

The Cassini family and the mapping of France (1684–1744)

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Abstract. *The paper presents the cultural atmosphere of France under the old regime when the royal court decided to use science to its advantage. At the turn of the 17th and 18th centuries, the government's priority became the depiction of strategic points for their protection, with which the Italian Cassini family helped. The paper is an overview of the then scientific issues that could only be solved by applying methods from new fields. The connection of astronomy and cartography marked a new beginning in the political-administrative way of dealing with space, i.e. territory, in favour of strengthening the power of the monarch, which led to far-reaching changes in education adapted to serve the homeland.*

Keywords

history of science, France, the Cassini family, cartography, triangulation, map

1. Introduction

The scientific revolution changed the way European states looked at the surrounding world. Experimentation, measurement, and use of mathematical calculations presented an infinite number of ways to deal with the landscape, and its representation came to the forefront of states on the continent. The idea of a national territory was stronger where the monarch firmly held the reins of government in his hands and desired to subjugate the entire country, so he turned to one of the disciplines that was supposed to significantly help him – cartography.

A good example of the use of cartographic methods for the benefit of the state is represented by absolutist France, which, however, did not have a sufficient number of knowledgeable experts, so it resorted to the recruitment of foreign experts. In the second half of the 17th century, she called in the Bologna astronomer Jean-Dominique Cassini (1625–1712), who was supposed to

help her with the calculation of the meridian and the longitudes in the country. The first scientific map was created only in the middle of the following century, mainly thanks to the continuous work of four generations of the Cassini family.¹

Great interest in the topic is showed by Monique Pelletier² who complements the engaging and comprehensive description of the background of the creation of the maps and the lives of the individual actors with rich visual material. The contributions of Suzanne Débarbat³ and Simone Dumont⁴ on academic circles, relations between cartographers and scientific expeditions demonstrate at first glance a minor, but nevertheless significant element in the joint solution of scholarly questions. Other studies illustrate the development of cartographic methods and their use in France at the end of the 17th and the first half of the 18th century.

2. Science, a tool of government

The birth of science in the 17th century brought with it, in addition to revolutionary approaches to the surrounding world, the creation of several scholarly institutions with the help of which European states wanted to use scientific disciplines to their advantage. It was no different for king Louis XIV (1638–1715) and his minister Jean-Baptiste Colbert (1619–1683), who was behind the economic and cultural growth of the monarchy. To dominate the country in the field of science, he had the Academy of Sciences founded in 1666 which was to serve the central power in addition to the discovery of inventions.⁵

The pressing problem was to determine the longitude by which Colbert could reliably locate the ports and protect the French coast. He therefore entrusted academics with the task of “*solving the problem of determining longitudes, measuring the Earth and dealing with cartographic methods*”⁶ and for the same purposes he had

¹ Fathers and sons worked in favour of France: Jean-Dominique was succeeded by Jacques (1677–1756), followed by his son César-François (1714–1784) and then by his son Jean-Dominique (1748–1845). For better overview, individual family members will be marked with Roman numerals as they followed each other. Cassini. *Des villages de Cassini aux communes aujourd'hui* [online]. Available at: http://cassini.ehess.fr/fr/html/7_cassini.htm [acc. 24.01.2023].

² PELLETIER, Monique. *Les Cartes des Cassini. La science au service de l'État et des provinces*. Paris 2019.

³ DÉBARBAT, Suzanne. Dès la création des Observatoires de Paris et de Greenwich, les astronomes entreprirent de rattacher les côtes anglaises et françaises puis les méridiens respectifs. *Revue XYZ*. 1999, vol. 79, no. 2, pp. 77–82.

⁴ DUMONT, Simone and DÉBARBAT, Suzanne. Les académiciens astronomes, voyageurs au XVIII^e siècle. *Comptes rendus de l'Académie des Sciences*. 1999, vol. 327, no. 4, pp. 415–429.

⁵ PELLETIER, Monique. *Cartographie de la France et du monde de la Renaissance au Siècle des lumières*. Paris 2002, p. 81.

⁶ Pelletier, *Cartographie*, p. 81.

the Paris Observatory established in 1667.⁷ Coincidentally, the next year the Italian Giovanni Domenico Cassini published his work on the eclipses of the moons of Jupiter, by means of which longitude could be deduced, earning the astronomer an invitation to France from the first Minister.⁸

Upon arriving in 1669, Cassini I established a partnership with Jean Picard (1620–1682) and Philippe de la Hire (1640–1718). Their task was to map the coast of France,⁹ so they began to travel around the country and, with the help of triangulation,¹⁰ wrote down the coordinates of the places where they were, thus gaining an overview of the latitudes and longitudes.¹¹ Although the mission was interrupted by Picard's death in 1682 and Colbert's death a year later, Cassini I was able to submit the first map showing the French coast to the Academy in 1684; however, further activity was halted.

⁷ **Débarbat**, *Dès la création*, p. 77 and **Pelletier**, *Les Cartes*, pp. 49–51.

⁸ **Débarbat**, *Dès la création*, p. 77 and **Pelletier**, *Cartographie*, p. 81.

⁹ Since the creation of the Academy, there have been numerous attempts to make measurements in the country, to which the equipment of the Observatory also contributed: in addition to ephemerides (tables with the calculated position of cosmic bodies by date), alidades, astrolabes, sextants, odometers (distance measures) or compasses were widely used. **Pelletier**, *Les Cartes*, p. 51 and 53.

¹⁰ "By observing the horizontal angles between hills and tall buildings that afford good views, a surveyor can define a network of triangles. If the length of one side of one triangle is known, then the length can be carried through the network to fix the relative locations of all the landmarks." EDNEY, Matthew

3. First scientific results and map of France

It was only in the 18th century that cartographers and surveyors solved another problem that weighed the minister down, namely the extension of the meridian. It originally led only from Amiens to the south of Paris, and by extending the southern (1701) and northern (1718) parts of the meridian, its complete representation was completed.¹² In the 1730s, Cassini II faced outbursts from academics who accused him of using faulty calculations, because he believed that the Earth was elongated at the poles, which contradicted the generally accepted belief derived from Newton that the planet was flattened at the poles.¹³

Therefore, to confirm or refute Cassini's calculations, the Academy decided to send one research team to Peru (toward the equator) and another to Lapland (toward the meridian) in 1735. After two years of

H. and SPONBERG PEDLEY, Mary (eds.). *The History of Cartography*. Volume IV: Cartography in the European Enlightenment. Chicago 2019, p. 1522.

¹¹ GALLOIS, Lucien. L'Académie des sciences et les origines de la Carte de Cassini: Second article. *Annales de Géographie*. 1909, vol. 18, no. 100, pp. 289–310, p. 290–293.

¹² The boundary points were northern Dunkirk and southern Perpignan. **Débarbat**, *Dès la création*, p. 77, **KONVITZ**, Josef W. Redating and Rethinking the Cassini Geodetic Surveys of France, 1730–1750. *Cartographica*. 1982, vol. 19, no. 1, pp. 1–15, p. 1, **Pelletier**, *Cartographie*, pp. 81–82, **Pelletier**, *Les Cartes*, pp. 86–88 and **REVEL**, Jacques. Knowledge of the Territory. *Science in Context*. 1991, vol. 4, no. 1, pp. 133–162, p. 156.

¹³ **Dumont et al**, *Les académiciens*, p. 422, **Konvitz**, *Redating*, p. 2 a **Pelletier**, *Cartographie*, pp. 84–85.

measurements, both found that Newton was right,¹⁴ and the cartographers could resume their work. The difficult task of measuring the meridian was undertaken by Cassini II, who was assisted by his son César-François and his collaborators. They again went to the regions where they also recalculated the parallels, and soon got the result: in 1740, they presented a rough version of the map with four hundred triangles.¹⁵

After four years, the magnificent work was completed: father and son Cassini presented the first modern map of the Kingdom of

France to the Academy and king Louis XV (1710–1774). A total of eight hundred¹⁶ triangles were scattered over eighteen maps which served either for engineer students, or as an atlas “*carried by engineers or officials on inspection rounds*”.¹⁷ The first modern map of France, drawn up on the basis of scientific calculations, thus foreshadowed the importance of cartographic learning, which the government through the School of Bridges and Roads (1747) used as its tool for the transformation and administration of the entire state.



¹⁴ Dumont et al., *Les académiciens*, pp. 422–424 and Gallois, *L'Académie*, pp. 301–302.

¹⁵ Konvitz, *Redating*, p. 2 and Pelletier, *Les Cartes*, p. 94, 96, 99–100 and 102.

¹⁶ The 1:886,600 scale showed only waterways, no roads., Dumont et al., *Les académiciens*, p. 423,

Gallois, *L'Académie*, pp. 302–306, Konvitz, *Redating*, p. 2, Pelletier, *Cartographie*, p. 85, Pelletier, *Les Cartes*, p. 100 and 102 a Vaysière, *A propos*, p. 254.

¹⁷ Konvitz, *Redating*, p. 2.

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Between the years 2020–2022, he completed international master's studies in France, Italy, and Portugal, covered by the Sorbonne. Currently a Ph.D. student at the Institute of Economic and Social History at the Faculty of Arts, Charles University, Dudzik's research covers the economic, technological, and political history of France in the 18th and 19th centuries

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Participation in conferences

- Oct 2022: international conference paper *Aplikace kartografie ve prospěch údržby francouzských silnic (1738–1747)*, FF UPJŠ, Košice, Slovakia
- May 2022: poster *The origins of the French beet sugar industry (1806–1815)*, FEL ČVUT, Prague, Czech republic
- Oct 2021: international conference paper *Institucionální podpora průmyslu a podnikání v napoleonské Francii (1801–1815)*, FF UPJŠ, Košice, Slovakia

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