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Pro memoria

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Creating Large-Scale Historical Maps in Russian Historiography (20th–21st Centuries). Methodical Approaches*

Alexey A. Frolov

This paper attempts to trace the path that was followed by the Russian historiography before contemporary methods of compiling large-scale historical maps arrived. The approaches that are being used in the digital age are described as the outcome of this development. The concept "large-scale historical maps" is very conditional – it should be understood as cartographical works compiled on a scale that is sufficient to depict not only towns but also ordinary populated settlements or groups of settlements. It should be noted that no attempts to this kind of review have ever been made before. Researchers who used old methods or proposed new ones did not focus much on the methodical background of their work. For example, Mihail Vitov – one of the founders of modern approaches – devoted only two paragraphs to his predecessor Aleksandr Andriyashev in his most famous work on mapping technique. With regards to other mapping methods, he noted in a footnote that "there were even earlier works... However, these works are not of great value for our topic."[1] In their reviews, Zinaida Karavayeva and Yury Kritsky focused mainly on small-scale maps. The methodical approaches used by the compilers of large-scale maps were not considered.[2]

The prerequisites for creating special methods were formed in Russian historiography in the 18th and 19th centuries, along with the development of the most historical cartography. The first attempt to depict historical events on a cartographic drawing was made in the first edition of the *Book of Mars* published in 1713.[3] It contained engravings of the plans for the sieges of the fortresses taken during the Northern War (Nienschanz – 1703, Derpt – 1704, Mitava – 1705, etc.).[4] Later, in 1766, the second edition of the book was completed with new texts and engravings devoted to the same military campaign.[5] So, a large-scale military-historical map organically grew out of a set of drawings depicting recent events. After that, separate studies on the ancient history of Eastern Europe started featuring historical maps.[6] Much later – in 1793 – the small-scale *Historical Map of the Russian Empire* was released. It appeared on the background of the cartographic works of Empress Catherine II and showed the territorial growth of the Empire, starting with Peter I. In the 19th century, several maps – mostly small-scale maps – were designed to illustrate the materials of historical researches. Undoubtedly, both the authors and the readers perceived these

* The work is funded by the Russian Science Foundation (project 14-18-02121).

1 М.В. Витов, *Приемы составления карт поселений XV–XVII вв. по данным писцовых и переписных книг*, in: *Проблемы источниковедения*, вып. 5, ред. А.А. Новосельский, Москва 1956, p. 239.

2 З.Ф. Караваева, *Некоторые вопросы создания исторических карт*, Москва 1956; Ю.М. Критский, *Русская историческая картография (XVIII–начало XX в.)*, in: *Вспомогательные исторические дисциплины*, т. 10, отв. ред. Н.Е. Носов, Ленинград 1978, p. 104–127.

3 В.И. Решетников, *Историческая карта*, in: *Российская историческая картография (XV–начало XX вв.). Краткий словарь-справочник*, ред. В.П. Козлов, В.Д. Банасюкевич, Э.А. Чернин, Москва 1997, p. 46–47.

4 *Книга Марсова или воинских дел от войск царского величества российских*, Санкт-Петербург 1713.

5 *Книга Марсова или воинских дел от войск царского величества российских*, Санкт-Петербург 1766.

6 For more, see Ю.М. Критский, *Русская историческая картография*, p. 104–127.

images as an additional tool for understanding political and military history. But the question of the specifics of the historical map distinguishing it from the usual geographical one did not arise explicitly for a long time. This is probably due to the fact that there were no special techniques used for making historical maps. These maps contained mainly those objects that could be transferred from the usual contemporary map.

The first to approach historical maps was Konstantin Nevolin, a professor at the Department of Civil Russian Law, Faculty of Law in St. Petersburg State University. Among his works there are several monographs devoted to the Russian history of administrative management, beginning from the Middle Ages. In his fundamental work on the history of Novgorod pogosts (administrative districts), the scholar used not only contemporary maps, but much older documents of the early 18th century.[7] He used the information contained in them when searching for toponyms that were absent on the modern maps, and for retrospective reconstruction of administrative borders of the 15th–16th centuries (fig. 1). Much more later, this idea was embodied in large-scale maps. Maps by Egor Zamyslovsky and Vladimir Debolsky (St. Petersburg State University) and by Mihail Bogoslovsky and Aleksey Yakovlev (Moscow State University) and many other maps of the second half of the 19th and early 20th centuries were still limited to the use of only modern cartographical basis.[8]

Maps on the history of economics needed more sophisticated approaches. Special area of studies on materials of mass historical and geographical sources (mainly cadaster and census books of the late 15th–17th centuries) started developing in the late 19th – early 20th centuries. Cadaster books (late 15th to the middle of 17th century) contained descriptions of each village and every wasteland of land ownership. The number of inhabited and empty yards was specified, the landlords were listed, the amount of land was estimated, and the tax burden of the respective site was calculated. Based on these sources, not only the agriculture of Rus' but also the social structure of the landowners' class, the administrative division and many other issues were investigated. The census books (mid-17th to early 18th centuries) described in much more details the structure of the population in the yards of each locality, but they did not assess the agricultural land and the taxability of the plot, since during that period there was a transition from land taxation to yard taxation. Localization of the settlement structure according to cadaster and census books makes it possible to add a spatial aspect to the analysis of the investigated phenomena.

At first, scholars who studied economic history using historical cadaster and census books dispensed with mapping. But as analysis methods progressed, such necessity arose. Yury Gautier defended his master's thesis at Moscow State University after which he published it as a monograph on the history of the economic life of "Zamoskovny realm."[9] This work, written based on the cadaster and census books of the 17th century, became the first experience in this field, which mobilized the huge stratum of historical toponyms.

But with the course of time, inquiries of the Novgorodian area became the main source for this kind of maps. Better methods of preservation and greater antiquity of the Novgorod books were the reason for this. The fact is that cadastral

[7] К.А. Неволин, *О пятинах и погостах новгородских*, Санкт-Петербург 1853 (Записки Русского географического общества, 8), p. 40.

[8] Е. Замысловский, *Герберштейн и его историко-географические известия о России*, Санкт-Петербург 1884; В.Н. Дебольский, *Духовные и договорные грамоты московских князей как историко-географический источник*, Санкт-Петербург 1901; А. Яковлев, *Засечная черта Московского государства в XVII веке*, Москва 1916.

[9] Ю.В. Готье, *Замосковный край в XVII веке*, Москва 1906.

Fig. 1. Novgorodian pyatinas.
Source: К.А. Неволин, "О пятинах и погостах новгородских" (Записки Русского Географического общества, 8), Санкт-Петербург 1853

documentation of the 16th century, which was kept in Moscow at *Pomestny Prikaz*,[10] was almost completely burnt down during the Kremlin fire in May 1626. Only Novgorod and Pskov had their full archives with land descriptions in the 16th and 17th centuries. But the Pskov archive was destroyed by fire as early as 1609. So for most of the uyezds of the Russian state, only the materials of the land descriptions of the 17th century were preserved. On the other hand, the rural settlement system that was formed after the Time of Troubles (the first decades of the 17th century) was much more reminiscent of the settlement structure of the 18–19th centuries than the one that existed before the Time of Troubles. So historical and geographical studies outside the Novgorod land did not so clearly require any search for special mapping methods. A comparison of toponyms from those descriptions with the published maps of the 19th century could appear sufficient.

In the study of Novgorod materials before the October Revolution of 1917, researchers from St. Petersburg, who, however, did not form a single "school," played the most important role. Approximately at the same time, the Vodskaya Pyatina[11] map was created by archimandrite Sergy (Tikhomirov) (as an annex to his master's thesis at the St. Petersburg Theological Academy)[12] and the map for 17 parishes of Shelonskaya Pyatina was created by Nikolay Nordman (as a student's work at St. Petersburg Polytechnic University, published in a separate print).[13] In all these cases, contemporary maps by General Staff were used as cartographical basis.

Nikolay Nordman drew attention to the fact that villages belonging to the same landowner are often located compactly, while the order of description of villages in the cadaster of the turn of the 15th–16th centuries coincides with their specific spatial sequence. He even proposed his own (not really harmonious) classification of land ownership – depending on how localized villages belonging to the same landowner are located in space (type A – location of villages in a certain direction, type B – location in group, type B has variants: C – neighboring settlements are described in a row, and D – without any visible order; variant D is divided into two subvariants: E – location of settlements as a close group and F – scattered throughout the district). For the above types and variants of land ownership, the researcher even defined a different degree of reliability with which one can assume the location of those settlements that could not be found on modern maps – based on the order of their description in the historical cadaster between those that were found on the maps. The researcher placed the reliability of localization of borders of parishes in dependence on the completeness with which it was possible to localize the settlements of the respective locality.[14] This was the first attempt at a gradation of the places of the historical map based on reliability of their localization.

In 1912, as a associate professor at the Faculty of Law, St. Petersburg State University, who taught the theory of statistics, Aleksandr Kaufman published a review of Nordman's unpublished manuscript, which was devoted to the statistical study of the part of the Shelonskaya Pyatina. The manuscript used historical-geographical materials already published by Nordman. The reviewer agreed with Nordman

[10] A government agency that oversaw land tenure issues.

[11] Pyatinas represent administrative divisions of Novgorod Land. The name *pyatina* originates from the word *пять* – 'five'. Novgorod Land was subdivided into five pyatinas.

[12] Сергий (Тихомиров), *Черты церковно-приходского и монастырского быта в писцовой книге Водской пятины 1500 года (в связи с общими условиями жизни)*, Санкт-Петербург 1905.

[13] Н.Н. Нордман, *Географическое положение погостов-округов Шелонской пятины по писцовым оброчным Новгородским книгам 1498 г.*, Санкт-Петербург 1908.

[14] Ibidem, p. 3.

that settlements not found on modern maps could be localized with varying degrees of reliability – depending on the characteristics of the settlement. However, he criticized the researcher for not offering statistical analysis of the landscape confinedness of the localized settlements.[15]

Aleksandr Kaufmann himself presented in the review his cartograms of the statistical distribution of economic indicators of several parishes of the Shelonskaya Pyatina from the books of the turn of the 15th–16th centuries (including indicators, calculated based on information from historical cadasters).[16] This marked the beginning of spatial analysis of statistical data of Russian historical sources. But this work did not devote enough attention to the source study of cadasters.

The man who, more than others, advanced the technique of detailed mapping of historical settlements was not affiliated with any research or educational institutions, although he received historical and philological education in Kiev thirty years earlier. As a censor of the St. Petersburg Press Committee, Aleksandr Andriyashev, working on a set of maps of the Novgorod's Shelonskaya Pyatina, applied a completely different approach.[17] He emphasized that "when applying geographical points mentioned in historical cadasters on a map, the exact methods developed by historical and geographical science can be applied in very rare cases."[18] On a modern map, he was able to find at most 15% of the villages contained in the historical cadasters of Shelonskaya Pyatina. However, being carried away by the idea of making the fullest possible historical map of the territory, he developed some special techniques that formed the basis for the modern method of localizing series of historical settlements.

First, having the task of localizing the villages of the turn of the 15th–16th centuries, he also enlisted later cadastral descriptions to obtain a more accurate knowledge of the toponymy of the region. This allowed him not only to localize more villages of the period under study but also to raise the question of completeness of localization results and, accordingly, the relevance of the created map.

Secondly, he – for the first time for a large-scale regional study – tried to attract the most informative cartographic basis, which recorded, albeit approximately, the situation not only of the populated areas, but also of the wastelands of the late 18th century which preserved the names of long abandoned villages. These are uyezd maps (the word *uyezd* literally means 'county' – a secondary-level of administrative division) compiled from General Survey materials, and economic notes to them.[19]

Thirdly, Andriyashev noted that there was very low accuracy of localization of villages of historical cadaster which were correlated with the wastelands of the General Survey. Therefore, he began to place such points on the map in places that were most suitable for settlement in terms of landscape and other circumstances. Moreover, he raised the issue of the need to search for criteria that would allow to decide how appropriate the presence of inaccurately localized data is on a historical map (fig. 2).

During the Soviet period, the tradition of historical mapping was continued at the Moscow State University by Matvey

[15] А.А. Кауфман, *Отзыв о сочинении Н.Н. Нордмана: "Статистика в русской истории. Опыт статистической обработки писцовых новгородских оброчных книг ок. 1498 года" (рукопись)*, Санкт-Петербург 1912, p. 57–61.

[16] Ibidem, p. 100–108, 146–147, 158–159.

[17] А.М. Андрияшев, *Материалы по исторической географии Новгородской земли*, т. 1: *Списки селений*, Москва 1914, т. 2: *Карты*, Москва 1913.

[18] Ibidem, т. 1, p. 40.

[19] Aleksandr Andriyashev's predecessor was a director of St. Petersburg Historical Museum of Artillery Nikolay Brandenburg, who, for the immediate vicinity of Staraya Ladoga, compiled a layout of plans for land plots of the late 18th century – "for clarification of different localities, wastelands and tracts, mentioned in old times (e.g., in the Census Book of Votskaya Pyatina of 1500)". Н.Е. Бранденбург, *Старая Ладога*, Санкт-Петербург 1896 (preface, table 1).

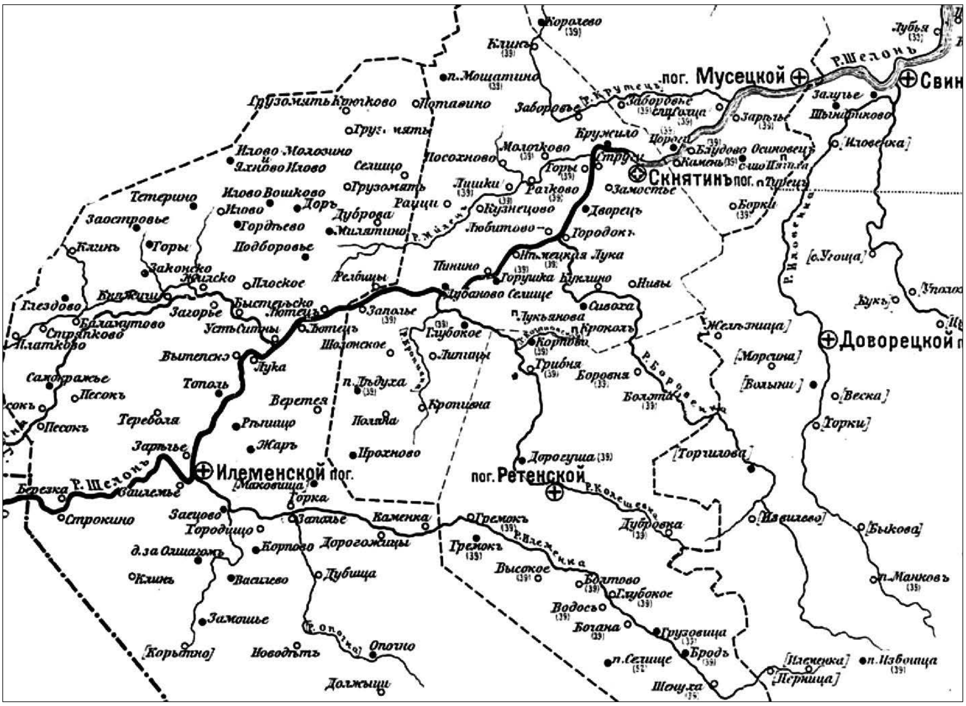

Fig. 2. Settlements of Shelonskaya Pyatina at the turn of the 15th–16th centuries.
Source: А.М. Андрияшев, "Материалы по исторической географии Новгородской земли", т. 2: "Карты", Москва 1913

Lubavsky, a professor at the Department of Russian History, Faculty of Ethnology in his monograph on the state territory of Russia, as well as by his student, Mihail Tikhomirov, who taught history at the Chemical Technical School while working on a book on the historical geography of Dmitrov Area.[20] Gautier's student Ivan Golubtsov is best known in cartography as the author of small-scale maps on the history of Rus' and Russia. But he made an important contribution to the development of more detailed maps. As a staff member at the Institute of Archeology of the USSR Academy of Sciences, he drew drawings and images of the city of the 16th–19th centuries when drawing up Moscow's historical plans.[21] On the map of Novgorod's roads of the beginning of the 17th century he designated – like Aleksandr Andriyashev – the non-localized points with special symbols, "on the semantic path line connecting the known points."[22] Those researchers used the methodical developments of their pre-October Revolution predecessors.

In 1941 Aleksandr Kopanev defended his thesis on the history of land ownership in the Belozersky Area at the Leningrad State University. He also limited himself to using a printed map of the mid-19th century as a cartographical basis, but,

[20] М.К. Любавский, *Образование основной государственной территории великорусской народности. Заселение и объединение центра*, Ленинград 1929; М.Н. Тихомиров, *Села и деревни Дмитровского края в XV–XVI веке*, in: *Московский край в его прошлом. Очерки по социальной и экономической истории XVI–XIX веков*, ред. С.В. Бахрушин, Москва 1928, p. 5–16.

[21] И.А. Голубцов, *Вопросы исторической географии, архивоведения, археографии и источниковедения*, Москва 1963 (abstract of master's thesis), p. 9.

[22] Idem, *Пути сообщения в бывших землях Новгорода Великого в XVI–XVII веках и отражение их на русской карте середины XVII века*, Москва 1950 (Вопросы географии, 20), p. 271–302.

unlike his predecessors, for the first time he divided the material into three maps, reflecting, albeit in summary, the picture of land ownership of different periods.[23]

In Soviet historiography, the creation of large-scale historical maps was for a long time at a primitive level for well-known reasons and it was not widely practiced. Excessive secrecy made it impossible for both historians and specialists from other areas to work with maps, where maps required purely practical application. Besides, historical geography witnessed hard times – it was forced out by studies on economic geography and socio-economic history. But even under those conditions, works advancing the methods of creating historical maps appeared.

The Moscow State University again played an important role here. In a series of articles devoted to the study of settlement systems using the historical cadasters of the Obonezhskaya Pyatina, assistant professor at the Department of Ethnography, Faculty of History Mihail Vitov developed a technique for compiling a series of slice maps, reflecting the chronology of the settlement. For the first time since Aleksandr Andriyashev, he systematically made use of the materials of the General Survey. He also proposed to solve the problem of unequal accuracy of localization of cartographic objects using various types of signs.[24] However, after Vitov's works, the problem of uneven quality of localization of places received little or no attention.[25] It was more often ignored or solved in a traditional way – by text commentary featuring varying degrees of detail.

Nevertheless, the process of transforming a historical map from text illustration to an analytical research tool, which began as early as the beginning of the 20th century, continues to develop. For the Soviet period, there are few of such examples. In the historiographic situation of that time, historians and geographers had to combine efforts. For example, economic historian Boris Litvak (Institute of History, AS USSR) and Svetlana Sotnikova (All-Union Scientific Research Institute of Document Management and Archival Affairs, she had a degree in geography and history) gained an unusually interesting experience, continuing the direction laid down by Nikolay Nordman and Aleksandr Kaufman and turned to source study.[26] As they noted, the "modern cartographic method aims not so much to expressively illustrate as to promote a deep study of phenomena using the methods of generalizing and transforming mass facts developed by him."[27] The possibilities for assessing the relevance of the data on the per capita average-uyezd grain reserves according to the provincial statistics of 1843 were demonstrated by mapping the relevant statistical indicators and analyzing their distribution in space. This distribution was represented in maps in the form of a statistical relief displayed through isolines and described in geographical terms – as areas of elevations and depressions.

Drawing new large-scale maps is connected with the direction that began to develop already in the post-Soviet period – regional historical research. First of all, development proceeds towards assimilating the methods of creating historical maps proposed by Andriyashev and Vitov. Their methodology was adopted by researchers from the Moscow Institute of Archeology of the Russian Academy of Sciences,[28] the

[23] А.И. Копанев, *История землевладения Белозерского края XV–XVI в.*, Москва 1951.

[24] М.В. Витов, *Приемы*, p. 231–264.

[25] In one of his works, Sergey Chernov (Moscow State University, Historical Faculty) also specifically identified approximately localized toponyms: С.З. Чернов, *Историческая география Взвадского погоста*, in: *Генезис и развитие феодализма в России*, Ленинград 1985, p. 104–112 (map).

[26] Б.Г. Литвак, С.И. Сотникова, *Картографический метод в источниковедении*, in: *Источниковедение отечественной истории: 1984. Сборник статей*, отв. ред. В.И. Буганов, Москва 1986, p. 3–16.

[27] Ibidem, p. 3.

[28] С.З. Чернов, *Волок Ламский: структуры землевладения и формирование военно-служилой корпорации*, Москва 1998.

St. Petersburg branch of the Institute of Russian History of the Russian Academy of Sciences,[29] and researchers from Vologda.[30]

There was a particularly intensive use of the cartographic method amidst the emergence of computer technologies and informatics, whose branch became geoinformatics. Historians' acquaintance with geoinformatics led to the emergence of historical geoinformatics.[31] In Russia, the History and Computer Association found itself in the center of this process. The association brought together specialists from different research organizations in Russia: Moscow State University,[32] Altai State University (Barnaul),[33] Tambov State University,[34] and Institute of World History of the Russian Academy of Sciences.[35] There are, of course, other researchers who create large-scale historical maps.[36]

There has been a recent trend towards the creation of detailed historical maps in the form of an atlas, which offers the most complete reconstruction of the settlement structure at a particular moment or period (fig. 3, 4.). The user potentially perceives such a reconstruction as an analogue of a modern map. So, much more responsibility lies on the compilers of the maps than on the authors of thematic maps devoted to specific subjects.

The most important differences between a historical map and the usual geographical one are that data on spatial location of objects on a historical map typically cannot be verified by any means. Usually, this is the author's reconstruction, whose adequacy depends primarily on the informative capacity of the historical source. A source study makes it possible to address the issue of informative features. Unfortunately, however, not all historical map compilers take this into account.

At present, it is generally accepted that the General Survey (GS) materials of the lands of the Russian Empire from the second half of the 18th century to the end of 19th century are the best cartographic source which can serve as localization basis. In the course of these works, a land plot (*dacha*), a territory surrounded by one land boundary, was the unit of description and record. The borders of dachas recorded in the course of the GS were obtained as a result of the development of land ownership over several centuries, while the toponyms located within these dachas were the result of an equally long development of the toponymic system. This is best confirmed by a comparison of the configuration of the borders of the GS dacha with boundary descriptions of the 15th–17th centuries. Moreover, even the boundary that was described in prince Vsevolod Mstislavich's charter handing over the Liakhovichi pogost[37] to Yuriev Monastery (1134) is reproduced in detail in the GS.[38] The size and configuration of each land plot is individual.

[29] А.А. Селин, *Историческая география Новгородской земли в XVI–XVIII вв. Новгородский и Ладожский уезды Водской пятины*, Санкт-Петербург 2003.

[30] Д.А. Черненко, А.Л. Грязнов, *Фамильная и пространственная структура дворянского землевладения в Суздальском уезде в XVII–XVIII вв.*, in: *Особенности российского исторического процесса: сб. ст. памяти академика Л.В. Милова: к 80-летию со дня рождения*, отв. ред. А.А. Горский, Москва 2009, p. 204–218.

[31] I.N. Gregory, *A Place in History: A Guide to Using GIS in Historical Research* (http://hds.essex.ac.uk/g2gp/gis/index.asp, access: March 24, 2017).

[32] Н.В. Пиотух, *О возможностях компьютерного картографирования при работе с данными писцовых книг начала XVII в. и материалами Генерального межевания второй половины XVIII в.*, in: *Круг идей: модели и технологии исторической информатики. Труды III конференции Ассоциации "История и компьютер"*, ред. Л.И. Бородкин, В.С. Тяжельникова, Москва 1996, p. 306–327.

[33] В.Н. Владимиров, *Историческая геоинформатика: геоинформационные системы в исторических исследованиях*, Барнаул 2005.

[34] В.В. Каницев, *Опыт использования современных информационных технологий в проектах по исторической географии*, "Информационный бюллетень ассоциации »История и компьютер«", 39, 2012, p. 71–74.

[35] А.А. Фролов, *Геоинформационные технологии в современных историко-географических исследованиях отечественных историков*, in: *Вопросы исторической географии*, ред. В.М. Котляков, В.Н. Стрелецкий, Москва 2013 (Вопросы географии, 136), p. 447–458.

[36] А.А. Голубинский, Д.А. Хитров, Д.А. Черненко, *Итоговые материалы Генерального межевания: о возможностях обобщения и анализа*, "Вестник Московского университета", 8 (3), 2011, p. 35–51.

[37] The word *pogost* in terms of the 12th century means ´a settlement with its agrarian vicinity`.

[38] А.А. Фролов, *К дискуссии о характере пожалования Юрьеву монастырю "Терпужского" погоста Ляховичи*, in: *Новгородский исторический сборник*, вып. 9 (19), отв. ред. В.Л. Янин, Санкт-Петербург 2003, p. 57–65.

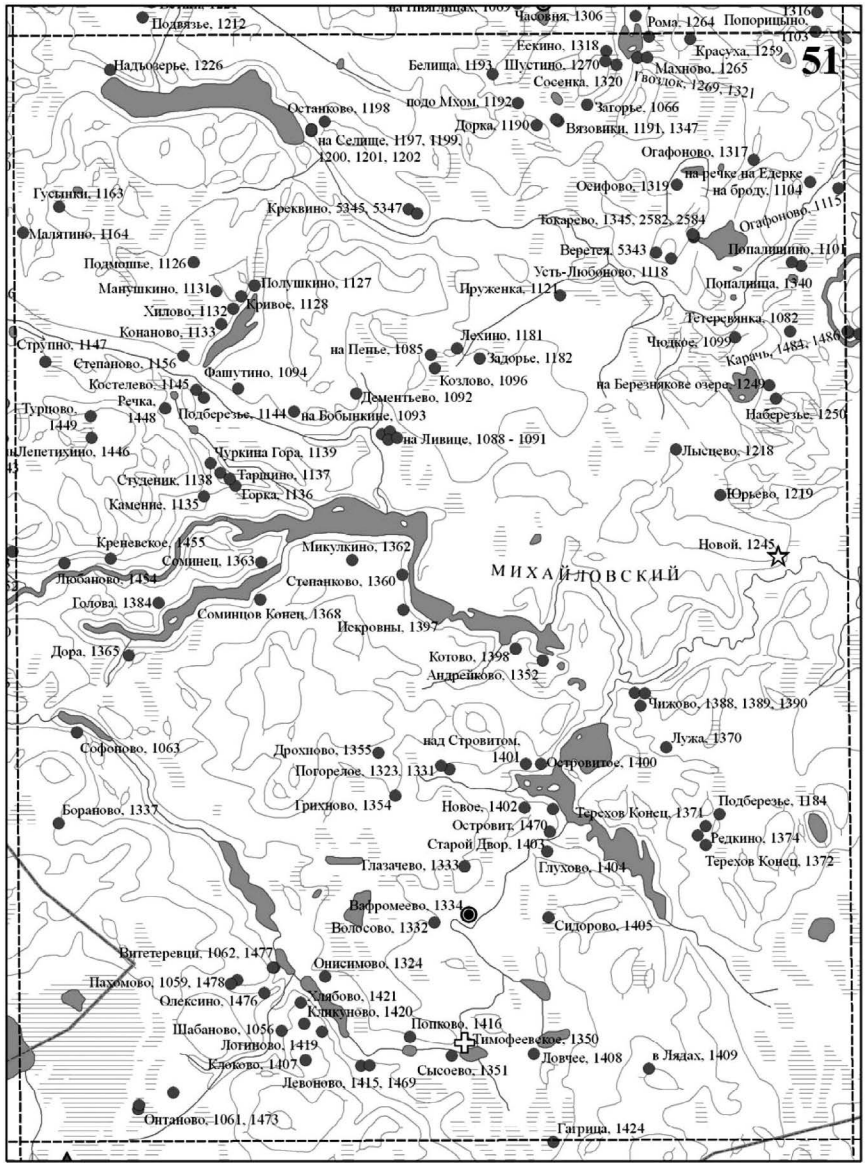

Fig. 3. Example of map solution used in "Historical Atlas of Derevskaya Pyatina".
Source: А.А. Фролов, Н.В. Пиотух, "Исторический атлас Деревской пятины Новгородской земли (по писцовым книгам письма 1495–1496 гг.)", т. 2: "Атлас и справочные материалы", Москва–Санкт-Петербург 2008, sheet 51

Each author chooses for himself the degree to which GS materials are used in the creation of historical maps. The most popular is the use of uyezd plans (1:84,000), which were compiled shortly after the completion of the land survey of the uyezd lands. The contours of individual dacha plans (1:8400) were reduced and mounted on one or several sheets. These plans were generalized. The accuracy of uyezd plans is much lower than the accuracy of the original plans for dachas. The main

Fig. 4. Example of map solution used in "Historical Atlas of Suzdal' Uyezd".
Source: А.Л. Грязнов, "Суздальский уезд в первой трети XVII в.: Атлас", Владимир 2014, sheet 1

toponymy volume, which is imprinted by the GS, is reflected in the economic notes to the uyezd plans. The economic notes are a text key to the plans.[39]

Due to the secondary nature of the information of uyezd plans with regards

[39] А.А. Фролов, Н.В. Пиотух, *Исторический атлас Деревской пятины Новгородской земли (по писцовым книгам письма 1495–1496 гг.)*, т. 1: *Исследование и таблицы*, т. 2: *Атлас и справочные материалы*, т. 3: *Уездные планы последней четверти XVIII века*, Москва–Санкт-Петербург 2008; С.З. Чернов, *Рекомендуемые форматы исторических карт уезда и волости (стана) средневековой России XIII–XVII веков (по материалам Взвада, Волока Ламского и московских волостей Воря и Пехорка)*, "Историческая география", 1, 2012, p. 344–361; А.Л. Грязнов, *Суздальский уезд в первой трети XVII в.: Атлас*, Владимир 2014; С.С. Кутаков, Ю.В. Степанова, *Границы и административное деление Тверского уезда в XVI веке*, "Историческая география", 3, 2016, p. 280–317.

to the plans of the land plots, the use of their geometry may have only an auxiliary significance for the creation of historical maps. But even a schematic representation of the boundaries of land plots on a modern map proves useful for studying the historical landscape (fig. 5).[40] This work is greatly facilitated amidst later maps, which already have a link to the coordinate grid, and at the same time, the borders of GS dachas are marked on them. Such was General Mende's survey in the mid-19th century, carried out for a number of Russian provinces (fig. 6). Its link to a modern map allows approximate localization of the boundaries of GS dachas. In modern conditions, these procedures are implemented using geoinformation (GIS) technologies.[41]

An alternative to drawing the boundaries of dachas taken from uyezd plans on the map is publication of the historical and geographical study of the uyezd plans themselves. It allows the reader to independently judge how accurate historical settlements can be identified not by a populated locality, but only by GS wasteland. After all, the position of these wastelands is reliably determined only within the limits of the corresponding land plot and that cannot always be ascertained. The first such solution was proposed by Sergey Chernov.[42] It was for this purpose that the plans of eight uyezds of the Russian Empire were assigned a separate volume in the *Atlas of Derevskaya Pyatina* by Aleksey Frolov and Nina Piotukh.[43]

Another group of GS materials – the very large-scale land plans – has a much more complete information about the toponymy of land plots and much more accurate information about their topography (fig. 7). In the cartouche of the plan, the names of the wastelands belonging to the land plot are often given which are absent in the economic notes. For 5720 plans related to the Derevskaya Pyatina, such information contained 1124 plans (about 20%). Of these, 537 plans (about 9% of the total) gave additional information that allowed to localize villages of the late 15th century that could not be localized in any other way.[44] Thanks to the toponymy from the cartouche of plans, it was possible to significantly increase the number of localized settlements of the 16th–17th centuries for the Bezhetsky Upland.[45]

It is an extremely labor-consuming exercise to continuously view complete sets of plans for whole uyezds. So, such an exercise can hardly be an indispensable element of a historian's work on compiling historical maps. Moreover, economic notes to uyezd plans and cartouches of land plans do not always have so much discrepancies – much depends on the nature of the dachas (it is definitely not all regions where one land plot contained such a number of wastelands) and on the practice applied when drawing out the plan.

The exact localization of the land boundary, described on the plan, facilitates an even more "delicate" work with GS land plans. The need for this may arise in identification of objects of archeology[46] or in micro-regional historical and geographical studies.[47] The GS survey involved determining the boundary of the land plot and filling the resulting contour with significant places located

[40] В.С. Кусов, *Земли Московской губернии в XVIII веке: Карты уездов. Описания землевладений*, Москва 2004; В.А. Буров, *О времени возникновения новгородского погоста Жабна*, "Российская археология", 2, 1995, p. 51.

[41] А.А. Фролов, А.А. Голубинский, *Веб-картографический ресурс "Источники по исторической географии Бежецкого Верха"*, "Историческая география", 3, 2016, p. 440–455.

[42] С.З. Чернов, *Волок Ламский*, p. 337–413.

[43] А.А. Фролов, Н.В. Пиотух, *Исторический атлас*, т. 3.

[44] Ibidem, т. 1, p. 39–43.

[45] А.А. Фролов, А.А. Голубинский, *Веб-картографический ресурс*, p. 441–448.

[46] С.З. Чернов, *Комплексное исследование и охрана русского средневекового ландшафта (по материалам древнего Радонежского княжества)*, Москва 1987; В.А. Буров, *О времени*, p. 44–58.

[47] А.А. Фролов, *Некоторые итоги и перспективы историко-географического изучения средневековых волостей Буйцы и Лопастицы*, "Историческая география", 2, 2014, p. 54–104.

inside: villages, roads and borders of landscape zones. Reconciliation of plans with the state of the terrain and with modern large-scale plans shows that despite the degree of approximation of the production of landscape features, the plans always authentically reflect the locality, the location of lands (including grazing lands) relative to rural roads and reservoirs (left/right), the presence of roads leading to settlements, and the crossing of roads on arable land. This was facilitated by the practice of sighting certain places located inside the land plot from several points of the boundary. Those places that appeared directly on the boundary were applied with the greatest accuracy, since their coordinates were obtained directly by surveyors during the survey.

The task of linking a GS land plan to a modern map can be solved in many ways. Sergey Chernov was the first who started involving land plans for a detailed study of cultural landscape. The essence of his methodology – developed later by his colleague at the Moscow Institute of Archeology of the Russian Academy of Sciences Vladimir Burov – is to bring (by copying with scaling) the archival copy of a plan to the scale of the current geographic sub-base (preferably 1:25,000 or larger) and their combination based on characteristic elements of the landscape.

In his work of 2005, archeologist Igor Kondratyev (Center for Historical and Urban Studies, Moscow) proposed an alternative solution aimed at adapting historical plans – first of all in the context of the Russian city, but also of the GS plans in rural areas. The solution takes into account the features of the formation of the survey justification and

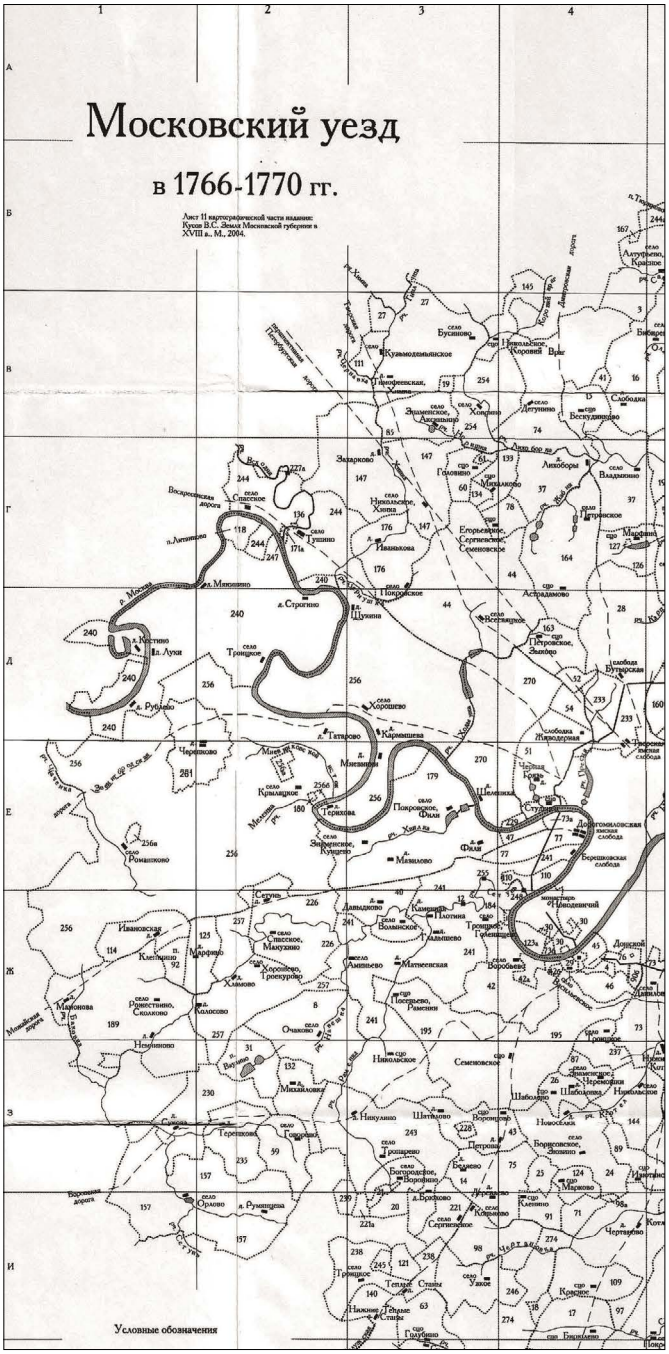

Fig. 5. Schematic representation of the boundaries of land plots of the General Survey on a modern map.
Source: В.С. Кусов, "Земли Московской губернии в XVIII веке: Карты уездов. Описания землевладений", Москва 2004

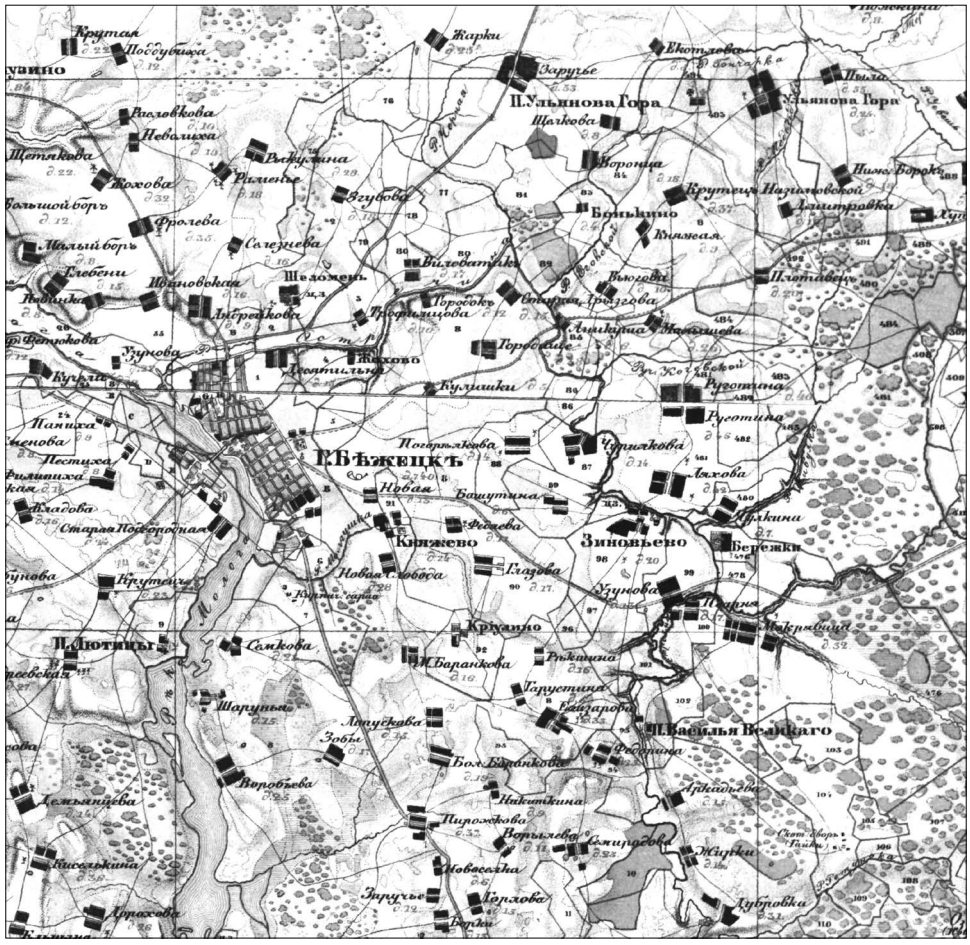

Fig. 6. General Mende's survey of Tver' province (the mid-19th century, fragment).
Source: "Топографическая межевая карта Тверской губернии", сост. А.И. Менде, Москва 1853

assembly of various locally accurate pieces of the map in the absence of a single geodetic network.[48] Like Chernov-Burov's method, Kondratiev's technique assumes the selection (as anchor points) of such points that are equally well defined both on historical and on modern maps (respectively, "old" and "new sub-bases" in Kondratiev's terminology). But in this case, the identified anchor points are also used as vertices of triangles to which the "old sub-bases" are "cut." Each of such sites is transformed (for example, using a raster image editing program) separately – to the extent that is required to combine corresponding anchor points of the "old" and "new sub-bases." Unfortunately, in a rural setting, the plan very often does not even have the minimum necessary three anchor points, so it is impossible to construct a triangle. Besides, it is risky to select an object as an anchor point that is remote from the boundary. Only those objects that are located directly on the boundary can most likely serve as reliable anchor points.

The third solution in terms of localization accuracy coincides with the accuracy of the plan itself and it is based on

[48] И.И. Кондратьев, *Картография 18 столетия: от артефакта к источнику* (http://www.archeologia.ru/Library/Book/31ee12a17595/page1, access: September 1, 2017).

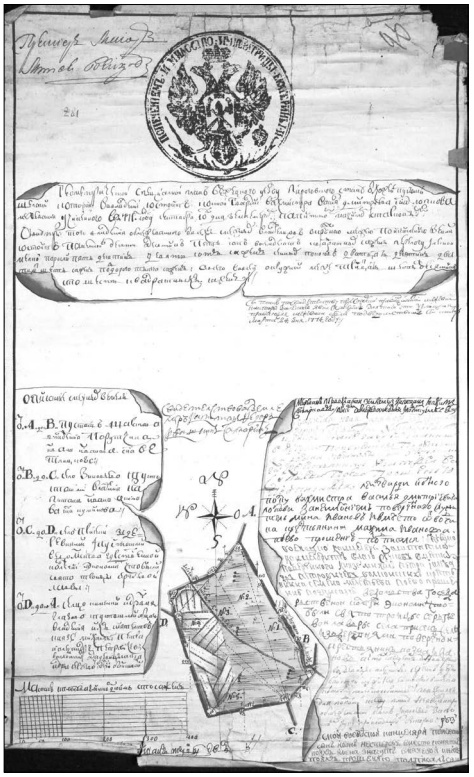

Fig. 7. Plan of the General Survey land plot.
Source: RSAAD, Coll. 1354, Inv. 494, Bezhetsky uyezd, File Ш-3син

surveying in GS.[49] The solution did not intend to find out the geographical coordinates of each land plot. In the surveyors' work, the length of each segment of the boundary (fig. 8.1) – with an accuracy of up to 0.5 Russian sazhens[50] – and the "rumbic" angle of the rotation of the boundary (fig. 8.3) – with an accuracy of up to 0.5 (more rarely 0.25) degrees were measured. It was also supposed that the bearing ("astrolabic angle" or simply "angle") should be measured using an astrolabe (fig. 8.2). However, in practice, it was calculated most likely from the rumbic angle.

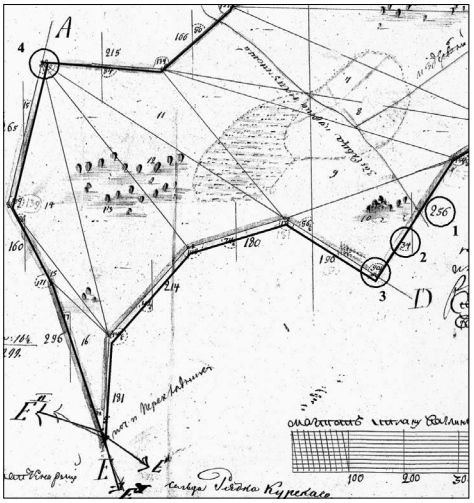

Fig. 8. Elements of the General Survey plan base:
1 – the length of the segment; 2 – astrolabic angle;
3 – rumbic angle; 4 – discrepancy
Source: RSAAD, Col. 1354, Inv. 276. Valdaisky uezd, File Г-93син

Without measuring the vertical angle, the surveyor could not take into account the differences in relief. Therefore, the actual distances on rough terrain could be generally somewhat smaller than the measured distances. The existence of various measurement errors, therefore, led to a discrepancy (fig. 8.4). This discrepancy was never reflected in the drawn plan: the contour was always closed. Obviously, the draftsman simply connected the first and last points of the boundary, or "dispersed" the error received. But the actual configuration of the boundaries of the land plot was somewhat different from one could see. Land surveying began in the uyezd town, and the border of each new land plot simply docked with the one already surveyed. The measurement error accumulated as you moved away from the land center.

The plans of the land plots were drawn already "at the station" based on measurement results recorded in the logbook during field measurements. Therefore, the most accurate reconstruction of the boundary of the land plot will be

[49] For more, see А.А. Фролов, *Дополнительные возможности использования материалов Генерального межевания для изучения исторических ландшафтов русского Средневековья*, in: *Сельская Русь в IX–XVI веках*, отв. ред. Н.А. Макаров, С.З. Чернов, Москва 2008, p. 363–372.

[50] A Russian unit of length equal to 2.13 m.

achieved if we do not refer to the plan, but to its mathematical basis, because it is the original one. The length of the land boundary piece, the rumbic and astrolabic angles are written on each plan.

of the land by pairs of digits (distance, angle), which characterize each piece of the boundary. In this case, the survey accuracy and the accuracy of each plan are estimated instantly, based on how large

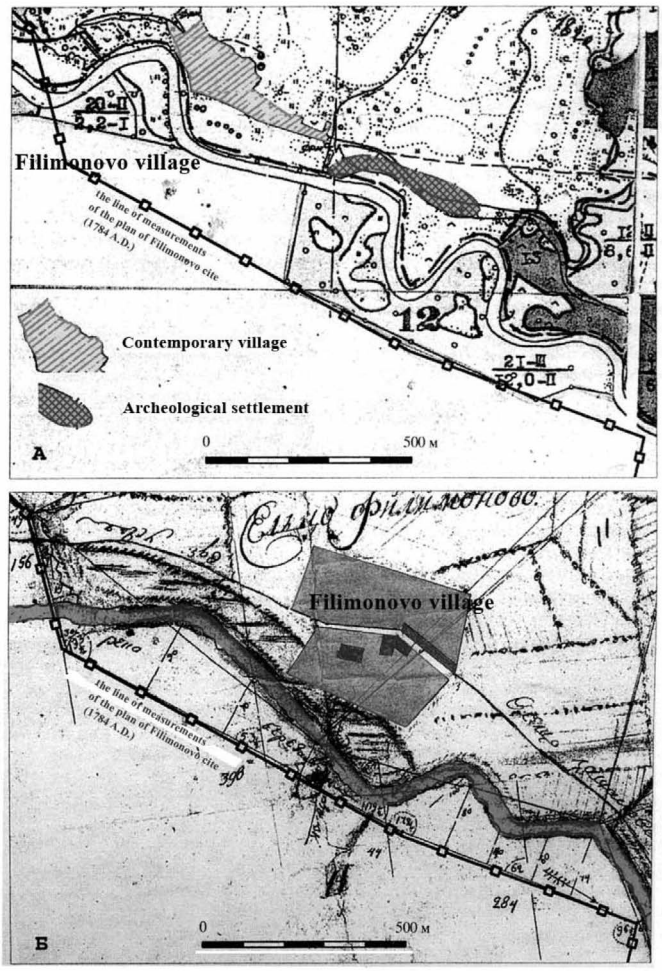

Fig. 9. Identification of archeological object on the basis of the General Survey plan. Source: А.А. Фролов, "Дополнительные возможности использования материалов Генерального межевания для изучения исторических ландшафтов русского Средневековья", in: "Сельская Русь в IX–XVI веках", ред. Н.А. Макаров, С.З. Чернов, Москва 2008, p. 370

The most exact localization of boundaries of the land plot on a modern map is possible with the help of computer technologies that allow you to quickly and without errors do the same work as the draftsman did more than two hundred years ago – to construct the boundary

the discrepancy is. In many cases localization of boundaries of the land plot on a modern map facilitates interpretation of archeological data and reconstruction of historical landscapes (fig. 9).[51]

[51] А.А. Фролов, *Дополнительные возможности*, p. 370.

Thus, the range of possibilities of using GS materials for creating historical maps is very diverse. Modern information technologies significantly expand this range. Computer technologies open possibilities for deterministic modeling, which relies on topographical connection of localized objects with the landscape and allows to enter the reconstructed settlement system in the landscape map of the region. However, this kind of research is not as accessible as it might seem at first glance. Before analyzing the obtained reconstruction of the settlement structure, it is necessary to determine the informative capacity of the model – taking into account the features of the source, which is the basis of the localization algorithm for the rural settlements of the 15th–17th centuries.

Analysis of the relative location of cartographic objects in space makes sense only in the case where most of the villages in the territory under consideration are localized, and localized quite accurately (that is, either correlate with GS settlements, or fall within the boundaries of dachas, small in area, or their position can be specified by some additional data). It is impossible to indicate the exact threshold values, but it is obvious that a sample that does not have relative completeness and accuracy of localization is not representative. The situation is complicated by the fact that the spatial structure of historically formed districts (uyezds, parishes, etc.) is complex: it has natural and man-made attractors – ponds, roads, etc., it is uneven in the sense of greater or lesser attractiveness of different landscapes. And since the toponymy of the most habitable places is much better than the toponymy of the periphery, the possibility of extrapolating the available location data of settlements for the entire settlement structure of the microregion for landscapes with different degrees of attractiveness is also not the same.

How can we take into account the unequal localization accuracy for each settlement? In the *Atlas of Derevskaya Pyatina*, this can be achieved by estimating the size of the corresponding GS dacha. But the result remained not expressed in the book in quantitative terms. So the accuracy of localizing individual villages remains hardly comparable. By developing this method using GIS, you can refer to the geometry of GS land plots: being geocoded, the boundaries of land plots will tell us both the limits within which the village was located and the area a land plot occupies. However, as follows from the above, such a solution is not optimal, since the anchoring of dacha boundaries on the uyezd maps of the 19th century is too inaccurate, while the anchoring of individual dachas based on the mathematical basis of the survey, which is shown in each land plan, is too time-consuming.

Localization accuracy can be estimated through the quantitative value of the area of the corresponding GS dacha: the larger the area of the dacha, the lesser the localization accuracy of the village of the 15th–17th centuries, carried out by correlating the name with the GS wasteland. In addition, for each village in the historical cadasters, it is possible to determine the proportion occupied by localized villages in the land property to which it belongs. This is important because the villages of one domain are almost always compact, so the proportion of localized settlements is an indicator of the completeness of reconstruction of the settlement structure.

By varying the indicators of completeness and accuracy of localization of historical settlements, we can now find a measure that allows to most successfully (in terms of specific research tasks) analyze a sufficiently large area on which the settlement structure is reconstructed quite completely and accurately. Depending on the selected values of the corresponding fields, the polygonal layer to be formed will include

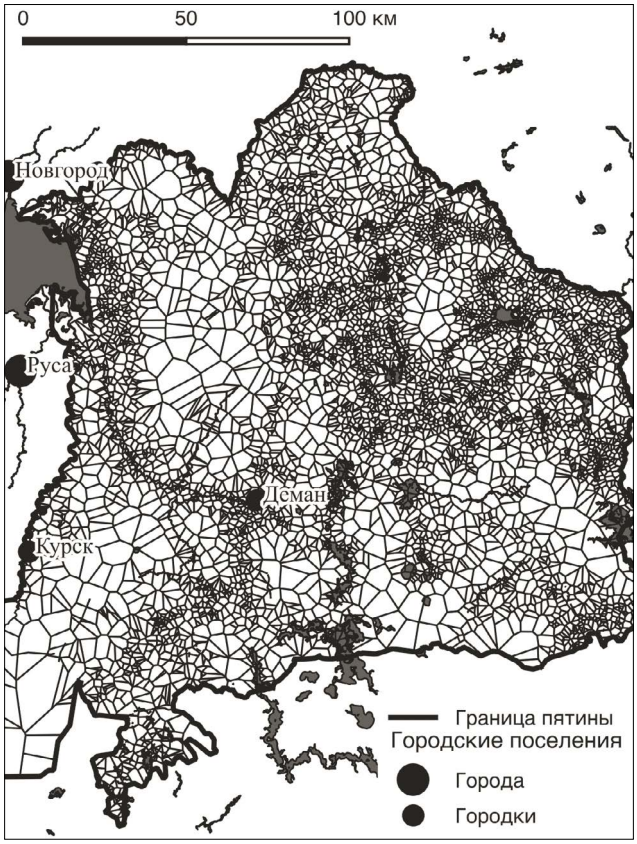

Fig. 10. Point objects (the 15th century settlements of Derevskaya Pyatina) represented in "Voronoi polygons". Source: А.А. Фролов, "Определение информативных возможностей картографирования исторических объектов средствами ГИС", "Информационный бюллетень ассоциации »История и компьютер«", 43, 2015, p. 176

more or less the places that form more or less compact arrays (for better perception, point objects are represented by "Voronoi polygons" – fig. 10).[52] As we can see, even in the scale of a large region (32,000 km^2), the possibilities of analyzing the spatial aspects of the settlement structure of the turn of the 15th–16th centuries with the help of deterministic modeling are limited (fig. 11).[53]

Expansion of the possibilities of analyzing spatial aspects is seen in the application of a stochastic approach, which involves taking into account the topographic features of the location of places with a certain degree of probability – by constructing a distribution for each group of objects (for example, settlements) on an arbitrary but homogeneous territory. This approach allows working with inaccurate localization, but imposes certain restrictions on the territory under study, namely, the homogeneity of the physiographic and socio-economic conditions of the territory.[54] But the approval of this approach is only beginning now.

[52] Idem, *Определение информативных возможностей картографирования исторических объектов средствами ГИС,* "Информационный бюллетень ассоциации »История и компьютер«", 43, 2015, p. 176.

[53] Ibidem, p. 177.

[54] О.Н. Трапезникова, А.А. Фролов, *Математическое моделирование и геоэкологическая оценка системы сельского расселения Северо-Западной Руси и ее трансформации на рубеже Средневековья и Нового времени,* "Известия Русского географического общества", 4, 2017, p. 46–61.

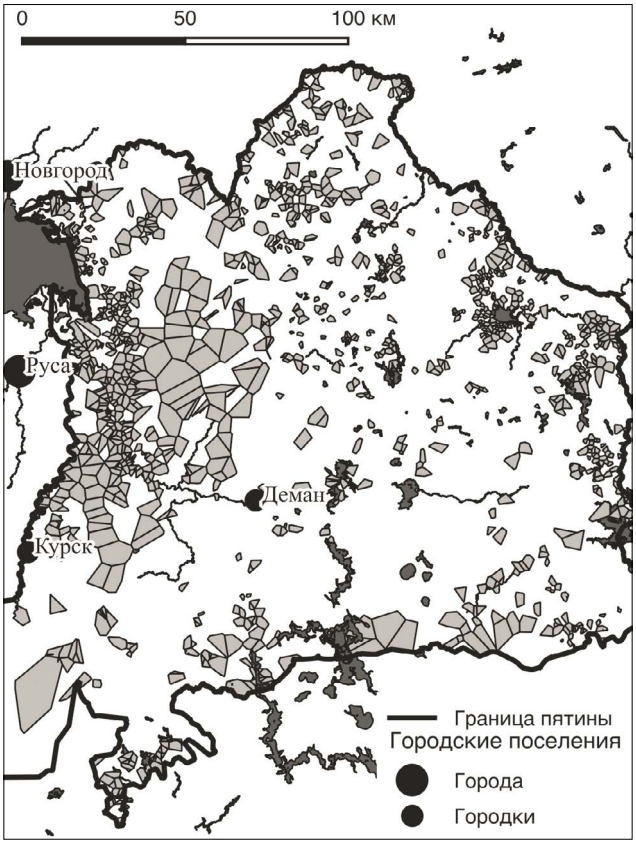

Fig. 11. Historical settlements localized with given accuracy (within 16 hectares or more exactly) and completeness (no less than 75% of settlements of the land property are localized).
Source: А.А. Фролов, "Определение информативных возможностей", p. 177

Apparently, the Russian approaches develop in the same course as Western European ones. The Polish historiography may serve as an example for comparison. The concept of the historical atlas of Poland (second half of the 16th century) was developed in the 1920's. This concept had already based on retrospective mapping of objects. Since the 1960's, besides documents of the second half of the 16th century, earlier and later written sources were included in the study.[55] Researchers were concerned about the accuracy with which the historical settlements were localized. They used special designations for settlements of uncertain location. Now GIS technologies allow to realize these approaches most fully.[56] ■

[55] *Historical Atlas of Poland in the 2nd Half of the 16th Century: Voivodeships of Cracow, Sandomierz, Lublin, Sieradz, Łęczyca, Rawa, Płock and Mazovia*, vol. 1–4, ed. M. Słoń, Frankfurt am Main 1973–2014.

[56] *Ziemie polskie Korony w XVI w. Przestrzenna baza danych* (http://www.atlasfontium.pl/index.php?article=korona, access: September 1, 2017).

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Tworzenie wielkoskalowych map historycznych w rosyjskiej historiografii XX i XXI w. Aspekty metodyczne

Streszczenie

Niniejsza praca stanowi próbę prześledzenia drogi, którą przeszła rosyjska historiografia, zanim dotarła do współczesnych metod tworzenia map historycznych w dużej skali. Kwestia specyficznych cech mapy historycznej – odróżniających ją od zwykłej, geograficznej – nie pojawiała się wyraźnie przez długi czas. Badania materiałów pochodzących ze źródeł historycznych i geograficznych (głównie ksiąg katastralnych i spisów powszechnych od końca XV do XVII w.) zaczęły się rozwijać pod koniec XIX i na początku XX stulecia.

Wymagało to stworzenia wielkoskalowych map historycznych. Jednym z kierunków badań była analiza przestrzenna danych pochodzących z rosyjskich źródeł historycznych (Mikołaj Nordman, Aleksander Kaufman). Zupełnie inne podejście, oparte na dokładniejszej i pełniejszej lokalizacji osad historycznych, zastosował natomiast Aleksander Andriaszew.

Proces przekształcania mapy historycznej z ilustracji tekstu w analityczne narzędzie badawcze postępował w okresie sowieckim. Michał Witow opracował technikę tworzenia serii map warstwicowych, odzwierciedlających chronologię osadnictwa. Zaproponował także rozwiązanie problemu niejednakowej dokładności lokalizacji obiektów kartograficznych, wynikającej z używania różnego typu znaków. Ostatnio widoczna jest tendencja do tworzenia szczegółowych map historycznych w formie atlasu.

Materiały pochodzące z pomiaru powszechnego (XVIII–XIX w.) są najlepszym źródłem, które może służyć za podstawę ustalania lokalizacji. Każdy autor sam decyduje, w jakim stopniu korzysta z materiałów tego pomiaru przy tworzeniu map historycznych. Technologie komputerowe otwierają zaś możliwości modelowania deterministycznego, które polega na topograficznym powiązaniu zlokalizowanych obiektów z krajobrazem i pozwala wprowadzić system osadnictwa na mapę krajobrazową regionu. ■

Keywords: historiography, methods, large-scale maps, Russia, cadaster books, census books, General Survey, geoinformatics

Słowa kluczowe: historiografia, metody, mapy wielkoskalowe, Rosja, spisy katastralne, spisy ludności, pomiar powszechny, geoinformatyka

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