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Settlement Spatial Distribution from Late Chalcolithic to Early Hallstatt in the Cracău-Bistrița Depression

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Abstract. *The various geographical features had a major impact on the behaviour of prehistoric communities, which can be determined by identifying a series of characteristics and preferences regarding the geographical location of the settlement and the resources exploited. In a well-defined space, the population, as well as the development of human groups, is determined by the micro- and macro-regional geographical characteristics. The use of this type of analysis in the study of Cracău-Bistrița Depression, between the late Chalcolithic and the early Hallstatt, will contribute to a better knowledge of this segment of archaeological research in Romania. The present approach, combined with a high number of thorough field researches, can generate predictive models, thus contributing to a more complex overview of the archaeological characteristics, but also of geographical, geological conditions, etc. preferred by prehistoric communities in this area and beyond.*

Rezumat. *Diversele particularități geografice au avut un impact major asupra comportamentului comunităților preistorice, care poate fi determinat prin identificarea unei serii de constante și preferințe în ceea ce privește locul amplasării sistemelor de locuire și resursele exploatate. Într-un spațiu bine delimitat, populareа, precum și dezvoltarea grupurilor umane este determinată de caracteristicile geografice micro- și macroregionale. Utilizarea acestui tip de analiză în studiul depresiunii Cracău-Bistrița în intervalul cuprins între Eneoliticul dezvoltat și Hallstattul timpuriu, va contribui la o mai bună cunoaștere a acestui segment al cercetării arheologice din România. Demersul de față, reprezentat de analiza spațială a așezărilor, îmbinat cu un număr ridicat de cercetări de teren amănunțite, poate genera modele predictive, contribuind astfel la obținerea unei imagini de ansamblu cu mult mai complexă asupra caracteristicilor arheologice, dar și asupra condițiilor geografice, geologice etc. preferate de comunitățile preistorice din această zonă, și nu numai.*

Keywords*:* spatial analysis, landscape archaeology, Chalcolithic, Bronze Age, Early Iron Age.

Introduction

The analysed area runs along the two eponymous rivers, Cracău and Bistrița. The depression (Figure 1), the largest in the Subcarpathian Mountains of Moldavia, forms a well-

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individualized unit, with a slope from north-west to south-east, in the direction of the flow of the main rivers that cross it. Thus, it acquires the appearance of a succession of hills and valleys, representing the fall in steps, from north to south, to the eponymous river meadows.

The depression formed as result of repeated orogenetic movements, then modelled due to the erosion process. The flat surfaces that developed along the courses of Cracău and Bistrița are "the result of the phenomenon of terracing of the present hydrographic network"[2]. From a geological point of view (Figure 2/b), it overlaps the formations of the

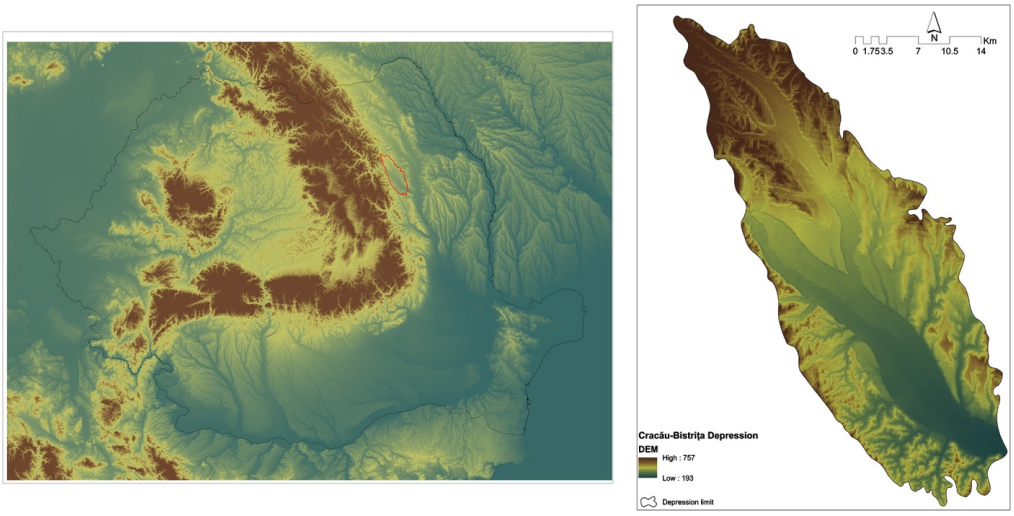


Figure 1. Cracău-Bistrița Depression — geographical context

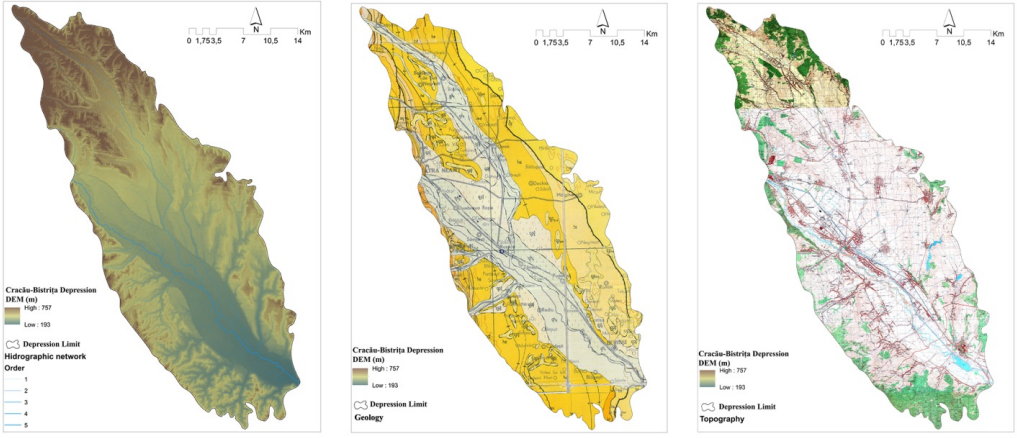


Figure 2. Cracău-Bistrița Depression: a – hydrography; b – geology; c – topography

[2] CONSTANTINESCU-NEAMȚU 1940.

Subcarpathian (Pericarpathian) Unit, with the exception of the western and eastern extremities. Along the water, the geographical unit presents newer, quaternary, formations[3]. From a pedological point of view, Cracău-Bistrița Depression was divided into two regions: one in the north and one in the south, separated by a line that crosses Piatra Neamț, arching to the village of Dochia. All the streams in the study area belong to Bistrița basin, the main hydrographic arteries draining it being those that give it the name, Cracău and Bistrița, whose course is a longitudinal one (Figure 2/a). It is also necessary to specify that the present hydrographic system of the territory has undergone modifications compared to the period under study: the numerous processes of embankment, regularization of the riverbeds, desiccation of the lands, irrigation or construction of dams, situations in which it is not excluded that some prehistoric sites have also been affected. Regarding the climatic characteristics of the studied periods, these were marked by the transition from a warm and humid climate from the Atlantic period, to the more fluctuating arid climate, from the sub-boreal regime[4].

Regarding the research that was conducted in the past, there are three major intervals that we can distinguish. The first one, the interwar period was characterized by small-scale research, focusing in particular on the material component (in very few cases one can speak of an interest in the research of housing systems). We have to mention, for this period, the contributions of Constantin Matasă[5], Ioan Andrieșescu[6] and Radu Vulpe[7]. Constantin Matasă identified, beginning with 1928, a large number of archaeological sites existing in the depression of interest in this study; he also was the first to mention the relation existing between the human, the environment and the occupied territory, suggesting the favourable conditions offered by Neamț County for the establishment of prehistoric settlements. Ioan Andrieșescu identified numerous Chalcolithic settlements and Radu Vulpe was the first archaeologist that conducted excavations in the studied area (he also made some remarks concerning the geographical features of the Cracău-Bistrița Depression). The second interval is represented by the period between the Second World War and 1989. This is marked by the continuation of the existing paradigm and methods, although some initiations in the interdisciplinary field can be observed. Mention should be made of the surface and systematic research, undertaken by archaeologists such as Virgil Mihailescu-Bîrliba, Dan Monah, Mihai Zămoșteanu, Silvia Marinescu-Bîlcu, Vladimir and Hortensia Dumitrescu, Ecaterina Vulpe, etc.[8]. The third and last period, is the current one and it is characterised by the continuation

[3] LUPAȘCU 1996.

[4] DRĂGAN & AIRINEI 1993.

[5] MATASĂ 1938.

[6] ANDRIEȘESCU 1924.

[7] VULPE 1936.

[8] See DUMITRESCU 1954; VULPE 1957; VULPE 1961; VULPE & ZĂMOȘTEANU 1962; MONAH & CUCOȘ 1985.

of the research on some of the old sites, the opening of new sites and a greater extent of interdisciplinary collaborations. This can be explained by the fact that the classical manner of research, used until now, does not answer all of the archaeologist's questions anymore[9].

The presentation of the research history of the workspace illustrates the need to approach new methods in archaeology, since the foundation of the present work is represented by the interdisciplinary domain.

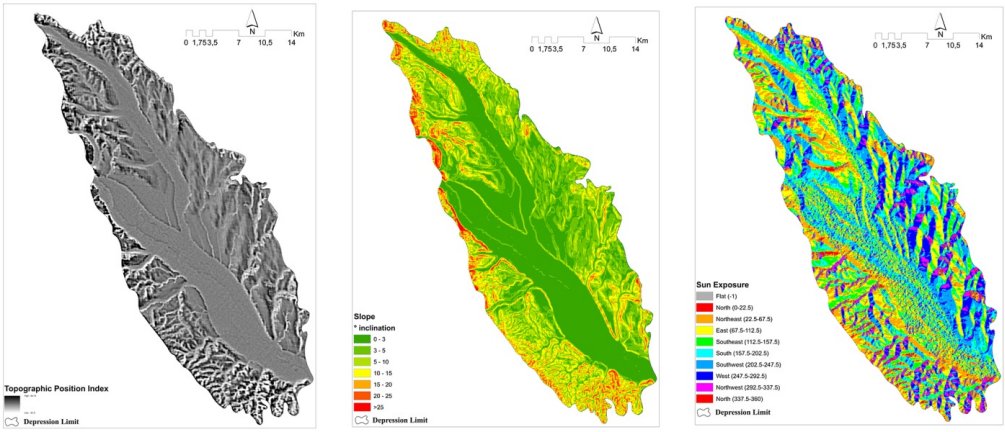
Methods

The present study emphasizes the research of the interval between the final sub-period of the Chalcolithic and the beginning of Hallstatt period, by applying the pluridisciplinary working methods from archaeology, geography, statistics, environmental archaeology and landscape archaeology, using also elements from geology, pedology or biology. The chronological interval was selected in such a way as to offer a high number of discoveries, in order to highlight the characteristics of each period and the evolution of the cultural manifestations in the region. For the analysis of human behaviour it was necessary to choose a relatively known chronological interval, with as many sites as possible, from successive periods. The number of settlements, quite high, reflects the increased interest of communities for a complex landscape, with different features of the surrounding areas. In the Cracău-Bistrița Depression, the physical-geographic characteristics and the natural resources determined the appearance of microzones, in which the density of population for certain periods was high. These particularities had a major impact on the behaviour of the prehistoric communities. Through this analysis, a series of constants and preferences can be established regarding the choosing of place for the new settlement, the exploited resources and the relations between the contemporary human groups. Mankind has made changes to the occupied environment since the beginning of its existence. The traces left by past communities are either direct or indirect, and their historical study and interpretation is the main objective of archaeology. Most structures of the archaeological heritage are under the influence of erosion processes, accelerated by intensive agriculture or by the "industrial" transformations of the landscape. The analysis of the characteristics of the natural environment contributes to the identification of a series of features regarding these preferences of the communities, during the studied periods.

For this purpose, morphometric indicators were calculated, such as: altitude, slope degree (Figure 3/b), sun exposure (Figure 3/c), distance to the water source and to the salt source, *Topographic Position Index* (Figure 3/a) and *Nearest Neighbour*. Numerous biological and physical processes that manifest themselves within a region, characterized by a certain type of terrain,

[9] See NECRASOV *et alii* 1990; POPOVICI 1999; COTOI 2000; COTOI & GRASU 2000; ȚURCANU 2006; ALEXIANU *et alii* 2007a; 2007b; BEM 2007; SOFICARU 2008; LAZĂR & IGNAT 2012; BOLOHAN 2013; BOLOHAN *et alii* 2015.

are closely related with the *Topographic Position Index* (headlands, valleys, troughs, backwaters, plains, etc.). These bio-physical attributes represent predictability criteria for habitat installation within a favourable geographical region and its development, conditioning, at the same time, the distribution and abundance of resources[10]. Another favourite technique, used by archaeologists in analysing the spatial distribution of one group of points refers to the analysis of the distance from the *Nearest Neighbour*. This indicator calculates, also, the aggregation coefficient of the settlements. It must be mentioned that the Slope and Altitude analyses are calculated for a single geographical point, placed according the description, not for an outline that could reflect the boundaries of the settlement.



a b c

Figure 3. Morphometric indicator maps
(a. Topographic Position Index Map; b. Slope Map; c. Sun Exposure Map)

The realization of such a project for the field of archaeology also presents a series of methodological limitations. For most of the archaeological discoveries reported in the workspace, no absolute location data is offered. Obtaining this information requires financial, human and time resources. There are also a number of sites that either cannot be accessed because they are on private property or have been destroyed. In many cases, determining the exact position, using GPS coordinates, is very difficult, which is why it can lead to the exclusion of some of the elements from the analysis. Also, for better accuracy, hydrographic networks should be determined from the Digital Elevation Model. This method could offer us not only the main rivers, but also the smallest ravines that occurred as a result of the springs, thus giving us an image closer to the one existing in the past.

[10] See BRIGAND *et alii* 2012; ASĂNDULESEI 2015; GAFINCU 2015; MIHU-PINTILIE & NICU 2019.

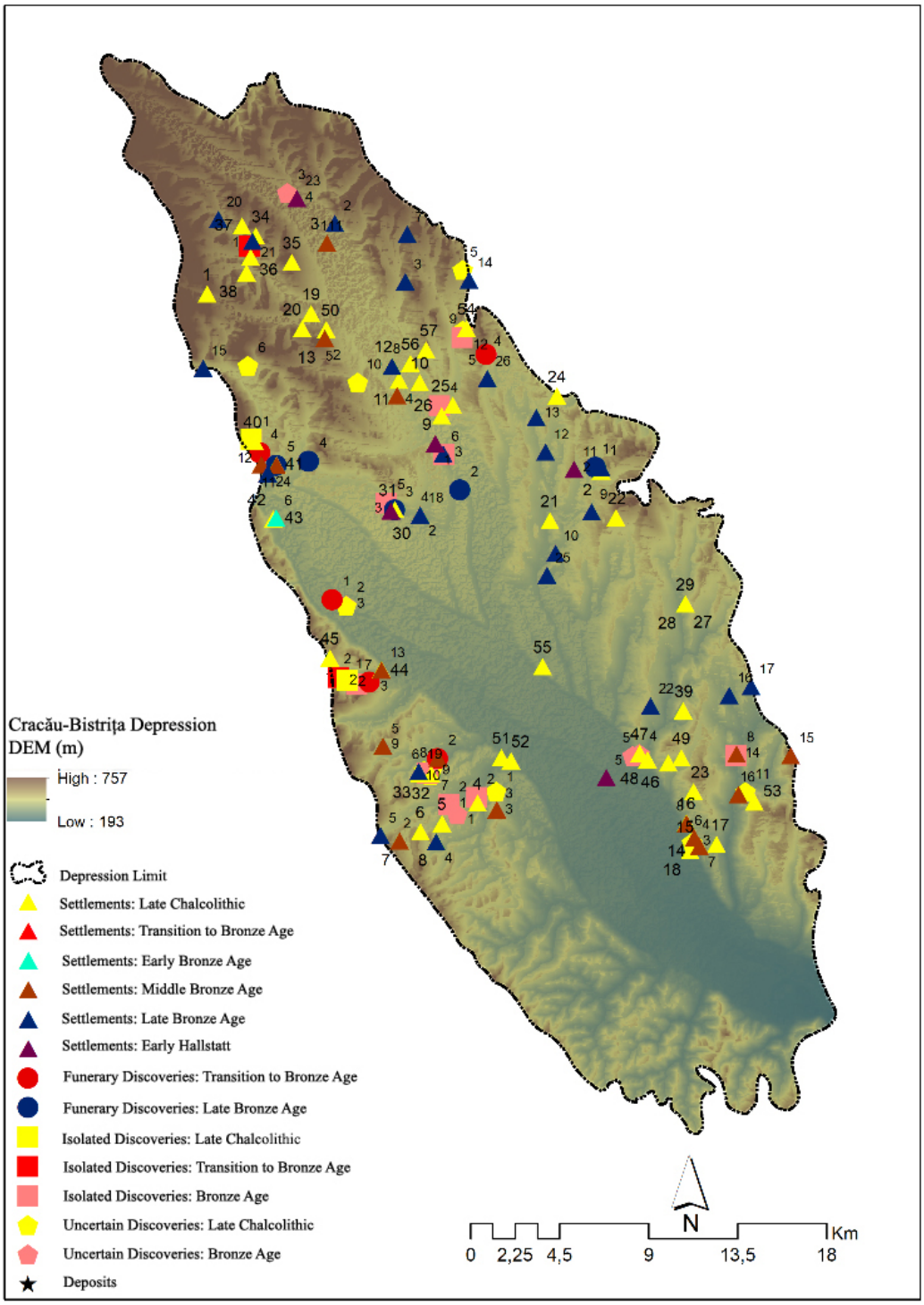


Figure 4. Archaeological finds from Cracău-Bistrița Depression

Results and discussion

Following the researches, there were identified 112 settlements (Figure 4), 10 funeral discoveries, 4 deposits, 13 isolated discoveries and 17 uncertain discoveries. Their relatively small amount is not due to the unfavourable conditions in the area, but to the small number and the amplitude of the research undertaken. The transition period to the Bronze Age, as well as the early periods of the Bronze Age and Hallstatt, have a very small number of settlements (between two and six discoveries), which is why a complete analysis that could give certain results could not be carried out. The results obtained for these chronological intervals can be seen in the graphs presented at the end of the paper. In such situations, I believe that the solution could be a field investigation in the areas where uncertain or isolated discoveries specific to these periods have been reported, in the hope of new discoveries, which will contribute to the completion of the existing database. Also, the surface research could be extended to many areas of the studied territory, especially to those with a small number of settlements.

Choosing a location for the future settlement was a very important moment for prehistoric communities. The selected areas had to provide the natural resources needed for the type of economy practiced. At the same time, the place chosen had to minimize the effort made in obtaining food and building shelters. Water supply, for both human and animal consumption, is one of the essential elements in the existence of communities, in prehistory, but even today. The daily activities involved large quantities of water, so that the water supply became an effort for the whole community. In addition to the role of livelihood, water is also a mean of communication for the communities of the past, but also of the present, a cultural factor, and sometimes it can also have a depository purpose. Fertile soils were needed for agriculture, and grasslands for animal husbandry. Last but not least, salt is another key factor in the life of prehistoric communities, most of them taking into account the presence of a salt source when placing the future settlement.

Regarding the first indicator studied (Figure 5), it was noticed that, during the whole chronological interval, human communities opted for relatively high areas (between 300m and 400m absolute altitude), which offered favourable conditions for daily activities, and natural defence. Also, we can say that the most avoided areas are those of very high altitudes, as with the increase of altitudinal value, the fertility of the soil decreases, and thus, the possibility of practicing agriculture and animal husbandry, things necessary for the subsistence of communities. From the obtained report, it is observed that in the workspace there are an approximately equal number of discoveries located at altitudes between 200–300m or 400–500m. Regarding the average of the existing altitudinal values, this was calculated for each period separately (for Cucuteni culture the evolution in the three phases was also tracked).

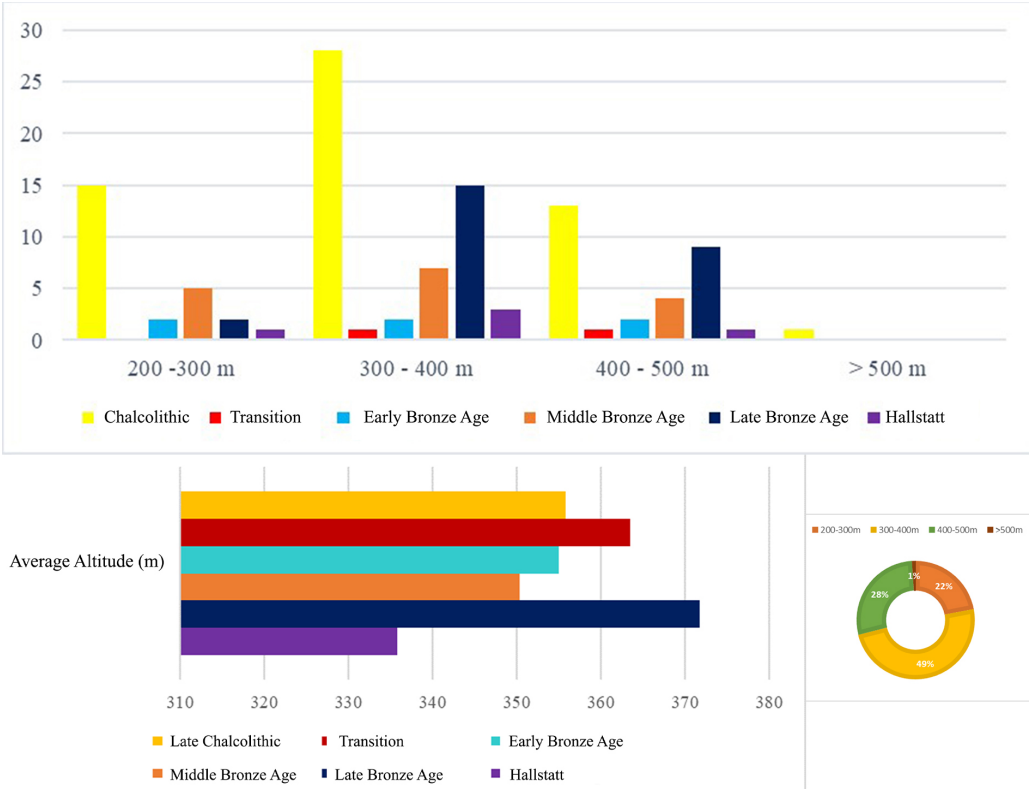


Figure 5. Altitude charts

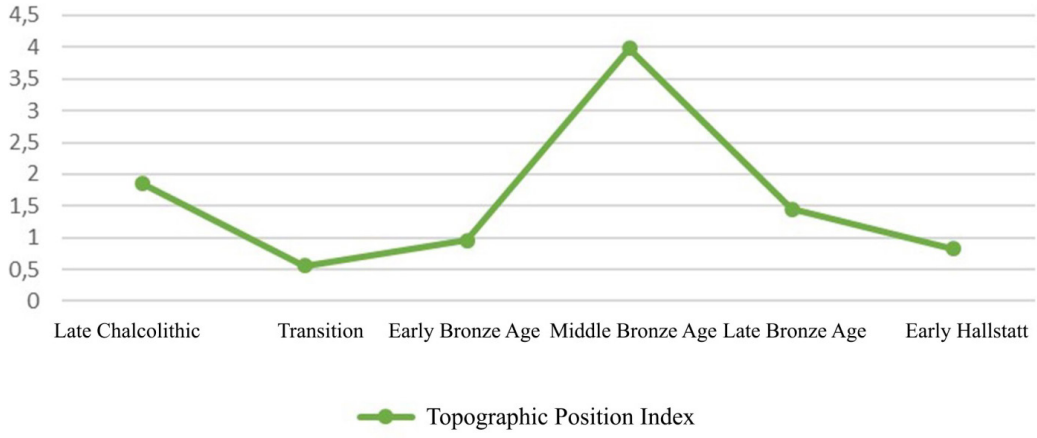


Figure 6. Topographic Position Index chart

In the case of this community, it is possible to observe an increase of the altitudinal average, directly proportional to the evolution of the manifestation. Overall, the average of this indicator falls in the category 300–400m, but the highest value is found in the late Bronze Age (371,76m), and the lowest in the Early Hallstatt (335,8m).

In connection with this indicator is the Topographic Position Index since, the results obtained from its calculation provides information concerning the form of terrain on which the settlement was located (low, dominant etc.). For each studied period, a positive average was obtained (Figure 6), which indicates a preference for the dominant areas, with visibility over the neighbouring territory. We can see that in the Chalcolithic and the Middle Bronze Age, the highest values of the index average were recorded. This is understandable given that the Cucuteni groups, as well as those belonging to the Costișa culture, preferred the high areas to settle. For the transition period, the Early Bronze Age and Hallstatt, the low number of listed dwelling systems does not allow for conclusive results. Otherwise, in the Late Bronze Age the average Topographic Position Index is lower than in the case of the Chalcolithic sequence, which confirms the analyses carried out previously (the communities of the Noua culture preferred the low areas, near the rivers).

The coefficient of aggregation (Figure 7) of the sites existing in the investigated area can be easily observed, simply by visual analysis of the spatial distribution maps, sufficient for defining the characteristics of their geographical distribution. The values of the concentration degree of the chalcolithic sites (R <1) show a way of organizing the settlements for the communities of Cucuteni, in our area of study. This was made by forming some large groups of concentrated settlements, probably in relationship. Unfortunately, the Chalcolithic period was the only one that provided an aggregation coefficient that demonstrates the organizing of the settlements. This can also be related to the small number of sites existing for the other intervals, when taking into comparison.

Regarding the relationship between the altitude and the pedological specific, it can be observed that: the soils on which the analysed structures of housing were located predominantly belong to the category of molisols (ash soils, cambic and alluvial chernozem), and unevolved soils, truncated or crumbled soils (alluvial protosol and alluvial soil). The explanation for these choices lies in the fact that molisols are among the soils with the best properties, being rich in humus and nutritional elements and thus very good for growing barley and wheat. Also, due to the multitude of nutrients and the possibility of additional water supply for plants, the lands with protosols or alluvial soils are usually very good surfaces for agriculture. Cambisols also have good physical, physico-mechanical, hydrophysical and aeration properties. They are located in humid or very humid areas, being well supplied with water, and are often present on lands with good external drainage, which is why they can be used in agriculture. As for the categories of vertisols and clays, avoided by

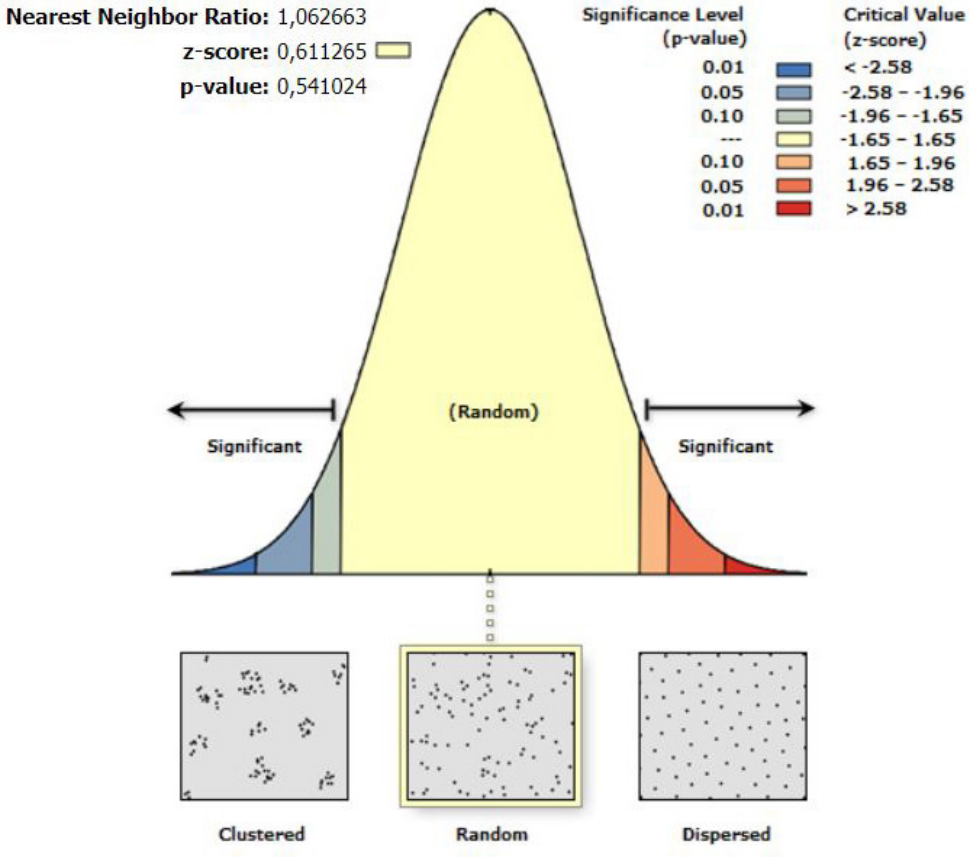


Figure 7. *Nearest Neighbour* analysis for the Chalcolithic settlements

prehistoric communities, they generally have low fertility, due to the unfavourable physical properties, but can be used for wheat crops, poor quality meadows, and sometimes they are occupied with forests.

A very important factor in such an analysis is the geology, because it influenced both the terrain and the soils, determining the presence of hills or depressions, which favoured the settlements. There are also places where this factor led to the fragmentation process, the visible result being that of steep slopes. From a geological point of view, most of the Cracău-Bistrița Depression overlaps with the deposits of gravel and sand, but also with those of clays, sandstone, marlstone, bituminous, stratum of Țicu, Bizușa and Ileanda from Miocene (aquitanian, burdigalian, helvetian, tortonian), Pleistocene and Holocene.

At least for the Chalcolithic period, the problem of raw material sources should be taken into consideration, since the supply of useful rocks was very important in the life of the prehistoric communities. Thus, we can mention menelite, black shale, silicon sandstone with

glauconite, flint, radiolarite, and jasper. The menelite is present in the form of outcrops in the hills of the area of Piatra Neamț (Cernegura, Bâtca Doamnei, Pietricica, Cozla). Black shale is more common in this territory because the Bicaz Valley is crossed by a strip of black clay shale[11]. This type of rock is found, predominantly, in the area of the Hangu stream and its confluence with Bistrița. The existence of flint layers on the Bistrița Valley is attested, in particular, by the affluents of Cuejdiu, Horaița and Cracău. On the Cuejdiu river (near Gârcina), the flint appears as thin strips or lenses up to 20cm thickness, in the layer of limestone known as Pasieczna or Doamna layer and, more rarely, in a layer of sandstone. Radiolarites are found in the conglomerates of the Ceahlău Massif, and the jasper in the aptian conglomerate deposits of Comarnic, Hăghieș, Chicerei Massifs, etc. This fact underlines the direct possibilities of obtaining rocks from Bistrița, where they could have reached by erosion processes[12]. Of course, the presence of these outcrops in the perimeters accessible to the prehistoric communities does not imply a certain knowledge and exploitation.

Regarding the degree of slope inclination (Figure 3/b), it was structured into new categories, which could be applied to each period, namely: 0–5°, 5–10°, 10–15° and >15° (Figure 8). There is an obvious preference for the slopes included in the first interval, as well as a small number of settlements located on steep slopes. The mild slopes, along with the average ones, are the most sought after by the prehistoric communities, which can be seen from the general average of the slopes (3.6°), despite the fact that the steep ones offered a special defensive character. The results obtained in this analysis do not exclude the existence of different types of slopes nearby.

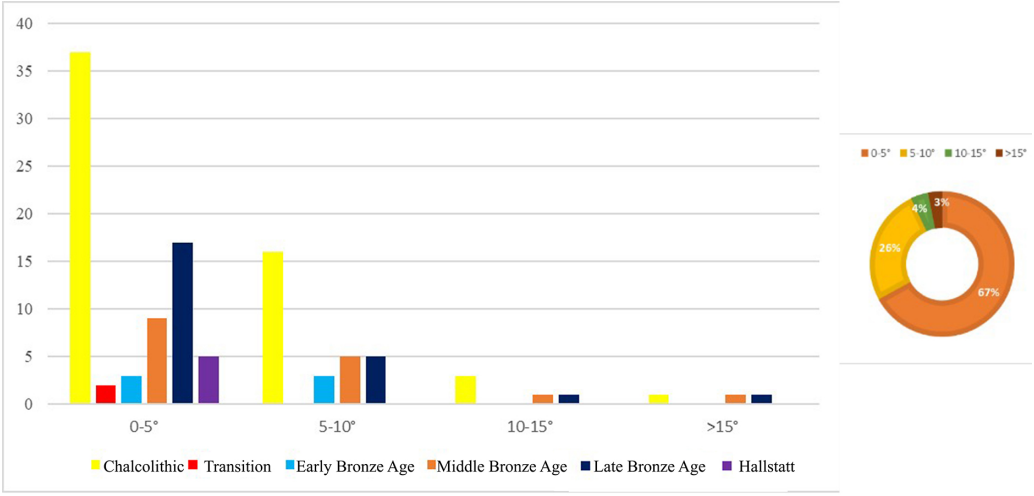


Figure 8. Slope charts

[11] FILIPESCU *et alii* 1952.

[12] CÂRCIUMARU *et alii* 2007.

In the late Chalcolithic, it is observed that the living areas were established, predominantly, in areas with a low degree of inclination of the slope, the minimum being 0.4°, and most of the points falling in the 0–5° range, being followed by those in the 5–10° range. The average of this indicator for the whole range is 4.4°. For the first category, a group of points is differentiated in the northern half of the depression, and for the second in the southern half. It is noted that the sites belonging to the first phase of Cucuteni culture are, in most cases, on headlands with steep slopes. Also, for the 5–10° interval it can be observed that, again, this choice was made predominantly by the members of the communities of Cucuteni A. For phase B, the lands with mild slopes are chosen with preference, most of these discoveries being within the first intervals. Regarding the stage A-B of the culture, the corresponding points can be found in all the categories presented above.

The Middle Bronze Age is characterized in the workspace by a minimum of 0.9°, as in the previous cases, but by a much higher maximum, namely 22.3° (Piatra Neamț–Pietricica). We differentiate a group of nine sites located in areas with mild slopes, between 0-5°, five in areas with medium slopes, between 5-10°, and one in the last two classes, those of steep slopes, 10–15° and >15°. Regarding certain relations between the chosen slope classes and the occupied regions, no clear conclusions can be drawn. It can be observed, that the points located in the territories with steep slopes are in the western end, close to the contact with the mountain; regarding the other categories, they are characterised by findings from the whole area under study. In this case, the average of the slopes increases, in comparison with the previous ones, thus obtaining 5.9°.

In Late Bronze Age we find the classes of slopes we encountered previously, so that the minimum is 0.3°, the maximum 15.5°, the communities opting again for the mild or medium ones. The first interval, the one between 0–5°, is characterized by the presence of 17 sites, which are predominantly located in the northern half of the territory. Also, it can be observed that the second value segment, 5–10°, has five points, most of which are concentrated in the central-eastern area of the study space. The slopes' average is 3.7°.

The degree of sun exposure (Figure 3/c) reveals two main options preferred by the communities when placing the dwelling system (Figure 9): semi-shaded and semi-sunny slopes (eastern and western exposures). These are followed by sunny slopes (southern exposures), the category for which the rarest one was the shaded slopes (northern exposures). If we put in relation the present indicator with the altitudinal one, we notice that for the Chalcolithic period, the lands with eastern exposure have values between approx. 300m and 400m, except for the sites from Piatra Șoimului–*Pe Gorgan* (452m), Negrești–*Ilișeni* (437m), Negrești–*Piciorul Crucii* (429m) and Traian–*Dealul Fântânilor* (283m). For the western orientation, the values are between 200–400m, except for the settlement from Negrești–*Cetățuia* (471m) and the one from Negrești–*Dolhești* (518m). In the case of southern exposure,

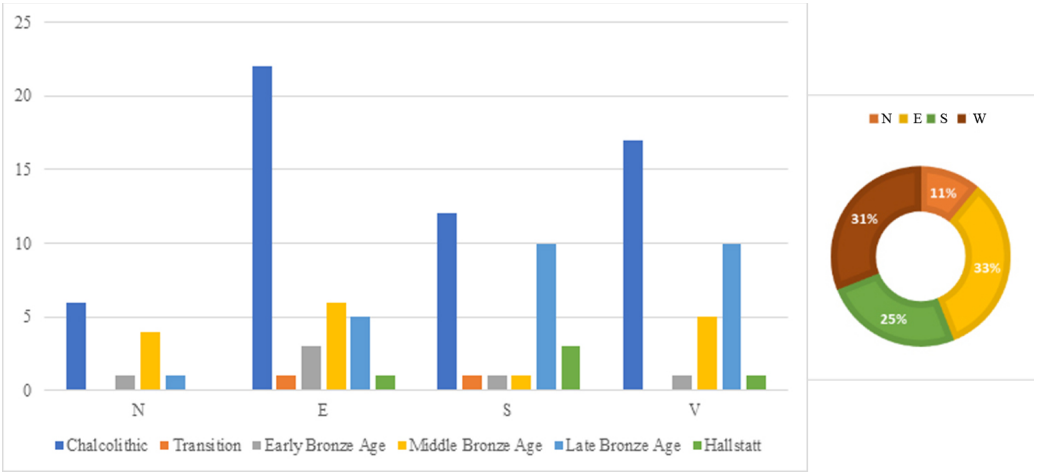


Figure 9. Sun exposure charts

the points are found in all categories of heights. In the last category, of the orientations towards the north, we have a number of six sites, characterised predominantly by altitudes between 300–500m, with one exception: Ruseni–*Vatra satului* (257m).

Regarding the altitude-exposure ratio, from Middle Bronze Age, it is observed that the values of the heights corresponding to the eastern orientations are higher than the western ones. Thus, for the first category, we obtain the range 300–400m, with one exception: the settlement from Români–*Râpi*; at the same time, for the second category, the altitudinal class is the one between 200–300m, also with one exception: Borlești–*Dealul Runcu*. In the case of the northern and southern orientations, the altitudes are predominantly between 400–500m.

The altitudinal values of the discoveries of Late Bronze Age, located in areas with western exposure, are in the range 300–400m, with the exception: Corni–*La Șuri* (473m). In all other situations, the value range is 300–500m, because sites with heights less than 300m, specific to this period, are found in a reduced number in the workspace. The two discoveries that can be classified between 200–300m are those from Goșmani–*Cărbunești* (295m) and Dochia–*La perdele 3* (300m). As they are very close to the value of 301m, from which the points were included in the following altitudinal category, we could consider that all sites of this period, respectively of these categories of exposures, fall within the range of 300–500m.

As a result of calculating the distance to the nearest water source (Figure 10), there was obtained a relatively small number of sites near the river courses or at a great distance from them. On the other hand, it was found a preference for the location of the settlements at distances between 100–500m and 500–1000m, medium distances, easy to travel.

Most settlements were related to rank I water courses, followed by the ones that are rank II. For the following ranks we have fewer and fewer corresponding sites, so that in the end, in the case of Bistrița (rank V) we have only one discovery[13]. It should not be overlooked that this analysis took into account the current courses of the rivers, being possible the existence of a very different situation in prehistory.

The last indicator calculated in this analysis is the distance to the nearest source of salt (Figure 11). It is noted that very few sites are near such a place, most being located more than 3km away, some over 5km, but at easy walking distances.

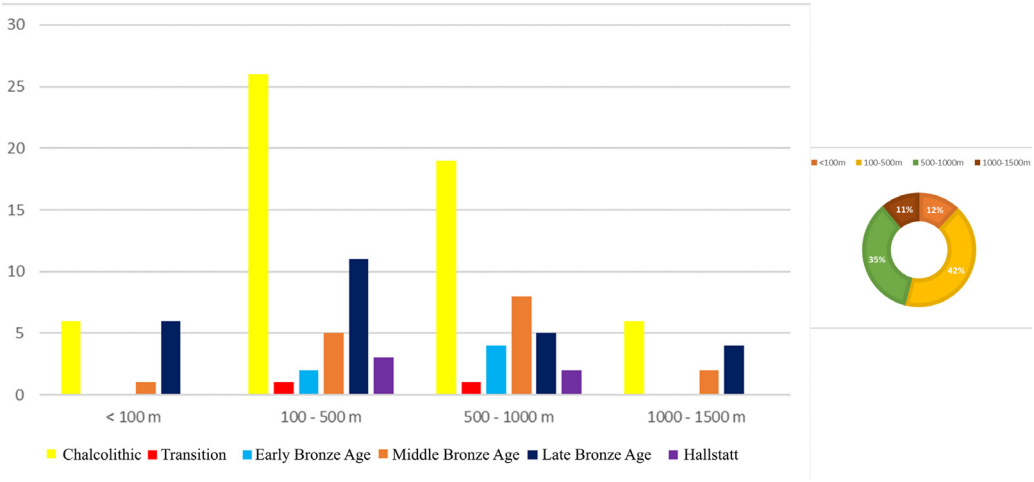


Figure 10. Distance to the source of water charts

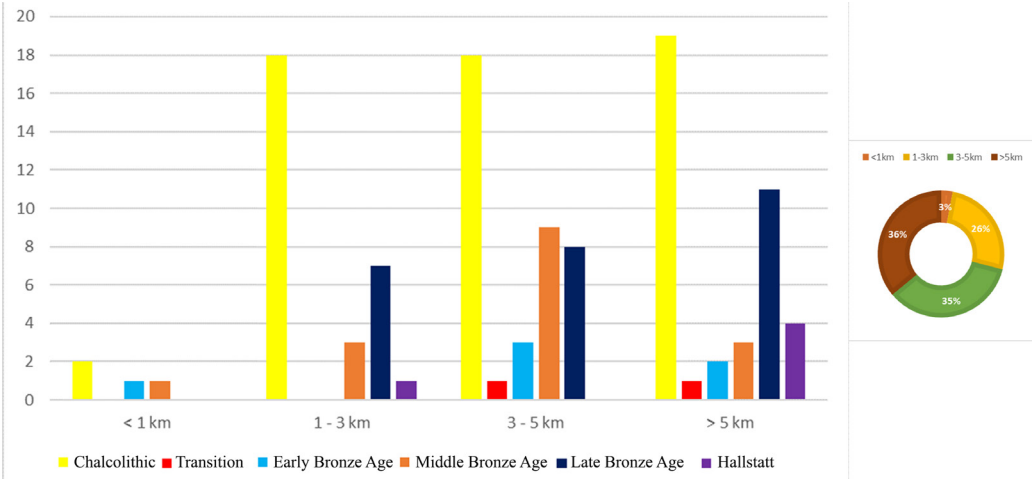


Figure 11. Distance to the source of salt charts

[13] The ranks of the rivers were obtained using the Horton-Strahler number.

Conclusions

The morphometry of the terrain (altitude, slope, orientation and heating) is an important factor in the pedogenetic process. As the main landscape present in the depression is of the fluvial kind, the features of the corresponding soils are: the presence of a lighter colour compared to the surrounding areas, only in certain directions, due to the streams; the high density of some formations (ravines), which will lead to the removal of the soil cover and the appearance of the so-called *bad-lands*; the appearance of the terrain offsets, depending on the number of terraces and meadow steps, etc.[14].

If we structure the conclusions by segments corresponding to the analysed periods, we extract the following information: in the final stage of the Chalcolithic, the communities opted for lands situated at 300–400m altitude, with mild slopes (0–5°) and eastern exposures, at relatively small distances from the water sources (100–500m). The Middle Bronze Age is similar, in terms of preferences, with that of the Chalcolithic, as the altitudinal values sought after are the same (300–400m), also the slope classes (0–5°), and the chosen sun exposures are again, predominantly eastern. As far as the distances are concerned, the one up to the water source is between 500m and 1000m, and to the salt source between 3km and 5km.

The Late Bronze Age period undergoes minor changes regarding the sun exposure, this time being western and southern, and the distances to the water source are between 100 and 500m or less than 100m. As for the distance to the salt source, the communities had to cover, for the most part, distances greater than 5km. The altitudes and slopes remain those preferred by the previous communities, namely: 300–400m and 0–5°.

During the Early Hallstatt, the first two indicators are unchanged, the exposures are predominantly southern, and the distances 100–500m, respectively greater than 5km.

Finally, as a whole, the prehistoric communities in the studied range, located their dwelling systems on lands with altitudes between 300–400m, with mild slopes (0–5°), eastern or western exposures, with distances to the water source in the range of 100–500m, and even greater than 3km or even 5km, when talking about salt sources.

As we mentioned before, in the Cracău-Bistrița Depression there are numerous funerary discoveries, deposits, isolated and uncertain discoveries. For these, the same type of analysis was performed, and the results showed that they are located in territories similar to those in which the living areas were located previously. I paid particular attention to the funeral discoveries specific to the Late Bronze Age. The distance from these to the contemporary settlements was calculated in order to see if it is possible for some to represent necropolis outside the inhabited area. In two of the five cases distances of less than 1km were obtained, namely: the flat graves from Bălușești are located approx. 280m from the Bălușești–*La Școală*

[14] SECU 2011.

site, and the potential funeral complex from Piatra Neamț–*Lutărie* at approx. 620m from the settlement of Piatra Neamț–*Steagul Roșu*. However, we cannot issue a verdict, the information being placed, to some extent, in the area of speculation.

It has been observed that the northern area is rarely frequented by human communities, a fact due either to the geomorphological characteristics of the Cracău-Bistrița Depression (high altitude, corresponding to the alpine area) or to the low number of researches undertaken in the region. The situation is also encountered when talking about the western frame of the depression, which is marked by the contact with the mountain and the existence of paths and passers-by. The eastern area is faded by the contact with the hilly terrain of the Depression of Moldova, and the southern one follows the interfluvial hills that separate Bistrița from Trotuș, leading to a strong frequentation of these areas by the human communities. All the factors considered in the present study (physico-geographical, geological, pedological, petrographic, hydrographic, climatic, etc.) illustrate an area favourable to human development, both in the past and in the present.

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