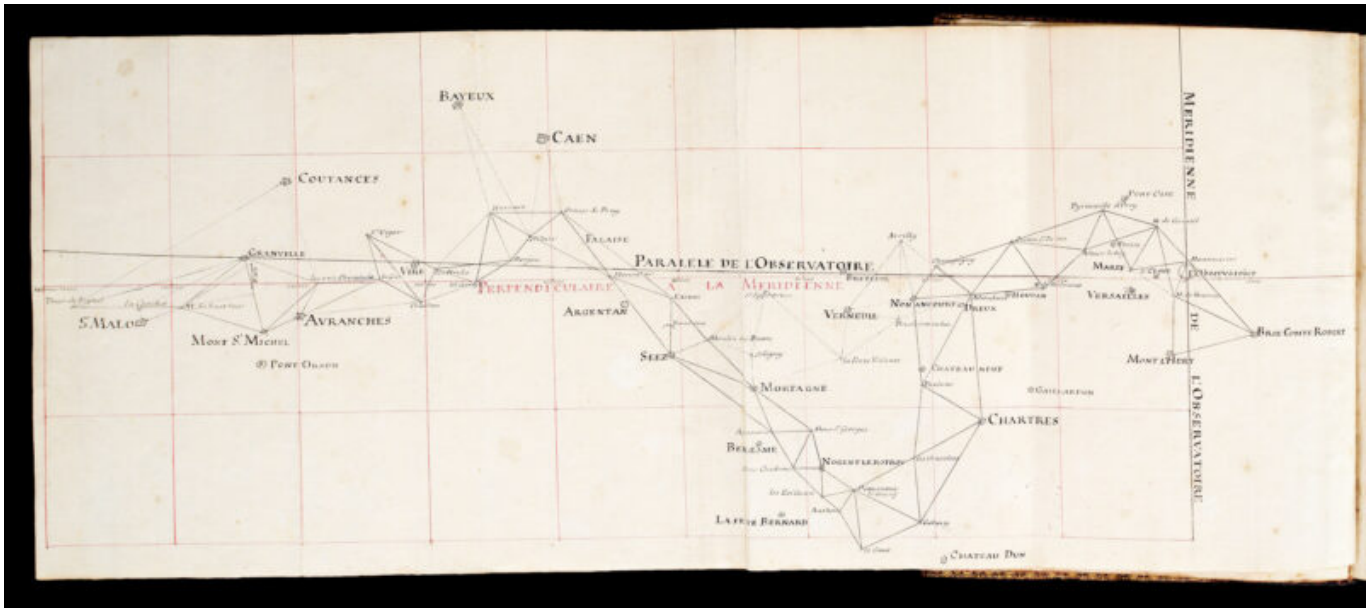

2 works in one volume. Quarto (340 by 185mm); 46 leaves (leaves 22, 45 and 46 blank); illustrated with two maps; contemporary full red morocco, gilt border, coats-of-arms of Germain-Louis Chauvelin, Marquis de Grosbois, spine in six compartments separated by raised bands, green morocco lettering-piece, gilt.

“NOTHING WAS MORE IMPORTANT FOR [ANCIENT] GEOGRAPHY THAN TO KNOW THE SIZE OF THE EARTH, AND NOTHING SEEMED MORE DIFFICULT TO UNDERTAKE” (CASSINI)

De la Carte de la France et de la Perpendiculaire a la Meridienne de Paris

Author
CASSINI, Jean-Dominique

Publication date
1734].

Publisher

Publication place
[Paris,

Physical description

2 works in one volume. Quarto (340 by 185mm); 46 leaves (leaves 22, 45 and 46 blank); illustrated with two maps; contemporary full red morocco, gilt border, coats-of-arms of Germain-Louis Chauvelin, Marquis de Grosbois, spine in six compartments separated by raised bands, green morocco lettering-piece, gilt.

Dimensions

Notes

An exceptional pair of manuscripts, especially prepared for Germain-Louis Chauvelin (1685-1762),

Marquis de Grosbois, being transcripts of the lectures given by Jacques Cassini (Cassini II) to the 'Académie de sciences' in Paris, ostensibly recording the feat by which he, and his son (Cassini III) accurately determined the breadth of France, for the first time, by measuring the line, perpendicular to the Paris meridian, from San Marlo to Strasbourg; but also providing vital new evidence that considerably advanced the investigation into the size and shape of the earth. Illustrated with two maps, not included in the original publication of lectures, in 1735 and 1736.

Cassini's Great National Map

The great project, of creating a detailed map of all France, began in the early 1660s, and would consume four generations of the Cassini family – Jean-Dominique Cassini, or Cassini I (1625-1712); Jacques Cassini, or Cassini II (1677-1756); César-François Cassini, or Cassini III (1714-1784); and Jean- Dominique Cassini or Cassini IV (1748-1845) – for the next 150 years.

The map had originally been the brainchild of Jean-Baptiste Colbert, who was minister of finance from 1665 to 1683 in Louis XIV's reign. Envisaging a detailed map of the whole of the royal estate, to improve its management and potential revenue, he turned to the newly formed Académie de Sciences for help, and principally to the services of Jean-Dominique Cassini and the surveyor and astronomer Abbé Jean Picard. The survey was carried out using astronomical observations (courtesy of Cassini) to ascertain the precise longitude and hence the accurate measurement of a baseline. Once an accurate baseline had been measured, the surveyors began the trigonometrical survey. These intricate interlocking triangles would become the survey's skeleton, which in turn would be fleshed out by the use of more traditional techniques. Picard outlined his method in his work 'Mesure de la terre' of 1671. The project was "the first general map of an entire nation based on geodetic and topographical measurements… [and] transformed the practice of mapmaking over the next 150 years into a verifiable science" (Brotton).

The first map in the survey, the 'Carte particulière des environs de Paris', was completed by Picard in the late 1660s, and published in 1678 on a scale of 1:86,400 (the standard scale for the whole survey). Picard then turned his attention to surveying the French coast. One of the most startling results of the coastal survey, published in 1684, was that it reduced the overall size of France from 150,000 square kilometres to 120,000 square kilometres. It was this dramatic change that caused the legendary outburst from Louis XIV:

"You have cost me more territory than all my enemies!"

Although the coastal survey gave the maps in outline, the measuring of the Paris meridian from Collioure to Dunkirk, in order to work out the length of the country took much longer – due mainly to Louis's numerous military campaigns that had begun to starve the project of funds – and although attempts were made in 1700 and 1701, it would not be until 1718, that Cassini II would complete the task.

In 1733, Philibert Orrey, Louis XV's controller general, would order Cassini, to resume the triangulation of the entire nation. Jacques was joined in his endeavour by his son Cassini de Thury (Cassini III), together with his cousin the astronomer Jean-Dominique Maraldi, the cartographer l'abbé Jean Delagrive, and the clock and instrument maker Julien Le Roy.

The measurement of the west to east line, perpendicular to the Pairs meridian – in order to measure the country's breadth – would begin in June of 1733, when the group set out from Paris to survey the route to St Marlo in the west. The work was completed by late October, and Cassini gave a lecture to the Académie de Sciences the following month. Soon afterwards the group measured the line from Paris to Strasbourg, with Cassini giving another lecture regarding his findings to the Academy in

mid 1734. Both these lectures are recorded in the present work, together with maps showing the triangulation stations of both surveys. The survey not only gave a measurement (west to east) that would be essential for completing the map of France, but also provided evidence for the shape and size of the earth, a question that had consumed geographers since antiquity.

Oblate or Prolate?

In its strictest sense, and certainly the definition used in the eighteenth century, geodesy is the calculation of the earth's size and shape.

Cassini, in the introduction to his lecture: 'De la grandeur et de la figure de la terre' (1720), set out the historical context for such an endeavour:

"Nothing was more important for [ancient] Geography than to know the size of the Earth, and nothing seemed more difficult to undertake. For how is it possible to measure this vast expanse of continents, the surface of which is covered with an infinity of mountains which render it uneven, and which is intersected in so many ways by rivers and lakes and by the seas that surround it on all sides. Pliny, therefore, admired the boldness of the human spirit to dare to attempt such difficult things, and one would never have succeeded in doing so, if one had not tried to determine the whole circuit of the Earth by the measure of one of its parts, which one was able to do on the supposition that its figure was spherical. (trans.)"

Since Eratosthenes's remarkably accurate calculation of the earth's circumference, in the second half of the third century BCE, the size of the globe had been known, with the earth's sphericity taken for granted. This situation changed with Isaac Newton's 'Philosophiæ naturalis principia mathematica' of 1689.

"Newton argued that the earth is not actually spherical. His calculations suggested that the earth is flattened at the poles [ie oblate] as a consequence of gravitational attraction acting within a rotating fluid" (Edney).

This hypothesis was challenged by Cassini's triangulation of the Paris meridian of 1718. When he compared the angles of the meridian at each end, the numbers pointed to an earth elongated towards the poles. This erroneous conclusion – due to the measuring devices not being sufficiently accurate – was reinforced by his surveys of 1733 and 1734 (outlined in the present manuscripts), which gave degrees of longitude smaller than those concurrent with a perfectly spherical earth.

Although Cassini would hold on to his belief of a prolate world, two French expeditions to measure the meridian at the equator and near the poles, would prove Newton's hypothesis. Both missions set out in 1736: the first under the command of Pierre Louis de Maupertuis was sent to the river Torne in Sweden, near the arctic circle; the second under the command of La Condamine, Bouguer, and Godin was sent to Quito in present day Ecuador. The expeditions confirmed Newton's theory that the earth was an oblate sphere.

Provenance:

The work was produced and bound for Germain-Louis Chauvelin (1685-1762), Marquis de Grosbois, a politician who served as "garde des sceaux" (keeper of the seals) and Secretary of State for Foreign Affairs under Louis XV. In 1727, Chauvelin was put in charge of the department of publishing, printing and censorship and was given the presidency of the seal. He would fall out with the king is 1737, and spend the rest of his life away from court. His impressive library was sold in Paris in 1762. Both manuscripts were later published in Royal Society's journal, 'Histoire de l'academie royale des sciences', in 1735 and 1736 (389-405pp and 434-452pp). Neither publication

contains the accompanying maps, present here.

Rarity

We are only able to trace two institutional examples similar to the present manuscript: Cornell University, the eastern survey (ie Paris to Strasbourg) only, bound in full calf for Jean-Frédéric Phélypeaux de Maurepas, who was the Secretary of the Navy and Secretary of the Royal Household; and an example held at the Bayerische Staatsbibliothek.

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Price: £75000

Inventory reference: 21950