

*Galina Trebeleva*

## The Organization of Taman's Defense from the Mid 1<sup>st</sup> Century BC to the Turn of the 2<sup>nd</sup> Century AD: A Historical Simulation Based on GIS Technologies

*Abstract:* One of the main priorities of modern archaeology is not just a study of specific sites, but the study of them in the context of the natural and historical landscape. To solve this problem it is very convenient to use geoinformational systems (GIS) technologies which are understood as integration of actual electronic databases (text, digital, etc.) and geoinformation. We have a great number of sources regarding the defense of the Bosporian Kingdom in the Roman time. These include epigraphy, antique literary heritage and archaeological data. The latter is the main source of the research. In this work spatial analysis modules from the following programs of Arc Map 8.3 were used: Spatial Analyst, 3-D Analyst, Geostatistical Analyst.

One of the main priorities of modern archaeology is not just a study of specific sites, but the study of them in the context of the natural and historical landscape. This modifies the requirements for archaeological study: it becomes necessary not only to possess data on the archaeological site or set of sites but for the study to be based on the synthesis of the historical, geographical and archaeological information of the specific territory. GIS technologies are of great assistance in solving this problem.

The application of GIS techniques in archaeology began relatively recently. This method has developed dynamically over the last ten to fifteen years. This article focuses on one of the questions of spatial organization of Taman peninsula defenses from the middle of the 1<sup>st</sup> century BC to the early 2<sup>nd</sup> century AD, and in particular, on the analysis of the relationships between fortifications and unfortified settlements. This kind of analysis, to a certain extent, can help to define both the construction of fortifications, and the challenges that the inhabitants were facing. In spite of the fact that the problem of the Taman peninsula defense has been addressed from time to time by a large number of researchers, this specific question has not yet been investigated.

The basis of the spatial analysis are density coefficients of fortified and unfortified settlements on a given territory. The density of settlements is evidence of the territory's development, and hence of the number of nodes of communication. High density of fortifications could reflect either a potential danger, or the strategic importance of the territory. The system of fortifications' location depends on why they were built. There are two main goals for

the construction of fortifications. The first is the immediate protection of the population from the looming threat, i.e. the possibility of hiding behind thick walls in the event of enemy's attack. In this case, fortifications should be located even distances away from all unfortified settlements associated with it, or roughly in the centre of the territory. Furthermore, there should be a good match between the area and the number of inhabitants within the dependent territory. The second objective is to ensure the strategic security of the territory, which should be fortified to ensure the protection of borders and communications. In this case, the location of fortifications in relation to unfortified settlements can be uneven.

To determine "dependent territory", i.e. the one which is the nearest to each fortress, so that people living in this territory would have sought retreat in the central fortress, the study used Thyssen's method of territory generation, introduced to archaeology by D. CLARKE (1968). When using GIS software for the calculation of the Thyssen polygons, the outer limit of the total area considered can be controlled by program options. However, internal borders, i.e. landscape barriers (lakes, firths, wide rivers, etc.), are disregarded by the program. It is possible a situation might arise in which the "dependent territory" of the fortification encompasses, for example, both sides of a firth. In this case, manual correction should be applied, when a natural landscape barrier is accepted as the border of a site.

The methodology of archaeological research using GIS technologies involves two main phases:

- establishing GIS, i.e. mapping sites, landscape, designing and filling databases;

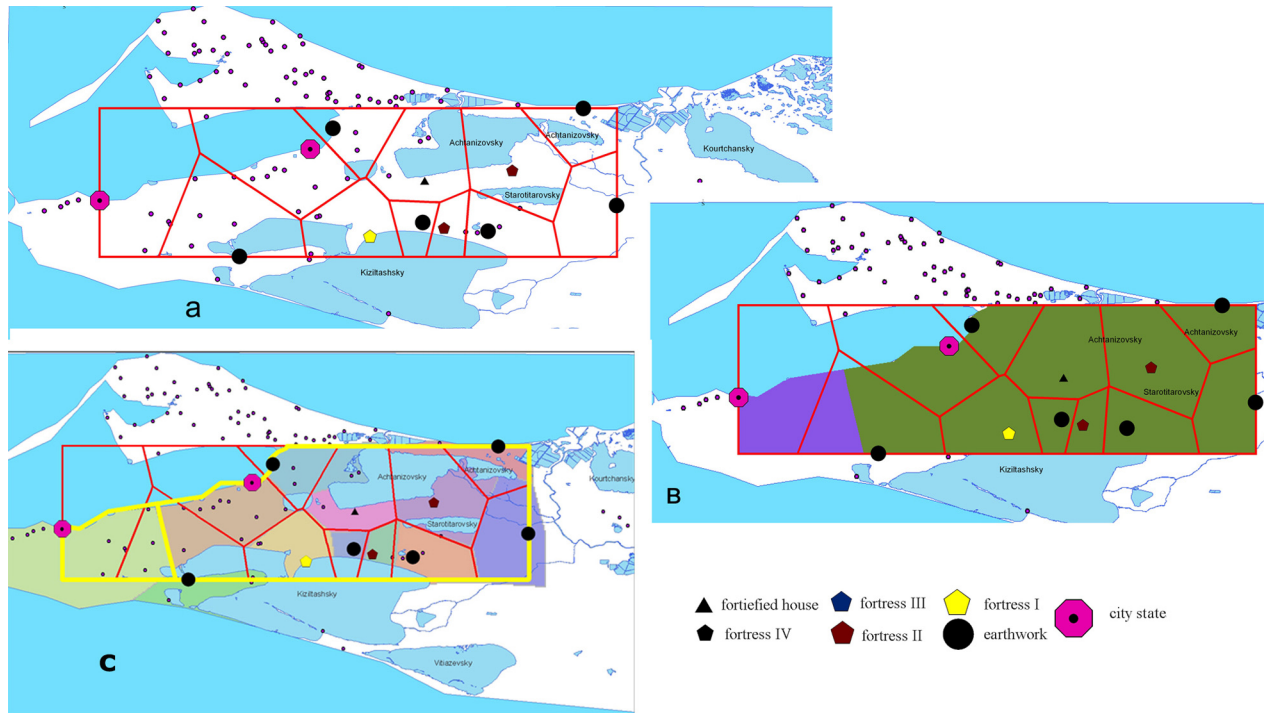


Fig. 1. The “dependent territory” was first created by Thyssen’s method and adjusted manually afterwards.

- analysis, consisting of classifying data and spatial processing of mapping results.

In order to conduct analysis in this work the following modules of spatial analysis of Arc Map 8.3 were used: Spatial Analyst, Geo-statistical Analyst.

For mapping sites geographic coordinates provided by the GPS receiver during the archaeological surveys were used. Given their usually insignificant extent, most sites were recorded as single objects.

For mapping and terrain models modern topographic maps at the scale of 1:25 000 and 1:10 000, which were geo-coded in the ArcMap 8.3, were used. Next, with the previously coded maps the data about the heights was recorded in a form of a separate spot topic. Overall, for the Taman peninsula 3337 definitions were made, which were comparatively evenly spread over the territory. Then, on the basis of the height data from the Geo-statistical Analyst module, a landscape model of Taman peninsula was created.

In Russian historical and archeological literature, there are two main variants for reconstructing the paleo-geographical situation on the Taman peninsula. Supporters of the first variant are of the view that in ancient times the area was a system of islands (MONTPEREUX 1839, 38–80; PONOICHEVNY 1891, 1–60; BASHKIROV 1927, 7; WOJTSCHOWSKI 1929, 4–9; ABRAMOV / PAROMOV 1993, 45). The second variant

is that the modern Taman peninsula was in ancient times a single island (LATYSHEV 1909, 124; GORLOV 1996; GORLOV / POROTOV 2000; KULIKOV 1995). Therefore, in order to complete the picture, spatial analysis of the defenses was made separately for the two models for reconstructing the paleo-geographical situation. After that the results were compared. An important point of the study is the classification of the data conducted on the basis of the following criteria and their relationships: type of fortifications, the area of fortification, and the chronology.

The first two centuries of our era were a unique period in the development of Bosphoran Kingdom. After the Mitridatovsk wars were over Bosphorus was resigned from the Pontus Kingdom and gained formal independence. One of the main goals of the rulers was the strengthening of the State as well as enhancement of their own tsarist power of authority. The first century of Bosphorus’s independence (middle of the 1<sup>st</sup> century BC to the middle of the 1<sup>st</sup> century AD) is filled with inter-state dynastical wars and insurrections. The tsar was generally opposed by the state cities of Asian Bosphorus. It therefore appears that the tsar could consider them as potential domestic enemies. This may explain the lack of defenses in some state cities from the second half of the end of the 1<sup>st</sup> century BC up to the 1<sup>st</sup>–2<sup>nd</sup> centuries AD. As for the destruction of defensive walls

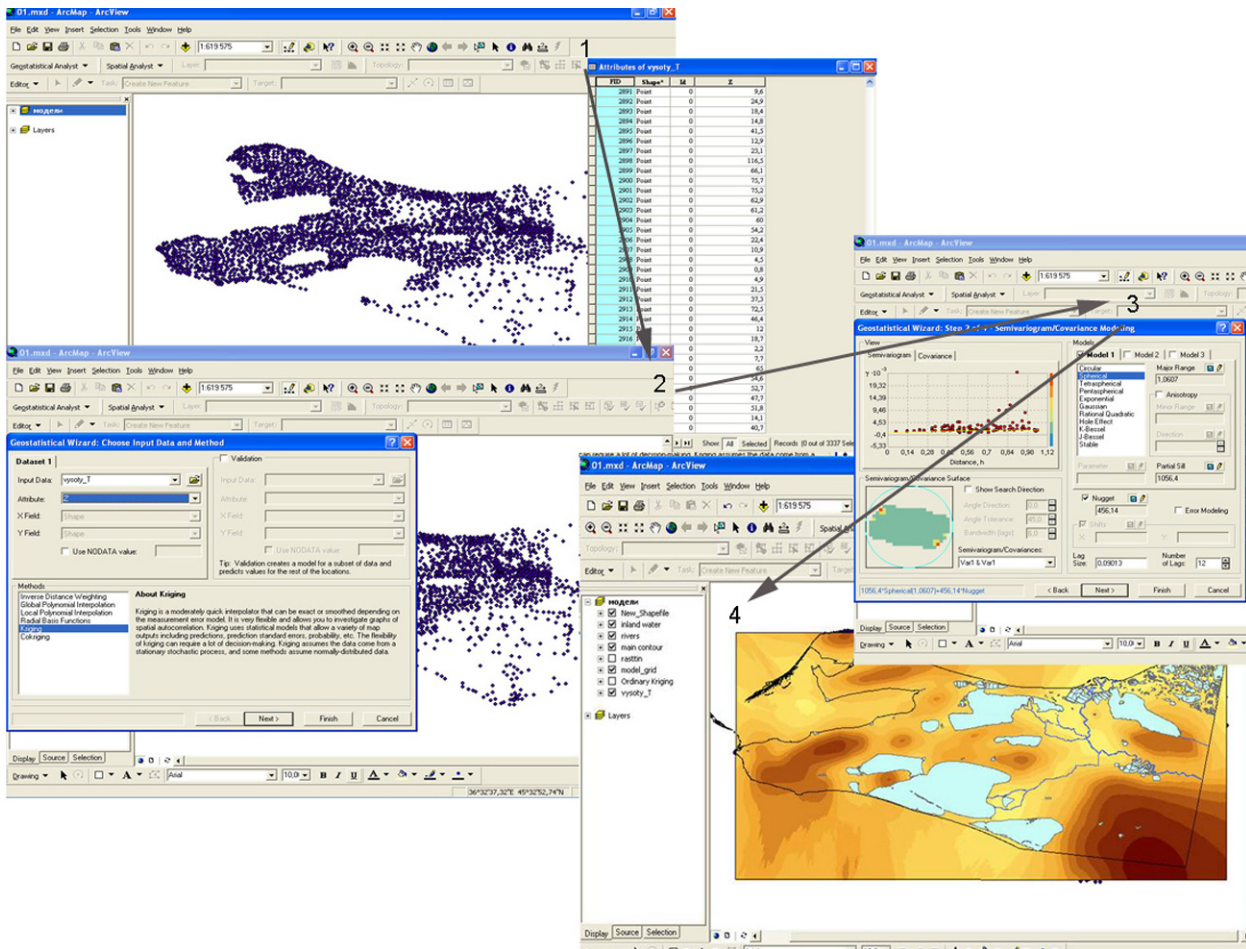


Fig. 2. Creating a landscape model of Taman peninsula.

of Phanagoria and Tanais there is some evidence from narrative sources (App. Mithr. 120; Strabo, XI, 493) that to a certain extent are confirmed by archaeological evidence. When it comes to the two other state cities (Gorgippia and Germonassa) there is no such evidence. Yet, there are inscriptions dating around the 1<sup>st</sup>–2<sup>nd</sup> centuries AD which report on the restoration of walls. Therefore, as a hypothesis, it can be assumed that the two cities for the period of their history were either without defensive walls, or their defensive positions were in a condition inadequate for effective defense. Previously around the 1<sup>st</sup>–2<sup>nd</sup> centuries BC tsarist power did not display any interest in proper defense of cities. Perhaps, this situation with the defensive walls of state cities at the Asian Bosphorus was due to the fact that the tsarist government tried to destroy the state cities as centres of separatism that possessed significant military and economic potential. In this case the parallel with the development of fortifications in Europe in the Middle Ages is noteworthy. During

the period of establishment of absolutism, the city's defense system was either completely destroyed or brought to such a physical condition that they could not be a serious obstacle for the troops of the King.

The situation was different in rural settlements. To date, on the territory of the Taman peninsula (excluding cities) there are some 300 ancient time settlements identified, among which about 100 sites date back to the middle of the 1<sup>st</sup> century BC to the beginning of the 2<sup>nd</sup> century AD; 23 of them have some form of fortifications. Fortifications, with an area less than 0.05 ha, are fortified houses, or apparently private houses, while fortifications covering an area of more than 1 ha are settlements which only have earthworks for their defense. In such fortifications the stationing of regular troops was very unlikely. They were primarily built for the protection of their own population. In later centuries, they could have become a part of a uniform system of fortifications of the State as a whole, but their initial function was

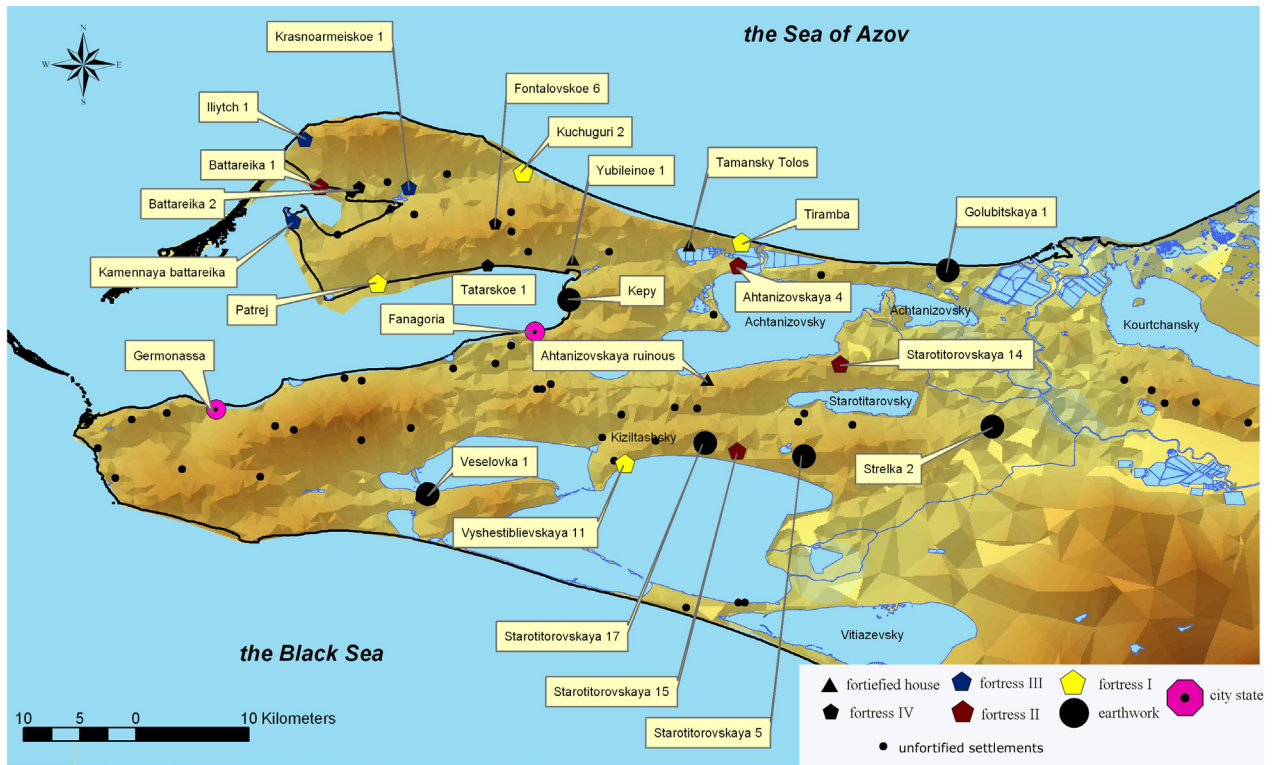


Fig. 3. Fortified sites on Taman: Typological analysis.

different – to protect the population of a specific fortified settlement. For the fortresses the situation is different. Apart from the earth fortifications they also had walls made, in this case, of adobe.

All adobe fortresses on the Taman peninsula were erected at the same time, within the second half of the 1<sup>st</sup> century BC. They have areas ranging between 0.05–1 ha and can be classified into three groups: smallest, with an area of up to 0.2 ha (there are three such fortresses); medium size from 0.2–0.5 ha (there are seven such fortresses), and larger than 0.5 ha (four fortresses). The group of the smallest fortresses (0.05–0.2 ha) consists of three fortresses: Battareika 2 ( $S = 0.12$  ha), Fontalovskoe 6 ( $S = 0.13$  ha) and Tatarskoe 1 ( $S = 0.16$  ha). Population of these fortresses was most likely around 100 people. (The ratio of area and the number of its inhabitants had been found at the time by S. D. KRYJITSKI (1985) and C. B. LANTSOV (1999).) Apparently, this team may be the smallest unit in Bosphorian army called loh, or the Roman centuria (TREBELEVA 2002, 313). Assuming that the fortress was housing not just one, but two teams, i.e. the population number was 200 people, the area of the fortress should be about 0.25–0.3 ha. There are three fortresses complying with these parameters: Kamennaya battareika ( $S = 0.25$  ha), Krasnoarmeiskoe 1 ( $S = 0.25$  ha), and Iliytsch 1 ( $S = 0.3$  ha).

If the fortress hosted a unit equal to a spira (250–300 people) (TREBELEVA 2002, 313), its area had supposedly to be equal to around 0.35–0.5 ha. There are four fortresses of this type: Battareika 1 ( $S = 0.36$  ha), Starotitorovskaya 14 ( $S = 0.36$  ha), Ahtanizovskaya 4 ( $S = 0.47$  ha), and Starotitorovskaya 15 ( $S = 0.5$  ha). A unit consisting of 500–600 people (tagma) (TREBELEVA 2002, 313) was to be hosted in a fortress with an area of 0.7–0.9 ha. Fortresses corresponding to these parameters in the Taman peninsula are also four in number: Patrej ( $S = 0.7$  ha), Vyshestiblievskaya 11 ( $S = 0.8$  ha), Tiramba ( $S = 0.9$  ha) and Kuchuguri 2 ( $S = 0.9$  ha). Thus, there is a certain hierarchy of fortresses based on the amount of people hosted.

In order to conduct spatial analysis on Taman peninsula of the fortification system in the first chronological period, two different models of paleo-geographical situation reconstruction were used: Taman peninsula as an archipelago of islands and Taman peninsula as a single island. Findings were virtually identical; the main objective of all fortifications was to protect communications. The aim of directly protecting people behind the fortification walls did not exist.

Such an organization of defense system bespeaks of the high level of Bosphorus society organization during the period: not only protection of population bears importance, but also protection of the entire territory. At

the same time, protection of the entire territory could only be provided through proper protection of marine and land borders, as well as communications systems, and ensuring effective communication between fortifications. It seems that it becomes irrelevant, how exactly we reconstruct the paleo-geographical situation of the ancient times. Regardless, existing fortifications were parts of a united system, which was designed to protect the entire territory of the Taman peninsula, be it an archipelago, or a single island.

The system of fortifications based on their types also provides grounds for certain conclusions: In the western part of the peninsula (in the Fantalovsky peninsula region = Kimmeriysky Island region) adobe fortresses were located which deployed regular troops. Thus, these fortresses were forts serving as a basis for communication. Whereas in the east, apart from adobe fortresses, there were a considerable number of settlements surrounded by earth fortifications (shafts and ditches). The purpose of such fortifications is: the protection of their own people, and secondly, their possible link with the system of regular fortifications. The presence in the west of only adobe fortresses indicates that the area was relatively safe. People did not have to build additional fortifications around their settlements, but strategically it was very important, which is why the State was building fortresses here in order to protect the communication system and provide good communication. Moreover, high population density and a dense network of roads, provided the opportunity to build small fortresses as well as large ones. At the same time, in the east a constant military threat was evident. The government fortifications were inadequate, so people had to build their own. There are not many fortresses, and they are all large, as the population density in the territory is low and the network of communications is less developed.

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*Galina Trebeleva*

*Russian Academy of Sciences  
Institute of Archaeology  
Dm. Ulianova str., 19  
117036 Moscow  
Russia  
g\_gis@mail.ru*