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SPECIAL PURPOSE MAPPING IN 18TH CENTURY RUSSIA: A  
SEARCH FOR THE BEGINNINGS OF THEMATIC MAPPING

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The development of cartographic science in eighteenth century Russia is well documented in the literature. The emphasis, however, has been upon the rapidity of its growth. Three distinct periods have been identified: a formative period, around the turn of the century, in which a basic education program in the geodetic sciences was created by Peter the Great; a period of development, after the appearance of sufficient numbers of trained geodesists, in which systematic mapping procedures were developed for the inventory of the extensive Russian territories - we largely associate the accomplishments of this period to the genius and drive of Ivan Kirilov; and a third period of maturity, arising out of Kirilov's organizational work, in which the Academy of Sciences [Akademiya nauk] takes an increasingly important role.

This paper, in contrast, focuses upon the diversity of special purpose mapping that accompanied the development of the larger scale, inventory mapping of the country. The discussion is divided into three general areas: thematic atlases of which there are several interesting categories; miscellaneous single maps, largely associated with the diverse work of the Academy; and maps produced for the mesyatseslový, the annual published calendars. While these special purpose map products are of interest in their own right, some seem to foretell of more specific thematic maps to follow - maps which seem now to have been a nineteenth century development in the history of cartography. Many, however, point to possibly productive areas for more intensive research into the development of scientific

cartographic practice in Russia.

First of all, some clarification should be made of the terms "special purpose mapping" and "thematic mapping" which appear in the title of this paper. In attempting to do so there is no intention to discover or argue a definitive distinction but simply to clarify their use in this paper. A brief reading of the literature in search of clarification would suggest that:

- 1) there is no clear distinction between the terms;
- 2) we are not talking about reference mapping as with topographic maps or navigational charting<sup>1</sup>; however,
- 3) one might consider hydrographic charts and land use maps as very early examples of specialized map products<sup>2</sup>; and
- 4) these terms may apply when any corpus of information is systematically recorded, organized and displayed on a map<sup>3</sup>.

Thus it may be more productive to seek clarification by considering the terms "base information" and "map information". By the former is meant the primary locational information which forms the basic structure of all maps "... usually consisting of coasts, rivers, lakes, and political boundaries ... available from larger-scale, generally accurate, survey or reference maps".<sup>4</sup> By "map information" is meant the specialized information that is superimposed over a selection of base information and represents the central thrust or subject matter of the map. In a sense then, individual maps could be characterized by the relative amounts of these two kinds of information which they contain. In addition, their titles, legends and overall designs reflect this relationship.

Considering all maps in a continuum, the topographic map would be found at one end containing essentially only base

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information - essential descriptive information on the physical and cultural landscapes arranged into graphically distinctive groupings but theoretically having no visual hierarchies. Technically there would be no map information. Further, the titles of such maps would carry locational information and their legends would assist in the identification of specific symbols (often conventional ones) found on the map. Near the other end of this continuum one would find the thematic map whose emphasis is upon some specific concept or set of map information. The selection of base information, also present, would be reduced in both its amount and in its visual emphasis from that in its reference counterpart, and may even depart to a certain extent from reality.<sup>5</sup> The titles of such maps identify the nature of the map information and the legends assist in its interpretation.

In practice then, examples of maps can be identified at points all along this continuum. From our 20th century vantage point, the position of any given map within the continuum should be self-evident from a visual inspection, for modern map designers are trained to create strong visual contrasts and hierarchies between the base and map information. In an historical context, this may not be as true. All too often, maps illustrating specific topics were constructed upon a readily available reference map. Certainly the styles and conventions of reference mapping, which even today influence thematic map design, were convenient models to follow. In fact, it is conceivable that the concepts of and the distinctions between map information and base information were inconceivable to map designers two hundred years ago. At a time of generally increasing geographical knowledge, few special purpose maps could function solely as we today think thematic maps should function, for their "base information" was in a constant

evolutionary process. As a result, the early thematic cartographer was continually faced with accomodating new information to a previous picture. Even if he were aware of problems such as visual clutter and information overload, it is doubtful that he could resist including new information if for no other reason than to show that he was "up-to-date". In other words, the process of generalizing the base information in thematic maps, which we take for granted today, may simply not have occurred to the early thematic cartographer nor have been intellectually possible for him to carry out. For example, he could not rely, as we do today, on his map reading audience having a strong enough mental image or schema of geographical areas to allow him to highly generalize or abstract them and still be sure that his readers could recognize them and supply the missing detail.

As a result, some maps may seem to be thematic in nature in that they appear to have been drawn to illustrate a specific distribution, concept, relationship or event, but from a visual or graphic design point of view may seem to us to be more of a reference type of map. It is in this gray area that the term "special purpose map" may be useful to describe a map which attempts to illustrate something more specific than the principal features of a region and yet falls short of expressing the impact of the idea in modern design terms. In an historical context, special purpose maps could also be viewed as antecedent to truely thematic maps. They are a reflection of the increasing availability of specialist information and the increasing awareness on the part of cartographers of the utility of expressing ideas in graphic form and of the validity of mapping information from the physical and social sciences - information which in the 18th century was being generated in accelerating amounts. The resulting influence on map making is self-evident:

the initial plotting point locations of a specific phenomenon is followed by increasing densities of information and the need to summarize and reduce its complexity; this need gives rise to new techniques and new symbols which aid in this process of generalization; by wrestling with such basic conceptual and generalizing problems there emerges the specialized techniques which we associate with modern thematic mapping.

This study then is an examination of special purpose mapping in 18th century Russia. From its diversity there is no doubt that a number of people were attempting to deal with the increasingly available information on the physical, cultural and economic landscapes. The possibility of independent invention is not great because 18th century Russia was not as isolated from Western ideas as it was at the end of the previous century. On the other hand, such a possibility is increased by the diversity of cartographic production, a point this paper hopes to establish.

One difficulty immediately arises out of this. With the addition of a graphic design element into the definition of thematic maps, it becomes necessary to have very good descriptive information on maps or to be able to view them in their original form and coloration. While there is an increasing amount of detailed documentary material being published on maps in Soviet libraries and archives, for which scholars can only be grateful and appreciative, the identification and description of visual hierarchies and specific mapping techniques or symbolization used are not necessarily a standard part of those descriptions. This is certainly understandable as they are characteristics which have far greater meaning and significance to cartographers than to librarians and archivists - although this should not necessarily remain so. In addition, there is,

of course, the problem of access. For scholars unable to visit Soviet depositories, only a tiny fraction of the maps have been reproduced in printed form at scales suitable for a reasonable amount of analysis. The work of the Institute of Ethnography of the Academy of Sciences, under the leadership of A.V. Yefimov, in publishing a facsimile atlas<sup>6</sup> relating to the geographical discoveries in Siberia and northwestern America, shows what can be done. They have captured the essential cartographic elements of this particular epoch in Russian history.

There is also a problem of access in that many of the maps and sketches which may contribute to our story here may not exist as large format, separate maps which may appear as separate inventory items. Rather they may be included among notes, correspondence or reports and thus not appear in listings of maps. It may take careful sifting and some considerable detective work to uncover them. In the meantime there is considerable evidence that is visible and worth noting.

#### Atlas Production

The beginning of atlas production in Russia is the subject of some debate. Interesting hypotheses<sup>7</sup> are put forward about the possible existence of large-scale coverage of extensive portions of 1) the occupied portion of European Russia and 2) western Siberia that would allow for the respective compilations of the 1) Bol'shoy Chertyozh and 2) the Godunov map of Siberia of 1667. If either of these "collections" of larger scale maps were in any way systematically sorted or bound together then indeed they would have formed the first regional atlases of Russia and it would have been accomplished 50 to 100 years before the focus of this paper. However, such conjecture is not important to the goals of this paper and in any event a

much stronger case could be made for the work of Semyon Remezov who did collect and bind together maps or copies of maps concerning Siberia. There is no doubt about the great wealth of information which he had at his disposal and of the artistry which he applied to the execution of his maps. It is unfortunate that the reproduction of his work most available in the West<sup>8</sup> fails to do him justice in this respect. If his use of color and symbolization as found in his Khorograficheskaya Chertezhnaya Kniga is typical of his other work, then he should be given high marks in map design. His maps have yet to be evaluated in light of modern, thematic map design and of the map as a communication system<sup>9</sup> but it is this author's contention that they will be seen in a much superior light than they often are when viewed in a geodetic sense, i.e., when their geographic reference system is examined in an absolute rather than a relative sense. In any case, the work of Remezov appears to have been an isolated epoch as it did not influence Peter or the scientific development of cartography in 18th century Russia.

A more modern, specialized atlas was not long in coming. By 1704 the river Don had been mapped and an atlas of 17 plates was printed in Amsterdam.<sup>10</sup> The atlas was to assist in navigation on the Don between the ship building activities in Voronezh and the naval engagements taking place against the Turks in the Sea of Azov and the Black Sea. A small atlas of the world<sup>11</sup> appeared in 1713 and the following year a 12 map atlas of the Baltic Sea, albeit a copy of a Swedish atlas,<sup>12</sup> was produced. Work in this area was to produce subsequent collections of charts in 1720 and 1723.<sup>13</sup>

By mid-century, there had been produced a school atlas of the world, an historical atlas, two more hydrographic atlases,

two atlases of the Russian Empire<sup>14</sup> and one regional atlas. Of particular interest is the regional atlas. The Orenburg Expedition, under a succession of excellent leaders - Tatishchev, Krasil'nikov, Rychkov, and others - had been gathering data in the trans-Volga regions as far back as 1734 when Ivan Kirilov had been its head. Much of this material was included in a twelve sheet manuscript atlas<sup>15</sup> produced in 1755 along with an accompanying written description.

With the exception of a special atlas of the Volga River and a "pocket" atlas<sup>16</sup>, there was a lull of nearly a quarter of a century before atlas production bloomed again. In the last quarter of the century, there appeared another world atlas for youth, some half dozen atlases of Russia, five hydrographic atlases<sup>17</sup>, two regional atlases, and three special purpose atlases. The latter two groups deserve special consideration.

Two government policies after 1762 created the need to describe the extent of the government's land fund. One was the creation of a new class of free privileged land owners; the other was the settlement of foreigners who were being invited to Russia on a large scale. Thus a special committee was established to conduct a general land survey. It began in 1765 and did not complete the 35th province until 1861.<sup>18</sup> While the survey had as its principal goals the establishment of land boundaries and the production of detailed maps at the scales of 1:8,400 for a plot or tract [dacha] and at 1:42,000 for a district, a more generalized product was also envisioned. The first general atlas of a province, that of the Kaluga governorship, was issued in 1782 and was to be the model for all other provinces as the surveying was completed. It was published by the Landed Estates Surveying Expedition and it included 42 maps at a scale of 1:168,000 in a format of 49 x 64 cm. It is of



interest that three years later, the Academy of Sciences published a smaller (33 x 48 cm.) atlas with only 13 plates and 69 pages of text under the exact same title.<sup>19</sup> Its relationship to the former document is unclear. However, it was planned that each atlas would be accompanied by a topographic description. One of the Tula government was printed in 1781; one of the Kursk government was compiled in 1785.<sup>20</sup> Obviously a great deal of information was coming out of the survey and this could be used for more specialized mapping. But perhaps the very magnitude of the program also placed in question its economic viability for no more atlases were to appear.

The three special purpose atlases included two on economic topics in manuscript form and a printed one on an historical topic. The state ministry of mines compiled an atlas of all State and private factories in the Empire in 1777-78.<sup>21</sup> The Admiralty compiled an inventory of forests of all kinds in 1782.<sup>22</sup> The historical atlas, printed in 1796, was of the Seven Years War.<sup>23</sup> These atlases deserve examination in regard to their design and method of representing this information.

But in reference to special atlas production, the most exciting story relates to one atlas that was never compiled. Mikhail Vasilyevich Lomonosov was active in the Academy's Geographical Department during the period 1754-1765. During an absence due to sickness, Taubert, the Imperial Librarian and an Academician, obtained an Imperial order to stop work on the new atlas of Russia which was to replace the 1745 atlas. Instead, work was to commence on an economic atlas showing the production of agricultural, mineral, and other commodities. Each product was to be mapped on four regional maps: European Russia, the Ukraine, and two for Siberia. With some 300 commodities to be included, the atlas would have totalled 1200

plates! In addition, there were to be maps showing annual trends of production for each product.<sup>24</sup> On Lomonosov's return, however, order was quickly restored as he pointed out the impracticality of such a venture. One assumes this was done on financial grounds for surely Taubert must have had some ideas as to how he would accomplish cartographically the goals he had established. Thus his memoirs and other papers deserve further scrutiny for clues to his plans and intentions.

### Single Maps

Perhaps the richest and most varied group of special purpose maps are the single sheet maps that were produced for, or which accompanied, reports, travel accounts and books. As with atlases, one can look back into the 17th century for many examples of specialized maps such as the communications maps which are among the earliest surviving examples of Russian cartography. But the earliest example of a thematic-like map is Remezov's ethnographic map of 1673 which is preserved in his Chertezhnaya Kniga Sibiri. It is perhaps most striking in appearance when viewed in its reproduction in Yefimov<sup>25</sup> where the various tribal regions are depicted in tones of gray. It is all the more interesting when compared with the ethnographic map of Eastern Siberia, found in the same Chertezhnaya Kniga Sibiri<sup>26</sup>, where a great deal more information is simply listed on the face of the map without any enhancement or differentiation as with the 1673 map. The same topic was also the subject of a map by Pieter Müller<sup>27</sup> who sent a map to the Academy in 1726. While it is not clear from the literature what type of technique was used to portray information on this map, it may be reasonable to assume its form was similar to the series of ethnographic maps from the First Kamchatka Expedition.<sup>28</sup>

Mining was also a topic which received particular attention. As early as 1726, Mikhail Kutuzov prepared a map of the Alapayev and Demidov iron works; in 1735 he also produced a map of the forests and mines of the Ilim district.<sup>29</sup> Brigadier Beer, a master founder, prepared a map of ore deposits in the Sestroretsk district near St. Petersburg.<sup>30</sup> Similarly, Colonel-Lieutenant Ushakov drew a map of the Siberian and Permian metal works in 1734.<sup>31</sup> Vasilii Nikitich Tatishchev was particularly interested in mapping, mining and mintage. In 1734 he went to the Urals as Chief Director of Mining in Siberia and the Perm' area. Having deemed all the available mapping to be highly unsatisfactory, he proceeded to assign geodesists and students from the Admiralty and Artillery Schools to further mapping projects. One of these involved his chief land-surveyor Ignaty Yudin who produced a "map of company mills indicating the location of churches and their distances from mills".<sup>32</sup> Similarly, the existence of oil deposits, particularly those in the North Caucasus, was noted in early maps such as that of Gotlieb Shoher in 1717. A survey of this particular mapping interest has been set out by Professor Kostrin.<sup>33</sup>

The Academy of Sciences also played a significant role in map making. From its inception, the Academy was concerned with data gathering specifically for the purpose of compiling maps that would contribute to the production of the first atlas of all Russia. Siberia was an area of particular interest to the Academy, in a much broader sense than in simply the compilation of base maps. Perhaps Gerhard Friedrich Müller is exemplary of this interest. He joined Bering's Second Kamchatka Expedition and spent a decade in Siberia studying archives, copying documents and gathering all sorts of information on the geography and natural history of the region. His interest and

active correspondence with knowledgeable people and officials in Siberia continued during his term as head of the Geographical Department from 1753-60 and up until his death in 1783. The wealth of his material in AAN<sup>34</sup> would appear to be sufficient to generate a wide variety of special purpose and thematic maps. It seems that a selective analysis of his portfolios for its cartographic content has yet to be accomplished.

After 1768, with the support and often at the initiative of Stepan Yakovlevich Rumovskiy, the Academy of Sciences sent out expeditions for a comprehensive study of the plants, animals and inhabitants of Russia. Many of the long list of expeditions sent to the Caucasus, Siberia, the trans-Volga, etc., published maps to accompany the scientific essays which reported their work and findings.

Two pieces of evidence point to the systematic way in which information was sought. In 1757, when Müller and Grischow were still heads, Lomonosov obtained approval of a special instruction regarding the daily affairs within the Geographical Department. It also affirmed that a new atlas was the Department's main task. For this purpose, the maps on hand were examined as to their correctness and usefulness. As it was clear that new information was needed, a questionnaire of 30 questions was prepared and in January, 1760, it was sent to offices of all governments and provinces. As one might expect, it was nearly two and one half years before answers began to come in. Il'yey Avramov, one of Lomonosov's hand picked students, was continually abstracting information that was received in the Department.<sup>35</sup> Interestingly, one of the goals of this exercise was the arranging of data for an economic encyclopedia which was to be made up instead of the aforementioned atlas of economic maps.

Another source of mappable information was the census [perepis']. While there had been two 17th century attempts, the first reasonably organized census to determine the magnitude of the male population, began in 1718.<sup>36</sup> It was not completed until 1727. A second census was conducted from 1743 until 1756; a third in 1761-1767; a fourth in 1781-1787; and a fifth in 1794-1796.<sup>37</sup> These last three came during a period of particularly great change in Russia. Besides the aforementioned change in class structure and the large scale immigration to Russia, there was 1) a rapid growth in urban population from an estimated 328,000 in 1724 to 1.3 or possibly even 2.3 million by 1796, and 2) an increasing number of serfs or bondsmen who paid their lord a specified annual tribute [obrok] and then earned their living by working in factories. These new sources of labor are often linked to the rapid expansion (more than three times) of large industrial enterprises which took place from 1762 to 1796.<sup>38</sup> Such displacements, which would be reflected in the census, would seem to be a strong stimulus for more specialized mapping.

One final interesting group of single maps were those prepared especially for the travel of royalty. Some of these maps were the responsibility of the Academy of Sciences. In 1766, when it was decided that the Empress should make a trip the following year on the Volga, the Academy was informed accordingly and it in turn requested available maps from the Admiralty. The Academy received two volumes of maps based on a 1735-1736 survey of that river. A small eight sheet atlas was subsequently engraved for the Empress. We have already mentioned this atlas.<sup>(16)</sup> When she undertook a trip to Belorussia in 1780 and one to the Novorossiisk area in 1786, she was provided with maps especially prepared for her together with accompanying texts.<sup>39</sup>

Maps were also prepared for the travels of other sovereigns and dignitaries. In 1780, a map was made for the visit of the Austrian Emperor Joseph II. The Crown Prince Pavel and his wife received special maps for their trip to Western Europe.<sup>40</sup> There was also an obligation for land-surveyors to prepare special maps for royalty. Traditionally, when the sovereign travelled through Russia, the governor of each province would meet her at the boundary of his jurisdiction and present her with a road map. This was in part an impetus for the production of a whole series of such maps which appeared in the 1780's although, from an inspection of examples of these maps, they are clearly of the reference type of map.<sup>41</sup>

#### Mesyatseslový

As early as 1728, the Academy started publishing calendars. They contained the usual dates and information on church holidays and other events. Over the years other materials were appended, including maps. Under Rumovskiy, who took over their publication in 1770, the calendars acquired even greater significance by the addition of original scientific articles. For example, Pallas used the map from an expedition to the Aleutian Islands, prepared by Afanasy Ocheredin, in his own map of the new Russian discoveries in the Northern Pacific which was appended to his article in the Calendar for 1781. For many articles the maps were of extreme importance. The 1768 calendar, or mesyatseslov as it now became known, contained 14 maps as part of a geographical description of the Empire; in 1773 it was supplemented with 19 drawings of views of Moskva and St. Petersburg.<sup>42</sup> Many others recorded information on the geography, history and ethnography of various parts of the Empire. Taken as a whole, the maps found in the mesyatseslový represent special purpose mapping at its best: maps prepared to illustrate or compliment short written articles on specific topics. Unfortunately the sample of contents found in Sobraniye<sup>43</sup> only begins with the

year 1785 so that the picture is incomplete. Nevertheless, from the evidence at hand, the mesyatseslový represent an interesting and potentially rewarding research area for a study of the development of thematic mapping in Russia.

### Conclusion

Thus it is apparent that by 1800, Russian cartography had matured into an enterprise which produced a great variety of map products. Many of these were directed at illustrating specific problems or distributions. In addition, a great deal of evidence suggests the availability of a large amount of specialist information that could be used in special purpose mapping and possibly thematic mapping. Given that Halley's<sup>44</sup> work had been around for nearly a century, and that Western Europe was soon to see the introduction of a great variety of new techniques - isothermal lines, dasymetric maps, flow lines and the like - then it seems quite reasonable that Soviet archives and library collections may yet yield some interesting early examples of thematic mapping which will help to complete the emerging picture of the development of this most fascinating kind of cartographic practice. We look forward to initiatives by Soviet scholars by which this comparative study might be furthered.

### Footnotes

- <sup>1</sup> Robinson, A.H. and Randall D. Sale (1969). Elements of Cartography. 3rd edition, New York: John Wiley, p. 10.
- <sup>2</sup> Thrower, Norman J.W. (1969). "Edmond Halley as a Thematic Geo-Cartographer", Annals, A.A.G., LIX (#4), 652.
- <sup>3</sup> Wallis, Helen (1975). "Maps as a Medium of Scientific Communication", Studia z dziejow geografii i kartografii, III, 257 but see also Robinson, A.H. (1967). "The Thematic Maps of Charles Joseph Minard", Imago Mundi, XXI, 95, paragraph 3.
- <sup>4</sup> Robinson and Sale (1969) 40.

- 5 Base information in thematic maps can be highly generalized or abstracted (as in the case of cartograms) or distorted (as in the case of perspective drawings such as those of Richard Edes Harrison) without diminishing the effectiveness of the map in communicating an idea.
- 6 Yefimov, Aleksey Vladimirovich ed. (1964). Atlas geograficheskikh otkrytiy v Sibiri i v severo-zapadnoy Amerike XVII-XVIII vv. [Atlas of geographical discoveries in Siberia and North-western America, XVII-XVIII centuries]. Moskva: Izdatel'stvo "Nauka".
- 7 Polevoy, Boris Petrovich (1967). "Novoye o 'Bol'shom Cherteze'" [New data on the Bol'shoy Chertyozh], Akademiya Nauk, Izvestiya, Ser. Geog., (Nov. - Dec., #6), 121-130, and (1966). "Gipoteza o "Godunovskom" atlase Sibiri, 1667g" [Hypothesis on the "Godunov" Atlas of Siberia, 1667], Akademiya Nauk, Izvestiya, Ser. Geog., (#4), 123-132.
- 8 Remezov, Semyon Ul'yanovich (1958). The Atlas of Siberia. 's-Gravenhage: Mouton. Supplement #1 to Imago Mundi. The original is in the Harvard College Library, Cambridge, Mass.
- 9 See Castner, Henry W. (1975). Introduction to "Essays on the History of Russian Cartography 16th to 19th Centuries", Cartographica, #13, x-xii.
- 10 Cruys, Cornelis (1704). Novaya Chertezhnaya Kniga soderzhashaya velikuu reku Don ili Tanais ... [A new book of drawings containing the great river Don or Tanais ...]. Amsterdam: Hendrik Doncker.
- 11 Kiprianov, Vasiliy Anofreyevich (1713). Atlas mira [Atlas of the world]. Moskva.
- 12 Kniga rozmernaya gradusnykh kart Ost Zee ili Varyazhskogo morya ... [A measured book of graduated maps of the Eastern Sea or the Varangian Sea]. 1714. It was based on the Swedish atlas by Vice-Admiral Björn Rosenfält.
- 13 Bagrow, Leo (1975). A History of Russian Cartography up to 1800, edited by Henry W. Castner. Wolfe Island: The Walker Press. p. 108.
- 14 Atlas sochinenny k polze i upotrebleniyu i vsekh chitateley vedomostey i istoricheskikh knig [Atlas compiled for the benefit and use of youths and all readers of gazettes and historical books]. St. Petersburg: 1737.
- Atlas drevnevo obitayemogo sveta [Atlas of the ancient inhabited world]. St. Petersburg: 1753.
- See Bagrow (1975) 168 and footnote #41, p. 173 on Soymonov's atlas of the Baltic.



Atlas vsego Baltiyskago morya ... Alekseyem Nagayevym [Atlas of the whole Baltic Sea ... by Aleksey Nagayev]. 1757.

Kirilov, Ivan (1734). Atlas Vserossiiskoy imperii [Atlas of the All-Russian Empire]. St. Petersburg.

Atlas Rossiyskiy sostoyashchey iz devyatnadsati spetsial'nykh kart ... Akademii nauk [Atlas of Russia, consisting of nineteen special maps ... by the Academy of Sciences]. St. Petersburg: 1745.

- 15 Atlas Orenburgskoy gubernii ... [Atlas of the Orenburg Government ...]. 1755. It is kept in BAN. The accompanying description: Rychkov, Pyotr Ivanovich (1762). Topografiya Orenburgskaya: ... [Topography of Orenburg]. St. Petersburg.
- 16 Geograficheskoye opisaniye reki Volgi ot Tveri do Dmitrevska ... [Geographical description of the Volga River from Tver to Dmitrevsk for the travel of Her Imperial Majesty on that river]. St. Petersburg: 1767. [A pocket theatre of war between the Russian Empire and the Ottoman Porta in 1768]. Four folded maps approximately 23 x 27 cm.
- 17 A convenient list of these and many of the atlases referred to here can be found in Churkin, V.G. (1975). "Atlas Cartography in Pre-revolutionary Russia", The Canadian Cartographer, XII, (June), 1-20.
- 18 See Tsvetkov, M.A. (1969). "Cartographic Results of the General Survey of Russia 1766-1861", The Canadian Cartographer, VI (#1), 1-14.
- 19 Atlas Kaluzhskago namestnichestva [Atlas of the Kaluga governorship]. St. Petersburg: Akademiya nauk: 1785.
- 20 Bagrow (1975) 235.
- 21 Zavodskoy atlas ... [Factory atlas ... compiled in the State Ministry of Mines]. 1777-78. Now preserved in GPBS-S.
- 22 Generalny atlas ... [General atlas ... of all kinds of Forests in the Admiralty]. 1782. Also kept in GPBS-S. These two atlases were described in a paper delivered by D.M. Lebedev in 1949 at the Moskva Section of the Vsesoyuznoye Geograficheskoye Obshchestva [The All Union Geographical Society]. See Akademiya Nauk, Izvestiya, Ser. Geog. (#3, 1956).
- 23 Atlas Semiletney voyny 1756-1763 [Atlas of the Seven Year's War of 1756-1763] 1796?.

- 2<sup>4</sup> Bilyarski, Pyotr Spiridonovich (1865). Materialy dlya biografii Lomonosova [Materials for a biography of Lomonosov]. St. Petersburg: Akademiya nauk, 394-625.
- 2<sup>5</sup> Yefimov (1964). Pl. 41. See also Baddeley, John F. (1964). Russia, Mongolia, China. New York: Burt Franklin. Vol. I, f. cxxxviii.
- 2<sup>6</sup> Yefimov (1964) Pl. 43.
- 2<sup>7</sup> Materialy dlya istorii Imperatorskoy akademii nauk [Materials for the History of the Imperial Academy of Sciences]. St. Petersburg: Akademiya nauk. I (1885) 191.
- 2<sup>8</sup> Yefimov (1964) Pl. 65 and 66.
- 2<sup>9</sup> Bagrow (1975) 167.
- 3<sup>0</sup> Ibid.
- 3<sup>1</sup> Ibid.
- 3<sup>2</sup> Ibid., 146. See also Anonymous (1932). "Gornyye karty" [Mining maps], Akademiya Nauk, Vestnik, II(#1), 51-58. for a list of maps supplied by I.F. Hermann showing sites of mines and mineral deposits in the Altay, Urals, Nerchinsk and Olonets areas.
- 3<sup>3</sup> Kostrin, K. (1968). "Pervyye karty neftranynkh mestorozhdeniy Rossii" [The first maps of oil deposits of Russia]. Nefyanik, (#4), 31-33.
- 3<sup>4</sup> See Müller, Gerhard Friedrich (1937, 1941). Istoriya Sibiri [History of Siberia]. Moskva: Izdatel'stvo Akademii nauk. 2 vols., and in particular Baklanova, N.A. and A.I. Andreyev (1937). "Obzor rukopisey G.F. Millera po istorii, geografii, ètnografii i yazykam narodov Sibiri, khranyashchikhsya v moskovskikh i leningradskikh arkhivakh i bibliotekakh" [A survey of the manuscripts of G.F. Müller on the history, geography, ethnography, and languages of the peoples of Siberia, in the Moskva and Leningrad archives and libraries]. I, 541-569. See also Bagrow (1975) 241, footnote #6.
- 3<sup>5</sup> Bilyarski (1865) 744. This was not the first time that questionnaires had been sent out. See Fel', S. Ye. (1974). "Russian Cartography of the 18th Century as a Synthesis of Astronomic-Geodetic and Graphic Processes", The Canadian Cartographer, XI (#1), 19.
- 3<sup>6</sup> Florinsky, Michael T. (1947). Russia: A History and an Interpretation. New York: MacMillan, I, 363.

- 37 Brokgauz, F.A. and I.A. Yefron eds., (1898).  
Éntsiklopedicheskiy Slovar', XXIII, 240-245.
- 38 Florinsky (1947) 561.
- 39 Bagrow (1975) 246, Footnote #55.
- 40 Ibid., 247, Footnote #56.
- 41 Ibid., 235. See there, for example, Figure 89, p. 239.
- 42 Bagrow (1975) 229.
- 43 Sobraniye sochineniy, výbrannýkh iz mesyatseslovov na  
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from various years]. St. Petersburg: 1785-1893. A list  
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1720-1870]. St. Petersburg.
- 44 Thrower (1969).