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Thirty Steps of the Be-JA Road

Geophysical prospection of Kazlacha Tell (Bulgaria). Research prospects

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ABSTRACT

The Kazlacha Tell is located 2 km to the north of the village of Chokoba, Sliven district (Bulgaria) (fig. 1). The interest in its study has been provoked by the prospect of establishing its spatial-temporal relations with the nearby Neolithic ditch enclosures in Kazlacha locality and the Hadzhidimitrovo prehistoric pit site.

The geomagnetic survey covered the northern and northeastern periphery of the tell, a small rectangular area measuring 90 × 25 m, falling in the eastern central sector of the site, as well as some zones located at a distance of up to 170 m, in a north/northeastern direction (figs 2–3).

The results show that the Kazlacha Tell was surrounded by a ditch 250 m in diameter, with an estimated width of about 7 m and up to 1.60 m deep. A probable concentration of burnt daub from a building/s around 280 sq. m in size was registered in the eastern part of the enclosed area. Outside the enclosure, only two anomalies were recorded, probably pits, located 56 m to the north/northeast of the ditch.

The human habitation of the tell is also evidenced by the higher magnetic susceptibility of the surface layer. The soil outside the ditch is characterized by much lower magnetic susceptibility, a result of the presence of sandy-clayey deposits from the Tundzha River spills. The pottery found on the surface date the Kazlacha Tell to the beginning of the Late Neolithic (Karanovo III period), but it is not unlikely that it is also related to the previous Middle Neolithic stage (Karanovo II–III period).

KEYWORDS

Tell, Neolithic ditch enclosures, Karanovo II–III, Karanovo III, magnetic mapping, electrical resistivity tomography, magnetic susceptibility

The Kazlacha Tell is located 2 km north of the village of Chokoba, Sliven district (Bulgaria), at the foot of the northern low and gentle slopes of the easternmost area of Sredna Gora mountain (fig. 1). Its location associates it with the long-term investigations at two other archaeological sites (the Neolithic ditch enclosures in Kazlacha locality and the prehistoric pit site of Hadzhidimitrovo), found in close proximity, about 2 km to the southeast (Петрова 2023, 7–25; Петрова и др. 2024, 7–94). The possibility to establish the spatial-temporal relationships between the three archaeological sites sparked our interest in the study of the tell, which began with geophysical prospection.

The initial information on the Kazlacha Tell was provided by P. Detev, who visited the site in 1964 and reported a diameter of 220 m and around 3 m height. He also noted that its southern part was ploughed, the northern part – sown with alfalfa, and the eastern part reached the vegetable garden of



Fig. 1. Location of the tell Kazlacha

the Chokoba village farm. Detev has further mentioned that the fallow land contained a large number of fragments of various Late Neolithic vessels, with black surfaces and cylindrical, pear-shaped or bi-conical shape. High handles with or without knobs projections were also present. The decoration was represented by stabs arranged on the inner side of the rim, and incrustation with white substance had also been registered (Детев, Детев 2002, 223). A few years later, E. Batsova-Kostova published various data, according to which the tell was about 80 m in diameter, 2 m high and it had a poorly preserved cultural layer with fragments from the Late Neolithic pottery (Бацова-Костова 1971, 64).

Today the Kazlacha Tell is about 3 m high, with very gentle slopes, and a diameter at the base of the visible part of about 190 m. The reason for the discrepancies in the descriptions in the earlier accounts is not quite clear, but its current size are closer to those provided by P. Detev. The region is flat and rich in water resources – the Azmak River has previously flowed about 140 m to the north of the tell (figs 2–3)¹, and 1.70 km to the north runs the middle course of the Tundzha River.

The main objective of this report is to present the results of the geophysical survey of the Kazlacha Tell, which was conducted in 2022². Since part of the tell is covered with trees, the survey was concentrated on its free northern and northeastern periphery, as well as on a small rectangular area measuring 90 × 25 m, located in its eastern central sector. Zones up to 170 m to the north/northeast were also mapped in order to reveal adjacent structures (figs 2–3).

1 The Azmak River was running until the late 1960s, when its course was inserted into a concrete channel of an approximate east–west direction. Its riverbed is clearly visible on Google Earth satellite images immediately north of the Kazlacha Tell and continues in an easterly direction.

2 The study was carried out with the financial support of the Ministry of Culture of the Republic of Bulgaria under a programme for providing targeted financial support for field archaeological research and field conservation.



Fig. 2. Google Earth image of the location of tell Kazlacha overlaid with the results of magnetic mapping (© Google)

Methods and results

The study began with magnetic mapping which was carried out according to a previously laid out grid plan, consisting of 48 squares measuring 30×30 m and a total area of 43.2 decares. Field measurements were performed with a dual configuration of a Bartington fluxgate gradiometer GRAD 601. The specified instrument accuracy of the device is 0.01 nT. The measurement density is 8 points per sq. m (profiles every 0.5 m, measurement points every 0.25 m). The RMS error of the measurements is 0.3 nT. The results of the field measurements were processed with the ArcheoSurveyor program of DW Consulting, the Netherlands.

The magnetic field in most of the studied area is weakly disturbed (predominant values of the measured magnetic gradient within ± 1 nT) and represents a relatively homogeneous medium, in which shallow geological or other “disturbing” elements are completely absent. Anomalies of various shapes and sizes which can be associated with archaeological structures have been registered. A linear anomaly is the most notable among them, approximately arc-shaped, values of magnetic gradient from 2–3 to 12–15 nT. It probably represents the northern and northeastern parts of a circular ditch that surrounds the tell and is located about 60 m outside its visible base (figs 2–3). Following the arc of the exposed part, it can be assumed that its diameter is about 250 m. To establish its transverse dimensions, a 34 m long traverse was measured in its northern part with the help of the continuous vertical electrical sounding (CVES) method, also known as “electrical resistivity tomography” (ERT) (fig. 4.1). Fourteen gradually increasing lengths (the maximum being 18 m) of the current line of a pole-dipole electrode array were used. It ensured a depth of investigation of the order of 7–8 m. As a result, according to the inversion model of the electrical resistivity, it was established that the probable width of the ditch is about 7 m, and its depth does not exceed 1.60 m (fig. 4.2) (Тошков 2024, 128–131).

At a distance of 15–18 m from the inner part of the ditch, a parallel arc of smaller and larger anomalies with magnetic gradient values from 7–8 to 20 nT were detected, which most probably are due to negative structures. The largest one measures 10×28 m and it is located in the eastern sector of the

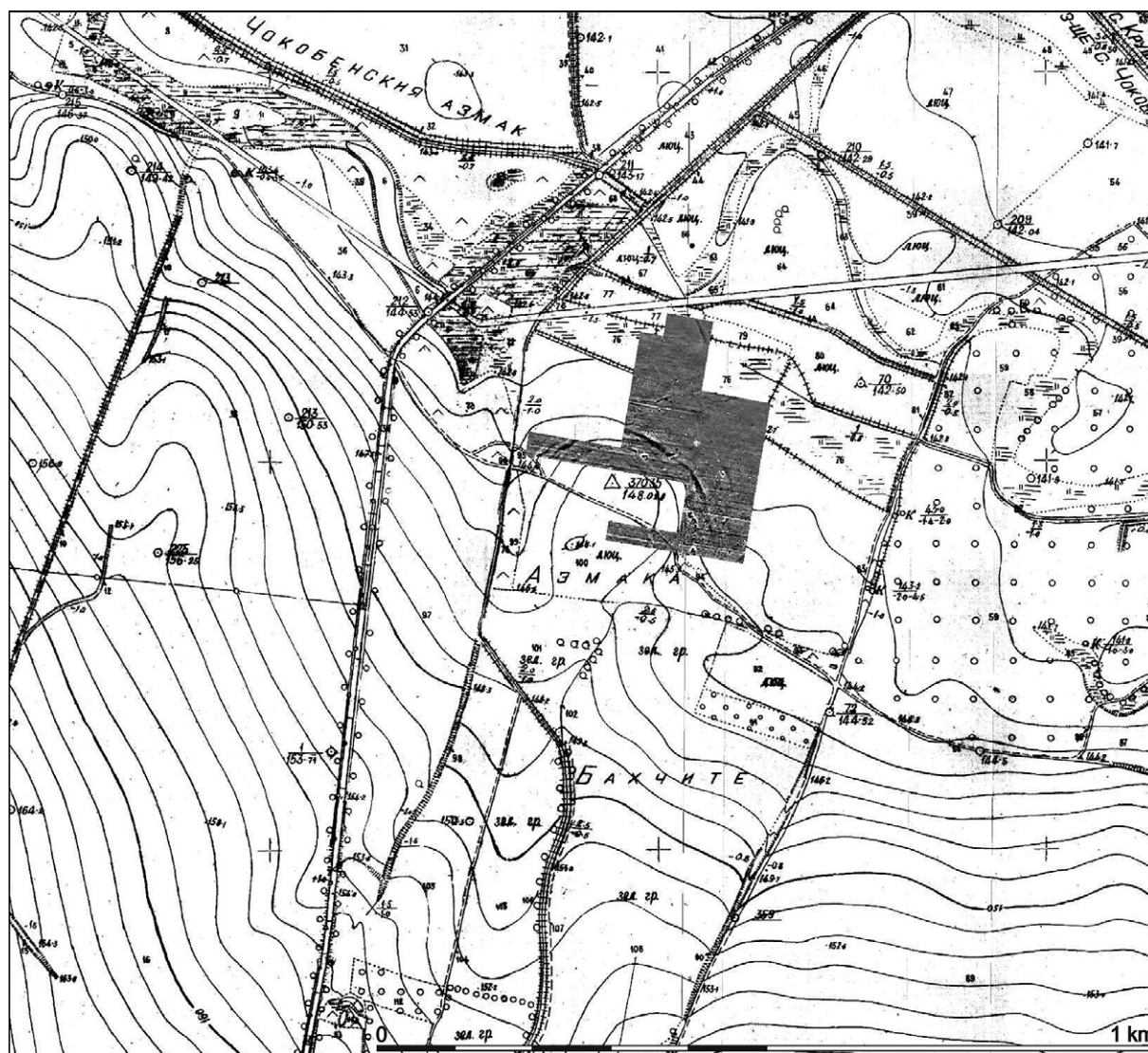


Fig. 3. Topographic map of the location of tell Kazlacha overlaid with the results of magnetic mapping

space enclosed by the ditch. It has magnetic gradient values reaching from 30–40 to 80–90 nT, which is typical for clay structures subjected to high temperature in the past. Most likely it was caused by a concentration of burnt debris from a building/s.

Only one linear anomaly with magnetic gradient values of 10–12 nT, suggesting the presence of an archaeological structure, was identified in the mapped area located in the eastern central sector of the tell. It is most likely negative structure such as a shallow ditch or a gutter. The probability that this is a trace of a clay structure subjected to heating and possessing thermoremanent magnetization is much smaller, due to the relatively low values of the measured magnetic gradient.

Around 56 m to the north and northeast outside the enclosure, two more anomalies with magnetic gradient values from 7–8 to 10–12 nT were recorded, which most likely represent negative structures (pits).

In addition to traditional gradiometry, the magnetic susceptibility of the surface layer (soil) in the area of the tell was also measured. The samples were divided into those taken outside the ditch (68 samples) and those taken inside the space enclosed by it (60 samples). The results of the statistical processing show that the surface deposits outside the tell have much lower values (about $0.6 \cdot 10^{-3}$ uSI) than

Geophysical prospection of Kazlacha Tell (Bulgaria). Research prospects

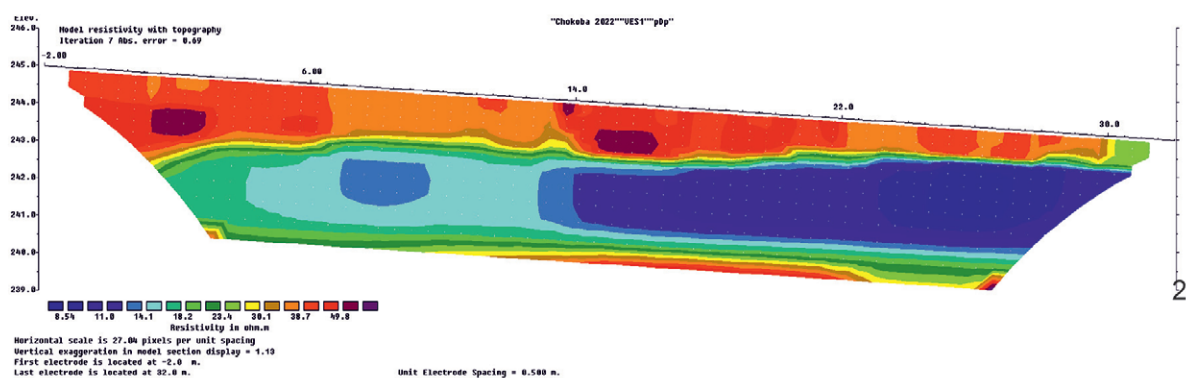
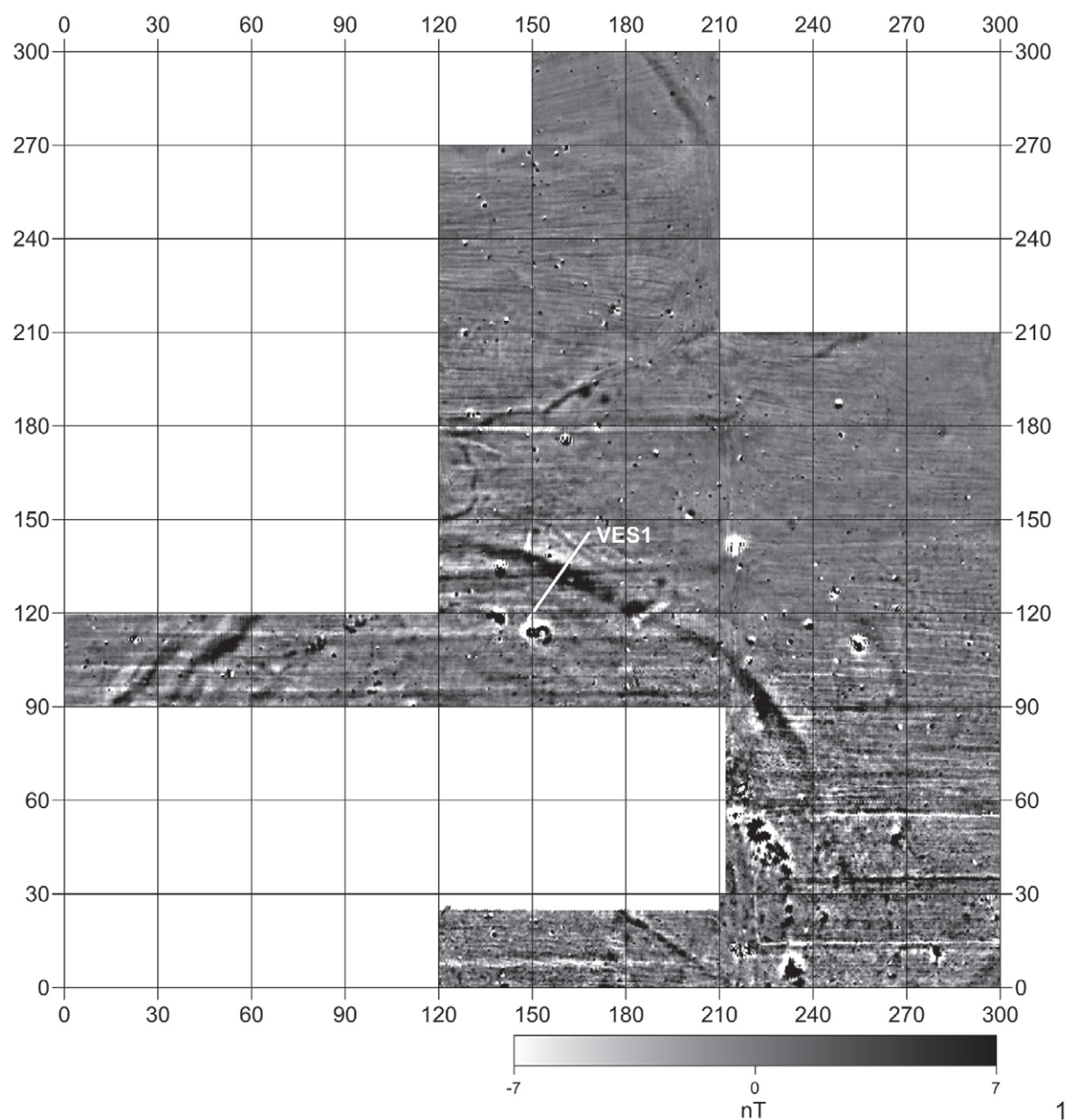


Fig. 4. Tell Kazlacha. Results of magnetic mapping (1) and 2D electrical resistivity tomography (2)
(N. Tonkov, A. Atanasov)

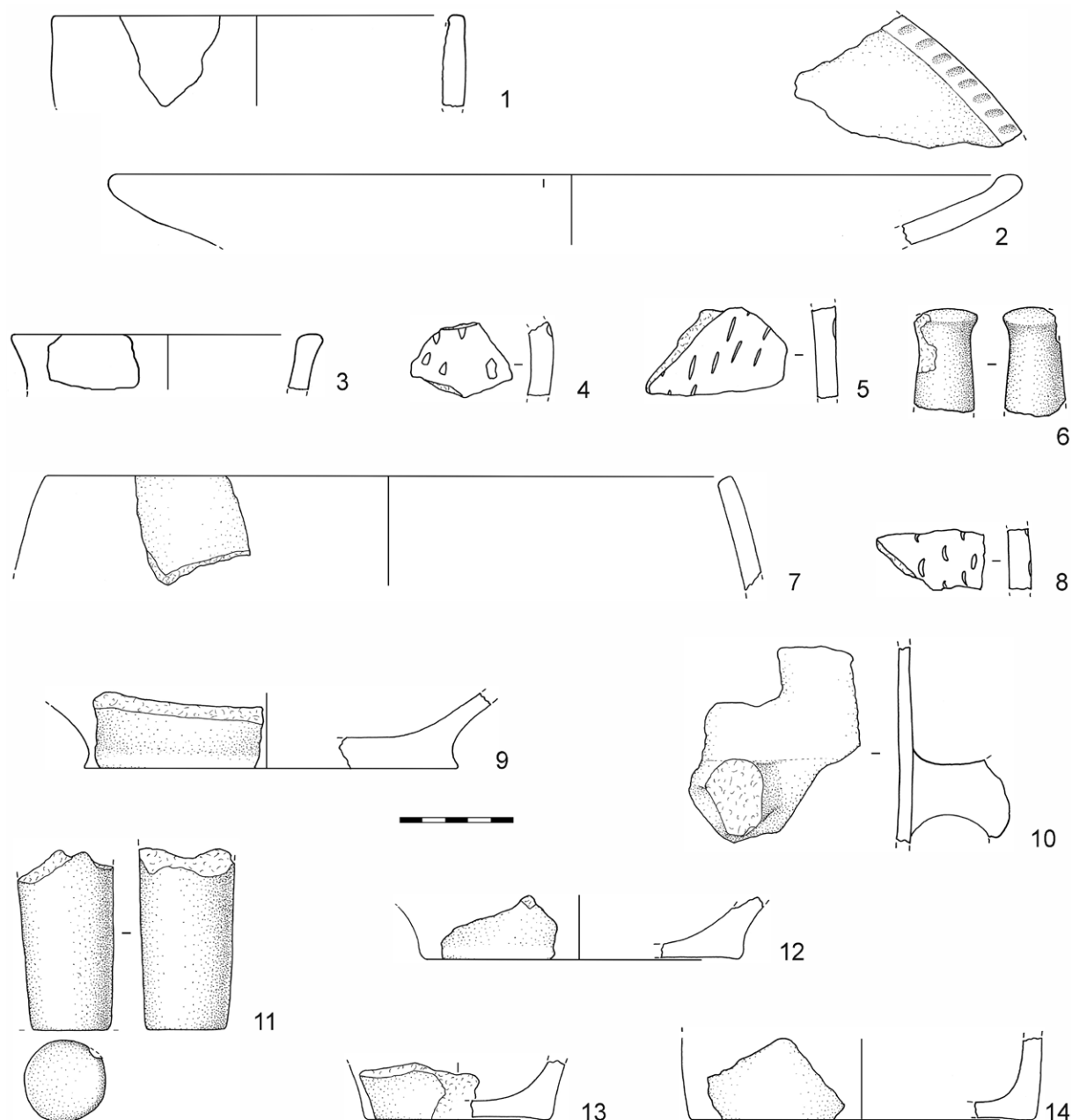


Fig. 5. Tell Kazlacha. Pottery from the surface: Late Neolithic (1–14) (V. Petrova)

those within the outlines of the ditch – average value $2.1 \cdot 10^{-3}$ uSI, and they are relatively smoothly distributed in the interval $1.4\text{--}2.8 \cdot 10^{-3}$ uSI (ТОНКОВ 2024, fig. 131). This observation can be explained by the increase of magnetic susceptibility of the environment due to the natural physicochemical processes that occurred as a result of human habitation and accumulation of the Kazlacha Tell. At the same time, the much lower magnetic susceptibility of the soil around the archaeological site is most likely due to the presence of sandy-clayey deposits from the Tundzha River spills.

During the geomagnetic mapping, scattered pottery fragments were found on the surface of the tell. Most of them are of brown or grey-black surfaces, others are secondarily fired. Concerning the shapes, they include a fragment of a dish with thickened inside rim decorated with channels (fig. 5.2), the lower part of a cylindrical cup (fig. 5.14), vertical handles (fig. 5.6, 10), some of them with a mushroom-shaped knob (fig. 5.6), wall fragments decorated with stabs (fig. 5.4, 5, 8), the upper part of a bowl

Geophysical prospection of Kazlacha Tell (Bulgaria). Research prospects

(fig. 5.1, 7) or jars? (fig. 5.3), a high cylindrical foot of a ceramic vessel (fig. 5.11) and flat profiled or concave bottoms (fig. 5.9, 12–13). The stabbed patterns consist of arcuate, oval or short thin stabs (fig. 5.4–5, 8), and the channels are small and oval and alternate along the inner side of the rim of the dish (fig. 5.2).

Most of the mentioned features (a dish with channels along the rim, the lower part of a cylindrical cup, a vertical handle with mushroom-shaped knob, a cylindrical foot) are similar to the pottery from the Karanovo III period, found in the Northeastern sector (dwellings 1 and 2), trench O19 (horizons 6, 5 and 4) and the Southern sector (horizons 10, 11, 12) of the Karanovo Tell (Николов 1998, Pl. 7.22–26; 8.7–11; 9.1; 11.7–8; Nikolov 2002, Taf. III.1.20, 24; III.2.9–20; III.5.6, 10; III.6.1).

At the same time, there are also some common features (lower parts of cylindrical cups, a dish with decorated rim on the inside, stabbed decoration) with the pottery assemblages from the Karanovo II–III period, discovered in trench O19 (horizon 7) and the Southern sector (horizons 8 and 9) of the Karanovo Tell (Николов 1998, Pl. 1.12, 15; 2.2, 5; Nikolov 2002, Taf. II.1.21–22; II.3.4; II.6.24).

Some formative and ornamental elements, characteristic for the pottery found on the surface of the Kazlacha Tell (the lower part of a cylindrical cup, a vertical handle) are also present among the pottery coming from trench AI of enclosure A – the latest of the Neolithic enclosures in Kazlacha locality (Петрова, Вълчев 2021, обр. 4.7–8).

Conclusions

The summarised results of the geophysical survey show that the Kazlacha Tell was surrounded by a ditch 250 m in diameter, located about 60 m from visible periphery. According to the travers made by electrical resistivity tomography, its presumed width was about 7 m, up to 1.60 m deep. A probable concentration of burnt daub from a building/s appears at 20 m from the inside edge of the surrounding ditch covering an area of about 280 sq m. It is part of an arc of small and larger anomalies located between the ditch and the tell.

It is intriguing to note that despite the assumption that there should be more archaeological structures on the tell itself, only one anomaly was identified in the mapped area of 2250 sq. m. It is located in the eastern part of the surveyed zone and its western end reaches the centre of the prospected area. It is probably a shallow ditch (gutter) located around 43 m to the southwest of the burnt daub concentration. It has northwest/southeast orientation and its length is 42 m³.

In general, no archaeological structures have been recorded in the surveyed terrain outside the enclosure, at a distance of up to 170 m to the north/northeast. An exception are two likely pits located 5 m apart and 56 m to the north/northeast of the ditch.

The pottery found on the surface of the tell dates to the beginning of the Late Neolithic (Karanovo III period), but it is not unlikely that it is also related to the previous Middle Neolithic stage (Karanovo II–III period). The human habitation of the tell is also evidenced by the higher magnetic susceptibility of the surface layer. In contrast, the soil outside the ditch is described by a much lower magnetic susceptibility, which is explained by the presence of sandy-clayey deposits, the result of the Tundzha River spills.

In the context of prehistoric habitation research in the region between the villages of Chokoba, Sliven region and Hadzhidimitrovo, Yambol region, a future study of the Kazlacha Tell provides stimulating perspectives.

3 It seems possible that this ditch (gutter) is not related to the occupation of the tell, but dates from a later period – e.g. the Early Middle Ages, remains of which have been recorded immediately to the east. Single fragments from this period have also been found on the surface of the tell.

First of all, it is necessary to clarify the cultural features and chronology of the occupation, emphasising a time that marks the beginning of the Late Neolithic, and perhaps is also related to the transition to this period. This provides an opportunity to fill in the temporal gap in the established periodization for the region between the Neolithic Kazlacha ditch enclosures and the Hadzhidimitrovo Prehistoric pit site (Петрова 2023, fig. 3).

In this sense, establishing the synchronicity or sequence in the occupation of the Kazlacha Tell and the meaning of enclosure A (the latest of the Kazlacha Neolithic ditch enclosures) is another priority in the study of the spatial-temporal relationships between the two sites. This aspect can be definitively clarified through archaeological excavations of the ditch surrounding the Kazlacha Tell, as well as through the study of a larger area and, accordingly, the analysis of a larger amount of pottery from enclosure A.

Finally, the study of the Kazlacha Tell and its surrounding ditch finds its worthy place in the discussion of Neolithic ditch enclosures in the Upper Thracian Lowland. On the one hand, it offers a chronological perspective for the persistent research issue of early Neolithic ditches, analysed in detail by N. Nikolova (Николова 2022; Nikolova 2021; 2022). At the same time, it relates to the currently known Late Neolithic ditches, registered in the Upper Thracian Lowland and dated to the Karanovo IV period – near the village of Ezero, Nova Zagora region (Site 3, Lot 3, Trakia Highway) (Стефанова, Тодорова 2011, 58–60), the Late Neolithic settlement of Krushaka (Leshtakov 2016, 14–16), as well as the ritual centre near the village of Kapitan Andreevo, Svilengrad region (Николов, Петрова 2021, 10).

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Geophysical prospection of Kazlacha Tell (Bulgaria). Research prospects

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