

Archaeology of Conflicts

edited by
Pavel Drnovský – Petr Hejhal

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Reviewed:

prof. PhDr. Václav Matoušek, CSc.

Mgr. Petr Žákovský, Ph.D.

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Medieval fortification systems in the form of linear embankments in present-day Poland

Łukasz Miechowicz

The Great Wall of China and Roman limes are the best known in literature as well as in popular culture systems of linear fortifications intended to protect not only individual settlement points, but entire territories. Several dozen kilometers long Danish Danevirke and hundreds of kilometers long Ukrainian Zmiyevi valy are equally known structures of this type, the chronology of which can be referred to the early Middle Ages (Dobat 2008; Maluck 2014; 2017; Kowalczyk 1969; 1972). Medieval fortifications in the form of linear embankments are also known from other regions of Europe, ranging from the Frankland, through Lusatia, to the Pannonian Basin (Kowalczyk 1984; 1987, 23–35; Müller 2013).

The linear embankments in Central and Eastern Europe are rarely mentioned in the literature on the subject of the medieval art of war. They are also rarely excavated. Sometimes they were the parts of much more extensive lines of fortifications, which also used abatises and difficult to cross natural terrain obstacles, such as swamps, marshy river valleys, lakes and backwoods. The early medieval fortifications in the form of linear embankments can be found in the area of present-day Slovakia – the so-called Pohronsky embankment or embankment in the Zvolenska kotlina basin (Kolnik 1978; Kolnik – Roth 1984; Beljak-Pazinova 2012). For the area of Poland, this issue was primarily the subject of insightful studies by Elżbieta Kowalczyk, which has been the best research on the subject in archaeological and historical terms so far (1969; 1987; 1998; 2013). The vast majority of theses and findings of the author concerning the functions and chronology of the examined objects should be considered as valid. This subject matter for the area of early medieval Prussia was discussed by A. Piotrowski and A. Bitner-Piotrowska and R. Klimek, and for the area of Lesser Poland, by the author of this text (Piotrowski – Bitner-Piotrowska 1990; Klimek 2006; Miechowicz 2017). The topic of so-called Silesian Walls has been taken up again by M. Boryna (2011).

The analysis of the LiDAR Numerical Terrain Model (NMT LiDAR) and the records of monuments in the GIS Geographic Information System are of invaluable assistance in locating, verifying and reconstructing the line of linear embankments¹. Due to the NMT LiDAR analysis, it is possible to verify the state of preservation of the embankments sections known from historical records and old field studies, and to discover completely unknown fragments, often located in hard-to-reach forest areas².

Medieval linear embankments known from the territory of present-day Poland can be systematized in terms of location, function, chronology, length and type of construction. Considering their geographical

¹ LiDAR data obtained from the Central Office of Geodesy and Cartography and the geoportal.gov.pl were used for the analysis of the area.

² On the issue of possibility of using LiDAR Airborne Laser Scanning in research and documentation of cultural heritage: Ślawik – Zapłata 2011; Banaszek 2014



Fig. 1. Map of the linear embankments in Poland (by Ł. Miechowicz)

location, we can distinguish 6 groups: Silesian Walls, Zaniemyśl embankments and the alleged embankments in the area of Greater Poland, Kuyavian embankments, embankments on the Mazovian-Prussian border, Prussian embankments and a group of single embankments related to early medieval gords in the area of historical Lesser Poland and the so-called Cherven Gords (Fig. 1). The line of the preserved sections of the embankments presented in this text has been reconstructed both on the basis of the results of historical and archaeological works to date, as well as the NMT LiDAR analysis, which is a new contribution to the research on this issue.

The first group of the discussed objects includes the so-called „Silesian Walls” (Fig. 1, group 1) – the best researched and preserved system of linear fortifications in Poland. The total length of the sections existing today is over 45 km, and the original length of the entire line of fortifications can be estimated at over 150 km². In the literature, they are conventionally divided into: southern, middle and northern sections. The fortifications mainly consist of a triple line of embankments, up to 2 m high, separated by moats. They cross a very marshy basin of the Bóbr River, which is the left tributary of the Odra river (Fig. 2). E. Kowalczyk (1987, 36–103) presented a detailed analysis of their line, the settlement background and a description of the research conducted in the 19th and 20th centuries. The excavation of individual sections of the embankments, carried out by German archaeologists at that time, revealed their internal wooden structure (Geschwendt 1934, 257–258). Most researchers are in favour of the interpretation that the embankment had defensive or borderline function. However, their chronology is the problem. Based on i.e. Thiethmar’s report, the time of their construction was referred to the beginning of the 11th century, or – as most researchers of this issue agreed – to the tribal period of the 8th–10th centuries. According to this concept, the embankments were to define and protect the tribal territory of Dziadoszanie tribe or Trzebieszanie tribe (Kowalczyk 1987, 38–62). Recently, the topic of the Silesian Walls has been taken up again by M. Boryna (2011). During archaeological research

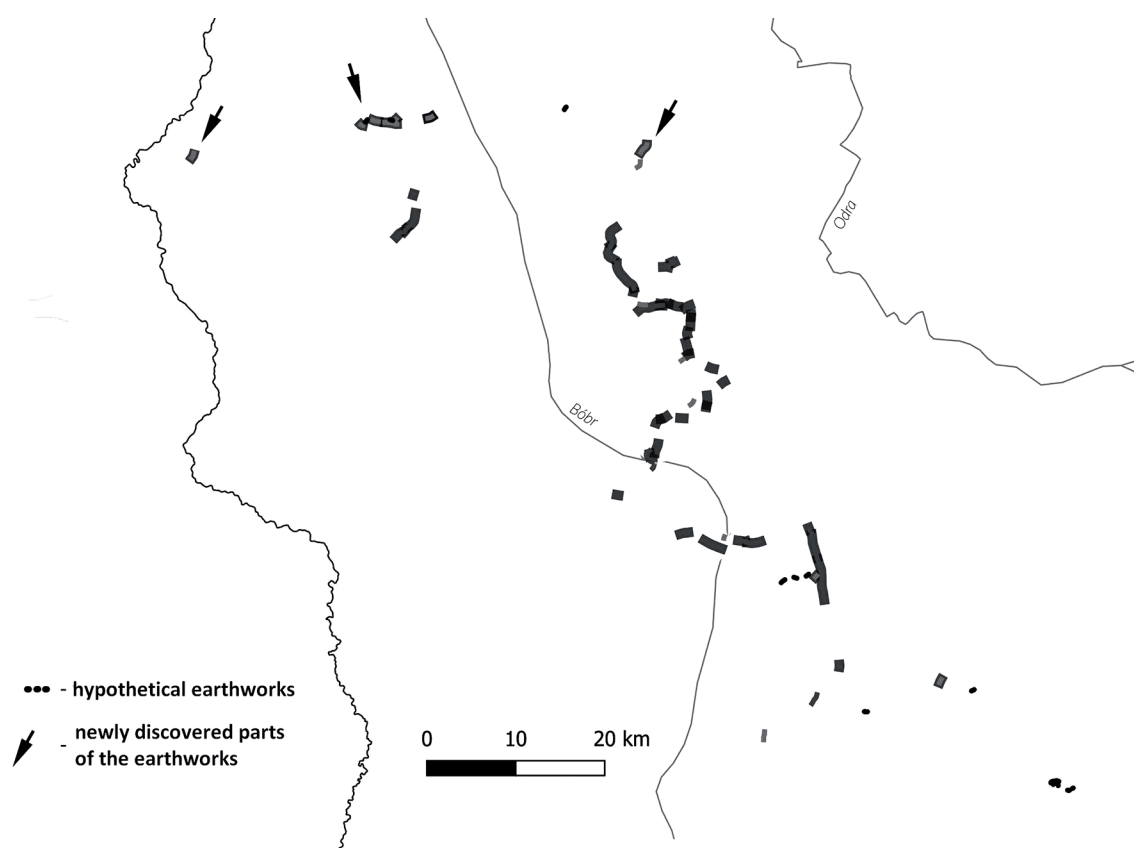


Fig. 2. „Silesian Walls” – line according to E. Kowalczyk (1987), M. Boryna (2011) and own research (by Ł. Miechowicz)

conducted on selected sections of the fortifications, several fragments of late medieval pottery were discovered in their embankments. These findings and the construction of these embankments, analogous to the well-dated objects from Lusatia and Germany, made the dating of the embankments in the late Middle Ages as very probable. According to M. Boryna, the linear fortifications were designed to mark and protect the border of the Głogów and Żagań principalities. This hypothesis should be considered as probable, although, based on the current state of research, we cannot exclude that the objects could come from the Early Middle Ages.

NMT LiDAR analysis allows capturing subsequent sections of the embankments, previously unknown in the literature. Two objects of this type, running longitudinally, are located in the forest area between Świdnica and Ochla. It can be presumed that this is a fragment of the so-called northern section of the Silesian Walls. Another line of triple embankments which has not been mentioned in the literature is located on the left bank of the Bóbr River (Fig. 3).

It runs latitudinally through forested areas, starting from the village of Dachów, below Janiszowice and the village of Welmice. Its total length is over 3 km. It should be considered the northernmost preserved part of the Silesian Walls, which, due to its layout and location, can be referred to as their western section³.

The so-called „Zaniemyśl Embankments” represent another line of linear embankments whose chronology relates to the medieval period (Fig. 1, group 2) and which were mentioned in the *Annals* of Jan Długosz under the date 1331 as the fortifications built against the Teutonic incursion (Kowalczyk

³ I have excluded from the considerations on Silesian Walls the embankments located near Krosno Odrzańskie, mentioned earlier in literature, because of their uncertain provenance (comp. Kowalczyk 1987, 102). It is possible that they are remnants of communication dykes.

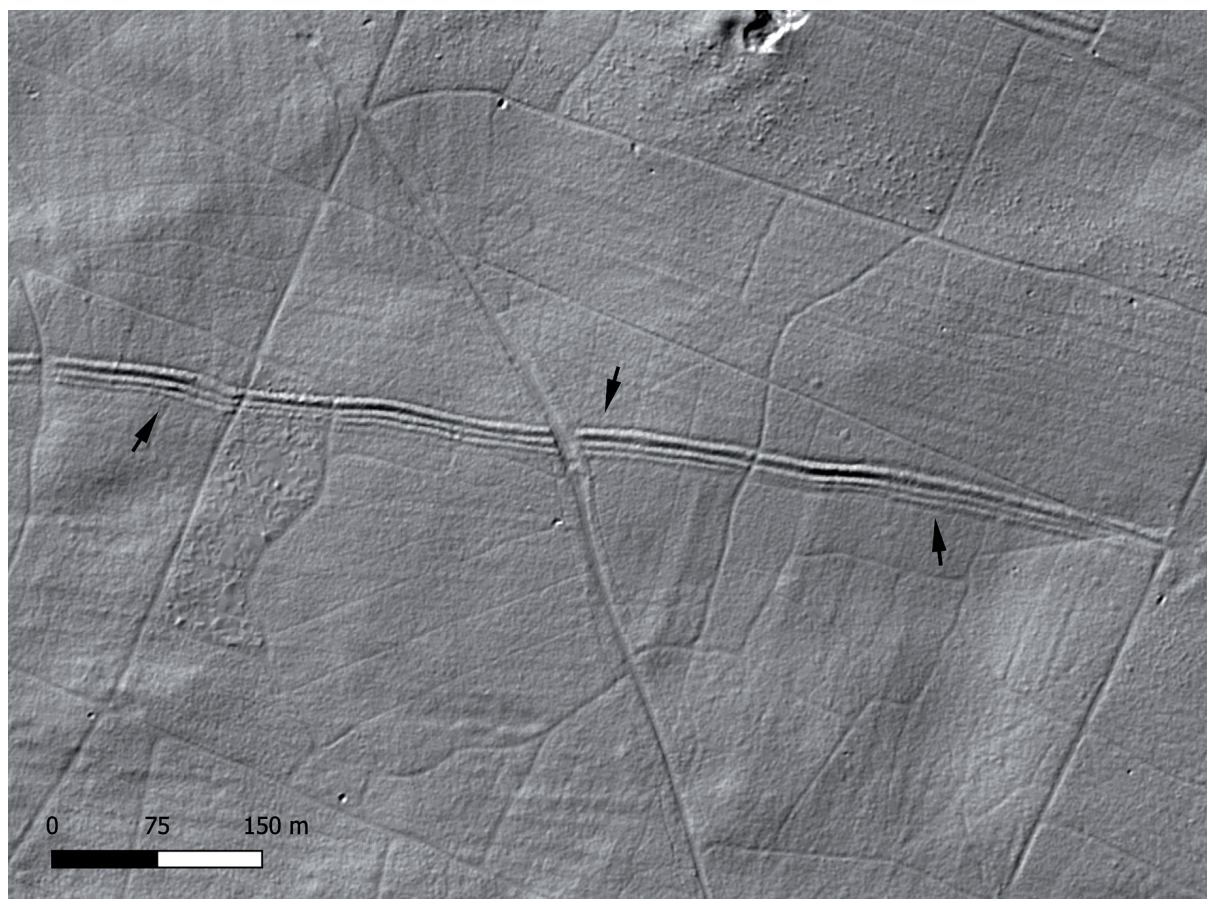


Fig. 3. A fragment of „western” section of the Silesian Walls, located in forested areas between the villages of Dachów, Janiszowice oraz Welmice. Miechowicz)

1987, 176–187). Other alleged linear embankments located in the area of Greater Poland were mentioned mostly in travel reports from the 19th and early 20th centuries (Kowalczyk 1987, 215–216 – further literature there). Unfortunately, none of the sections has survived to this day, and the alleged line of the fortifications can only be reconstructed on the basis of laconic descriptions.

It is impossible to indicate accurately the position of the Zaniemyśl Embankments, it is only known that they were to run longitudinally and extend along the post-glacial channel of the Kórnik-Zaniemyśl lakes, probably reaching from the southern side of the Warta valley.

The so-called „Kuyavian Embankments” (Fig. 1, group 3) are located at the mouth of the Brda River valley towards the Toruń Basin, closing the area between the right bank of the river, the slope of the ice-marginal valley and the marshes⁴. They form two lines with visible moats on the southern side. In 1954, they were excavated, their internal earth and wood structure was found, and numerous pieces of charcoal were also discovered (Posadzy – Wędzki 1955; Kowalczyk 1978; 1987, 120–122).

Based on the NMT LiDAR analysis, we can calculate the length of the preserved section of the northern embankment at 2,5 km. At a distance of 1,5 km from the bank of the Brda River, the embankment forks, one of its fragments diverges to the north-west reaching the high slope, the so-called Osowa Góra. The second arm stretches towards present-day Osowa Góra quarter. The southern section is 1,5 km long. From the east, it reaches the edge of the Czyżkowo quarter and extends westward to the banks of the Flis creek (Fig. 4).

⁴ Northwest from the center of Bydgoszcz, towards Osowa Góra.

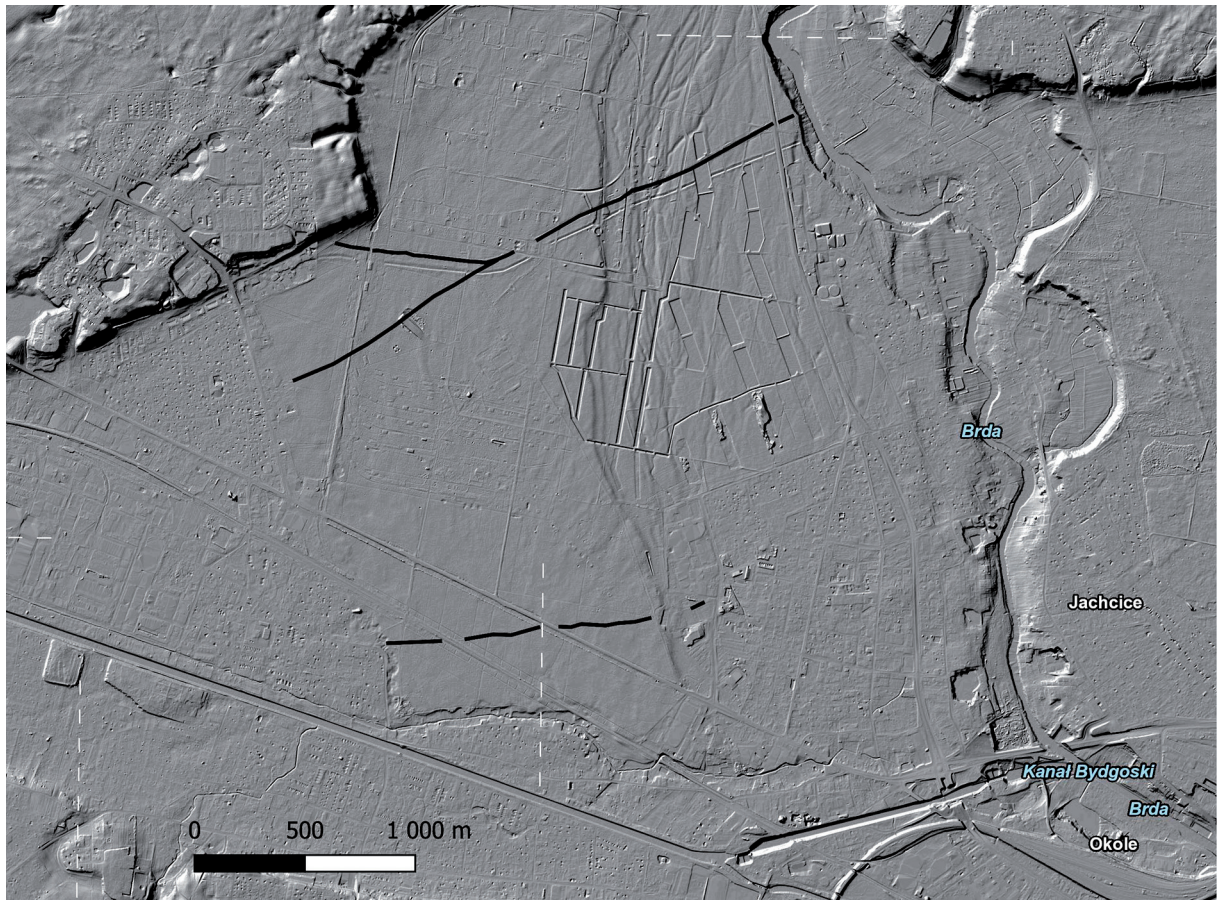


Fig. 4. A line of preserved sections of so-called „Kuyavian embankments”, reconstructed on the basis of NMT LiDAR analysis (by Ł. Miechowicz).

According to E. Kowalczyk the time of their construction is estimated to the period of the early Middle Ages – from the 9th to the 12th century. Besides the gords, they were supposed to serve as permanent defense on the Kuyavian-Pomeranian border. Their purpose would then be both, military and forming the borderderline (Kowalczyk 1987, 120–122; Kalinowski 2013, 116–117). However, there have been opposing views regarding the discussed embankments as a late-medieval marking of municipal and private property borders (Łbik 1997).

The embankments on the Mazovian-Prussian border (Fig. 1, group 4), besides the Silesian Walls, represent another relatively well-preserved, over 200 kilometers long stretch of fortifications, known mainly thanks to the pre-war research by H. Crome and later E. Kowalczyk (Crome 1937; Kowalczyk 1987, 122–175; 1998; 2013, 303–323). The long stretches of embankments located in the basins of the rivers Nida, Wkra and Orzyc, near present-day Mława, Działdowo, Nidzica and Janów, belong to the best-preserved ones. The longest preserved fragment of the embankments – the so-called Greutz Wall – is over 25 km long. The so-called Swedish Wall located between the villages of Zimna Woda and Wały – as shown by the NMT LiDAR analysis – is over 3 km long⁵. The other known sections are from several hundred meters to 5 km long. The second group consists of 7 preserved sections of the embankments running longitudinally and is located north of the Orzyc River, near present-day Wielbark. The longest fragment of the embankment in this place is over 3 km long. Another embankment is located near Szczytno, in the forest area between the villages of Wały and Lipowiec. The approximately 50 m long section of the linear embankment was also discovered at the Pisa River, near Kałęczyn (Fig. 5).

⁵ Measurement based on NMT LiDAR analysis

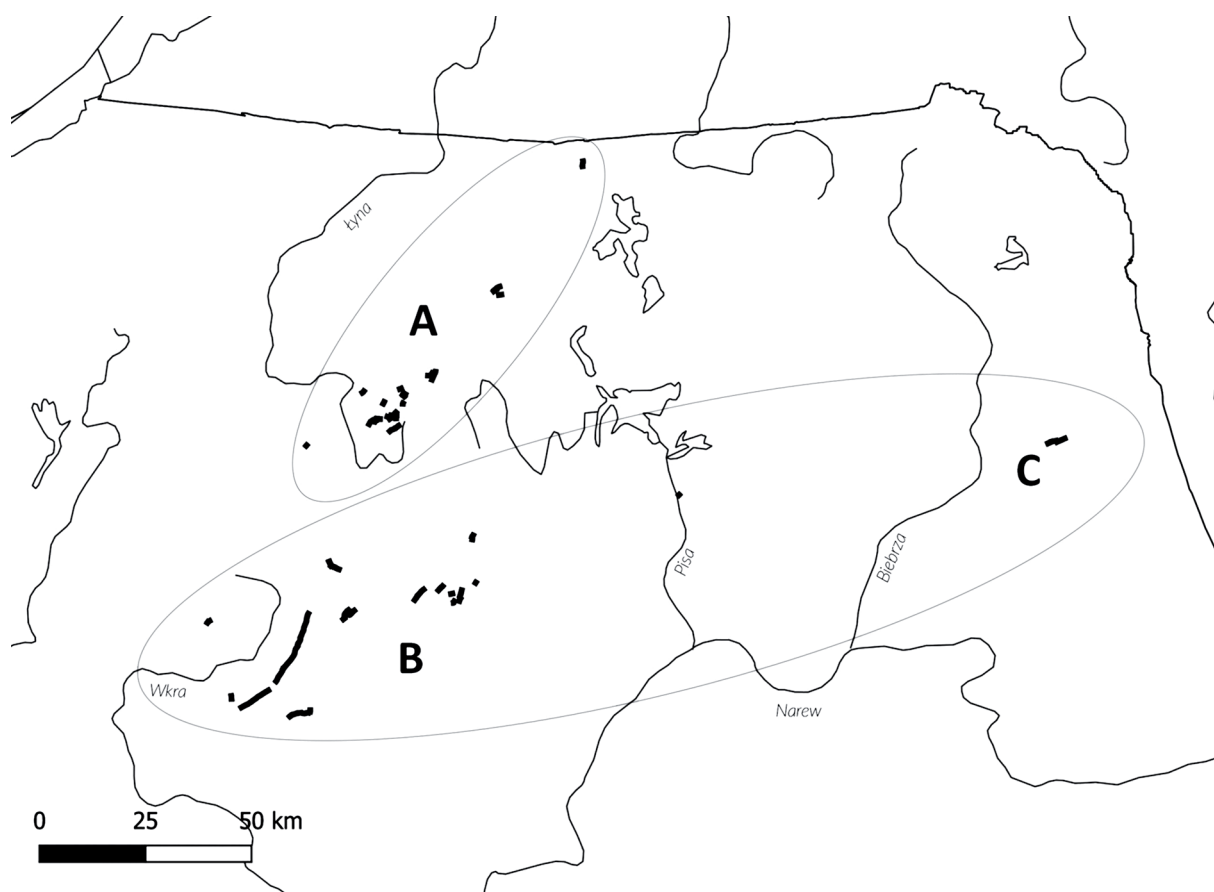


Fig. 5. A: Prussian embankments; B: Embankments on the Mazovian-Prussian border; C: Linear embankment by the gord in Grodzisko, municipality Suchowola (by Ł. Miechowicz)

In terms of construction, they are single or double walls, with one or two moats. In the older literature on the subject, the initiative of building them was attributed to the state of the Teutonic Order and the German settlers, who brought with them the idea of building the so-called *Landwehrs* – frontier fortified areas (Crome 1937, 70–72). According to this concept, the embankments were to serve as a protection against armed attacks of the Prussian tribes. The Prussian tribes were also indicated as builders of some sections of the embankments. Fortification systems in the form of embankments and abatises located in strategic points provided the protection of tribal territories against the Teutonic incursions. It is possible that some of the objects, already located in the territory of the Teutonic Order, served as internal administrative borders.

The concept of assigning the construction of at least a part of the embankments to the Masovian rulers or the Polish state as a protection against both Prussian invasions and Teutonic expansion is also quite probable. The so-called *Grentz Wall* presumably served the purpose, which corresponds to the course of the boundary line from 1343. E. Kowalczyk estimates the time of its construction for the years 1344–1351, i.e. the years of the reign of the prince Bolesław III of Płock (Kowalczyk 1987, 174). This concept is also supported by the very structure of the wall with a moat on the northern side of the embankment. Only the so-called *Grentz Wall* was excavated to find out the existence of its wooden internal structure (Kowalczyk 1987, 132).

Following the E. Kowalczyk's analysis, it should be assumed that individual sections of the embankments probably have a different chronology, which can cover a broad time range from the 10th to the 14th century. The linear embankments on the Mazovian-Prussian border were not created as a result of the implementation of one fortification line, but formed point barriers. Their individual sections were built

at different times, depending on the needs and historical events, and therefore each of them should be considered separately.

When discussing the issue of linear embankments on the Mazovian-Prussian border, it is necessary to mention another alleged object of this type, absent in the literature on the subject, which is located in the basin of the upper Biebrza River. It is located on the north side of the gord in Grodzisko dating back to the 12th–13th century, in the municipality of Suchowola⁶. It is a single embankment with ditches on both sides, consisting of three sections 800 m, 950 m and 1800 m long. The first one closes the area between the nameless stream in the village of Podgrodzisk and the Horodnianska River. The last and most eastern fragment reaches the marshes near the village of Olsza. It probably served a military purpose, additionally securing the gord and related settlements from the south.

Another group of the so-called Prussian embankments, consisting of approx. 30 sections (Fig. 1, group 5), is located in the area of the Olsztyn Lakeland and the Mrągowo Lakeland. The issue of the chronology and functions of linear embankments in the area of Prussia has not been sufficiently researched so far, although it has been mentioned several times in the literature (Crome 1937; Piotrowski – Bitner-Wróblewska 1990; Klimek 2006; 2008).

By correlating the NMT LiDAR analysis with the descriptions of the embankments known from medieval written sources and later literature, we can state the existence of a well-preserved fortification, consisting of a double wall located by Lake Kielarski, near the village of Zazdrość. Another group of embankments, consisting of several sections, is located between Lakes Serwent and Wardąg, near the village of Nerwik. The embankment of probably early medieval provenance is located between Lakes Gąsiorowskie and Sapłat. Four parallel sections of the embankments are located in a forested area adjacent to Lake Rasząg from the west, and to the east of the village of Bartoły Małe. Another facility of this type closes the area between Lakes Raks Górny and Dłużek. Other 1,2 km and more than 2 km long embankments extend north of the village of Pudąg. The next sections run perpendicularly to Lake Dejnowa, south of the village of Święta Lipka. The northernmost facility of this type is located on Lake Osiek, west of the village of Marszałki (Fig. 5).

Unfortunately, none of these objects has been archaeologically explored yet, which seems to be necessary to establish their chronology and purpose. Based on the analysis of written sources, including those mentioned in the chronicle of Piotr Dusburg, we can attribute their construction to the Prussian tribes, the Teutonic Order or the Warmian bishopric. From this perspective, their chronological span will be quite long, from the 9th to the 14th century (Klimek 2006, 113). It seems that their purpose – strictly military or border marking- should be considered separately for each group.

The last group of medieval fortifications (Fig. 1, group 6) in the form of linear embankments can be found in the area of present-day south-eastern Poland. In two cases – in Chodlik (Trzciniec-Kazimierzów) and Czermno – they were archaeologically investigated.

The most famous and best-studied object of this type in Poland is the linear embankment in Czermno, Tyszwice municipality, which is a part of an early medieval settlement complex.

This object was discussed in detail by E. Kowalczyk (1987, 191–210). It is located about 1 km from the gord identified with Cherven known from the chronicle. To this day, the monument has been preserved in a section of over 1.5 km long; its height is 2 m⁷. It crosses the area between two swampy valleys of the Huczwa and Sieniocha rivers, blocking the direct access to the settlement complex in Czermno from the south. Directly behind it there are clusters of burial mounds (Fig. 6–7). In 1952, the object was excavated and its chronology was determined at the end of the 11th–12th centuries. Based on the NMT LiDAR analysis and the field query we can identify potential additional, perhaps older defense systems located in the so-called Tyszowiecki Forest. It is an alleged triple-wall system,

⁶ Grodzisko has not been archaeologically researched yet. In literature it is dated to the 12–13 centuries (comp. Engel – Iwanicki – Iwanowska – Sobczak 2013) I inspected the embankment in 2013.

⁷ Determined on the basis of NMT LiDAR analysis.

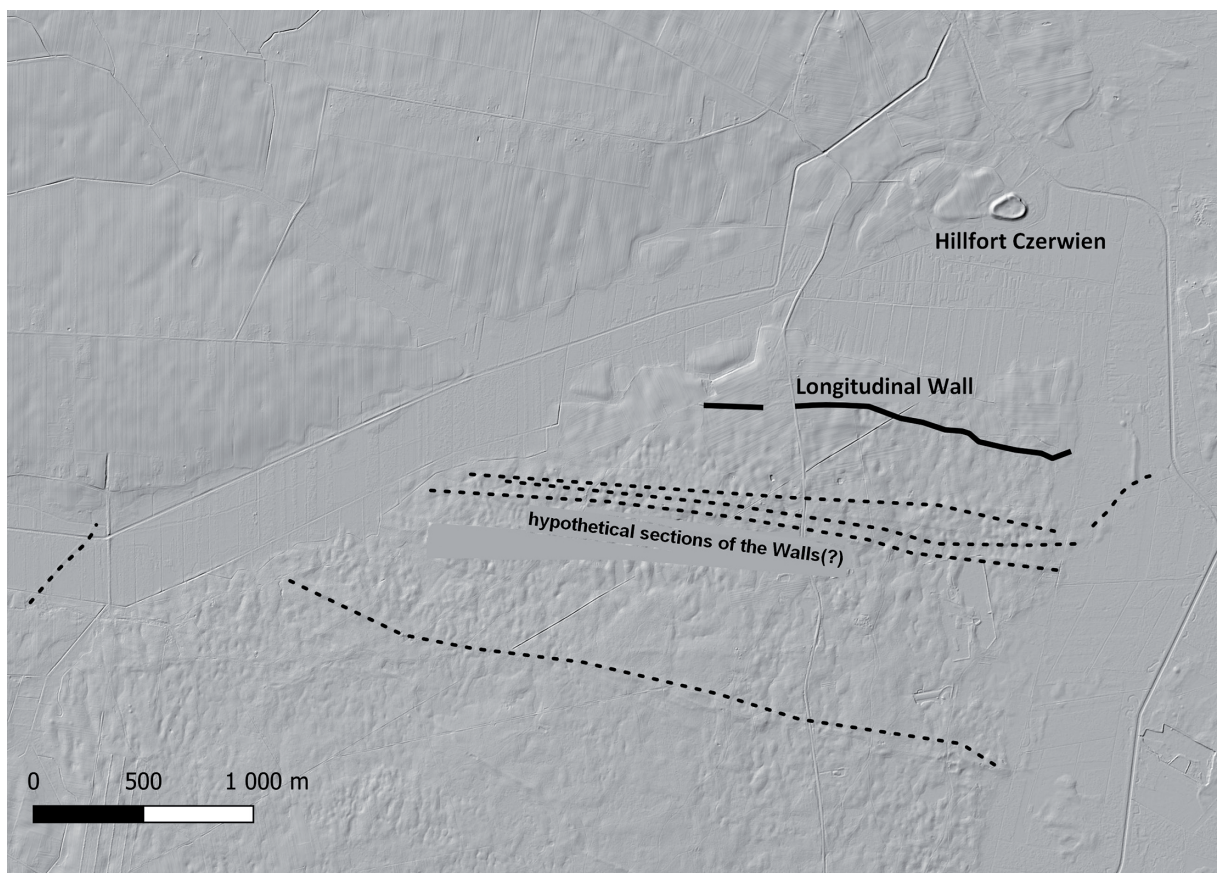


Fig. 6. Linear embankment and alleged linear fortifications related to the protection of the early medieval settlement complex in Czerwno, municipality Tyszowce (by Ł. Miechowicz).



Fig. 7. Linear embankment in Czerwno, municipality Tyszowce (photo by Ł. Miechowicz)

approx. 3 km long and up to 50 cm high, located approx. 500 m far from the linear embankment mentioned above. Another embankment parallel to them lies about 1 km further south. However, archaeological research is required to confirm the purpose of these objects.

Another linear embankment recently discovered is located in the so-called Powiślański Forest in the village of Trzciniec, Łaziska and Kazimierzów municipalities, Karczmiska municipality, south of the gord and settlements in Chodlik (Miechowicz 2017). Initial recognition of the monument indicates its early medieval history. It is a previously unknown element of permanent defense, probably also having the importance of the border embankment. It closes the isthmus lying between the marshes, which allowed access to the gord and settlements in Chodlik from the south (Fig. 8–9). Right behind it, on the southern side, there are burial mounds and the remains of a dyke that stretches up to the break of the wall in its central part. It is possible that it is a remnant of an early medieval road. The embankment is located approximately 800 m far from the gord in Chodlik and 300 m far from the nearest gord settlement. The height of the dyke in the best preserved points reaches 1,5 m. Outlines of ditches are visible on both sides. During the excavations, in the destroyed part of the dyke, a fragment of early medieval pottery and iron axe heads of type IIB.5.2 according to P. N. Kotowicz were discovered, dated from the end of the 10th to the first half of the 13th century (Kotowicz – Miechowicz 2017).

In 2016, the best-preserved eastern part of the embankment, along with the forefields, was non-destructively tested using the electrofusion method⁸. The test results show with a high probability the internal box construction of the object.

A similar embankment, about 100 m long, can also be found in the immediate vicinity of the gord located on the so-called Bagno Staw in Tarnów, Wierzbica municipality, Chełmno county (Fig. 10–11). It is located about 600 m south of the embankments of the gord. Based on the excavations the embankment is dated back to the 8th/9th and 10th centuries (Dzieńkowski 2007, 93). The dyke is preserved up to a height of approx. 1 m, on its southern side you can see the outline of a ditch.

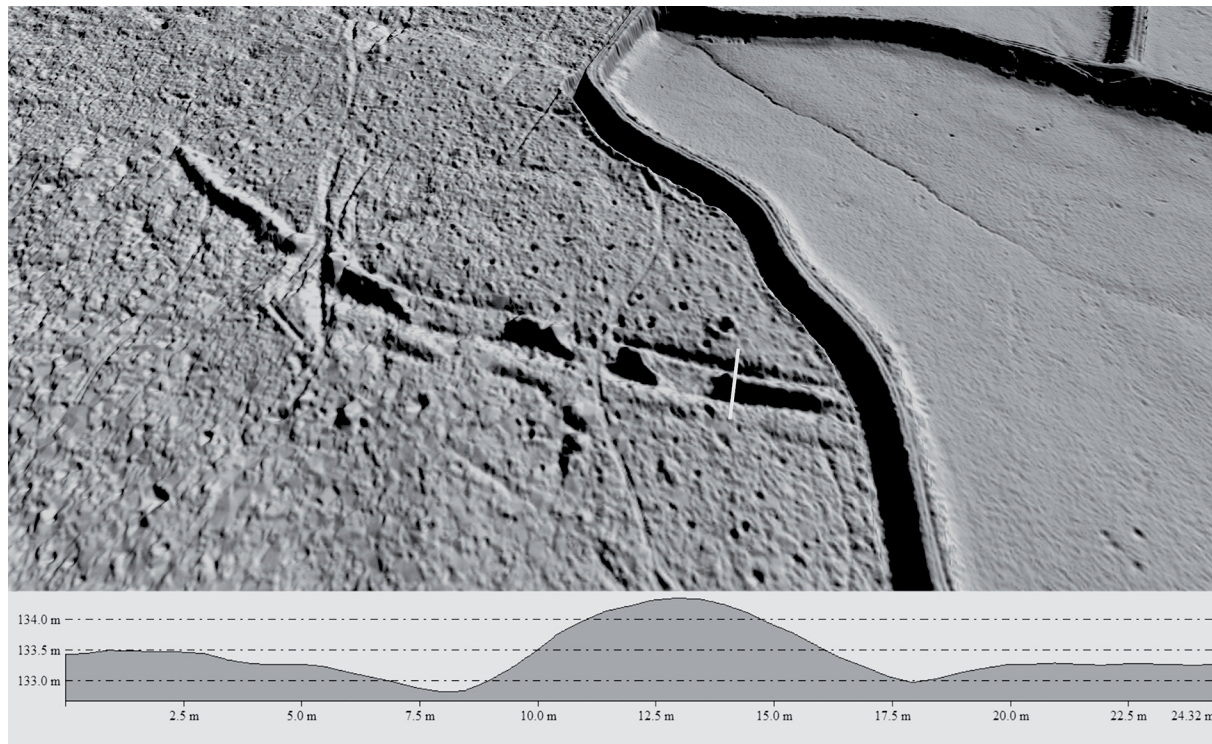


Fig. 8. NMT LiDAR of the linear embankment in Chodlik (Trzciniec-Kazimierzów) (by Ł. Miechowicz)

⁸ Research was conducted by mgr Robert Ryndziejewicz from the Institute of Archaeology and Ethnology PAN (Polish Academy of Sciences)

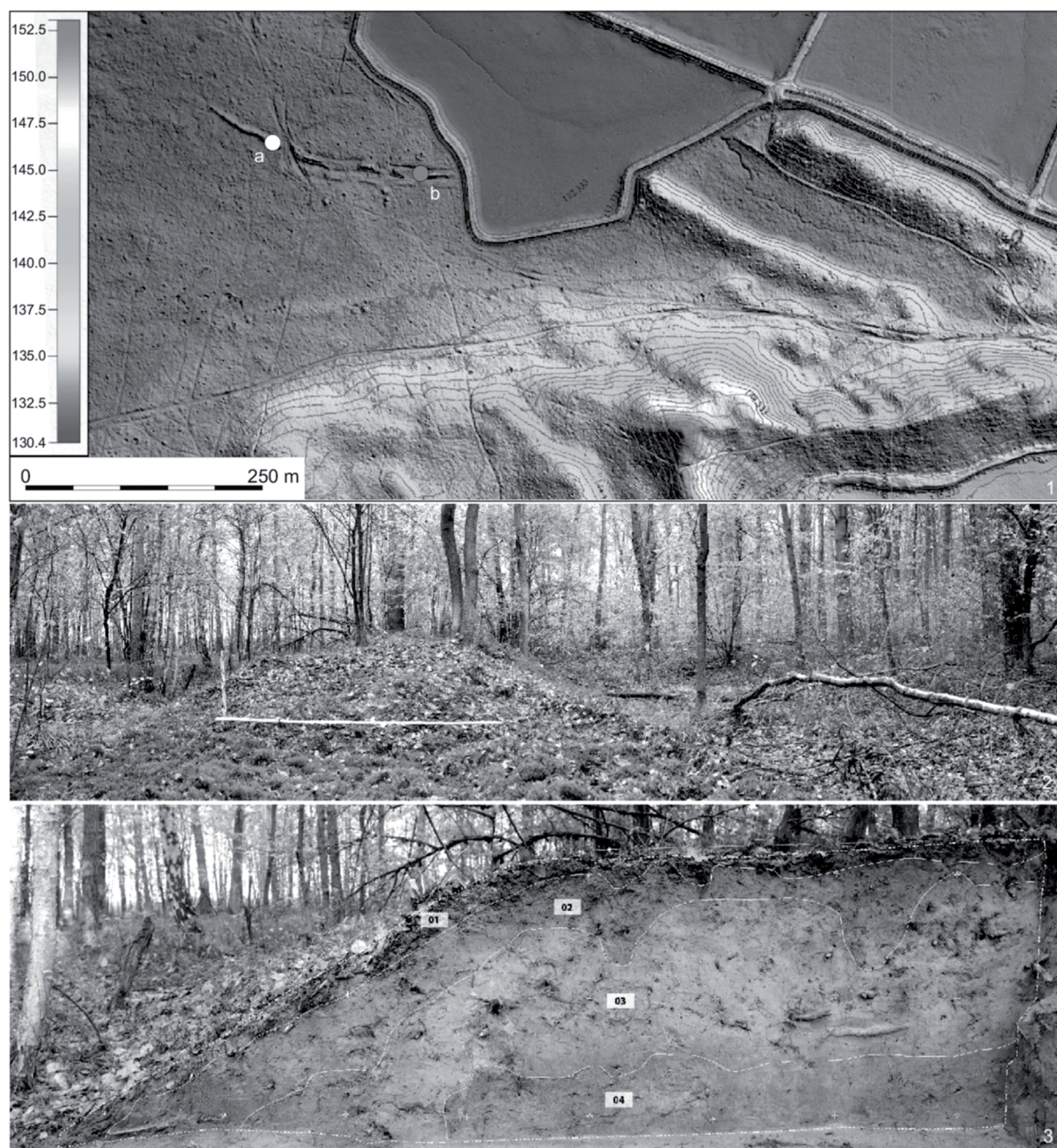


Fig. 9. Linear embankment in Chodlik (Trzciniec-Kazimierzów) – 1: localization on NMT LiDAR; 2. The view on the preserved fragment of the embankment; 3. Embankment layers (by Ł. Miechowicz)

This monument was discovered on the basis of the NMT LiDAR analysis and verified during a field survey conducted by the author. At the base of the embankment, fragments of early medieval pottery, initially dated to the 10th–11th centuries, were found. Several mounds are located approximately 200 meters to the south.

Another object of this type, which has not been archaeologically researched, is located about 600 meters west of the relics of the Horodyszczę gord in Trepcza near Sanok. It is almost 250 m long and cuts across the so-called Sanok Path. Half a kilometer further there is a system of three ditches parallel to the object. The last of the embankments included here, also unexplored archaeologically, is located in Batorz in the area of Janów county. It is over 270 m long and located about 230 m north

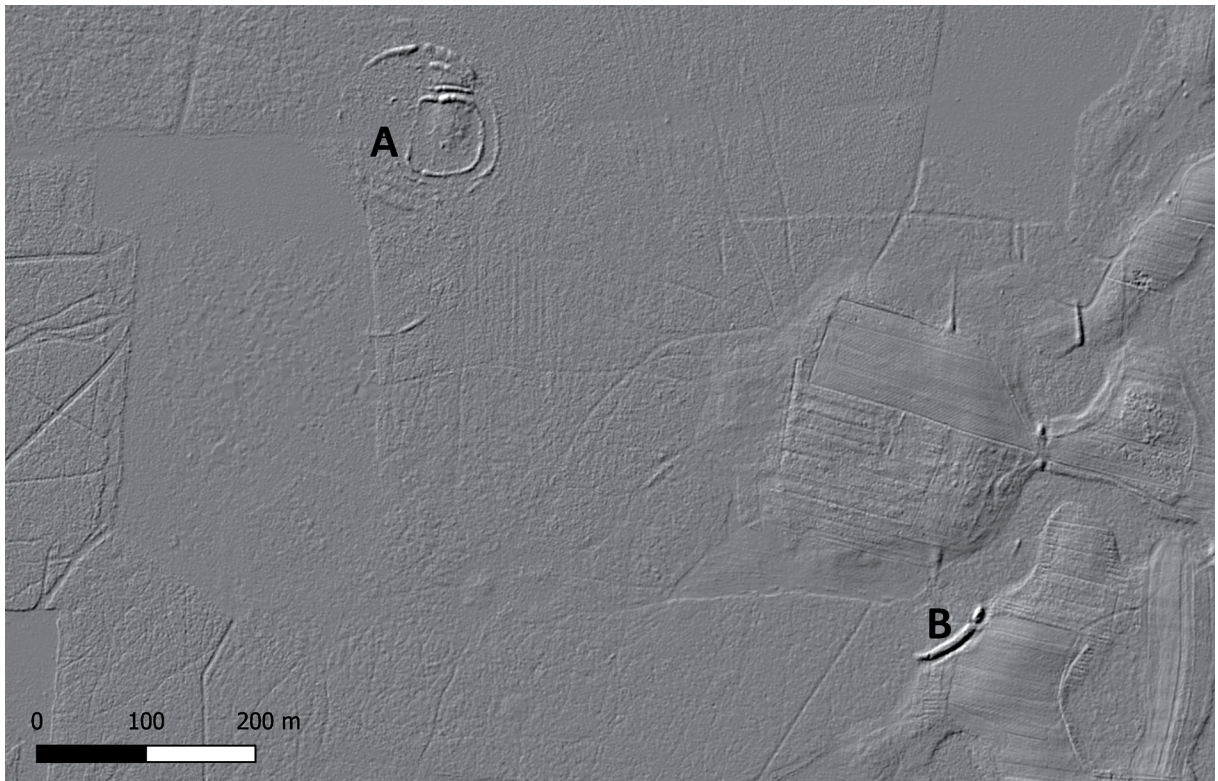


Fig. 10. The gord „Bagno Staw” in Tarnów, Chełm municipality (A) and preserved fragment of the linear embankment (B) (by Ł. Miechowicz).



Fig. 11. Linear embankment in Tarnów, Chełm municipality (by Ł. Miechowicz).

of the embankments dating back to the tribal period of an early medieval settlement. In order to confirm the function and chronology of these objects, it is necessary to conduct excavation research.

Following the findings of E. Kowalczyk, we can divide linear embankments from the territory of Poland into single and multiple embankments, with one or more moats (1987, 21). As regards the function, they are objects of defense or borderline importance, most often simultaneously serving both purposes. We can distinguish several kilometers long lines of embankments delimiting and defending the borders of entire settlement areas, as well as individual embankments related to the direct protection of human dwellings – settlements and gords (Kowalczyk 1987, 220). Their chronology has been estimated between the 10th and 14th centuries. The NMT LiDAR analysis allows for the sections completion

of individual fortifications and the evaluation of their state of preservation. Using it, it was also possible to discover five previously unknown in literature fragments of long lines of fortifications and four single embankments of this type. Poor recognition using archaeological methods is common for all these objects. Only a few excavations were conducted, and geophysical methods were used only for the study of the object in Chodlik. Knowledge about them can provide answers to many important questions regarding the functioning and territorial range of settlement clusters, the route of roads, or forms of marking medieval borders. The information obtained during the research can be an excellent material for the logistic and mobilization analyzes of the power center's capabilities necessary for the long-term building of complex structures. They can also serve as an additional source of research on political changes or historical events. They can also bring new arguments to the discourse on military conflicts and the medieval art of war. Since linear embankments, besides the gords, are one of the oldest examples of fortifications covering vast areas.

References

- Banaszek, Ł. 2014: Lotniczy Skaniny Laserowy w Polskiej Archeologii. Czy w pełni wykorzystywany jest potencjał prospekcyjny metody? *Folia Praehistorica Posnaniensia* XIX, 207–251.
- Beljak-Pažinová, J. 2012: Das Geheimnis der Frühmittelalterlichen Wälle im Zvolener Talkessel (Slowakei). In: A. Liska, – I. Szatmári (eds), *Sötét Idők Rejtélyei*, 6–11. századi régészeti emlékek a Kárpát-medencében és környékén. A 2011-ben Békéscsabán megrendezett konferencián elhangzott előadások. Békéscsaba, 297–324.
- Boryna, M. 2011: Wały Śląskie. Tajemnice dawnych granic. Szprotawa
- Crome, H. 1937: Längswälle in Ostpreussen. *Mannus*, 29, 69–90.
- Dobat, A. S. 2008: Danevirke Revisited: An Investigation into Military and Socio-political Organisation in South Scandinavia (c ad 700 to 1100). *Medieval Archaeology* 52, 27–67.
- Dzieńkowski, T. 2007: Badania archeologiczne wczesnośredniowiecznego „grodziska schronieniowego” na „Bagnie Staw” w Tarnowie, pow. chełmski, stan. 1. *Archeologia Polski Środkowo-Wschodniej* 9, 79–95.
- Engel, M. – Iwanicki, P. – Iwanowska, G. – Sobczak, C. 2013: Grodziska Jaćwieży w perspektywie badań Działu Archeologii Bałtów Państwowego Muzeum Archeologicznego w Warszawie, In: Z. Kobylński (ed), *Archaeologica Hereditas. Grodziska Warmii i Mazur 1. Stan wiedzy i perspektywy badawcze*. Warszawa-Zielona Góra, 233–252.
- Geschwendt, F. 1934: Untersuchung der Dreigräben. *Altschlesien* 4/4, 255–259.
- Kalinowski, S. 2013: Pogranicze Kujawsko-Pomorskie we wczesnym średniowieczu. Wybrane problemy badawcze. *Acta Universitatis Nicolai Copernici, Archeologia* XXXIII, 111–127.
- Klimek, R. 2006: Wały podłużne w Nerwiku, gmina Purda, województwo warmińsko-mazurskie. *Pruthenia* I, 109–125.
- Klimek, R. 2008: Funkcjonowanie i obecny stan zachowania średniowiecznych wałów podłużnych w południowej części dominium warmińskiego. *Pruthenia* III, 163–206.
- Kolník, T. 1978: Zisťovací výskum tzv. Spečeného valu v Žemberovciach. *Archeologické výskumy a nálezy na Slovensku*, 139–142.
- Kolník, T. – Roth, P. 1984: Zisťovací výskum tzv. Dlhého valu v Novom Tekove. *Archeologické výskumy a nálezy na Slovensku*, 119–123.
- Kowalczyk, E. 1969: Wały Żmijowe. Ze studiów nad obroną stałą ziem ruskich we wcześniejszym Średniowieczu. *Kwartalnik Historii Kultury Materialnej* 17, no 2, 141–181
- Kowalczyk, E. 1972: W sprawie przebiegu i datowania Wałów Żmijowych. *Kwartalnik Historii Kultury Materialnej* 20, no 2, 315–321.
- Kowalczyk, E. 1978: Ginący zabytek – Wały Kujawskie. *Z Otchłani Wieków* 44, no 2, 162–164.

- Kowalczyk, E. 1984: Wały lużyckie. Ze studiów nad umocnieniami podłużnymi Słowiańszczyzny. *Kwartalnik Historii Kultury Materialnej* 32, no 4, 461–469.
- Kowalczyk, E. 1987: Systemy obronne wałów podłużnych we wczesnym średniowieczu na ziemiach polskich. Warszawa.
- Kowalczyk, E. 1998: Powracający temat: wały podłużne pogranicza mazowiecko-pruskiego: opracowanie wstępne. *Światowit* 41/Fasc. B, 497–508.
- Kowalczyk, E. 2013: Dzieje granicy mazowiecko-krzyżackiej (między Pisą a Biebrzą). Warszawa.
- Łbik, L. 1997: Zagadkowe rowy i wały ziemne na bydgoskim Czyżkówku i Osowej Górze. *Materiały do Dziejów Kultury i Sztuki Bydgoszczy i Regionu* 2, 9–16.
- Maluck, M. 2014: Das Danewerk in Schleswig – Ein dänischer Limes?. In: E. Weinlich (ed.), *Der Limes als antike Grenze des Imperium Romanum. Grenzen im Laufe der Jahrhunderte. Geschichte und Kultur in Mittelfranken durch Edgar Weinlich*. Würzburg, 73–95.
- Miechowicz, Ł. 2017: Nieznany wał podłużny w Kotlinie Chodelskiej. Przyczynek do studiów nad obroną stałą oraz granicami we wczesnym średniowieczu, In: M. Dzik, – G. Śnieżko – M. Starski (eds.), *Fines testis temporum. Studia ofiarowane Profesor Elżbiecie Kowalczyk-Heyman w pięćdziesięciolecie pracy naukowej*. Rzeszów, 265–278.
- Müller, U. 2013: Grenzen, Grenzregionen und Grenzüberschreitungen in archäologischer Perspektive. In: S. Bo Frandsen – M. Krieger – F. Lubowitz (eds), *1200 Jahre deutsch – dänische Grenze*. Neumünster, 47–69.
- Piotrowski, A. – Bitner-Piotrowska, A. 1990: Wały podłużne w okolicach Biskupca w woj. olsztyńskim: przyczynek do pochodzenia i chronologii tego typu obiektów na obszarze południowej Warmii. *Komunikaty Mazursko-Warmińskie* 1–4, 133–140.
- Posadzy, W. – Wędzki, A. 1955: Wały Kujawskie. *Studia i Materiały do dziejów Wielkopolski i Pomorza* 1/1, 143–168.
- Sławik, Ł. – Zapłata, R. 2011: LIDAR w archeologii – zagadnienia wprowadzające, In: R. Zapłata (ed.), *Digitization of Archaeological Heritage. Selected Aspects*. Lublin, 207–232.

Łukasz Miechowicz
Instytut Archeologii i Etnologii PAN
Al. Solidarności 105
00-140 Warszawa
lmiechowicz@gmail.com