

Mapping Skies and Continents: The Production of Two Portuguese Scientific Atlases in the Era of Napoleonic Expansion (1799-1813)

Iris Kantor¹ and Thomás A. S. Haddad²

¹ University of São Paulo
e-mail: ikantor@usp.br

ORCID iD: <https://orcid.org/0000-0003-4626-168X>

² University of São Paulo
e-mail: thaddad@usp.br

ORCID iD: <https://orcid.org/0000-0003-1446-9961>

Submitted: 3 February 2020. Accepted: 30 October 2020.

ABSTRACT: To what extent the circulation of scientific knowledge was shaped by the European imperial geopolitics in the late-eighteenth century? Recruited to fulfill tasks increasingly considered essential to the very workings of imperial administrations, scientific practitioners of the time paradoxically seem to make use precisely of this encroachment in state apparatuses to secure some degree of autonomy for their nascent field. Thus, every material form of circulation of scientific information must be ultimately understood as an act of political consequences. Here we present these ideas through the analysis of two concrete scientific artifacts, which can exemplify the circulation of scientific information inside and across empires: two atlases, one terrestrial and one celestial (the latter being a version of Flamsteed's famous atlas of 1729, by way of intermediate French editions), produced in Portugal at the turn of the nineteenth century. Discarding the simple assumption that such cartographic artifacts might have a "utilitarian" use to Portuguese imperial administration, we aim to insist on their political and communicative nature, grounded on their modes of participation in trans-imperial pathways of circulation of knowledge, people, practices, and models of scientific authority (entangling Britain, France, and the Americas in multiple time scales). We also highlight how the atlases contribute to the affirmation of new patriotic science in Portugal, and explore the markedly didactic vocation of both objects, which also stress the question of the recruitment and reproduction of a new kind of imperial elite.

KEYWORDS: Terrestrial Atlas; Celestial Atlas; Portuguese Imperial Mapmakers; Astronomy; Scientific Networks.

Citation / Cómo citar este artículo: Kantor, Iris and Haddad, Thomás A. S. (2021) "Mapping Skies and Continents: The Production of Two Portuguese Scientific Atlases in the Era of Napoleonic Expansion (1799-1813)." *Culture & History Digital Journal*, 10 (2): e020. <https://doi.org/10.3989/chdj.2021.020>

RESUMEN: *Mapeando cielos y continentes: la producción de dos atlas científicos portugueses en tiempos de la expansión napoleónica (1799-1813).*— ¿Qué relación podemos establecer entre la geopolítica europea y la circulación del conocimiento científico a fines del siglo XVIII? Reclutados para cumplir con tareas cada vez más esenciales para el funcionamiento de las administraciones imperiales, paradójicamente, los científicos de la época parecen emplear su posición en los aparatos estatales para asegurar cierto grado de autonomía para su floreciente actividad. Por tanto, toda forma material de circulación de información científica debe entenderse como un acto de consecuencias políticas. Aquí presentamos estas ideas a través del análisis de dos artefactos que ejemplifican la circulación de información científica dentro y a través de imperios: dos atlas, uno terrestre y otro celeste (el último es una versión del famoso atlas de Flamsteed de 1729, recibido a través de ediciones en francés), producidos en Portugal a principios del siglo XIX. Descartando la simple suposición de que tales artefactos cartográficos podrían tener un uso "utilitario" para la administración imperial portuguesa, nuestro objetivo es insistir en su naturaleza política y comunicativa, basada en su participación en las vías trans-imperiales de circulación del conocimiento, las personas, las prácticas y los modelos de autoridad científica (vinculando Gran Bretaña, Francia y América en múltiples escalas de tiempo). También destacamos cómo los atlas contribuyen a la afirmación de la nueva ciencia

patriótica en Portugal, y exploramos la vocación didáctica de ambos objetos, que también acentúan la cuestión del reclutamiento y reproducción de un nuevo tipo de élite imperial.

PALABRAS CLAVE: Atlas terrestre; Atlas celeste; Cartógrafos imperiales portugueses; Astronomía; Redes científicas.

Copyright: © 2021 CSIC. This is an open-access article distributed under the terms of the Creative Commons Attribution 4.0 International (CC BY 4.0) License.

INTRODUCTION

Issues of scientific communication have been attracting interest from historians. How do the artefacts materialize geopolitical issues through trans-imperial appropriation of scientific knowledge? Differently from seventeenth-century courtly patronage systems, with an ideal *cursum honorum* based on the accumulation of prestige before competing factions and patrons, late-Enlightenment Portuguese men of science do not depend exclusively on traditional loyalties to mediate new kinds of relationships with the state itself. With different temporalities and proximal causes, the exact same process—ultimately connected to the overarching theme of the centralization

of modern states—can be traced in other European regions: even if still engaging in clientele relationships with sectors of the nobility, scientific men become more and more encroached in state apparatuses—not to be confounded with dynastic or government interests—, which become fundamental nodes of new reciprocity networks. Ultimately, recruited to fulfill tasks increasingly considered essential to the imperial administration, scientific men, paradoxically they seem to make use precisely of this dependency on the State to secure their own *autonomy* within the field (Bourdieu, 1976).

At any rate, being a scientific practitioners and a clients of powerful patrons, servants of centralized states, or acting with self-orientation meant that they engage must

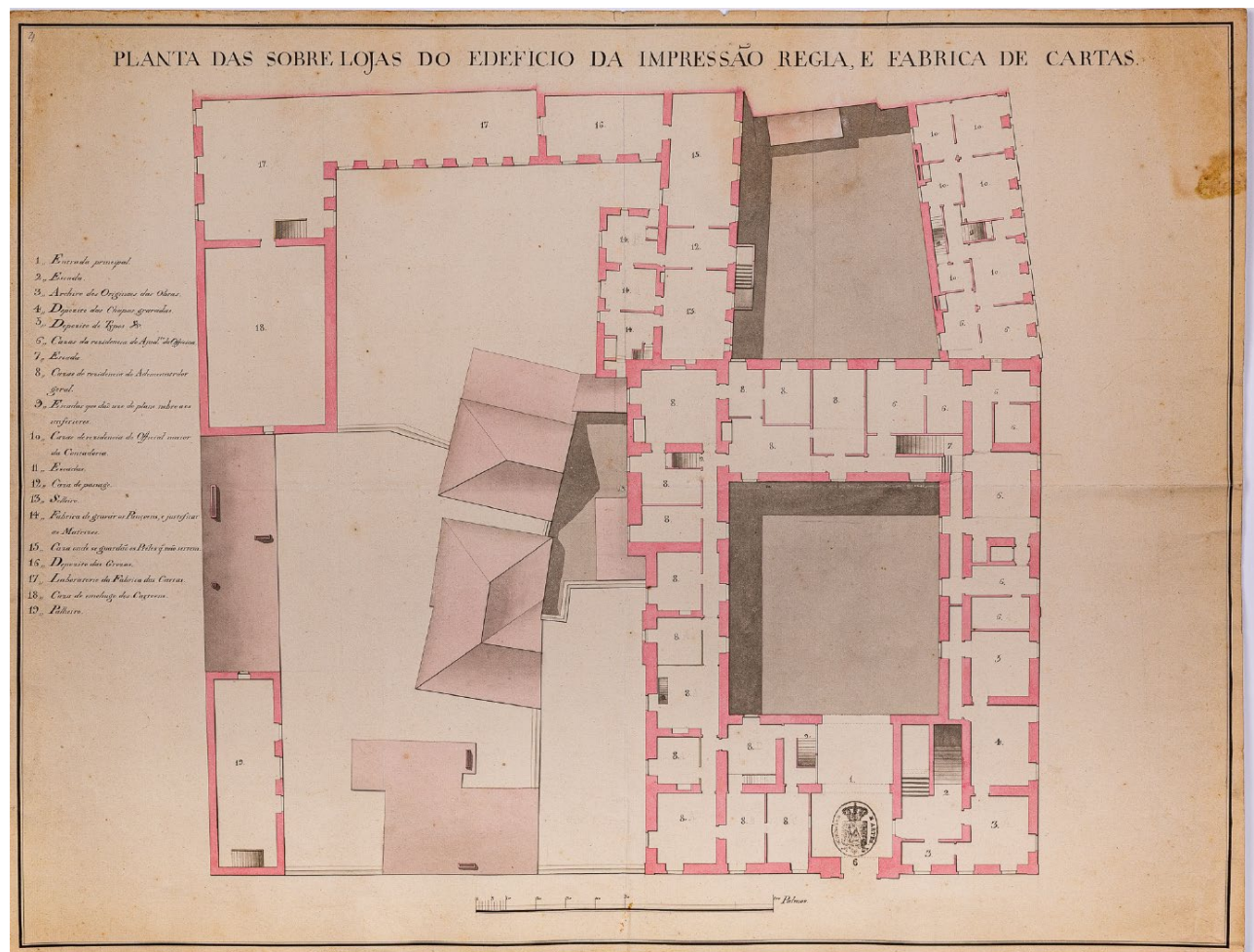


FIGURE 1. Royal Press, architectural plan, including a dedicated office to engrave and print maps. Coleção Imprensa Nacional-Casa da Moeda, Lisboa.

be simultaneously understood as an act of sociopolitical communication. For the specific case of late-Enlightenment Portugal, we aim to explore this idea following two concrete scientific artifacts, which can testify to the extension and density of the circulation of scientific information, and how it entails a large-scale network of communication inside and across empires: two atlases, one terrestrial and one celestial, produced in Portugal against the backdrop of decades-long efforts to reform the economic and administrative bases of the empire in the era of Napoleonic Wars and constitutional projects.

The aim of this article is to figure the process of elaboration of two atlases—one celestial and one terrestrial—in the context of the reconfiguration of diplomatic alliances and intensification of flow of scientific information fostered by the Napoleonic wars, which ultimately led to the transfer of the Portuguese court in Rio de Janeiro in 1808 (Kury, 2004). The printing matrices of the two atlases were also transferred to Rio de Janeiro together with the impressive collection of engravings and copperplates of the Lisbon printing house *Tipografia do Arco do Cego* (in operation from 1799 to 1801), which was under the responsibility of the influential Franciscan and botanist José Mariano da Conceição Veloso (1742-1811). After the closure of the *Arco do Cego* enterprise, all of its assets, about 60 highly skilled workers and even Veloso himself were incorporated by the *Impressão Régia* (Royal Press), which had been founded in 1768 (see Fig. 1 the level of sophistication of the Royal Press at the time it inherited the *Arco do Cego* project). To have an idea about the output of the *Arco do Cego* press, in less than four years it oversaw the translation and publication of over 90 scientific works that sought to reorient the Portuguese imperial economy.¹ After Veloso's death, about 1700 copperplates engraved at the *Arco do Cego* were sent to the Royal Library in Rio de Janeiro in 1813, together with several other important materials that were kept by Veloso.

Incepted at the *Arco do Cego*, the celestial atlas was finally published under the imprint of the Royal Press in 1804. A few of the original engraved copperplates were among the materials dispatched to Rio de Janeiro in 1813 (Fig. 2). The terrestrial atlas ended up never being published, but a proof print run, with 52 maps, and 46 copperplates, were also sent to Rio as part of Veloso's spoil.² But going beyond the identical places of origin and destination of the copperplates and the editorial project provided by Veloso, the article offers evidence that leaves no room for doubt that the terrestrial and celestial atlases shared a much longer history of inception and production.

An analysis of documents of the *Arco do Cego* and the Royal Press allowed us to identify which were the models for the two atlases, to figure out the bricolage practices involved in their production, and the ways their meanings were transformed by the editorial process. This in turn allows us to high light the nationalization of late-Enlightenment scientific culture, under the auspices of the Portuguese crown, which sponsored institutions such as the Lisbon Academy of Sciences (1779), the aforementioned *Arco do Cego* and Royal Press, the Royal Maritime, Military, and Geographical Society (an institution founded

in 1798 in order to promote the revision and publishing of terrestrial and maritime maps and charts), the Royal Navy Observatory (1798), and the Mathematics Faculty at the University of Coimbra (1772), among others. Moreover, the same institutional complex connects the atlases to an overarching program of educational and economic reforms that were in course since the time of the Secretary of State, the Marquis of Pombal, who intended to breed a new professional elite responsible for the administration of the Portuguese empire (Maxwell, 1995; Araújo, 2000; Kantor, 2004). The mathematicians, astronomers, designers, engravers and diplomats involved in the production of the two atlases interacted frequently in these institutional arenas. As a matter of fact, the pair of atlases seem to have been conceived together, as complementary objects that could well represent and materialize the Portuguese ambitions in the field of international science.

By the turn of the nineteenth century, powerful Portuguese minister D. Rodrigo de Sousa Coutinho was the main political driving force behind all the initiatives mentioned in the previous paragraph. He was able to secure the unflinching support of the Prince Regent D. Joao and promoted the integration of the institutions by bringing all of them under his formal purview and enlisting their members in his own patronage clientele. For Coutinho, these institutions should also help to project an image of a learned and enlightened Portugal to foreign competitors. In the Statutes of the Royal Navy Observatory, for instance, he had it stated that the director of the Observatory must send reports not only to the Royal Maritime and Geographical Society, but also to other national and foreign scientific societies (Reis, 2009, p. 52).

This institution was especially important for Coutinho's project, modeled as it was on foreign institutions such as the Bureau des Longitudes, created in France in 1795, the Admiralty Hydrographic Service, created in Great Britain in the same year, and the Spanish Hydrographic Directorate, created in 1797 (Martins, 2014, p. 240). Foreign personnel were also sought after by Coutinho in order to staff his "scientific-geopolitical" institutional complex: to give just one important example, the chief engraver of maps at the Royal Maritime Society was the French artist Louis-André Dupuis,³ who was also a professor at the Lisbon Academy of Fortification, Artillery and Drawing. He had been hired together with other foreign artists to refine the production of copper engraving, particularly for cartographic projects, and the manufacturing of naval and topographical instruments (Faria, 2005, I, p. 269; Martins, 2014).

While analyzing the composition of the library of a number of these institutions, we could identify the authors and editions that may have served as models for the elaboration of the celestial and terrestrial atlases. The library of the Royal Navy Observatory in Lisbon, for example, had three copies of the celestial atlas of John Flamsteed, with their tables and explanations (Reis, 2009, p. 56). In the *Arco do Cego* Library we also find one edition of Flamsteed's atlas; and many universal atlases that could probably being used to compose the terrestrial atlas.



FIGURE 2. (a) Copperplate “Judea Santa ou Terra Santa.” (b) Copper printing plate engraving matrix (24.8 × 29.6 cm). [Arco do Cego Atlas]. Lisboa: Ofic. Tip., Calcografica e Literaria do Arco do Cego [1799-1801]. Fundação Biblioteca Nacional do Rio de Janeiro, Brazil.

In the private library of D. Rodrigo Sousa Coutinho we also find a French edition of the atlas of Flamsteed, and terrestrial atlases of different nationalities that probably served as an example for the making of the Portuguese terrestrial atlas. Among the models that seem most evident to us, we can quote the atlas that accompanied the work of Abbé Raynal, as well as the indication of an “Atlas de Vaugondy” in the library that belonged to the Arco do Cego. Both can be seen at the library of the Academia dos Guarda Marinha, also (Pereira, 1812; Leme, 2019, p. 286).

But the history of the Portuguese reception/transformation of these objects is even more convoluted. The celestial atlas published in 1804, for instance, was an abridged translation (of texts and images) of a French atlas from 1795, edited by astronomers Jérôme Lalande and Pierre Méchain. This French book was, in turn, a revised edition of a former atlas from 1776, prepared by instrument maker Jean Fortin. And Fortin’s version was itself a revision of John Flamsteed’s 1729 posthumous magnum opus. Flamsteed’s atlas was based mainly in his painstaking catalogue of stars visible from London, although it already included a planisphere of the southern skies based on the observations his foe Edmund Halley had made in the island of St. Helena. It was intended as a monument to British astronomy and to the memory of Flamsteed himself, the first Astronomer Royal, both of which converged as it were in the Greenwich Observatory. The subsequent French editions made ever more use of southern observations, especially those originating from Nicolas-Louis de Lacaille’s global network of observers.⁴

In French hands, the atlas became a wholly different object (also in its material presentation), gaining airs of a handbook of practical positional astronomy with an emphasis on the tools needed for multi-sited, widespread observational enterprises. Thus, the French versions testified to the sheer change of scale in the practice of astronomy that took place during the eighteenth century, all the while resolutely claiming a central role to France’s scientific institutions in the shaping of such large-scale projects.

In its turn, the ultimate sources of the charts that comprise the terrestrial atlas cannot be traced as straightforwardly as in the case of the celestial one (as a rule, celestial atlases have always been more “coherent” entities). By a careful historical-cartographic analysis of the charts, though, we show that the atlas is a bricolage of Portuguese reworking of mainly to French atlases produced in the eighteenth century with various purposes.

The terrestrial atlas reveals the self-representation of late-eighteenth century Portuguese territorial aspirations in a global scale, as well as part of the same imperial imagination that animated the production of the celestial counterpart. This is most strikingly evident in the way it depicts Africa and more specifically in the continent’s toponymics, which we study in detail in order to show how Portuguese interests and circuits of information were deployed in the maps, marking their distance from its foreign matrices even as communicating a form of patriotic design into transnational (and trans-imperial) modes of scientific practice.

Discarding the simple assumption that such cartographic artifacts might have any immediate practical utility for Portuguese imperial administration, we insist on their political and communicative nature, grounded on their modes of participation in trans-imperial pathways of circulation of knowledge, people, practices, and models of scientific authority. We also highlight how the atlases contribute to the affirmation of a form of “patriotic science” in Portugal, and explore the markedly propaedeutic vocation of both objects, which points to their being part of a larger (geo)political project committed to the recruitment and reproduction of a new administrative imperial elite (Kantor, 2016).

Either in the case of the terrestrial atlas, or in its celestial counterpart, the intention of their makers was to revise models of astronomical and geographical knowledge disseminated by European atlases, especially in England and France, updating them with more accurate information and mathematical calculations, gathered by Portuguese engineers, mathematicians and astronomers. In other words, Portugal was jumping into a policy of extroversion and national affirmation of its own model of knowledge production.

ON THE TRANSITS OF SCIENTIFIC OBJECTS

Books, maps, and atlases are without a doubt among the fundamental cultural objects of the sciences (Frasca-Spada and Jardine, 2000; Kusukawa and MacLean, 2006). More than instruments, techniques, or even people, printed texts and images (broadly understood) long dominated research agenda of the history of science, given their air of finished and definitive products, carrying supposedly established and unquestionable truths, with which any “reasonable” reader would agree.⁵ Although it is trivial to observe that any cultural object changes its meaning when it undergoes transits in space and time, the particular case of scientific artifacts such as books and maps seems to be always met by the expectation that they would be protected, as if in principle, by their technical contents, incapable of undergoing any change in meaning. However, to follow the movements of such scientific objects, as far as cultural history is concerned, is not to narrate the triumph of content over form or transformation, but rather to understand the changing uses and meanings of the objects in each place, context, and community (of readers, translators, users, producers and so on) through which it travels (Livingstone, 2003; Secord, 2004; Raj, 2007; Roberts, 2009).

The Enlightenment ideal of universality of the sciences, be it either “real” or “perceived,” has also acted powerfully to erase another fundamental scale for understanding the transits changing meanings of scientific objects: the scale of nations.⁶ The observation is somewhat paradoxical, for more than one reason. First, certain sciences played a decisive role in the very invention of national units. They are those that we could call the “sciences of ethnicity,” such as linguistics, ethnography, even biology, not to mention the “sciences of the territory,”

such as cartography, geography, and geology, and, obviously, history itself. At the same time, areas such as mathematics, astronomy, or physics, apparently the immune to any local conditioning, have participated, and still do, in national fictions and constructions. On the other hand, and therein lies the apparent contradiction, no national construction assumes that the law of gravitation is only English, that microbes only exist on French soil, or that quantum physics only explains the properties of German atoms. In fact, it is fundamental for national mythologies that the discoveries of a nation's scientists be recognized precisely as universal, almost as "gifts" generously offered to the whole of humanity.

Once again, books, maps, and atlases appear as the alleged bearers of these gifts. They would just be translated or reproduced, passively adopted by new communities of readers. It is necessary to reiterate the obvious: despite their apparent continuity, they undergo deep transformations in their contents, forms, uses, and meanings. In the transits of scientific objects, particularly in the case of translations and appropriations, historical analysis must attend not to internal comparison between "original" and "version," but to the new semantics of the objects themselves.⁷ This can be done by paying attention to material aspects, paratexts, contexts, following the actors involved in the transits, and understanding how these objects are incorporated in cultural constructions that range from the scale of individuals or groups to that of the nation.

Let us consider, for instance, our celestial atlas. Successively published in London (1729 and 1753), Paris (1776 and 1795), and Lisbon (1804), Flamsteed's *Celestial Atlas* was not simply translated and reprinted over almost eight decades. From London to Paris, profound changes took place in all formal aspects and in part of the contents of the book. From a commemoration of British astronomy and a posthumous monument to the memory of its "author," John Flamsteed, the first royal astronomer in charge of the Greenwich Observatory in the late seventeenth century, the atlas became an almost exclusively French enterprise. It went from a monumental book, with somewhat dubious employability in practical astronomy, to the condition of a practical handbook of observational astronomy. Physical dimensions were reduced and printing costs decreased; all maps were redrawn taking advantage of almost half a century of new observations of the positions of the stars, made by French astronomers, mainly in the Southern Hemisphere, with new instruments (Paris rivaling London, or even surpassing it, in the market for the manufacture of scientific instruments); tables, instructions, practical problems of astronomical observation and calculation and their solutions were included.

It is in this French incarnation that the book aroused the interest of the Portuguese cultural-editorial-cultural-political project represented by the Arco do Cego (although the publication only took place in 1804, through the Portuguese Royal Press, after the extinction of Casa do Arco do Cego). Once again, the object was adapted to another cultural and linguistic area, taking on new meanings and functions. Although the title page proudly

indicates that it is an edition in which the French atlas is "correct, and augmented," the fact is that there is no correction in the French astronomical data and part of the content is discarded—the parts that could be employed for the teaching of astronomy. If it was not any more the monument-book that it was in England, nor the technical manual and index of the vertiginous growth of French astronomy represented by the Parisian versions, what does the Portuguese edition stand for?

But one last transit, a final passage, was yet to come, as a consequence of the French invasion and the flight of the Portuguese court to Rio de Janeiro. The *Atlas Celeste de Flamsteed* (the Greenwich astronomer's name was never abandoned, either in the Paris or Lisbon editions) also crossed the Atlantic, accompanied by the copperplates with the engraved sky maps, still preserved in the Brazilian National Library.⁸ Again, then, what matters is understanding the uses and meanings of the atlas in the new capital of the Portuguese empire, within newly founded cultural and educational institutions.

FIRST CASE: THE TERRESTRIAL ATLAS

The terrestrial atlas was a project of one of the most remarkable cultural and political institutions of late-Enlightenment Portugal, the Royal Maritime, Military and Geographic Society for the Design, Engraving and Printing of Hydrographic, Geographic and Military Charts, established in 1798 on the initiative of the Minister of the Navy and Overseas, D. Rodrigo de Sousa Coutinho (Mota, 1972; Silva, 2006, II, pp. 97-126). By means of this official body, Portugal defined for the first time an official policy for the publishing and sale of maps in its domains. Among the stated objectives of the new institution was the correction of the "deformations and errors" conveyed by foreign cartography, especially Dutch, French and English. In the charter for the creation of the Royal Maritime Society, the queen mentions the lack of accurate maps: "and having present [...] the lack and shortage that my Royal and Merchant Navies have of good hydrographic charts, to the point of having to acquire them from foreign nations, only to put into use some charts that, due to their inaccuracy, expose navigators to very serious dangers."⁹ Thus, the charter ordered the Royal Maritime Society to examine, correct, and approve the sale of all printed maps, either national in origin or foreign made. Errors encountered in foreign charts were to be publicly announced by the Society.

The Royal Maritime Military Society inaugurated a new attitude of the Portuguese crown regarding the restrictions on the dissemination of cartographic knowledge of its overseas conquests. Besides exerting strict control over the dissemination of geographical information in the form of maps, the Society had exclusive rights for the inspection and approval of maritime compasses, which should carry the identity of their manufacturers in order to avoid counterfeiting. Finally, the Society was to publish "the best and most accurate" astronomical tables and celestial charts.

According to the statutes, the geographical, military, and hydrographic charts prepared by members of the Royal Maritime Society, whether large or small, should always use the Portuguese meridian established by the Royal Navy Observatory in Lisbon. In line with the reorganization of Portuguese imperial geography accelerated by the Napoleonic expansion, which was met with projects for the establishment of manufactures on the coast of Malabar and the execution of an “old, useful and never executed project of the meeting of the two coasts of Africa.”¹⁰

The production of the terrestrial atlas, circumstantially interrupted and never finished, conceived by the cartographers of the Royal Maritime Society and partially engraved at the Arco do Cego workshop, represented an important initiative in the age of constitutional revolutions and territorial reorganization of European empires. Differently from other atlases published in the beginning of the nineteenth century, sponsored by the Portuguese

crown in 1814 (as was the case of the *Atlas Universal*, copied from Guthrie/Arrowsmith), the unfinished atlas of the Royal Maritime Society allows one to observe the remarkable effort made by the ruling elites to gain legitimacy in the international diplomatic arena and to validate in scientific circles the cartographical knowledge built up by the Portuguese over the eighteenth century.

What models may have served as starting points for the making of this atlas? How did the Royal Maritime Society appropriate the insurgent geography of the famous work of Abbé Raynal, made by the maritime hydrographer Rigobert Bonne.¹¹ The Portuguese Atlas is a curious compilation of printed geographic maps, where geographical information was added, especially from Portuguese colonial possessions. French atlases were made to wide audiences and with great circulation at the time. These atlases, as well as globes and mural maps, tried to attract the attention of the general public, presenting ancient and modern maps, historical maps, whether from remote times

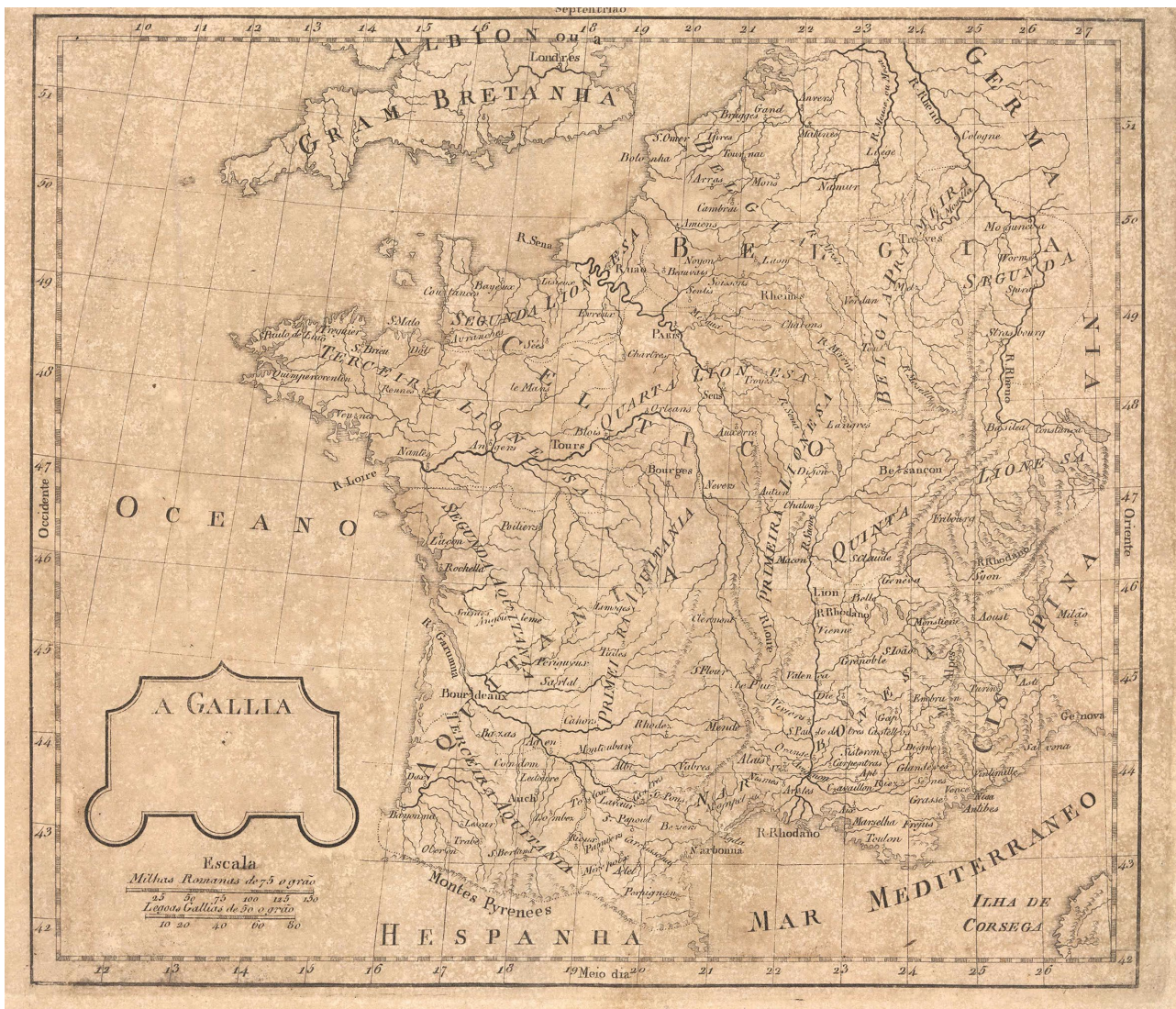


FIGURE 3. (a) “A Gallia.” (b) “França” (24.8 × 29.6 cm). [Arco do Cego Atlas]. Lisboa: Ofic. Tip., Calcografica e Literaria do Arco do Cego [1799-1801]. Fundação Biblioteca Nacional do Rio de Janeiro, Brazil.

or from ancient biblical times, combining with information that also sought to inform about the reorganizations of the political world map. Here is no doubt that the Atlas was intended for the Portuguese-speaking public, since in the vast majority of maps, the names of places were translated into Portuguese, which seems quite representative of the pedagogy of the Enlightenment.

The well-known Atlas of Robert Vaugondy was the main model for the Portuguese, but not exclusive. We have some interesting historical maps from the biblical times and the Roman period: “the first epochs of the world,” Roman Gaul, Ancient Judea... But, the great majority of the maps concern with up-to-date information, reflecting geopolitical knowledge of a world undergoing a rapid transfiguration after the French Revolution. France is represented according to the post-revolutionary model (32 departments) (Fig. 3).

Curiously, the map of Brazil is unfinished, and does not correspond to the entirety of Portuguese America. The incomplete map of Brazil, however, does not correspond to the cartographic knowledge, since at that time, the continental scale map of Brazil had already been made, although it was not accessible to a large majority of the public, but only for diplomats and military officials (Fig. 4).

It seems that the atlas intended to satisfy the expectations of that public due to the greater number of maps of Asia and Europe, which together account 31 from the 51 total. Here we have the numbers: Europe (21 charts), Asia and Middle East (10), Africa (6) and America (only 4).

How to identify the matrix that has been worked. Some maps suggest the use of Raynal/Bonne maps. The fragmentation of Portuguese sovereignty in America was very common for French maps of South America to depict the region of the Río de la Plata and the Amazon region as autonomous geopolitical units (Province of Paraguay and Country of the Amazons). In the map of Africa, the name of d’Anville is mentioned, also.

The lack of more maps of the Americas is intriguing, above all because at that time the Royal Maritime Society had presented to its fellows the most accurate map of Portuguese America to date, called *Nova Lusitania* (1797), made by Antonio Pires da Silva Pontes Leme. The map, produced by a cartographer born in Brazil, aimed to demonstrate to other great powers that Brazil constituted an indivisible unit, both physically and geopolitically. This map reflected the desire of the administrative elite to consolidate a homogeneous and contiguous image of Portuguese spatial occupation.

In fact, the atlas presents only 4 charts to represent the American continent as a whole. There is one map representing the South America north to the Paraguay River, stretching longitudinally from the Atlantic to the Pacific coasts. The second one represented Paraguay, Chile, and Strait of Magellan. The third map was devoted to Central America, including the Caribbean, New Spain and New Mexico, again from the Atlantic to the Pacific. And finally, the fourth map, which bears no title, represents the United States and Canada and the strait of Bering. There is also an unfinished map that we can deduce should be dedicat-

ed to the Peruvian Coast: it consists of a mute map where we can only see the rivers and some indigenous houses.

But the lack of American maps, or even a Brazilian map, can be attributed to the incompleteness nature of this atlas, whose execution was probably interrupted by the death of the French engraver (André Dupuis) who served in the Royal Maritime Society and was also preparing the *Portuguese Neptune*. We can imagine that a third maritime atlas could be probably also being planned.

SECOND CASE: THE CELESTIAL ATLAS

The printing press made the Reverend John Flamsteed always distressed and apprehensive. Despite being nominated as Charles II’s “Astronomical Observer” in 1675, under the age of thirty, and almost immediately elected a member of the newly founded but already influential Royal Society of London, Flamsteed was basically a self-taught, Anglican cleric with strong Puritan tendencies, and a country man.¹² The endless buzz of London’s huge publishing market and the coffee-houses that were a fundamental part of bookish sociability, the treacherous maneuvers of the bookshop corporation and the English scientific elite, all repelled him. He had received the royal commission to oversee the implementation of an astronomical observatory in Greenwich and to “apply himself [...] to the rectifying of the tables of the motions of the heavens, and the places of the fixed stars, so as to find out the so much-desired longitude of places for the perfecting of the art of navigation,” and that was what he intended and should do (Baily, 1835, pp. 111-112). When the telescope began observing the London sky at the behest of the king, it had been a common part of astronomical practice for at least half a century, and its task was, above all, a job of patience: equipped with the catalog of prepared star positions and published by the Danish Tycho Brahe in the previous century, of some celestial letters and auxiliary instruments, and assisted by the young Abraham Sharp (who was followed by other collaborators), the task that would consume four decades of his life was monotonous and perfectly repetitive. It was a question of locating the stars in Tycho’s catalog, about a thousand, and increasing the precision of their coordinates, raised by him in the pre-telescopic period. With the optical instrument at his disposal, however, the work multiplied indefinitely: in addition to the reobservation of the stars in the old catalog, Flamsteed could see many others, visible only with the telescope. The result of his work was the determination of the coordinates of more than three thousand stars, scanning the sky practically until the day of his death, in 1719.

The king’s order to “rectify” and “perfect” the positions of the stars was an unquestionable absolute for Flamsteed. His catalog of star coordinates was never ready for printing. The possibility of making a mistake, even on the faintest star, terrified him. The documents show it abundantly. Deliver an incomplete catalog to the wolves of the booksellers’ corporation, risk the work of a lifetime to piracy always on the prowl, in London itself or abroad, suffer the threat of a distracted eye, a careless hand of a

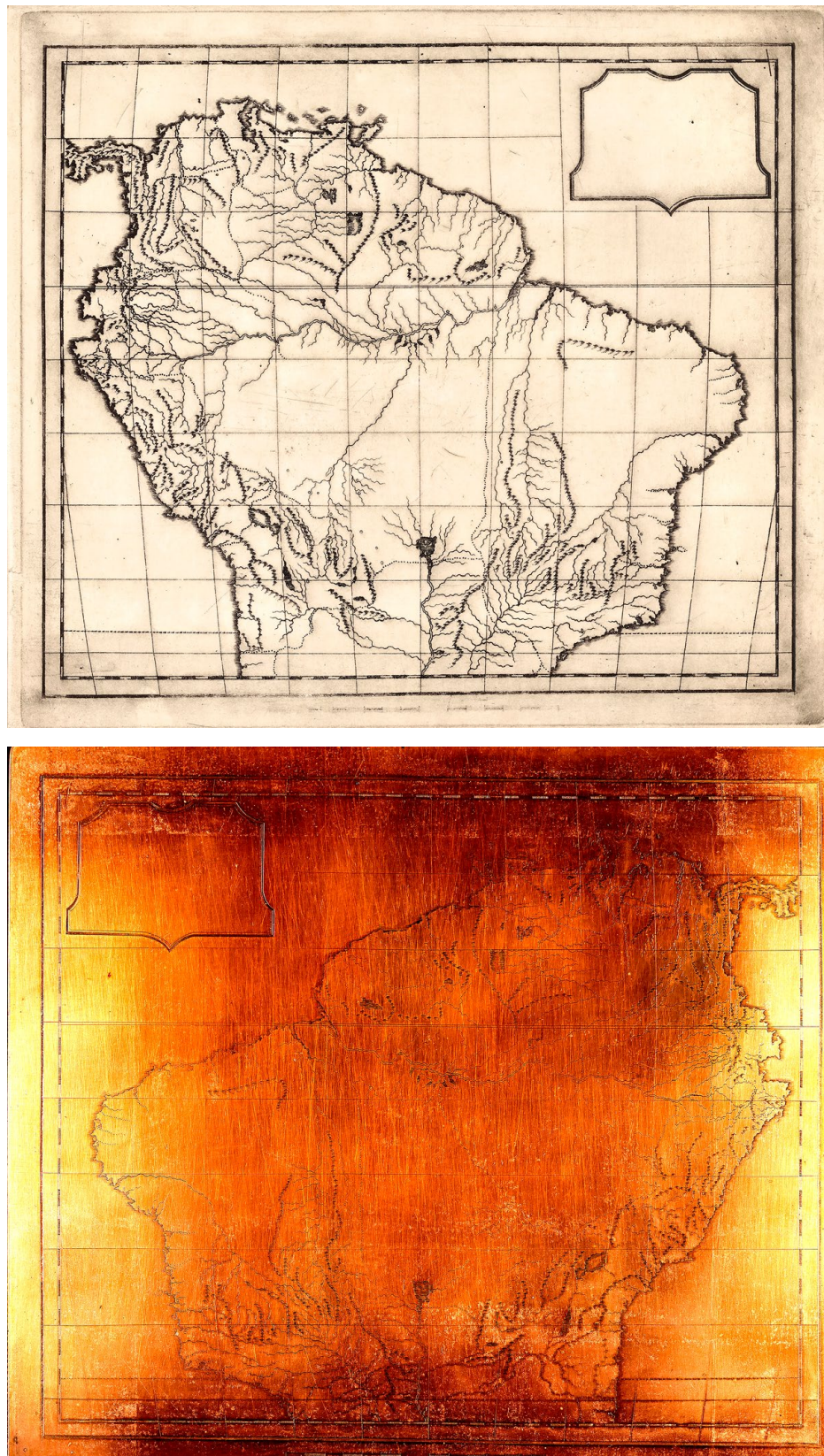


FIGURE 4. (a) Copperplate [“Brasil” or “America do Sul”]. (b) Copper printing plate engraving matrix (24.8 × 29.6 cm). [*Arco do Cego Atlas*]. Fundação Biblioteca Nacional do Rio de Janeiro, Brazil. Many charts remain incomplete as the map, although the Maritime Society had produced a very actualized map of Brazil at the time.

typographer changing patiently some of the thousands of numbers established, verified, certified—everything was unbearable. That Isaac Newton, then President of the Royal Society, and Edmund Halley confiscated their tables in 1712 and forcibly published a first edition of Flamsteed's endless catalog, only confirmed his suspicion about the corruption of the scientific world and of booksellers. At his own expense, he bought the 300 copies he managed to find out of the 400 copies print run and burned them without remorse (the others had already been sent by the Royal Society to other European academies and courts, no doubt as a symbol of the power of British science). He recovered his notes and continued to hunt for stars until he died in 1719, while slowly entering into negotiations to finally publish the catalog, accompanied by a celestial atlas that would represent his brightest stars.

It was his widow Margaret and former assistants who finally gave Reverend Flamsteed's life's work to the print. First, in 1725, the catalog with almost 3,000 stellar positions, which he had already decided to call *Historia Coelestis Britannica*. More than an endless list of coordinates, the book was the story of astronomical observation itself according to Flamsteed. A long narrative part came from the Hellenistic world to himself, from Alexandria to London, from one noble patron to another. It was the largest catalog ever collected and published, and it was—the title already announces it—British. In 1729 the atlas that Flamsteed had always thought should accompany the catalog, financed by a subscription mechanism, and dedicated to King George II was finally printed. A book of enormous dimensions, in the largest folio available at the time for the printers of London, with its open leaves exceeding 80 centimeters in width and 55 centimeters in height, the *Atlas Coelestis* contained 27 celestial charts in double page.

The first London edition is, above all, a posthumous vindication of Flamsteed's obsessive work against the usurpation of Newton and Halley.¹³ His portrait flanking the frontispiece already indicated it, and the preface, probably written by former assistant James Hodgson, confirms it:

To render the *indefatigable Labours* of Mr. Flamsteed as useful and beneficial to Mankind as may be, as well as to complete the Work already publish'd, it has been judg'd very necessary by his Executors to carry on, and perfect the following Sheets, which contain all the *Constellations* visible in our *Hemisphere* (p. 1).

In 1776, Flamsteed's atlas became another object in France, in the hands of the manufacturer and dealer of scientific instruments Jean Nicolas Fortin. By that time, Fortin already had the privilege of “mechanical engineer of the King and the royal family, for the globes and spheres,”¹⁴ which guaranteed him excellent deals with the vibrant Paris Observatory and the Royal Academy of Sciences. Over time, he would become a supplier of analytical scales for Lavoisier, of different equipment for Gay-Lussac and François Arago, and, untouched by the

Revolution, he would still gain the trust of the Weights and Measures Commission, for which he prepared the metallic cylinder that defines the standard kilogram. His *Atlas Céleste de Flamstéed* bears, on the titlepage, the approval of the Academy, and was published within the framework of the privilege of that institution. It was sold in the store of F. G. Deschamps, on rue S. Jacques, and in the establishment of Fortin itself, on the rue de la Harpe.

Fortin's 1776 edition strikes first by its reduced size: it is a portable book, less than one-third the size of the English 1729 and 1753 editions. Second, in Fortin's hand the atlas became much more than a collection of star charts (re-engraved from the original, or made anew, especially in the case of the Southern hemisphere, using data from Lacaille's global network of observers):¹⁵ it gained many textual sections, including a catalogue of stars, lists of constellations, cross-references, and mathematical exercises of great interest for learners and practical astronomical observers—including exercises in the manipulation of data that would have been gathered with the use of instruments sold by Fortin himself. Thus, in its French incarnation, the atlas was more of a textbook and practical manual than anything else and met with considerable commercial success (Kanas, 2019, p. 198). In 1795 another edition was issued in Paris, based on Fortin's, with corrections on stellar coordinates made by Jérôme de Lalande and Pierre Méchain, besides the introduction of new constellations, nebulae, and a new detailed preface.

It was this 1795 French edition that arrived in Portugal in the late eighteenth century, in the milieu of Frei Veloso's Arco do Cego press. Engaged in the translation and adaptation of foreign scientific material, Veloso commissioned the production of the Portuguese version of the celestial atlas to Francisco António Ciera (1763-1814), cartographer and chair of astronomy at the University of Coimbra, and Custódio Gomes Villas Boas (1771-1809), a military engineer, cartographer, and army officer. Both men were members of the Royal Maritime, Military, and Geographical Society, and had been involved in important mapmaking projects, such as the geodetic triangulation of Portugal. They were thus very well positioned to direct the production of the Portuguese version of the already successful French Flamsteed.

It is remarkable, though, that apart from a preface by Veloso eloquently praising the past contributions of the Portuguese to astronomy (and navigation), the edition, finally published by the Royal Press in 1804,¹⁶ *has no new material whatsoever* in relation to the 1795 French version. In reality, Ciera and Villas Boas's work, described on the titlepage as a “revision and correction” of the latter (Fig. 5), seems to have been exclusively the word-by-word translation of the textual passages and the elimination of all the practical problems, which had rendered Fortin's work so successful among learners and observers alike. The charts were all remade by well-known Arco do Cego draftsmen and engravers, but without any purposeful difference in what was being represented (such as stellar coordinates, nebulae, new constellations or anything else) (Fig. 6). The Portuguese edition is, in this way, basically

an abridgment of the 1795 book, somewhat hastily commissioned by an over-anxious Frei Veloso and prepared by the over-worked team of Ciera and Villas Boas. The titlepage and the preface claim a Portuguese-ness that is not to be “really” found in the book.

But why would we have written “really” under quotations, as we have just done? Because the claim of the atlas having any kind of Portuguese contribution is by itself the Portuguese element that one must pay attention to, apart from the object itself. It is misleading to believe that Ciera and Villas Boas had to “revise,” “correct,” or in any way include “new” material in order for the Portuguese atlas to be Portuguese—it is precisely the claim that matters. In an age of imperial anxiety brought about by the sweeping transformations that had shaken Portugal in the second half of the eighteenth century, deepened as that anxiety was by the French Revolution and the Napoleonic threat, claiming that Flamsteed’s atlas, by way of the French (or, to be faithful to the Portuguese title, the atlas “assembled by Flamsteed, published by Fortin, corrected and enlarged by Lalande and Méchain”) was also Portuguese is the important point. It is this claim that amounts to an affirmation of Portugal’s integration in international

and inter-imperial scientific circuits, and it would have been disingenuous to affirm that only in the case that Ciera and Villas Boas had made changes to the *contents* of the atlas would it be “really” Portuguese.

CONCLUSION: SCIENTIFIC PATRIOTISM IN THE AGE OF IMPERIAL WARS

Rivers of ink have already been used to write about the action of Portuguese enlightened reformism in the “cultural sphere.” In fact, it is undeniable that, since the middle of the eighteenth century, when the Marquis of Pombal’s ministry began, measures to boost the economy and political and administrative reconfiguration (including, particularly, the domestication of the high nobility, or even its substitution by cadres from other social groups) are taken alongside acute practical interventions in domains that rightly belong to the universe of representations, which is typical of culture: the foundation of the Royal College of Noblemen and several royal classes and academies, the great reform of the University of Coimbra, the restructuring of the book censorship system, among many other examples of actions openly aimed at promoting the “lights” in Portugal.

This paper explored the multi-layered story of the transformations that the atlas went through, examining the changes (or lack thereof) in cartographic content, its material characteristics, the nature of paratexts, and the stakes held in it by the Portuguese scientific and technical experts and politicians involved in its production and commercialization. By combining an analysis of the artefacts themselves, along with previous editions or possible models, with archival material pertaining to the whole editorial process undertaken in Portugal, we traced the meanings of the celestial and terrestrial atlases to different actors and institutions, pointing to what sort of (political) communicative acts they were performing. We also investigated the political underpinnings of the range of scales embodied in the objects and in their movements (from single observatory to multiple observers, from one language to another, from “monument” to handbook, from the British to the French to the Portuguese empires and their respective scientific institutions), as well as the distinct modes of engagement of the “national” with the “transnational” and global in a setting of imperial reform and crisis.

By way of conclusion, one of the points we wish to highlight is that the Atlantic revolutions, and later the Napoleonic expansion, enhanced processes of circulation and appropriation of scientific knowledge amongst cartographers, sometimes reinforcing strategic alliances, but also going beyond political boundaries. If the Napoleonic wars ended up facilitating the sharing and interchange of scientific knowledge, the confiscation of a large quantities of geographical information related to colonial administration and commercial interests was also a common practice. At the same time, the inter-imperial and transnational transit of cartographers became more intense. Therefore, our atlases seem to be a direct result of this context where

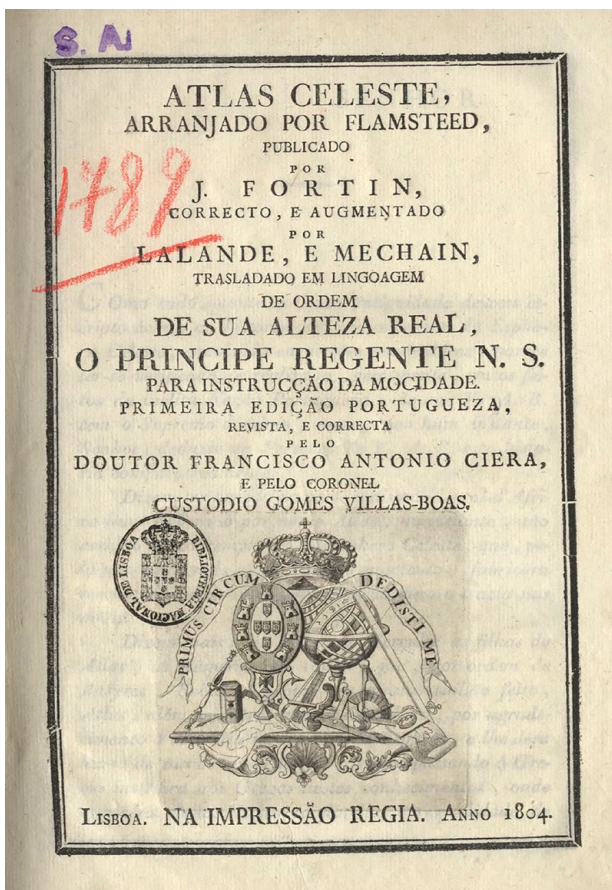


FIGURE 5. Title page of the Portuguese 1804 edition of Flamsteed’s Celestial Atlas. Note how it announces that the Portuguese editors, Ciera and Villas Boas, “revised and corrected” the French version. Biblioteca Nacional do Portugal.



FIGURE 6. (a) “Hemispherio Austral.” (b) Detail of printer’s mark: “Neves sc. no Arco do Cego.” [Arco do Cego Celestial Atlas] Lisboa: Ofic. Tip., Calcografica e Literaria do Arco do Cego [1799-1801]. Biblioteca Nacional de Portugal. (c) Detail of French edition (1795). United States Naval Observatory. Note that the map was simplified in the Portuguese edition, for example, it lost the identification of the constellation Unicorn.

scientific information flowed ever faster, in the context of geopolitical transformations.

For D. Rodrigo de Sousa Coutinho, the European war was beneficial to Portugal and its vast domains: “The nation can fairly doubt whether an absolute peace would have been more advantageous than the war whose dire effects it does not feel, seeing only greater stability in its Government.”¹⁷ The context of inter-metropolitan wars created new flows of scientific communication and opened up opportunities for actors situated on the periphery of the “centers of calculation.”

ACKNOWLEDGEMENTS

This article is part of the research project REX-PUBLICA “A Monarchical Res Publica. The Spanish Monarchy, A Polycentric Imperial Structure of Urban Republics” (PGC2018-095224-B-I00), financed by Spanish Ministry of Economy and Competitiveness within the ERDF.

NOTES

- 1 On the history and significance of the Arco do Cego press, see, among others, Moraes (2006, pp. 79-90), and the various essays contained in Tudela, Campos and Curto (1999) and Pataca and Luna (2019).
- 2 [*Atlas universal*] ou [*Atlas geográfico*]. Lisboa: Arco do Cego, 1801(?). Fundação Biblioteca Nacional do Rio de Janeiro, Brazil (FBNRJ), Cam.03,007-Cartografia, 1 atlas ([51]f.), 52 maps (2 folded); 35 × 43 cm. Available at: http://objdigital.bn.br/objdigital2/acervo_digital/div_cartografia/cart1013508/cart1013508.htm [Accessed 17 Nov. 2020]. The 46 copperplate engravings and the proof copy received the recognition of UNESCO’s Memory of the World Program in 2011. For more details about the transfer of the copperplates, see Cunha (2010, pp. 127-145).
- 3 Luís André Dupuis’ activity worked as a geographer for Duke Charles de Lorraine (1712-1780), governor of the Austrian Netherlands from 1744 to 1780; and after he actuate as an engineer and engraver at the Hermitage, at the service of Empress Catherine II of Russia (1729-1796). He came from the Russian army to Portugal in 1794, through the intervention of Luís Pinto de Sousa, to replace António José Moreira (ca. 1751-ca. 1794) in the design chair of the Fortification Academy. He participated in several recording works across Europe; see for example Carte chorographique des Pays-Bas autrichiens dédiée à Leurs Majestés impériales et royales par le comte de Ferraris lieutenant-general de leurs armées: gravée par L.A. Dupuis geographe de S.A.R.le duc Charles Alexandre de Lorraine et de Bar en 1777; see also the maps from Europe in the late 18th century, by L. Aubert; Ph. Macquet and Dubisson; engraved by L. A. Dupuis and P. F. Tardieu, 1785 (from the António de Araújo de Azevedo Library), FBNRJ, Archive, Cartography, AT-018-02-002.
- 4 As regards the global and imperial dimensions of Lacaille’s enterprise, see Glass (2012).
- 5 For a critical history of the overwhelming emphasis put by historians of science on the *contents* of books, as opposed to their material aspects, see Johns (1998a).
- 6 For penetrating insights on the nature of “scientific nationalism” and the “nationalization of science,” see the essays in Ash and Surman (2012).
- 7 See, for instance, the edited collection by Espagne and Werner (1988).
- 8 [*Atlas celeste*]. Lisboa: Arco do Cego, 1801(?). FBNRJ, Cam.03,009-Cartografia, 1 atlas: 30 maps; 22 × 33 cm. Avail-

able at: http://objdigital.bn.br/objdigital2/acervo_digital/div_cartografia/cart1013504/cart1013504.htm [Accessed 17 Nov. 2020].

- 9 *Alvará com força de Lei, 30 de Junho de 1798*. Lisboa: Regia Officina Typographica.
- 10 *Discurso feito Ilmo. Exmo. D. Rodrigo de Souza Coutinho na Abertura da Sociedade Real Marítima, 22 de Dezembro de 1798* (in Silva, 1993, p. 187).
- 11 The maps drawn by Rigobert Bonne for Raynal’s *Atlas de toutes les parties connues du Globe Terrestre* (1780).
- 12 The most extensive study of Flamsteed’s life, with an abundance of transcribed manuscript sources, is Baily (1835). See also Johns (1998b).
- 13 Reprints were issued in London in 1753 and 1781.
- 14 As can be seen on the titlepage of Jean Fortin (1776) *Atlas Céleste de Flamstéed*. Paris: Chez F. G. Deschamps et l’Auteur.
- 15 Fortin’s edition also included new visual information on the downsized original charts by Flamsteed, in the form of a few nebular objects that had been discovered by French astronomer Charles Messier.
- 16 Francisco António Ciera and Custódio Gomes Villas Boas (1804) *Atlas Celeste, arranjado por Flamsteed*. Lisboa: Imprensa Régia.
- 17 *Discurso feito Ilmo. Exmo. D. Rodrigo de Souza Coutinho, 22 de Dezembro de 1798* (in Silva, 1993, p. 183).

REFERENCES

- Araújo, A. C. (2000) *O Marques de Pombal e a Universidade*. Coimbra: Imprensa da Universidade.
- Ash, M. G. and Surman, J., eds. (2012) *The Nationalization of Scientific Knowledge in the Habsburg Empire, 1848-1918*. Houndmills and New York: Palgrave MacMillan.
- Bourdieu, P. (1976) “Le champ scientifique.” *Actes de la Recherche en Sciences Sociales*, 2/3, pp. 88-104. doi: <https://doi.org/10.3406/arss.1976.3454>
- Baily, F. (1835) *An Account of the Revd. John Flamsteed, the First Astronomer-royal: Compiled from His Own Manuscripts, and Other Authentic Documents, Never Before Published*. London: By order of the Lords Commissioners of the Admiralty.
- Cunha, L. F. F. (2010) *O acervo iconográfico da Biblioteca Nacional*. Rio de Janeiro: Biblioteca Nacional.
- Espagne, M. and Werner, M., ed. (1988) *Transferts. Les relations interculturelles dans l’espace franco-allemand (XVIIIe-XIXe siècles)*. Paris: Éditions Recherche sur les civilisations.
- Faria, M. F. (2005) *A imagem impressa: produção, comércio e consumo de gravura no final do Antigo Regime*. Tese de Doutorado. Portugal: Universidade do Porto.
- Frasca-Spada, M. and Jardine, N., eds. (2000) *Books and the Sciences in History*. Cambridge: Cambridge University Press.
- Glass, I. S. (2012) *Nicolas-Louis De La Caille, Astronomer and Geodesist*. Oxford: Oxford University Press.
- Johns, A. (1998a) “Science and the Book in Modern Cultural Historiography.” *Studies in the History and Philosophy of Science*, 29, pp. 167-194. doi: [https://doi.org/10.1016/s0039-3681\(98\)00004-1](https://doi.org/10.1016/s0039-3681(98)00004-1)
- Johns, A. (1998b) *The Nature of the Book: Print and Knowledge in the Making*. Chicago and London: University of Chicago Press.
- Kanas, N. (2019) *Star Maps: History, Artistry, and Cartography*. Cham, Switzerland: Springer Nature.
- Kantor, I. (2004) “Ciência e Império: trajetória de ilustrados na segunda metade do século 18.” In: M. C. Ruivo, org., *Laboratório do Mundo: ideias e saberes do século XVIII, Catálogo da Exposição na Pinacoteca do Estado de São Paulo*. São Paulo: Pinacoteca do Estado de São Paulo, pp. 27-37.
- Kantor, I. (2016) “Impérios portáteis: três Atlas na era das revoluções atlânticas.” In: A. B. Xavier, org., *O Governo dos Outros: poder e diferença no império português*. Lisboa: Instituto de Ciências Sociais, pp. 509-521.
- Kury, L. (2004) “Homens de ciência no Brasil: impérios coloniais

- e circulação de informações (1780-1810)." *História, ciências, saúde: Manguinhos*, 11, supl. 1, pp. 109-129. doi: <https://doi.org/10.1590/s0104-59702004000400006>
- Kusukawa, S. and MacLean, I., eds. (2006) *Transmitting knowledge. Words, images and instruments in Early Modern Europe*. Oxford: Oxford University Press.
- Leme, M. O. P. (2019) "A Livraria do Padre Veloso e o Plano Editorial do Arco do Cego." In: F. J. Luna, ed., *Frei Veloso e a Tipografia do Arco do Cego*. São Paulo: Editora da Universidade de São Paulo, pp. 281-292.
- Livingstone, D. N. (2003) *Putting Science in Its Place: Geographies of Scientific Knowledge*. Chicago and London: University of Chicago Press.
- Martins, C. H. M. R. (2014) *O programa de obras públicas para o território de Portugal continental (1789/1809)*. Tese de Doutorado. Portugal: Faculdade de Arquitetura, Universidade de Coimbra.
- Maxwell, K. (1995) *Pombal: Paradox of the Enlightenment*. Cambridge: Cambridge University Press.
- Moraes, R. B. (2006) *Livros e Bibliotecas no Brasil Colonial*. Rio de Janeiro: Briquet Lemos Livros.
- Mota, A. T. da (1972) *Acerca da recente devolução a Portugal, pelo Brasil, de manuscritos da Sociedade Real Marítima, Militar e Geográfica (1798-1807)*. Lisboa: Junta de Investigações do Ultramar.
- Pataca, E. M. and Luna, F. J., ed. (2019) *Frei Veloso e a Tipografia do Arco do Cego*. São Paulo: Editora da Universidade de São Paulo.
- Pereira, J. M. D. (1812) *Catálogo da Biblioteca da Academia dos Guardas Marinhas, criada por ordem de S.A.R. na cidade do Rio de Janeiro*. Rio de Janeiro.
- Raj, K. (2007) *Relocating Modern Science Circulation and the Construction of Knowledge in South Asia and Europe, 1650-1900*. Houndmills/New York: Palgrave MacMillan.
- Reis, A. E. (2009) *Observatório Real da Marinha*. Lisboa: Correios de Portugal.
- Roberts, L. (2009) "Situating Science in Global History: Local Exchanges and Networks of Circulation." *Itinerario*, 33, pp. 9-30. doi: <https://doi.org/10.1017/s0165115300002680>
- Secord, J. A. (2004) "Knowledge in transit." *Isis*, 95, pp. 654-672. doi: <https://doi.org/10.1086/430657>
- Silva, A. M. D. (1993). *D. Rodrigo de Souza Coutinho: textos políticos, economicos e financeiros*. Lisboa: Banco de Portugal.
- Silva, A. M. D. (2006) *Portrait d'un homme d'État: D. Rodrigo de Souza Coutinho, Comte de Linhares (1755-1812)*, vol. II. Paris: Gulbenkian.
- Tudela, A. P.; Campos, F. M. G. and Curto, D. R., eds. (1999) *A Casa Literária do Arco do Cego: bicentenário, (1799-1801): «sem livros não há instrução»*. Lisboa: Imprensa Nacional-Casa da Moeda e Biblioteca Nacional.