were also some taxa that live in extreme conditions, unsuitable for the Volhynian basin (*Solen subfragilis*, *Ervilia pusilla*, *Mactra basteroti*, *Abra alba*, *Mytilaster incrassatus* and *Musculus sarmaticus*).

This fact proves to us, that in the Volhynian there could be some biotopes in the form of closed lagoons, left over from the Badenian and in which they survived. Also, the presence of the same species as in the Central Paratethys and Mediterranean Tethys, however, proves that these basins corresponded.

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SEDIMENTARY EVOLUTION OF THE NORTHWESTERN BLACK SEA SHELF AREA DURING PLEISTOCENE

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Due to its character of enclosed sea, the Black Sea basin evolved very dynamically in relationship with the global and local sea level variations. The north-western shelf area is the widest and during Quaternary experienced successive submerged and subaerial periods. This evolution produced stacked sedimentary deposits as the result of the fluvial and deltaic sedimentation developed by a changing paleo-hydrographic network of rivers. The dynamics of this kind of sedimentation was heavily influenced by the tectonic movements that affected the extended part of the basin in this area. Most probable post-glacial rebounding phenomena that affected the lithosphere after successive glacial/deglacial times changed the slope of the paleorivers thalweg and consequently mediated the sediment discharge in the Black Sea Basin during Pleistocene. As the result of the tectonic movements produced in Quaternary era, the water and sediment supply changed accordingly, both quantitative and qualitative.

By using very high (chirp sub-bottom profiling and sparker) seismics and high resolution seismics (air gun seismics), several levels of fluvial and deltaic deposits have been revealed. A network of SW-NE seismic profiles put in evidence several paleovalleys characterized by specific sedimentary bodies, as point bars or deltaic agraddational structures. The paleovalleys have a vertical development up to about 15-20m and widths of about 700-1000m or wider. The depth below sea floor of the upper part of these paleovalleys is variable. In general, these structures are organized on 4-5 levels. The shallowers are just a few meters below sea bottom and the deepest to about 100-120 under the present sea/sediment interface. The sedimentary pile shows seismo-acoustic facies specific to the presence of biogenic methane accumulations. There are accumulations of the biogenic methane that seems to be locally formed or coming by migration from the deeper part of the sedimentary structures.

These young sedimentary deposits that are organized as fluvial or delta bodies are not at all, or very little deformed in comparison with the old sedimentary structures; for this reason, these recent sedimentary bodies can serve as valuable information for a better understanding of the deltaic sedimentation and associated methane accumulations, in general.

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FLUCTUATIONS IN THE OSTRACOD ASSEMBLAGES FROM THE BLACK SEA SINCE THE LAST GLACIAL MAXIMUM

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During the Holocene, the Black Sea basin suffered a major shift from a fresh water environment to a brackish one, which is mirrored in the biotical turnover. The transition of the Black Sea from an inland lake to a marine basin during the last glacial/deglacial episode is still generating many debates. In Black Sea basin deeper parts, i.e., below 200m water depth, Ross and Degens (1974) recorded three stratigraphic units (from young to old): Unit 1 (the microlaminated coccolith ooze, deposited under marine conditions), Unit 2 (the sapropel mud, corresponding to a brackish, anoxic phase), and Unit 3 (the lacustrine lutite deposited during the freshwater or oligohaline stage).

The Danube Deep-Sea Fan is one of the most developed deep-sea sedimentary structures in Europe (Panin & Jipa, 2002). In 2018, in the framework of the uBiogas Project (24PCCDI/2018), several cores were acquired from the Danube Deep-Sea Fan area to investigate the processes that led to the formation and accumulation of methane. In this study, high resolution microfaunal analyses coupled with sedimentological and calcium carbonate ($CaCO_3$) ones, were performed on two gravity cores, MN183_3_GC_1 (401cm long) and MN183_8_GC_1 (376.5cm long). The obtained results revealed changes that occur in the Black Sea from the Last Glacial Maximum through the transition to the present day semi-enclosed marine basin. The cores were collected from two secondary canyons situated to the east of the Danube Canyon, from 655,7 (MN183_3_GC_1) and 1315m water depth (MN183_8_GC_1). In both studied cores, all three stratigraphic units were identified: the youngest Unit 1 (Coccolith Mud), Unit 2 (Sapropel Mud) and the oldest Unit 3 (Lacustrine lutite). The glacial cold period is marked by the presence of the cold-water ostracod species. The cores contain a reddish-brown clay and silt interval belonging to the post-glacial melt-water pulse of the Heinrich Event 1. In the upper part of the cores, in Unit 1, a brackish ostracod assemblage, with low diversity and abundance was identified. This interval is characterized by the presence of polyhaline ostracods with Mediterranean origin. The ostracods from this assemblage tolerate salinities comprised between 17-21‰ and characterize a sub-littoral environment.

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CHARACTERISTICS OF THE PARATETHYAN MIDDLE MIOCENE COASTAL DEPOSITIONAL SYSTEMS CROPPING OUT IN THE GREATER ŞOMUZ VALLEY, NE ROMANIA

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The deposits cropping out in the Greater Șomuz Valley belong to the third depositional megacycle of the Moldavian Platform. During the Middle Miocene, the Moldavian Platform developed as a foreland basin system due to the subduction of the western part of East European Platform beneath the Eastern Carpathian orogen. This event led to the separation of 4 depozones in which the sedimentation was influenced by the rate of the subduction and the accommodation space from the sedimentary basin.

In order to reveal the coastline behaviour from the Sarmatian deposits of Greater Șomuz Valley, five outcrops were considered and studied through the sedimentary facies analysis. In the studied outcrops, 15 sin- and post depositional sedimentary facies, along with their processes and mechanisms, were identified. Having into consideration the spatial distribution, geometry and genetical processes, 4 facies associations were separated *e.g.*: FA1 – offshore transition; FA2 – lower shoreface; FA3 – upper shoreface; FA4 – backshore.

The depositional environment of each outcrop was determined by separating facies associations corresponding to specific basin processes. The altimetric distribution of the facies associations and their way of stacking allowed the separation of some parasequences indicating the shoreline behaviour and the depositional processes associated within.

Analysing the sedimentological log from the base to the top at least two shoreline behaviours could be identified: (i) a regressive trend in which the sedimentary succession has a shallowing upward (ShU) feature: offshore-transition → lower shoreface → upper shoreface → backshore; (ii) a transgressive trend of deepening upward (DeU) feature – backshore → upper shoreface → lower shoreface.

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THE PALEOENVIRONMENTAL CHANGES ON THE MULTI-LAYERED UPPER PALEOLITHIC SITE DOROSHIVTSI III (MIDDLE DNIESTER AREA, UKRAINE), ACCORDING TO THE MOLLUSK FAUNA

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The Dniester River valley contains numerous Paleolithic sites, including the Doroshivtsi 3. The loess section of the site covers the interval from the Vytachiv to the Prychornomorsky Stages (MIS 3-2).

The Bug Climatolith (MIS 2, LGM) sediments contain the mollusks' assemblage with a rich quantitative and species composition, among which the most numerous are: *Succinea oblonga, Pupilla loessica, P. muscorum, Vallonia tenuilabris, Columella columella, Pseudotrichia rubiginosa, Trichia hispida*. The largest number of freshwater mollusks were found in these beds: *Microcolpia (Fagotia) acicularis, Galba (Lymnaea) truncatula*, *Anisus spirorbis*.

S. oblonga, P. loessica, P. muscorum, C. columella, V. tenuilabris, T. hispida, P. rubiginosa prevail in the sediments of the Dofinivka Climatolith (MIS 2, post-LGM interstadial). Some species that occurred at the previous stage were not found. The mollusk fauna of the Prychornomorsky Climatolith (the end of MIS 2, Younger Dryas) is diverse. The dominants: *S. oblonga, P. loessica, P. sterri, V. tenuilabris, C. columella, T. hispida, P. rubiginosa, V. pulchella*. There are species that are not found in the sediments of the Dofinivka and Bug climatolithes. However, *N. hammonis, E. praticola* are disappearing. Based on the change in the mollusks' ecological assemblages, the following paleogeographic conditions were established: 1) open dry biotopes prevailed at the end of the Vytachiv Climatolith (vt_3, MIS 3); 2) at the beginning of the Bug Climatolith (bg_1), they changed to open humid meadows, which were periodically flooded; during the LGM (bg_2), mesophytic meadows prevailed; after the LGM, a periodic cycle of changes in more and less humid conditions in open biotopes (bg_{3a}); open biotopes at the end of the Bug Climatolith (bg_{3b}), humidity decreased, in the end, active loess accumulation occurs; 3) at the beginning of the Dofinivka Climatolith (df_1), aridity decreases; towards its middle (df_2), the aridity increases, xerophilic species appear, an active eolian sedimentogenesis; at the end (df_3), the humidity increase, the number of cryophilic species decreases; 4) a gradual aridity increase characterizes the Prychornomosrsky Stage. The beginning ($pč_1$) is characterized by active loess sedimentogenesis; in the middle ($pč_2$), it became cooler and drier; at the end ($pč_3$), the climate aridization and loess sedimentogenesis are traced.

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THE QUATERNARY PROBOSCIDEAN FAUNA IN THE SEDIMENTS OF THE MIDDLE DNIEPER (UKRAINE)

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The remains of Proboscideans in the Middle Dnieper region are found mainly in alluvial deposits of the Dnieper, as well as in loess sections. Numerous accidental finds of both postcranial and teeth accumulate, as a rule, in local museums. But their stratigraphic position is recorded extremely rarely. The alluvial taphocenosis are usually mixed and may consist of remains of different ages. On the other hand, the remains of mammoths themselves, the species affiliation of which is determined by the structure of the molar teeth, are a chronological indicator. We examined the collections of Proboscidea kept in the museums of Kremenchuk, Horishni Plavni and Hradyzk. The paleontological material comes mainly from the erosion of the banks of the Kremenchuk Reservoir in the area around Mount Pyvykha and several iron ore quarries near the town of Horishni Plavni.

It should be noted that among the finds there are no remains of late forms of the mammoth *M. primigenius* with a high frequency of plates, characteristic of the end of the late Pleistocene. *M. meridionalis* remains are also missing, apparently due to the lack of Early Pleistocene deposits in the region.

The species diversity of the mammoth lineage is represented by *Mammuthus trogonterii, M. trogonterii chosaricus, M. intermedius, M. primigenius* (early form), *M. primigenius jatskovi.* Chronologically they belong to the Middle Pleistocene and the first half of the Late Pleistocene.
Palaeoloxodon sp. was identified for the first time for the region from a partial tooth. It can be attributed to MIS5e or MIS7.
The other megafauna species are represented by *Coelodonta antiquitatis*, *Stephanorhinus* sp., *Elasmotherium* sp., *Megaloceros giganteus*, *Cervus elaphus*, *Alces alces*, *Bison priscus*, *Equus* cf. *mosbachensis*, *Equus* sp., *Ursus* cf. *deningeri*, *Ursus* cf. *arctos*, *Panthera* sp., *Crocuta spelaea*.

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CHANGES IN SEDIMENTOGENESIS OF THE CENTRAL MOLDAVIAN PLATEAU (CODRU SECTOR) DURING THE TERMINAL MIOCENE

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During the Miocene epoch, marine, brackish and freshwater basins developed within the southwestern slope of the East European Platform, that are known as Badenian, Sarmatian, Meotian and Pontian stage of Parathetys. After regression of the sea in Upper Miocene, starting with Bessarabian substage of Eastern Parathetys the formation of the modern relief on area of Moldavian Platform began. This time mark exchange in sedimentation from marine to terrestrial that are known in geological crossection as Codru, Cahul and Stolniceni formation, that can be correlated with Balta and Balta-Păun Formations in neighbors' areas of Romania and Ukraine.
Thickness of terrigenous rocks measures up more than 200 m. Terrigenous rocks of Codru formation are present by intercalation of clay, sandy clay and sand. After the rise of the Carpathian Mountains, the central part of the Dniester-Prut interfluve was also subjected to vertical movements and area become highest place in Republic of Moldova. Lithological and mineralogical composition of rocks from the Codru Formation show their local origin. At that time, the main highland, in the region where in Podolia and direction of erosion was from North-East to South-West.
On the top of geological section of Central Moldavian Plateau appear alluvium with presence of Carpathian pebbles. This alluvium has 2-3 cycles, thickness of deposits are 6-8 m. This aluvium is situated on highest watershed space and it's known as Stolniceni, Gaureni and Milesti alluvial Formation, that mark big change in sedimentation on South-Western slope of Eastern European Platform. One of the lithological features of these deposits is the presence of Carpathian jasper pebble and the prevalence siliceous in it material, and also coarse-grained structure of rocks, intercalate beds, that testifies the river genesis of these padding. According to the mineralogical structure of the padding Stolniceni Formation, is identical to the deposits composing terraces of Dniester and Prut rivers, stratigraphically lying below the modern deposit of these waterways.
From these continental deposits are known series of fossil sites with remains of mammals that can be correlated with MN9-13 biozones. Some of these sites are well known as basic mammal assemblage for Late Miocene mammal fauna.

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DAWN OF THE PARATETHYS: PALAEOCLIMATIC AND PALAEOGEOGRAPHIC CHANGES WITHIN THE EOCENE-OLIGOCENE BOUNDARY INTERVAL

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The end of the Eocene is characterized by a planetary change, ushering in a cooler climate with permanent ice-sheets in the northern hemisphere. At those times, the Tethyan Ocean, extending on large areas from low-to-middle latitudes in the Northern Hemisphere, divided into the Mediterranean and Paratethyan seas. The Oligocene thus represents a key shift from a tropical to a modern, cooler world, evident in the sedimentary record and biotic turnover, especially in marine planktonic organisms that are very sensitive to water-surface fluctuations.

The present-day Romania territory belongs, from the Mesozoic up to the end of the Eocene, to the Tethyan Realm, but is also included in the Paratethys from the Eocene-Oligocene boundary interval. Representative successions of the Upper Eocene are known to occur in Romania, both in pelagic and hemipelagic facies, mainly in the Transylvanian basin and in deep-marine facies, such as the turbidites of the Eastern Carpathians. Within the lowermost Oligocene, these types of depositions were replaced by anoxic hemipelagic sediments, i.e., bituminous marls, bituminous cherts, and bituminous shales, indicative for a deficient connection with the world-wide ocean, as it currently exists in the present-day Black Sea basin.

Concomitantly, the marine, groups of organisms i.e., foraminifers and calcareous nannofossils, vanished from the record, while endemic taxa, showing a short-range, occur and dominated the lowermost Oligocene assemblages. These modifications mirror the global changes, but also show the overprint of the Paratethyan isolation from the world ocean since the Early Oligocene times.

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