# The Bruce-Mengden and Cornelis Cruys Maps of the Lower Don (1696-1705): An Inflection Point in the Practice of Russian Cartography?

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**Abstract:**
*Maps of the lower Don and Azov region produced by James Bruce and Cornelis Cruys in connection with Peter I's 1696 Azov campaign appear to mark the point at which cartographic work undertaken on Russian territory by specialists in Russian service began moving beyond the traditional* chertezh *mapping model and embraced the principles of the new Western European geodesic cartography. This was becoming possible through greater familiarization with Copernican cosmography and higher mathematics, the importation of new instruments of observation, and the establishment of new centers of calculation on Russian soil. The adoption of the new geodesic cartography served the Petrine imperial project—not only in supporting communications and logistics on the empire's frontiers, but in winning European acknowledgment of Russian Imperial sovereignty. The process of adoption also illustrates the manner in which a network of collaborating scholars in Russia and abroad was quickly assembled.*

**Keywords:**
Cartography, Azov, Lower Don, Peter I, James Bruce, Cornelius Cruys

Matthew Edney has argued that cartography as we generally understand it today is an historically recent construction with roots in sixteenth—seventeenth-century European (especially Dutch and French) practice.[1] It is an idealized project of applying standardized methods for accurate proportional representation onto maps of the earth's curved surface. The confidence this could be done only prevailed from the nineteenth century. In the early eighteenth century it was merely prefigured, but it would advance further in Europe by the end of the eighteenth century, through two important developments: 1) the increasing commitment to prescribing the *projective geometry* of latitude and longitude as a common language for all mapping; and 2) the application of projective geometry to surveying, by employing astronomical observations locating station positions along a meridian, then surveying a chain of triangles along two baselines (e.g., flat roads along part of this meridian), resorting to trigonometric functions to calculate the lengths of triangle sides. This was the method Cesar-Francois Cassini de Thury used to produce systematic surveys of all of France. The use of astrofix data and projective geometry became increasingly prescriptive because it was valued for extending mapmaking work in three ways. It was useful for mapping larger areas and integrating surveyed areas to produce bigger maps of national territory and, ultimately, world atlases. It could test and refine map

[1] Matthew Edney, *Cartography: The Ideal and Its History* (Chicago: University of Chicago Press, 2019), 200, 228-229. There were two seventeenth-century foundations for projective geometric cartography: the analytic geometry of Descartes and Fermat, which allowed the production of algebraic equations describing curves and the use of linear equations to fix coordinates, and improvements in instruments permitting more accurate astrofixes to determine the altitudes of pairs of stars or other heavenly bodies, one for latitude near meridian transit, the other for longitude near elongation.

projections and lead to new projection schemes. It could lay the foundations for a new science, "higher geodesy," by settling the Cartesian-Newtonian controversy about the figure of the earth. In the next stage of this history of cartography, from the early 19th century, geographers proceeded to pursue the goal of unifying *all* mapping within a projective geometry, and they adopted the new concept of map scale and standardized contour and physical feature symbols to assert this unity.

Before 1700 mapping in Muscovy followed a very different system. Whereas the new European cartography pioneered in the Netherlands and France inclined towards astrofixing, triangulation, and the employment of projective geometry to represent locations on the curved surface of the earth, surveying for the *chertezh* maps produced in Muscovy nearly always proceeded from the following of an itinerary—a road, more often a river—and the measuring of distances between points along the route using a rope, chain, and staff. (The compass was known to a few clerks in the central chancelleries but does not seem to have been used in mapping.) Data from measuring would be supplemented by interrogating local residents as to their understanding of the travel time between points; it is likely such testimony was relied upon more than actual measurement. This meant that *chertezh* drawings were most often graphic translations of verbal and textual descriptions—for example, the textual descriptions of travel distances found in "road books" (*dorozhniki*) or the "Great Chertezh Book" (*Kniga Bol'shomu chertezhu*) kept in the Military Chancellery (*Razriadnyi prikaz*) from 1627.[2] Hence, Alexei Postnikov has written the following about these *chertezh* maps:

> [They] had no mathematical foundations in the "Ptolemaic" sense. There were no geographic coordinates, uniform scale, nor cartographic projection of any kind […] The bulk of Russian geographic drawings continued to be scale-less and done with one aim in view—to display positional features relative to each other within a certain area (topology). The draftsmen believed it to be sufficient to observe metric properties in their works by providing them with detailed indications of dimensions and sizes: areas for estates and households, and distances in *verst*s or days *en route* […] To make their works more comprehensive, Russian cartographers often used different scales within a single map, for example, providing small-scale maps with large-scale plans of major towns and fortresses.[3]

To compensate for the absence of a grid of latitude and longitude, the *chertezh* draughtsman tried to present considerable topographic detail to establish specificity of locale. Most *chertezhi*

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[2] This *Great Chertezh Book* was compiled by Afanasii Mezentsev. It may have been undertaken for eventually drawing up a large wall map or atlas of maps, to replace a great wall map that reportedly perished in the Moscow fire of 1626. The *Great Chertezh Book* contained some descriptions of the North, from the Berezina to Kol'sk, but it was more thorough in describing the Polotsk military frontier with Poland-Lithuania and the central and southern Muscovite towns and districts near the Tatar invasion roads—which may explain why it was prepared for the Military Chancellery. L. A. Gol'denberg, "History of Russian Cartography to 1700," *The History of Cartography. Volume Three (Part Two). Cartography in the European Renaissance,* ed. David Woodward (Chicago: University of Chicago Press, 2007), 1864-1866. See D. I. Iazykov, *Kniga Bol'shomu chertezhu, ili drevniaia karta Rossiiskago gosudarstva* (St. Petersburg: Tipografiia Imperatorskoi Rossiiskoi Akademii, 1838).

[3] Alexei V. Postnikov, "Outline of the History of Russian Cartography," in *Regions: A Prism to View the Slavic-Eurasian World. Towards a Discipline of "Regionology*," ed. Kimitaka Matsuzato (Sapporo: Slavic Research Center, Hokkaido University, 2000), 8-10, 14-17.

were plane or orthogonal drawings; even when depicting towns, they did not follow European practice in adopting a bird's-eye view or perspective. Only towards the end of the century did a few *chertezh* drawings display a compass rose to relate the view to the cardinal directions. A *chertezh* could take multiple orientations simultaneously, drawing features "from several directions as the draftsman moved around the paper. Buildings and trees head up, down, or across, depending on the location or point of view of the artist at a given moment. Thus, they have more than one orientation, and they have to be read from all four sides. The most commonly used indicator of relative orientation is the direction of flow of rivers and streams, which would have had more local relevance than abstract points of the compass [...] In others the clue will be the positioning of a church, with its altar located in the east."[4] While aiming for thorough planimetric mapping of surface features, *chertezh* drawings did not attempt to show their depths or elevations; the positions of hills and mountains were depicted by sketching in low mounds resembling mole hills. Indicating elevations through cross-hatching or contours had to await the eighteenth century.

Part of the reason for the contrast between *chertezh* mapping and the new "scientific" European cartography was a difference in cosmographic traditions—the longer prevalence in Muscovy of Cosmas Indicopleustes' "box model" of the cosmos over the Ptolemaic model of a terrestrial globe, and less familiarity (beyond a small circle of natural philosophers in the Kyiv Mohyla Academy and Slavonic-Greek-Latin Academy) with the Copernican model of the heliocentric solar system. Another part of the reason was the lack of reliable instruments for astronomical observation (astrolabes were rare, and refracting telescopes as-yet-unavailable). And yet another reason was the underdevelopment in Muscovy of higher mathematics—unfamiliarity with analytical geometry, trigonometry, and calculus. The impressive *chertezh* atlases produced by Semen Remezov between 1695 and 1715 testify to the commitment by the Muscovite government (especially in the *Sibirskii prikaz*) to surveying as much of the realm as practical, and some see evidence in his maps that Remezov had examined the *Tartary Map* of Abraham Ortelius and the atlases of Gerardus Mercator and Johan Blaeu, consulted some ancient Greek and Latin maps and Polish and Ukrainian materials, and read chronicle and chorographical descriptions of other lands. Among his decorative symbols were images of magnetic compasses and calipers with brief remarks about their uses. In other words, Remezov showed curiosity about the new cartographic principles from Europe, even if he had little opportunity to master and incorporate them. But his charts were still drawn in traditional *chertezh* fashion, organized along river itineraries without grids of longitude and latitude, with no linear scale or single orientation, without any apparent use of the compass or other instruments, and "untouched by any trace of accurate measurement or rigorous surveying."[5]

*Chertezh* mapping was useful in that it met most of the immediate needs of the time, facilitating travel and communications by representing routes and distances. L. A. Gol'denberg considered Remezov's charts of Siberia surprisingly complete and accurate representations of the river networks and main surface features, and his maps also served an important ideological purpose: Valerie Kivelson discerns a coherent cosmographic vision in Remezov's quite beautiful

[4] Valerie Kivelson, *Cartographies of Tsardom*: *The Land and its Meanings in Seventeenth-Century Russia* (Ithaca: Cornell University Press, 2006), 2-3; Postnikov, "Outline," 14.

[5] Gol'denberg, "History of Russian Cartography to 1700," 1896; Kivelson, *Cartographies of Tsardom*, 133-136; Lebedev, *Geografiia v Rossii XVII veka*, 30. According to L. A. Goldenberg, Remezov's biographer, while at Moscow Remezov saw the recent map of the lower Don made by James Bruce that we discuss below.

maps, which excelled in linking chorographic description with spatial representation to express the ethnographic diversity across the vastness of Muscovy and its empire in Siberia.[6] But the *chertezh* method was best suited to surveying and depicting small areas—a monastery estate, a cluster of villages, a garrison town, occasionally an entire district. Because it lacked a geodesic foundation it was not yet able to tackle the task of integrating particular maps into a single general map of the realm at smaller scales of 1:300,000 or less, and there was increasing political need for such general maps.

### *The Bruce-Mengden map of the Lower Don, 1696*

In 1696, in connection with Peter I's campaign against the Turkish fortress of Azov—the tsar's first major military undertaking—a remarkable map of southern Russia from Moscow to Azov and the Black Sea was produced by James Bruce (Iakov Brius) under the supervision of Major General Georg von Mengden, commander of the Preobrazhenskii Guards regiment. Academician V. I. Vernadskii considered Bruce's map to have played a pivotal role in the development of cartography in Muscovy:

> The Bruce-Mengden map [...] is the first scientific monument to the penetration into Russia of the new learning. It was a first in connecting Russian cartographic work with Western cartography [...] It clearly appears in many aspects a novelty for southern and southeastern Russia and at the same time uses the best cartographic tutorial devices that were in Europe at the time."[7]

Leo Bagrow judged that the delivery of a copy of this map to Jan van Thessing's press in Amsterdam for engraving and publication marked "the first step in the break with old cartographic traditions."[8] This came at the moment Remezov was preparing the first of his *chertezh* atlases. Bagrow presented the clearest explanation of how this map has come down to us.[9] Three variants of it have survived—a manuscript version in Russian, a printed copy in Russian, and the printed copy in Latin produced in Amsterdam in 1699. The Latin version of the Bruce map was the first map drawn in Russia to be printed in Europe in Russian and without major alteration because it conformed to contemporary European cartographic methods.

The manuscript copy of the no-longer extant original was found by M. M. Bogoslovskii in the Library of the Academy of Sciences, among the papers Bruce had donated to the Academy towards the end of his life.[10] This hand-drawn copy was apparently made a few years after the death of Peter I, as the map's title refers to Bruce as General Field Marshal, a rank he received only in 1727. The labeling is in Russian, but the title is in Latin:

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[6] Valerie Kivelson, "'Between All Parts of the Universe': Russian Cosmographies and Imperial Strategies in Early Modern Siberia and Ukraine," *Imago Mundi* LX, 2 (2008), 173-175.
[7] V. I. Vernadskii, "Ocherki po istorii estestvovaniia v Rossii v XVIII stoletii," *Trudy po istorii nauki v Rossii* (Moscow, Nauka, 1988), 118.
[8] Leo Bagrow, *A History of Russian Cartography up to 1800*, (Wolfe Island, Ontario: The Walker Press, 1975),98.
[9] Leo Bagrow, "The First Map Printed in Russian," *Imago Mundi* XII (1955): 152-156.
[10] M. M. Bogoslovskii, *Petr I. Materialy dlia biografii. Tom pervyi, 1672-1697* (Moscow: OGIZ, 1940), fn., 399; Bagrow, "The First Map," 154.

> *1696. Tabula geographica partis minores et maioris Russiae delineate post expeditionem Assoviense A. 1696 ab illustriss. Comite Jacobo Dan. Bruce tunc temporis militum tribuno, nunc duce sive campi mareschallo. Dimensiones Regionum factae sun tab ill. D-no de Mengden, nunc ducis vicarion sive General Maiore. Hanc Tabulam Amstelodami aeri incidi curavit litteris latinis et ruthenicis et dedicavit serenissmo Russiae imperatori Petro I Mercator tunc clarus Johanes Thielsing.*[11]

Bogoslovskii had speculated that a Russian-language version was probably never printed in Amsterdam, as that would not have been necessary, the purpose of the published map being to inform Western Europeans of the topography of southern Russia and Crimea and the theater of Peter the Great's Azov campaign. But in the 1930s Bagrow found an impression of a printed Russian version in a Berlin bookshop. It differs from the manuscript version in extending farther to west and east, like the Latin version printed in Amsterdam, and in having a cartouche in the upper right-hand corner.[12] There is no reference to who made the engraving, but Bagrow thinks it was printed at Amsterdam sometime before Jan van Thessing's death in 1701. (**See Figure 1 below**)

The third and best-known version was the single-sheet map engraved and printed at Jan van Thessing's press in Amsterdam in 1699. This version was in Latin. The manuscript from which it was produced had been delivered to Thessing in 1697 or 1698, during Tsar Peter's Grand Embassy to Europe. By 1700 Peter I had awarded Thessing monopoly right to run a Russian printing house in Amsterdam with the mission of focusing on the printing of maps and charts. On the upper right of the printed Latin-language map is a larger and elaborate allegorical cartouche, possibly engraved by Adrian Schoonebeck. After Thessing's death in 1701 printing of this map was curtailed; the copperplate had been acquired by a different publisher by 1704.[13]

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[11] Bagrow, "The First Map," 154.

[12] Bagrow, "The First Map," 154.

[13] Edward Ockhuizen, "The Dutch Contribution to the Cartography of Russia during the 16th-18th Centuries," in *Russians and Dutchmen: Proceedings of the Conference on the Relations between Russia and the Netherlands from the 16th to the 20th century, held at the Rijksmuseum*, ed. J. Braat et al. (Groningen: Institute for Northern and East European Studies, 1993), 105-106.

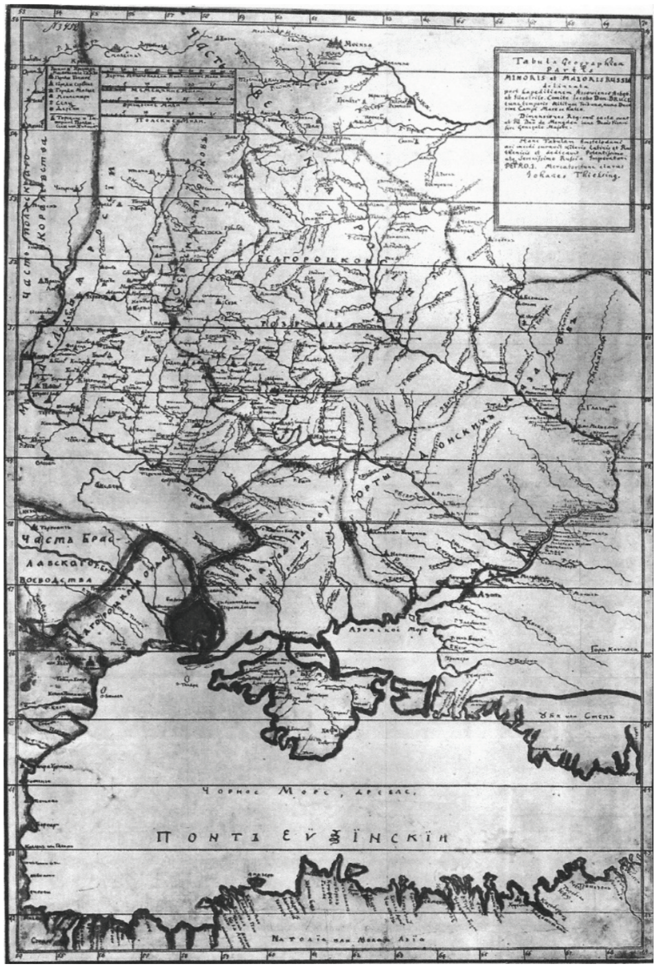

Figure 1: Russian version of the Bruce-Mengden map, entitled "Karta chasti Evropeiskoi Rossii k iugu ot Moskvy do Chernomorskogo pobehrezh'ia Turtsii (1696). Source: Otdel rukopisei, opis' № 35, sobranie rukopisnykh kart (osnovnaia chast'), Biblioteka Akademii Nauk, St. Petersburg.

As for the circumstances under which the original map had been made, this is what is known. Peter I's first attempt to besiege Azov, in 1695-6, had required the movement of the army down the Voronezh and Don, partly by ship. During the Preobrazhenskii Regiment's progress down the Don, its commander, Major General Mengden, had been tasked with overseeing the collection of information on march stages, distances, and topography along the route and the surveying of sites for siege works at Azov. This information was probably collected by the three leading engineers of the First Azov Expedition, Franz Timmerman, Adam Weide, and Captain James Bruce, who were on one vessel in the flotilla. Bruce had already established a close relationship with Tsar Peter; he had served in the "Toy" (*Poteshnyi*) embodiment of the Preobrazhenskii regiment for several years, despite his youth, and as of summer 1695 he was serving alongside the Tsar himself in Peter's Bombardier Command within the Preobrazhenskii Regiment.[14] During the first Azov campaign the Bombardier Company was in the vanguard of the Preobrazhenskii Regiment, in Franz Lefort's division.

[14] In a letter to Fedor Romodanovskii of June 18, 1695 Peter conveyed greetings to Romodanovskii from his humble servants, bombardiers "Ivashka Menshoi Buturlin, *Iakov Brius*, Fetka Troekurov, Petrushka Alekseev [Tsar Peter himself], and Ivashka Gommart." Bogoslovskii, *Peter I. Materialy,* I, (Moscow: ZAO Tsentrpoligraf, 2007), 238, 244.

Bagrow found no indication that Mengden went beyond supervising the collection of data to involving himself directly in mapmaking.[15] Of the three engineers it was most likely James Bruce who began translating this information into cartographic representation. Franz Timmerman, the head of the team, a Dutch merchant who had taught the young Peter the rudiments of sailing, ballistics, and the use of the astrolabe since at least 1688, probably lacked the ability; his tutoring notebooks show "he was far from a first-class mathematician, and he made errors even in simple addition."[16] As for Weide, his talent was for structural reform of the Russian army: in 1698 he devised the recruit levies mobilizing new infantry and cavalry regiments for the beginning of the Northern War, and he played an important role in the drafting of the Military Ordinance of 1716, but his skills as a military engineer were questionable, and Alexander Gordon, in his *History of Peter the Great* (published posthumously in Aberdeen in 1755) blamed the failure of the first Azov siege on Weide's technical blunders. The information collected during the first march down the Don in summer 1695 was supplemented by new data gathered by Bruce, aboard a ship with marines, during the Second Azov Expedition, in summer 1696. Bruce's new survey probably began after July 25, 1696, after the Turks had surrendered Azov and Liutin and Lefort's division had begun sailing back up the Don.[17]

It could be speculated that Bruce had assistance from others: perhaps from someone attached to Vice Admiral Iurii Stepanovich Lima, a Venetian engineer in Russian service since at least 1678 and *de facto* commander of the Azov flotilla on the 1696 campaign, or someone from the staff of Quartermaster-General Karl Andreevich Rigeman (Rigimon).[18] The fact that Bruce's map gave attention to the depiction of the Belgorod and Iziuma fortified lines suggests he drew in part upon textual and *chertezh* material from the Military Chancellery and perhaps upon E. G. von Berge's map from the time of the Chyhyryn campaign. It is also possible he drew his map while abroad in Europe, with the assistance of European cartographers. But evidence that Peter I appreciated his accomplishment of this project were Bruce's promotion to colonel *(polkovnik)* in 1696 and his selection in the following year to accompany Tsar Peter on the Grand Embassy, with the specific assignment to stay in Cambridge and study under John Flamsteed and John Colson.[19]

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[15] Bagrow, "The First Map," 152. It should be noted that Mengden (Iurii Famindin), of Baltic German descent, had been born in Moscow and was friends with the Scots General Patrick Gordon and John and Paul Menzies.

[16] N. G. Ustrialov, *Istoriia tsarstvovaniia Petra Velikago. Tom II: Poteshnye i Azovskie pokhody* (St Petersburg: Tipografiia 11-go otedeleniia Sobstv. Ego Imp. Vel.kantseliarii, 1858), 19, 373 n. 56.

[17] P. O. Bobrovskii, *Istoriia Leib-gvardii Preobrazhenskogo polka. Tom pervyi* (St. Petersburg: tip. V. S. Balasheva, 1892) 272; T. S. Bayer, *Kratkoe opisanie vsekh sluchaev kasaiushchiksia do Azova* (St. Petersburg: Imperatorskaia Akademiia Nauk, 1782 ed., fn., 170; Petr I, *Pokhodnyi zhurnal 1696 goda* (St. Petersburg: Izd. 2-m Otdeleniem Sobstvennoi ego imp. Velichestva kantseliariei, 1853), 21.

[18] Petr I, *Pokhodnyi zhurnal 1696 goda*, 12.

[19] Because Bruce wrote no memoir it is not possible to determine what training in mathematics and other sciences he had acquired during his youth in the Foreigners' Quarter (*Nemetskaia Sloboda*) in Moscow in the 1670s-1680s, or what technical knowledge he obtained in the 1690s from his associations with Gordon, Mengden, Timmerman, or Weide. The catalog of his personal library shows he possessed a copy of John Seller's *Practical Navigation*, published in London in 1694, but it seems unlikely he acquired this book before his study in London in 1697-1698. The contents of Sellers' book are indicated by its full title, *Practical Navigation, or an introduction to the Whole Part. Containing the Doctrine of Plain and Spherical Triangles, Plain, Mercator, Great-Circle Sailing; as also of the Plain-Chart, Mercator's Chart and both Globes. Sundry Useful Tables in Navigation: And a Table of 1000 Logarithms, and of the Logarithm-Sines, Tangents, and Secants. By John Seller, Hydrographer to the King.* See E. A. Savel'eva, ed. *Biblioteka Ia. V. Briusa. Katalog* (Leningrad: Biblioteka Akademii Nauk, 1989), item 632, 258.

The draughtsmanship in Bruce's map follows Dutch rather than Russian *chertezh* technique. The map is fairly accurate in representing the hydrographic network above the Azov Sea and Black Sea; it employs four scales (projection on a single scale did not become possible until the early nineteenth century); and it has longitudinal and latitudinal coordinates, although we do not know if these were based on triangulation done in the field or were added at Amsterdam from older maps.[20]

Of greater importance than the question of originality was the Bruce map's impact. It sparked a flurry of mapmaking activity over the next six years, which focused on the region of the Don and Volga rivers, reflecting Peter's interest in establishing lines of communication securing Russia's new foothold at Azov and the links to the Volga and the Caspian Sea. The strategic importance to Peter of securing and colonizing the Azov region for launching Russian naval and maritime trade operations in the Black Sea was evident in the coercive power he employed—involving tens of thousands of convict laborers—to build harbor works and fortifications at Taganrog and other sites in the Azov region,[21] and these projects of course demanded more precise mapping of the coasts and the course of the Don and its tributaries. The Bruce map had also established the precedent of importing into Russia Dutch engraving and printing technology and the translation into Russian of European geographic texts and maps.

### *The Cruys Atlas of the Don and the next stage in Russian reception of the new cartography*

In the late 1690s the center for most accumulation of engineering knowledge in Russia was the Gunner's Chancellery (*Pushkarskii prikaz*) in Moscow, which was under the direction of *dumnyi d'iak* Andrei Vinius, who also had promoted cartographic research as director of the Siberian Chancellery and as correspondent of Nicolaas Witsen and supervisor of Remezov. In 1698 Vinius opened a School of Ciphering and Earth Measurement (*Shkola tsifri i zemlemeriia*) in the Gunner's Chancellery. Other than the fact that a "Master Zertsalov" served as instructor, little is known about the School, which burned down in 1699.[22] But it was from the Gunners' Chancellery in October 1697 that Tsar Peter ordered a Swedish Engineer, Christian Rugal', to prepare a map of Taganrog Bay "from Mius Creek to Epanchik Creek, and from the creeks to Krivoi Spit and back to the mouth of the Don." This was part of a larger project, entrusted to Antoine de Laval, an engineer on loan from the Austrian emperor, to survey the Don and all its tributaries from Cherkassk south to the Azov Sea. Laval was also involved in constructing fortifications and harbor works at Taganrog and other sites, but he was dismissed from this by summer 1698 following political denunciations. However, Rugal' went on to produce a manuscript map of part of the coast around Taganrog. This map, labelled in Russian and French, was on a scale of 1:21,000 and measured 46 by 195 centimeters: its representation of the coastline was not very detailed, but it did include some soundings as navigational aids.[23] In 1701 the

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[20] V. V. Glushkov, *Istoriia voennoi kartografii v Rossii, XVIII- nachalo XX v.* (Moscow: IDEL, 2007), 69.

[21] Brian J. Boeck, "When Peter the Great Was Forced to Settle for Less: Coerced Labor and Resistance in a Failed Russian Colony (1695-1711)," *Journal of Modern History* 80:3 (2008); 485-514.

[22] A. V. Postnikov, *Razvitie krupnomasshtabnoi kartografii v Rossii* (Moscow: Nauka, 1989), 35.

[23] For Rugal's manuscript map, see "Carte de la cote meridionale de la mer de Azow," Otdel rukopisnykh kart, osnovnaia opis' № 19, Biblioteka Akademii Nauk, St. Petersburg. For a digital reproduction of Rugal's map manuscript, see "Papakoma: Zabytye stranitsy istorii severnogo priazov'ia," December 19, 2024, https://papacoma.narod.ru/maps/north_taganrog_gulf_1697.htm.

Amsterdam engraver Adrian Schonebeck incorporated Rugal's chart into a larger map of the Black Sea; in 1717 it was also incorporated into Nicolas Visscher's *Atlas Minor*.[24] Further mapping of the Sea of Azov and the lower Don was done by a Dutch shipbuilder, Piter Bergmann, in 1701 and 1702.[25]

Better known in Europe was the mapping of the Lower Don from Voronezh to Azov conducted by Vice-Admiral Cornelis Cruys in 1699.[26] Cruys' sketch-maps were engraved by Hendrick Doncker and published in Amsterdam in 1703-1705 in the form of an atlas, *Prilezhnoe opisanie reki Donu i Tanaisa, Azovskogo moria ili ezera Meotskogo, Ponta Evksinskogo ili Chernogo moria*, containing seventeen maps, labelled in Russian and Dutch, with explanatory text in Dutch.[27] S. E. Fel' considers Cruys' maps of the Don the first "fundamental" topographic work in Russia because Cruys' diary describes his work as instrument based.[28] While cruising the Don aboard the *Otverstvye vrata*, the Norwegian wrote:

> I observed and described the width of the river from place to place, and every noon I made calculations with a sea-lead, thin line, compass, and minute watch-glass to ensure that true positions and distances were measured, as that is the most reliable and precise method for knowing the bottoms and at what compass points rivers lie.[29]

From the measurements he logged he had an outline and eye-to-eye sketch-maps produced. Included in the Cruys *Atlas* was a chart of the Black Sea from Aqyar (the future Sevastopol) to

[24] Bagrow, *A History of Russian Cartography to 1800*, 100-102, 123, 223; E. S. Elagin, *Istoriia russkago flota. Period Azovskii* (St Petersburg: Tip. Kommissionera Imperatorskoi akademii khudozhestv, 1864), 103.

[25] Bagrow, *A History of Russian Cartography*, 100-102; S. E. Fel', *Kartografiia Rossii XVIII veka* (Moscow: Izdatel'stvo geodizicheskoi literatury, 1960), 43.

[26] Cornelis Cruys (1657-1727) was one of the most important technical advisors in the inner circle of Peter the Great, particularly after the deaths of Patrick Gordon and Franz Lefort. A Norwegian, he had been working as a ship outfitter in Amsterdam during Peter's 1697 stay at its wharves, and his recruitment into Russian service in spring 1698 had been arranged by Nicolaas Witsen. He assisted in the construction of the Russian Azov flotilla at the Voronezh wharves in 1698 and was appointed burgomaster of the new naval base at Taganrog, where he oversaw ship and wharf construction. The tsar relied frequently on Cruys to import instruments, ship stores, and other resources through his contacts at Amsterdam and to arrange for Russian volunteers to be taken into apprentice service in the Dutch fleet. For more on Cruys, see Turgrim Titlestad, *Tsarskii Admiral: Kornelius Kriuis na sluzhbe u Petra Velikogo* (St Petersburg: Blits, 2003), 11-18.

[27] S. E. Fel', *Kartografiia Rossii XVIII veka* (Moscow: Izdatel'stvo geodizicheskoi literatury, 1960), 43-45; N. M. Bykovskii, *Kartografiia. Istoricheskii ocherk* (Moscow-Petrograd: Gosudarstvennoe izdatel'stvo, 1923).

[28] Cornelis Cruys, "Ekstrakt iz zhurnala, uderzhannogo ot gospopodina viste-admirala Kriuis na puti iz Moskvy na Voronezh, s Voronezh na Azov, na Taganrog i Kerch', a ottuda taki nazad k Azovu 1699 g.," trans. P. Larionov, *Zapiski Gidrograficheskogo departamenta Morskogo ministerstva*, ch. 8 (St. Petersburg: V Morskoi tipografii, 1850), 367-394. For the manuscript of Cruys' diary, see f. 233, Chancellery of General-Admiral F. M. Apraksin (1695-1728), opis' № 1, delo 4, Rossiisskii gosudarstvennyi arkhiv voenno-morskogo flota, St. Petersburg.

[29] Glushkov, *Istoriia voennoi kartografii v Rossii, XVIII- nachalo XX v.*, 19. Fel' thinks Cruys measured the length of course links by sand hourglass and counting off the knots on the drag line to calculate his vessel's sailing speed, using compass points to measure the angle of turns of the drag line, and making many short compass point fixes to note orientation points and objects ashore. His sea lead was used to measure river depths and bottom obstacles, and he took quadrant sightings of the sun and moon and placed observation points in a grid of parallels and meridians derived from astronomical coordinates. See Fel', *Kartografiia Rossii XVIII veka*, 45.

the Kerch Straits, with several sea depth soundings, made in 1700 by Christian Otto, navigator aboard the ship taking ambassador Emel'ian Ukraintsev to Constantinople.[30]

Interests of state—the efforts to capture and hold Azov and advance Russian naval operations into the Black Sea—had pressed for the application of Dutch techniques in riverine and maritime mapping on the Black Sea frontier. The mappings done by Bruce, Rugal, and Cruys represented important progress, although only a start, towards Russian contributions towards constructing the "ideal" of modern cartography. Bruce, Rugal, and Cruys were serving Peter I's strategic interests by mapping Russia's expanded southern frontier after the fall of Azov; similar interests required the mapping of the Baltic region (Ingria, the Neva and Lake Ladoga region, and the area of the future St Petersburg) in the first years of the Great Northern War. This was done by foreign sea captains under the tsar's commission (Johann Rentel, Peter Bergmann, Martin Gossler) and relied partly on Swedish maps. The coast of the Caspian Sea was also surveyed by Captain Jeremiah Meyer.[31]

The positive reception accorded the maps by Bruce and Cruys by Peter I and the European scientific community inspired further adoption of the new cartographic methods in Russia. This can be seen in the following measures undertaken in the reign of Peter I:

**1697-1698**:

During Peter I's Grand Tour of Europe, James Bruce was assigned to study in England under the mathematician John Colson and the Royal Astronomer John Flamsteed. Through them Bruce became familiar with the new Newtonian paradigm and Newton's fluxion calculus. Bruce's surviving notebooks from this period indicate he studied geometry, trigonometry, calculus, and observational and theoretical astronomy.

**1700**: James Bruce established the first astronomical observatory in Russia, located in the Sukharev Tower in Moscow.

**1701**: A School of Mathematics and Navigation was founded at Moscow, offering instruction in higher mathematics, navigation, and geodesy, this instruction supervised by Henry Farquharson (Marischal College, Aberdeen) and Leontii Magnitskii (from the Slavonic-Greek-Latin Academy). Following the construction of St Petersburg and the founding of the Baltic Fleet, Farquharson would be transferred to St Petersburg to continue much of this instruction at the new Naval Academy (*Morkskaia akademiia*).

**1705**: The founding at Moscow of the Civil Typography (*Grazhdanskaia tipografiia*), managed by Vasilii Kipriianov, for the translation and publication in Russian of foreign texts, charts, and engravings. To facilitate this a new Civil Script was created, more suitable to the task than the Old Church Slavonic script.

[30] M. M. Bogoslovskii, *Petr I. Materialy dlia biografii. Tom IV, 1699-1700* (Moscow: Tsentrpoligraf, 2007), 198; Bagrow, *A History of Russian Cartography to 1800*, 100-124.

[31] Bagrow, *A History of Russian Cartography up to 1800*, 104, 108, 111-112.

**1703 to 1716:** Frequent correspondence (and three personal meetings) between Gottfried von Leibniz and Peter I. James Bruce played an important role as intermediary in this correspondence. Leibniz urged the tsar to organize general instrumental surveys of Russia, including astronomical observations of magnetic declinations in the far North, and recommended the founding of a Russian Academy of Sciences and other centers of calculation.

**1703-1709:** Communications through the diplomat Petr Postnikov with Claude Delisle, astronomer in the French Académie des Sciences, and Guillaume Delisle, French Royal Geographer, exchanged information about geography and cartographic practice.

**1717**: Peter I visited the Paris Observatory and the French Académie des Sciences, presented well-received data and charts of the Caspian and Kamchatka, and won election to extraordinary membership in the Académie. This would lead in 1721 to Peter's decision to invite Joseph-Nicolas Delisle into Russian service to administer a new observatory in St. Petersburg and supervise a general survey of the Empire (which will be launched after Peter's death). It will also result in 1724 in Peter's decree approving a project to establish an Imperial Russian Academy of Sciences, and by 1745, the completion of the general survey and the publication of the *Atlas Rossicus*.

## *Conclusion*

The Petrine regime's enthusiasm for the new European cartography likely derived from its perceived usefulness in military logistics, i.e., for the expansion and securing of Empire. But it was also useful for obtaining European acknowledgement of Peter I's new Empire. Because the vastness of northern Russia served as the ideal laboratory for astronomical observation of the transits of Mercury and Venus and measurement of magnetic declinations, European astronomers and cartographers would support Russian geographic research and assist in the founding of new centers of calculation in Russia, eventually leading to the establishment of the Academy of Sciences and the enlistment of Joseph-Nicolas Delisle in the General Survey. Peter I's successful appearance at the Académie des Sciences and his presentation to the academicians of a more accurate map of the Caspian not only won him election to the Académie but got him acknowledged by the French academicians and by Leibniz as Emperor even before his 1721 proclamation of the Russian Empire. By 1730 Vasilii Tatishchev and Philipp von Strahlenberg had succeeded in convincing Europe that the Russian Empire extended into both Europe and Asia, with the Urals mountains demarcating European and Asian continental space. Siberia and Inner Eurasia ceased appearing in European atlases as Grand Tartary; they were now acknowledged parts of the Russian Empire.