ADAM MICKIEWICZ UNIVERSITY POZNAŃ

Treasures of Time

Research of the Faculty of Archaeology of Adam Mickiewicz University in Poznań

Location of the main research areas.
Numbering, compare the table of Contents.

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Research of the Faculty of Archaeology of Adam Mickiewicz University in Poznań

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FACULTY OF ARCHAEOLOGY AMU

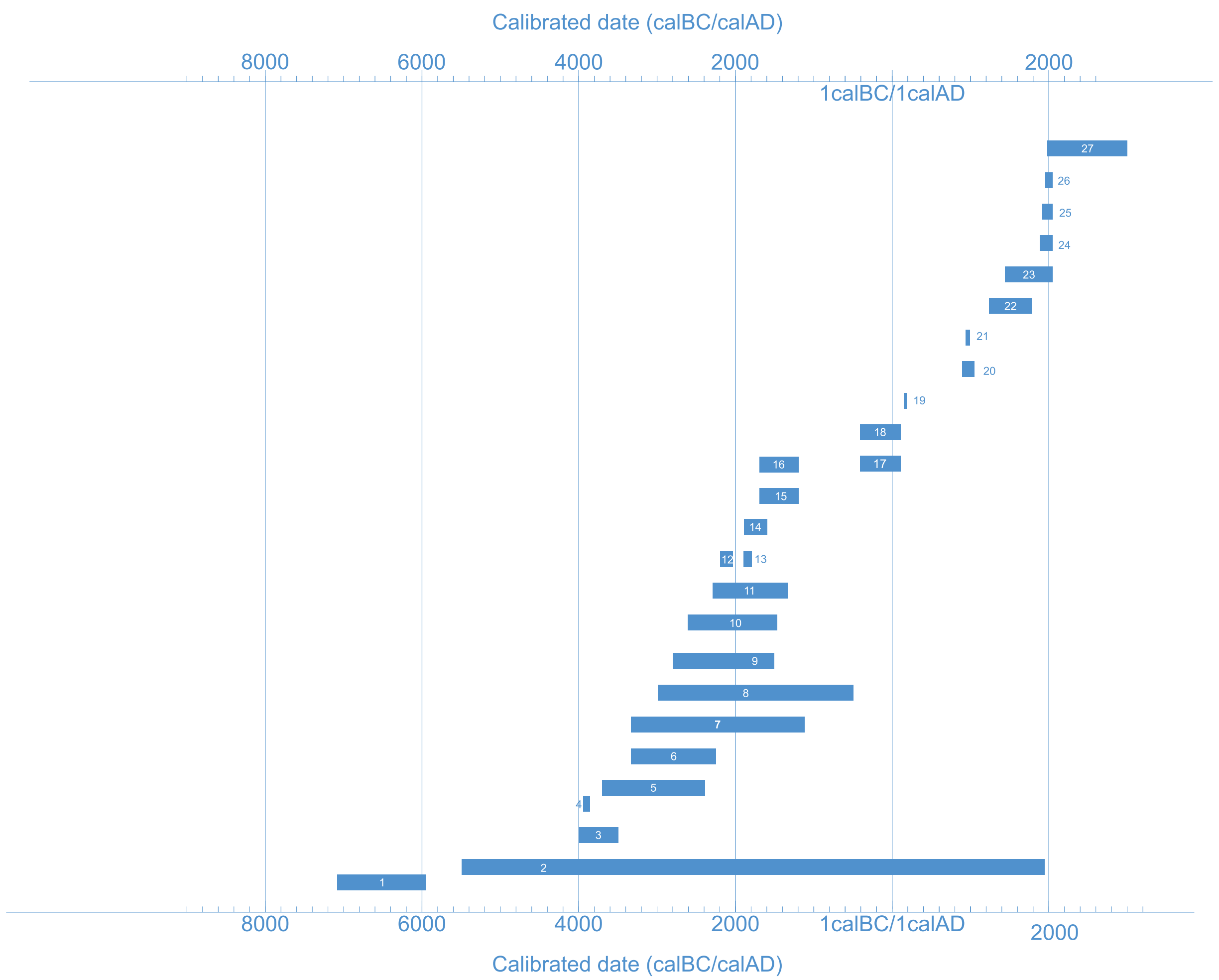
Contents

Treasures of Time: Research of the Faculty of Archaeology of Adam Mickiewicz University in Poznań

Introduction

In 2019, archaeology at the Adam Mickiewicz University in Poznan celebrated its honourable 100th anniversary! The establishment of archaeology at this university was associated with the strong influence of the authority of Prof. Józef Kostrzewski and a succession of eminent scholars, many of whom we today call Masters.

The year 2019 was a real breakthrough. We started the second century of existence within the Alma Mater Posnaniensis with a new structural independence and quality that the academic archaeology of Poznań had not yet known for its one hundred years of existence. This change, the formation of the first Polish Faculty of Archaeology, has opened new chances and possibilities of which we are now taking advantage.



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Prof. Józef Kostrzewski (1885-1969)

Currently, the Faculty of Archaeology of Adam Mickiewicz University is formed by a number of teams, each with their own leaders. In the majority of cases, these teams are united by interdisciplinarity, which integrates within selected projects the experience of many so-called ‘auxiliary’ sciences of archaeology. This trend is paralleled by the development of specialised laboratories armed with the latest equipment in the Faculty of Archaeology.

This publication presents the current scientific interests creatively developed by such teams at the Faculty of Archaeology of Adam Mickiewicz University. The research of these teams covers vast areas in time and space, summing up at least the last 9,000 years of prehistory. The following articles, arranged in chronological order, allow us to explore the prehistory of various areas.

The adventure begins around 7100 BC, in the Neolithic settlement of Çatalhöyük located in Turkey. Then, we move on to the loess uplands near Krakow, where the first farmers from the south of Europe had just arrived (5500 BC). A little later (4000-3500 BC), and a little farther north, in the area of Greater Poland, some of the first megalithic constructions in this part of the world were built. Around the same time, about 800 km to the southeast, a settlement of the Trypillia culture remains in the phase of development (3950 BC). The end of the Stone Age in Poland was described in the history of Late Neolithic communities on a hill in the center of Kujawy region (3700-2400 BC). Farther east, in the forest-steppe area of Ukraine, significant cultural and social changes resulted in the formation of the Yamnaya culture (3350-2250 BC), beginning the Bronze Age.

Intense elements of this era can be traced in the area of southern Europe in the Greek Anthemous Valley (3350-1150 BC), in Attica (3000-500 BC) on the plains of the Hungarian Lowlands (2600-1450 BC) and to the Upper Dniester Valley, where numerous burial mounds were formed (2800-1500 BC). A similar chronological range is presented in the articles devoted to a unique site in Bruszczewo, Greater Poland (2300-1350 BC), which not only accumulates valuable metal artefacts, but is also the subject of interest of an interdisciplinary team focused on reconstructing its environmental context.

The next text take us far to the east, to the area of Iraqi Kurdistan, where we can appreciate the importance of Mesopotamian influences in shaping the picture of the Early Bronze Age (2200-2150 BC).

Subsequent texts describe the discoveries of Poznań scientists in Syria (1906-1787 BC) and in Greater Poland (1900-1600 BC). These two distant points describe various aspects of life in contemporary communities in the Middle and Early Bronze Age.

The characteristic archaeological materials of the later centuries of the Bronze Age (1800-1200 BC) reveal an intensification of military conflicts and migration processes (1700-1200 BC). The turn of the eras is illustrated in this volume by texts on the interpretation of representations on ancient Greek and Roman sculpture (400 BC-100 AD), as well as the cultural situation in the Polish lands (400 BC-100 AD).

We are introduced to the new era by an article on the funerary customs of communities from the Polish lowlands describing discoveries at the site of Mirosław (160-175 AD). Moments of the formation of elements of Polish statehood are referred to in texts describing towns at Grzybowo (919-1050 AD) and Poznań in the early Middle Ages (950-1000 AD).

Later parts of the Middle Ages are described by sacral monuments located also in the area of the contemporary city of Poznań: the Collegiate Church of St Mary Magdalene (1263-1802 AD) and the still extant Church of the Blessed Virgin Mary on Ostrów Tumski, founded around 1431 AD in the immediate vicinity of the previously described early medieval site of the 'origin' of the city of Poznań.

The final texts of the volume do not refer directly to a particular period of prehistory, but present the history of Polish archaeological research on the Iberian Peninsula, the contemporary perception of prehistoric art by the inhabitants of present-day Canada and Siberia, and the development of methodological thought among Poznań archaeologists.

The volume closes with a text describing one of the many perspectives currently faced by the staff of the Faculty of Archaeology of Adam Mickiewicz University in Poznań: the new ArchaeoMicroLab.

We look to the future with great hope that the Staff of the Faculty will provide ideas for many more volumes of Treasures of Time. We trust that this set of articles will present archaeology at the Adam Mickiewicz University in Poznań in its new structure as a Faculty and show its potential. We would thus like to encourage you to get acquainted with our Poznań perspective on archaeological studies, and to reflect on ways of exploring the past.

Andrzej Michałowski

Danuta Żurkiewicz

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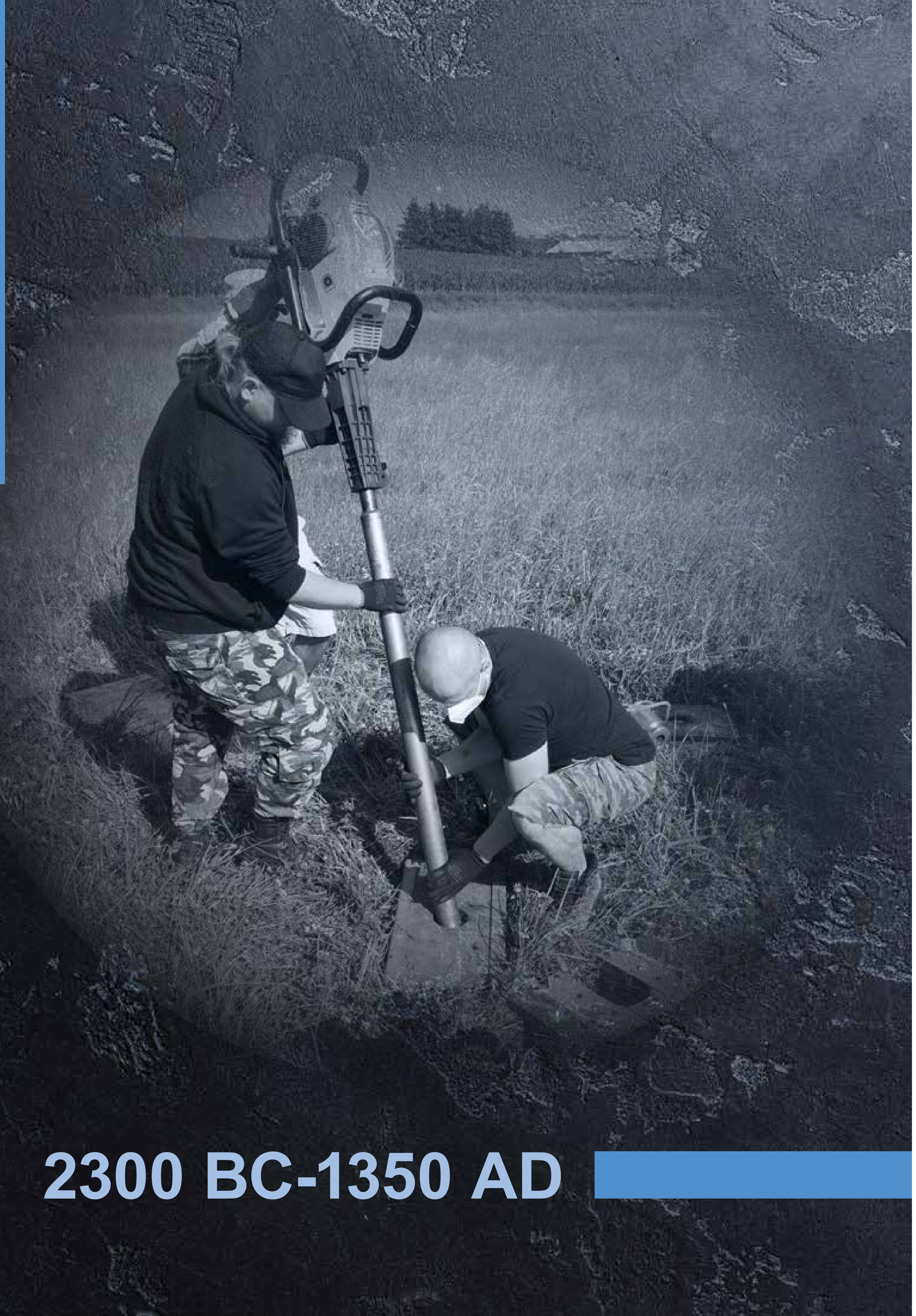

2300 BC-1350 AD

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When archaeology meets environmental sciences: the Bruszczewo site revisited

Jakub Niebieszczański, Mariusz Gałka, Iwona Hildebrandt-Radke, Monika Karpińska-Kołaczek, Piotr Kołaczek, Mariusz Lamentowicz, Monika Rzodkiewicz

Abstract

Settlement archaeology is often supported by geoarchaeology in which human habitation is drawn on the timeframe of landscape changes derived through interdisciplinary research. An example of a geoarchaeological approach to settlement study is the Bruszczewo Lake project conducted in Central-Western Poland. The area of Bruszczewo and the Samica River Valley witnessed human occupation since the Neolithic period and is most widely known for the presence of an Early Bronze Age fortified settlement. Previous research provided initial information about the presence of a lake and marshland in prehistoric and early historical times. A new geoarchaeological project aims to create a detailed environmental and landscape transformation history combined with the extensive knowledge of the archaeology of the area. Using GIS techniques, conventional drilling, and vibra-coring, a new set of data is brought to light and analysed in palaeoenvironmental terms. Constructed geological profiles across the valley revealed the basin's morphology and provided insight into the subsequent landscape transformation phases, from the Late Glacial ribbon lake lasting until the end of the Bronze Age to the marshlands that thrived until the Early Medieval period. The ongoing analyses of samples derived from drillings provide a perspective for detailed reconstructions of landscape changes.

Keywords: Geoarchaeology, Environmental Archaeology, Bruszczewo, Palaeoecology

What is geoarchaeology and what does it tell us?

Current archaeological research often meets various sciences that are beyond the conventional scope of human studies. As one of the principal purposes of archaeology is to reveal the human past, so is the goal to reveal the habitat in which humans lived. For this reason, numerous non-archaeologists have been involved in excavations, analyses of finds, and contextual research for decades. Alongside biology, anthropology, chemistry, and other branches of science that allow archaeologists to reconstruct various aspects of the human past, the combination of archaeology with earth sciences aims to reconstruct former landscapes in which people existed in prehistoric and early historical times. As the combination of various methodologies applied in archaeological research have already found themselves named in current scientific nomenclature, including bioarchaeology, petroarchaeology, and zooarchaeology or archaeozoology, the same applies to the fusion of palaeoenvironmental, or palaeogeographical sciences with archaeology. Presently interchangeably used terms include geoarchaeology and environmental archaeology. Despite applying a different suite of approaches, analyses, and fieldwork methods, they ultimately aim for the same purpose – to reconstruct the relationship between humans and the environment.

Geoarchaeology – as understood in the scope of this paper – answers archaeological questions using various methods derived from geology, geomorphology, physical geography or geophysics, combined with other earth sciences and biological aspects of the past, for instance by revealing vegetation history or hydrological conditions (Rapp & Hill, 2006). Studies in geoarchaeology vary both in terms of spatial and directional scope. The first division can be considered as on-site compared to off-site approaches; however, further distinctions can be seen as, for example, reconstructing microregional human influence on the landscape (e.g., Doyen et al., 2016) versus the regional pattern of human relations with the surrounding environment (e.g., Fouache et al., 2008; Ghilardi, 2018). These interdisciplinary and multifaceted research methods have been employed long enough to be considered an immanent part of settlement archaeology or past landscape studies (Rapp & Hill, 2006). The intention of this article is to present geoarchaeology in practice and its valuable addition to settlement archaeology on the basis of a microregion in Bruszczewo located in Central-Western Poland (Figure 1).

Bruszczewo microregion during the prehistory and early historical times – what happened there?

The area of Bruszczewo village, c. 50 km south of Poznań (Figure 1), is most widely known in archaeological disputes as the place where a fortified settlement from the Early Bronze Age, belonging to the Unetice culture people, was discovered (Czebreszuk & Müller, 2004) and has witnessed numerous studies and excavations oriented towards exploration of this site (Müller et al., 2010). It is considered as an unique representation of defensive installations of the Unetice culture (Jaeger & Czebreszuk, 2010). The discussed site lies on a promontory

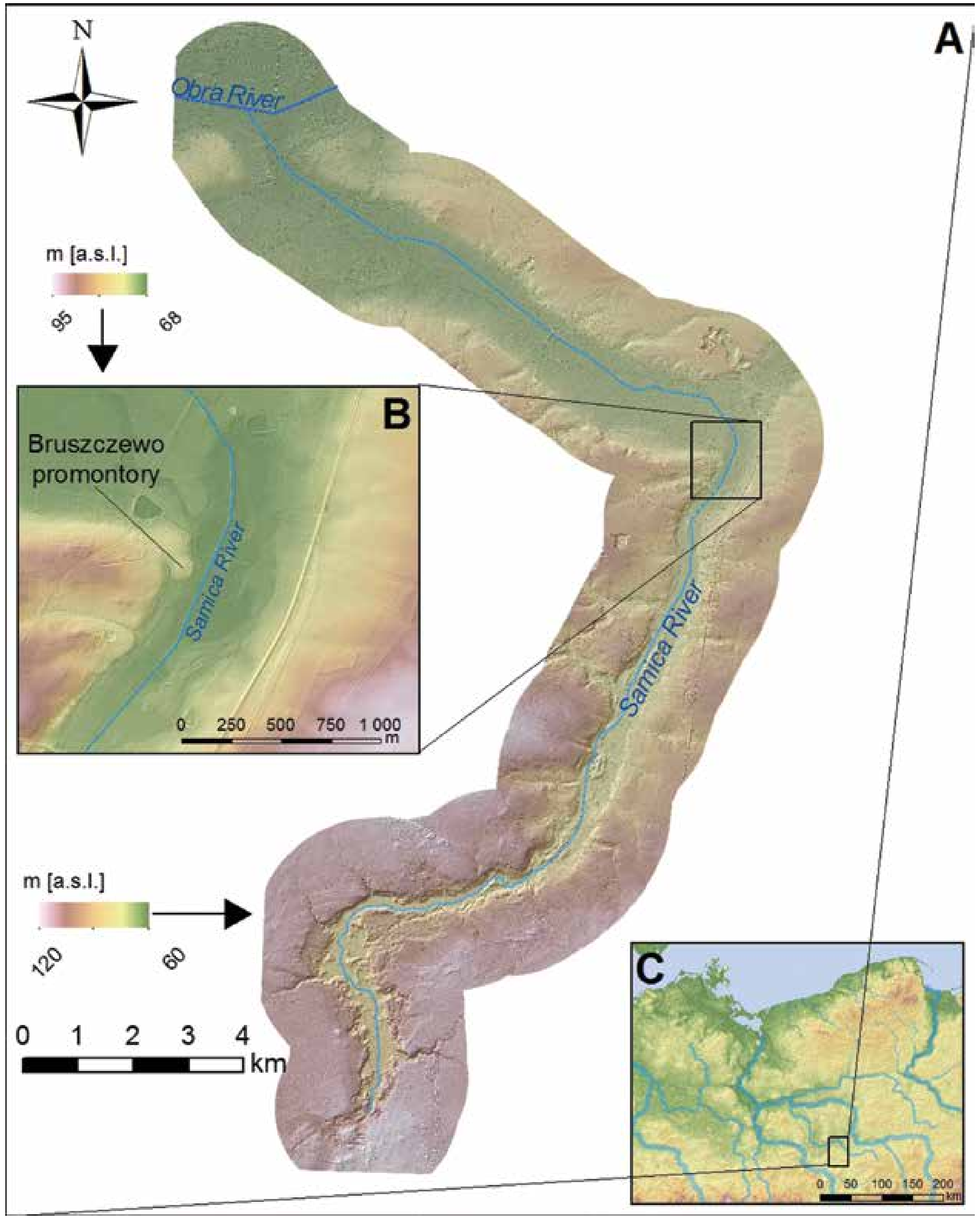

Figure 1. Samica River Valley (A) and the extent of the Bruszczewo microregion (B) in Central-Western Poland (C).

slope, extending over the middle of the course of the Samica River Valley (Figure 1A). The settlement was separated at that time from the rest of the slope by a ditch (Bork, 2010) or a moat (Hildebrandt-Radke, 2010), and on the inner side by a palisade and a rampart (Jaeger, 2015) (Figure 2).

Undoubtedly the largest archaeological effort was focused on the EBA settlement; however, the Bruszczewo microregion comprises a much longer habitation history. Several Neolithic stages of human presence in the area was documented both on the discussed promontory as well as in its vicinity (Szmyt, 2015). After the EBA phase of occupation and a supposed habitation hiatus during the Middle Bronze Age, this section of the Samica Valley witnessed an intense Lusitian Urnfield culture occupation in Late Bronze Age and the Early Iron Age, manifested in the presence of a peculiar ritual place and an associated extensive urnfield cemetery nearby (Figure 2) (Ignaczak, 2015). Remains from the Roman Period occupation are observable in several locations indicating ongoing human presence in

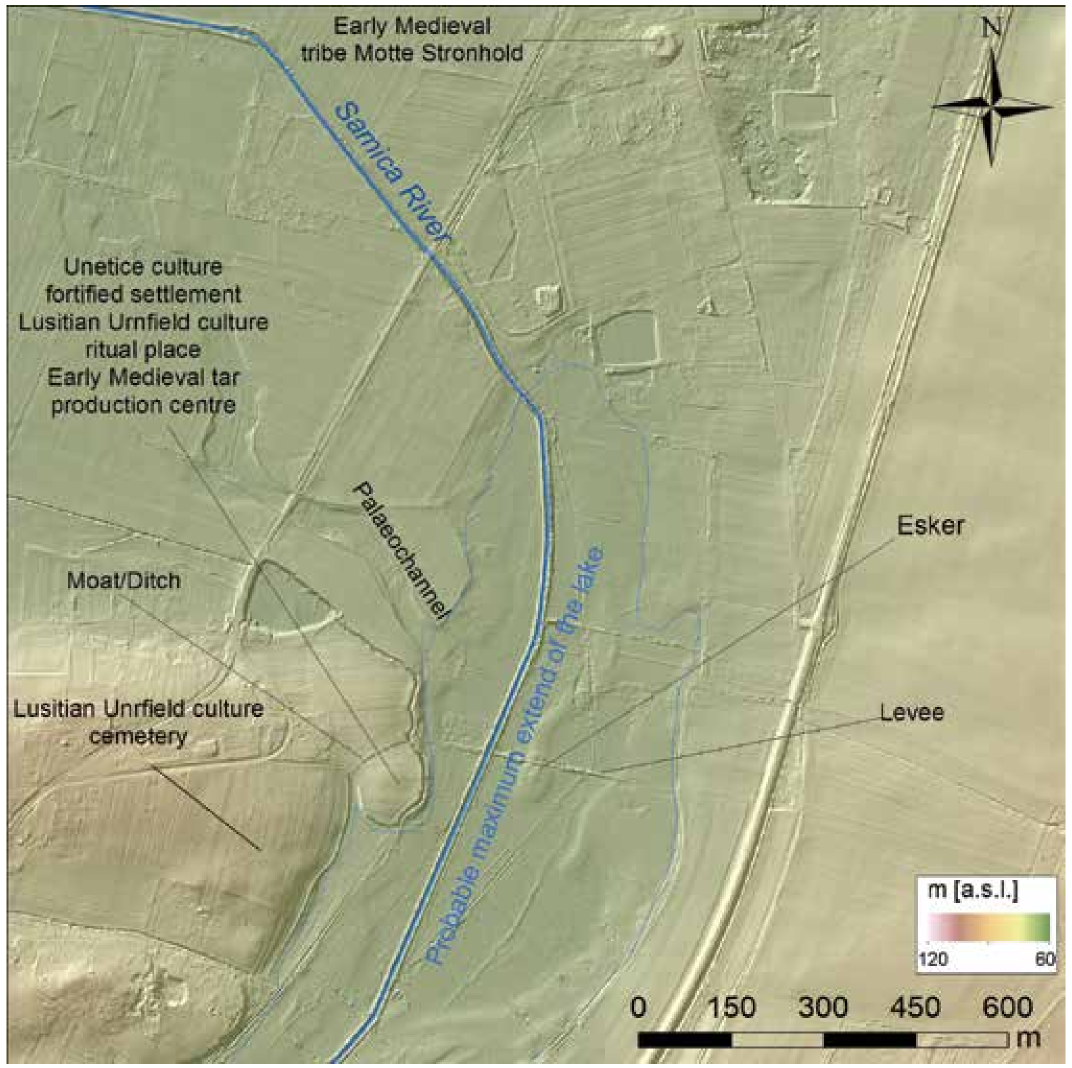

Figure 2. The Bruszczewo microregion with archaeological and geomorphological features discussed in the text indicated.

the area until the Migration Period (Szydłowski, 2004). After several centuries of turbulent and uncertain times during the latter phase, the Bruszczewo area was again stably inhabited by Slavic tribes in the Early Medieval and consequently incorporated into the Early Polish State during the tenth century AD (Figure 2) (Brzostowicz, 2002). These phases of early historical times are represented both on the promontory, where tar production took place, as well as in the northern part of the valley were the Slavic motte stronghold of Obra tribes was raised.

As seen from the perspective of habitation history, the area of Bruszczewo and the middle course of the Samica River marks an important spot on the archaeological map of Central-Western Poland, being a place of almost uninterrupted human occupation for several millennia. The interchanging cycle of human presence in the region offers a good perspective for investigating anthropogenic interventions on the landscape as being dependent on the scale of human occupation, its duration, tools involved in land cultivation, subsistence strategies, and even ritual activity.

It is not common to perform all such reconstructions; however, in the case of the Bruszczewo microregion, the landscape bears great potential due to its geomorphological and geological characteristics. The bottom plain of this section of the Samica Valley is currently a meadow that developed on a thick series of peat deposits. Therefore, it might be assumed that the past appearance of the Samica Valley might not reflect its present state. Since the beginning of excavations of the EBA settlement on the promontory in the early twenty-first century, researchers found significant evidence for landscape change in this part of the valley, which further prompted initial geoarchaeological research (e.g., Bork, 2010; Haas & Wahlmüller, 2010). Several brief geoarchaeological surveys that took place both on the promontory as well as in the valley plain indicated the presence of an extensive lake in the past, which was subsequently overgrown and drained, forming a vast marshland (Hildebrandt-Radke, 2013). A specific core from a meadow north to the EBA site was briefly analysed through palynological means (Haas & Wahlmüller, 2010) and provided insights into local vegetation changes from the Late Neolithic to the early stages of the EM. According to the dated palynological profile and identified sedimentary environments throughout the core, it appeared that a freshwater lake occupied the valley at least until the transition to the Roman Period. The lake subsequently transformed into marshland, which according to the researchers were present until the EM. The flora of the region was affected by changing human influence several times. The earliest stage recognized as experiencing a significant anthropogenic intervention is visible during the EBA when much of the forest in the area was exploited, both as a result of land cultivation as well as deforestation to provide wood needed for the construction of extensive fortifications. After the abandonment of the settlement, the woodland regenerated slowly and witnessed another phase of human presence during the LBA/EIA. The last stage of significant human impact was dated to the Roman Period, when settlements were spread around the valley.

The Bruszczewo Lake project – a new perspecitve and some initial results

Despite the significant data provided by earlier investigations, much of the detail of the landscape history around the lake remains unclear. For instance: how vast was the lake in its maximum of development? Did the lake diminish in its entirety during the BC/AD transition? Were there any fluctuations in water table level during its presence? How deep was the lake's basin throughout prehistory? Were the lake's waters incorporated into the defensive ditch during the EBA by hydrotechnical installations? Why did the lake transform into marshland and how did this process impact the local settlement? When did the Samica River start controlling sedimentation patterns in the valley bottom, thus changing the settlement pattern in the valley? Are there any traces of slope degradation and erosion around the lake due to the agricultural activities? To explore these research questions, in 2019 a new multidisciplinary project was started and oriented exclusively towards the geoarchaeological recognition of the Bruszczewo microregion, specifically landscape transformations throughout prehistory and the EM period. This initiative includes numerous scientists from different fields of study, including archaeology, history, geomorphology, geology, palaeoenvironmental sciences, and geophysics. The project assumes to obtain detailed chronological information on the environmental changes, both biotic and abiotic, and connect these dynamics with the already well-recognized history of human occupation in the area.

Looking from above – remote sensing

The first step of data collection was done through GIS studies of the microregion and the evaluation of morphological features within the valley (Figure 2). Several LIDAR-based digital elevation models distinguished a peculiar form in the central part of the valley's plain that was not included on maps produced by earlier researchers due to the lack of precise elevation models at that time. This particular feature represents the remains of an esker (os), formation that often lie within glacial tunnel valleys (Figure 2). Despite its Pleistocene origins, it is an important feature in the context of past human habitation, as its presence might indicate the existence of dry land within the former lake. Often eskers form oblong islands in lakes and such a situation might also have been the case in the Bruszczewo lake, or later when marshland dominated the valley's plain. Within the drilling conducted at the prominent elevation of the os structure, a pottery fragment dating to the Neolithic or Bronze Age period was found at the transition between the lowest peat levels and esker sand deposits. This small artefact might reflect that at least during Neolithic times, the esker was surrounded by the lake's water and remained a dry island.

Another feature revealed during the examination of the LIDAR scans was a narrow ridge of land cross-cutting the valley's plain in the area of the fortified EBA settlement. A preliminary interpretation of this feature is that it was raised by human hand as a levee to provide a path across the valley (Figure 2). Whether this feature is connected to the prehistoric settlement activity remains doubtful; the most probable explanation is that it was erected during Medieval times, possibly also changing the hydrological conditions in the valley.

The morphology of the valley derived from the elevation model also suggests the maximal former extent of the lake, which is indicated by a depression in the central part of the investigated area (Figure 2). At its northwestern margin, a specific fluvial feature was registered, indicating the presence of a palaeochannel from a time before river regulation. The historical cartography analysis performed for this area documents a regulated course for the Samica River since at least beginning of the nineteenth century AD.

Figure 3. Vibra-coring procedure in Bruszczewo.
The sampler is being stabilized in a drilling spot (Photo: Sebastian Teska).

Drilling the peatland and a search for an island

After the evaluation of cartographic materials combined with the identification of the geomorphological features of the area, the fieldwork campaign for drilling began. The aim was to create a geological cross-section of the Samica Valley's plain to define the thickness of lake and marshland deposits. At first, the method used for this purpose was vibra-coring. It produces cores with an undisturbed stratigraphy of sediments of great depths in a relatively short time (Canti & Meddens, 1998). Using this equipment, sediments are pushed into a PVC tube inside a steel sampler. In contrast to conventional drilling, the sampler is pushed into the ground by means of a pneumatic jackhammer, thus omitting any disturbance of sediments (Figure 3). Although the method is suitable for dry areas, its application in wetlands is obstructed by the presence of highly saturated sediments, such as gyttja.

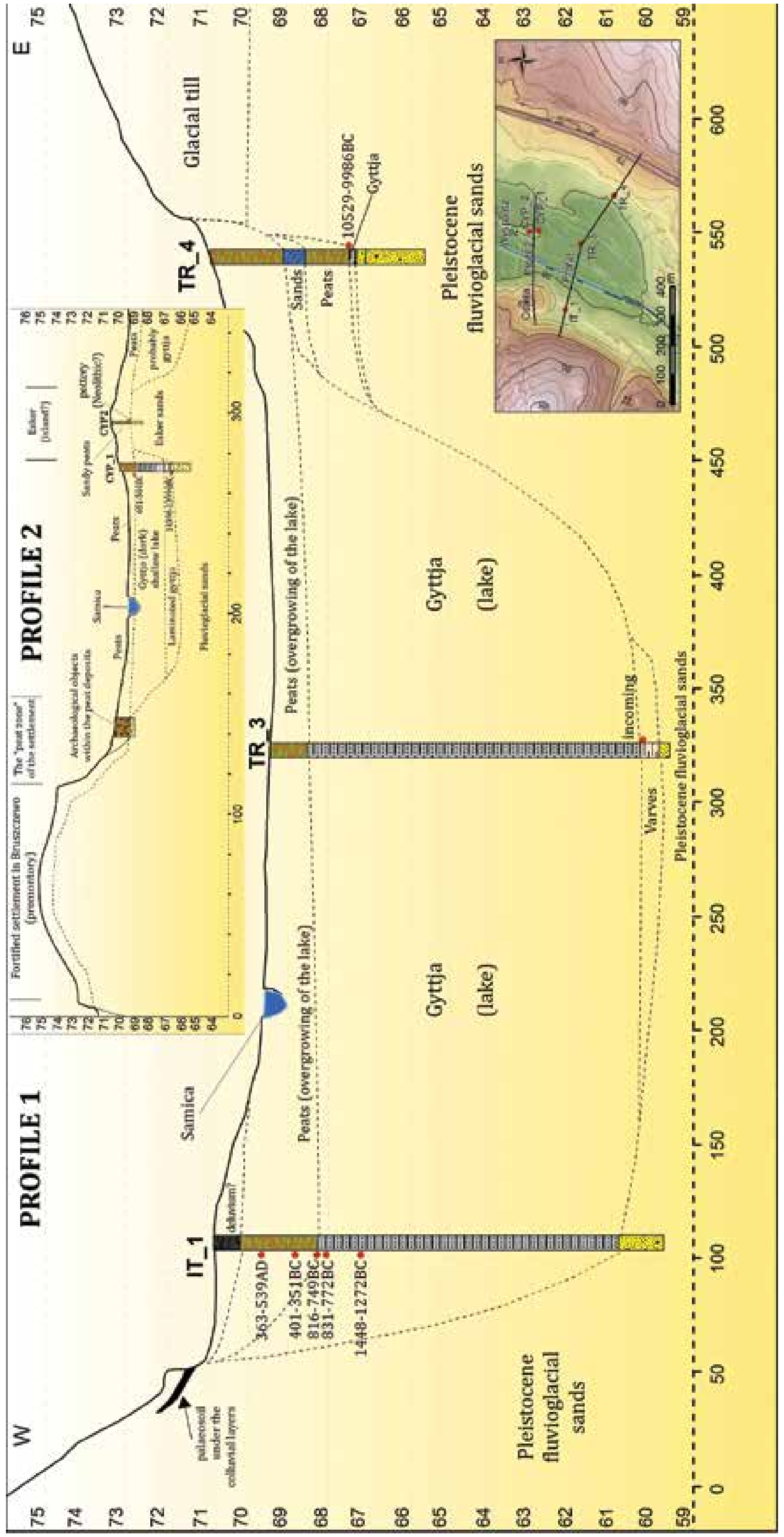

Figure 4. Geological cross section of the Samica Valley with lithology and the initial radiocarbon dates indicated.

Figure 5. Varve sedimentation registered in the TR_3 core in the central part of the basin.

However, the vibra-coring in Bruszczewo did provide crucial information about the thickness of marshland and lake deposits in different parts of the valley. Both the western and eastern edges of the floodplain comprise of 2.0 to 2.5 m of peat, which reflects the stages when the lake was becoming overgrown (TR_1 and TR_4 in Figure 4). In the central part of the basin (TR_3), the peat thickness did not exceed 0.5 m, which indicates the gradual diminishing of the former reservoir towards its centre (Figure 4). Directly beneath the organic sediments, a series of gyttjas were encountered in every core, representing the freshwater lake stage of landscape development. Surprisingly, the thickest gyttja deposits were registered in the western part of the basin (TR_1), reaching a depth of 9.5 m below ground level (b.g.l.). A slightly shallower gyttja deposit was encountered in the central part of the basin (TR_3), were it reached 9.3 m b.g.l. In this particular core (TR_3), the gyttja was deposited over clearly laminated varve sediments dating to the Late Pleistocene (Figure 5). Underneath this unit, the well sorted, yellowish Pleistocene sands of a tunnel valley were reported at a depth of 10 m b.g.l. The basin's profile therefore reflects a typical U-shaped tunnel valley – a remnant morphological feature of the Pleistocene age (Figure 4).

Figure 6. The Instorf corer.
Section 4.0 to 4.5m b.g.l. of the IT_1 core.

An additional core (CYP_1) was performed in the slightly sloping part of the esker's southern margin (Figure 4). A series of peat, gyttja, and sand layers was registered throughout the core, indicating a changing environment from shoreline to a deep-water conditions and dry land (island) episodes.

The cross-section of the basin constructed on the basis of the vibra-coring results provided important information for archaeological discussion (Figure 4). First, the thickness of lake deposits was much greater than previously thought. Earlier research was focused mostly on the Bronze Age phase of landscape development and therefore the archived cores for the northern context of the settlement reached a depth of only 5.5 m b.g.l. The newest data suggest that the lake bottom in the very southern proximity of the fortified settlement (ca. 70 m) had a significantly steep inclination. Thus, it might be interpreted that the settlement was not accessible through a shallow lake, but rather deep water, and was approachable only by boat from the south, east, and north. The inclination of the lake bottom was not identical on the opposite, eastern side. Despite the fact that the drilling was conducted at nearly identical elevations, the gyttja sediments did not reach greater depths.

Another interesting observation stems from the comparison of the archive excavation data and the drilling on the esker. During the EBA, when the promontory was turned into a fortified settlement, its eastern foothill was also occupied. Several houses were identified in the so-called "peat zone" (Müller et al., 2010) at an elevation of approximately 69.5 m a.s.l. When confronting this information with the highest modern peak of the esker, located approximately 150 m to the east, its elevation exceeds 70.5 m a.s.l. - at least one meter above the housing structures (Figure 4). This comparison indicates that there is a strong possibility that there could have in fact been an island during the EBA – which is a game changing perspective in terms of archaeology. Such an interpretation, however, requires further investigation regarding the CYP_1 core and its dating. Additionally, a magnetometric prospection is planned for the surface of the esker to search for prehistoric human activity in this zone.

How to reveal the landscape history and human impact?

The TR_1 core was supposed to be used as an indicator of landscape changes and human influence reconstruction. Its depth exceeding 9.5 m b.g.l. promised an optimal chronological timeframe for the reconstruction since the Early Holocene. Also, its position near the promontory suggested that it should contain suitable materials for dating (e.g., terrestrial plant remains, charcoal, or artefacts). However, due to the high saturation of gyttja sediments between 4 and 7 m b.g.l., the obtained core was affected by an extreme degree of compaction (over 50%) during vibra-coring and thus conventional coring was also performed using the Instorf corer (Figure 6).

This method provided optimal results, as the cores were undisturbed and no compaction was reported during the extraction. To reconstruct the palaeoenvironmental, first the sampling stage had to be performed. As the project aims to obtain a detailed chronological timeframe, it was decided to sample the IT_1 core by each 1 cm segment, thus providing the four datasets described in the following paragraphs for analysis.

1. Sedimentological analysis – what can the sediments tell us?

To reconstruct the sedimentary environment, it is necessary to know the physical parameters, structure, and texture of deposits (Racinowski et al., 2001). This is done by macroscopic observation of sediments and grain-size analysis. Both sieving samples and submitting them for laser diffraction analysis allows the environment in which the material was deposited to be defined. Also, the analysis of basic geochemical compounds provides additional identification of sediments. In the scope of this analysis, it appears that there are two main lithological units within the IT_1 core. The sections from the ground surface to 2.5.m b.g.l. comprise highly organic peats that represent the marshland that formerly occupied the valley bottom. Below lies a thick layer of gyttja that marks the stage when a lake dominated the area. The border between peat and gyttja at 2.5 m b.g.l. was preliminarily radiocarbon dated to c. 900 to 800 BC (in archaeological terms, this is the transition between the LBA and EIA). Within the gyttja, at least two levels of more organic sediments were identified that inform about eutrophication due to possible human activity in the area. An ongoing, detailed sedimentological study is oriented towards precise recognition of sedimentary environments. For instance, it will be possible to identify phases of pulsating deposition like influxes of material from adjacent streams or during episodes of slope instability.

2. Geochemical analysis – lead in the water?

As the archaeological evidence points to the presence of different economic practices during prehistory and early historic times, samples were also submitted for geochemical analysis of elements within the sediments. By tracing the presence of particular chemical elements, it is possible to detect, for instance, metallurgical activities – especially those connected with bronze smelting or iron processing (e.g., Cortizas et al., 2016). Also, the measurements of phosphate allows points in time when human were present in the surroundings of the lake to be identified (e.g., Zlateva et al., 2018). In addition, the identification of various elements might shed light on eutrophication stages of lake development, thus supporting the results of other analyses.

3. Palynological analysis – forested or deforested landscape?

One of the most crucial elements when reconstructing past landscapes is to reveal the vegetation history (Moore et al., 1991). This is done through palynological analysis, which is based on identifying and counting the pollen and palynomorphs of trees and other plants deposited in aquatic environments and embedded in their sediments. Such a study was previously performed in the area of Bruszczewo (Haas & Wahlmüller, 2010); however, it was mostly oriented towards the recognition of the EBA phase of the settlement. The current approach aims to improve the previous reconstruction by providing a more detailed timeframe for the analysis by, for example, obtaining a high number of radiocarbon dates and also focusing on other habitation periods. The most important research questions in this matter are related to human presence/absence or, in other terms - landscape degradation/regeneration patterns. By investigating the consequent stages of vegetation composition in an area, it is possible to relate them to human activity and changing subsistence strategies – for instance: how did the EBA fortifications influence the woodland composition in the area? How fast did the vegetation recover after the abandonment of the site? Did the LBA/EIA habitation influence the landscape through ritual and funerary activities? Are there any traces of human habitation during the Migration Period in the pollen record? Is there any evidence for birch regression during the EM period when tar production took place in Bruszczewo? Or do we see any traces of Prince Mieszko the First, when he raided the area to subjugate the pagan tribes?

4. Diatom studies – plankton in Bruszczewo Lake?

Another part of this ongoing research is diatom studies of the specimens extracted from core samples. Especially important in this matter are the gyttja sediments that comprise vast numbers of the remains of these microorganisms. By identifying particular diatom species, it is possible to reconstruct the water conditions of a lake. Fundamental in this matter are questions concerning the fluctuation of the lake's water table over time, fresh water influxes or stagnating water conditions, and the eventual pollution of the lake. Addressing these issues might explain the hydrological environment that accompanied human habitation in particular stages – were the lake waters drinkable or did the rise of the water table force humans to abandon the site?

5. Macrobotanical remains identification – what do we need seeds for?

All of the above-mentioned analyses would tell us nothing if they were not embedded in a timescale. The most precise method of dating is to use radiocarbon AMS dating of organic remains from terrestrial and wetland plants (e.g., seeds, fruits, buds, cones, leaves etc.). However, not all plant material is suitable for such a procedure including, for instance, remains of aquatic (submerged) plants. Their age is often affected by the so-called "reservoir effect", in which the living organism absorbs "old" carbon dissolved in aquatic environments (Philippsen, 2013). Such a dating result might be overaged even at a millennial scale.

On the basis of the identified plant macroremains, radiocarbon dating is being performed, while the results are calibrated and furtherly processed into the "age-depth" model (Bronk Ramsey, 2008). The latter provides information about the sedimentation rate along the core and therefore allows the result of a particular analysis to be situated within a timescale.

What do we get at the end?

The first results of the Bruszczewo Lake project reveal great potential for reconstructing landscape changes. The project's activities performed to date have provided new data about the landforms in the area and their parameters, new landscape features, and perspectives for further palaeoenvironmental investigations that are already underway.

A newly discovered island that supposedly accompanied the fortified settlement may bring us to search for new habitation structures dating to the EBA or other periods. This could force researchers to reinterpret the defensive aspect of the landscape in Bruszczewo (Figure 7). Also, for the first time a geological cross-section of the valley was constructed and allowed the slope of the lake bottom near the site to be defined, thus further supporting the usage of the lake as a defensive feature. The gradual diminishing of the lake and it's dating already influence our knowledge of the Lusitian Urnfield culture's cemetery and ritual space, which in light of current data were surrounded by marshes and wetlands rather than an extensive lake. Dating of the upper parts of peat also suggest the presence of marshland in the EM, a period not identified in previous research.

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Figure 7. A view on the Samica Valley from the western slopes. The promontory on which the EBA fortified settlement was established is visible on the left side of the photograph.

The most important and still ongoing research is the multiproxy palaeoenvironmental reconstruction (in terms of vegetation history, hydrological parameters, and geochemistry) of this area, which aims to provide detailed and chronologically precise information about landscape changes. All these data will be confronted with the extensive archaeological knowledge of the Bruszczewo microregion. The final goal of this project is to recreate the complex, multi-aspect settlement history of this important part of Central-Eastern Europe.

Acknowledgments

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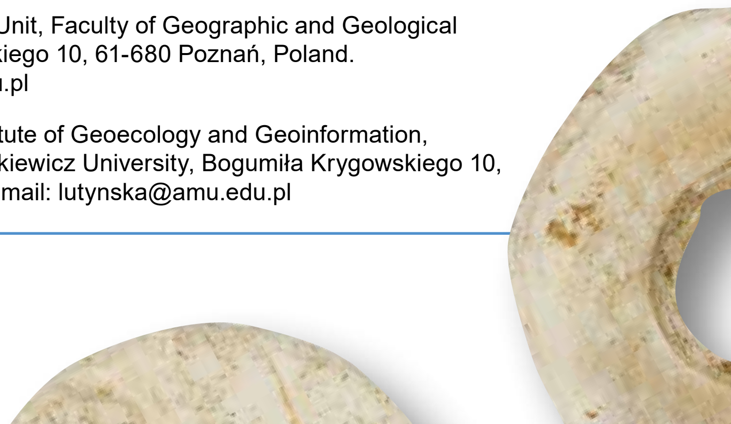


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