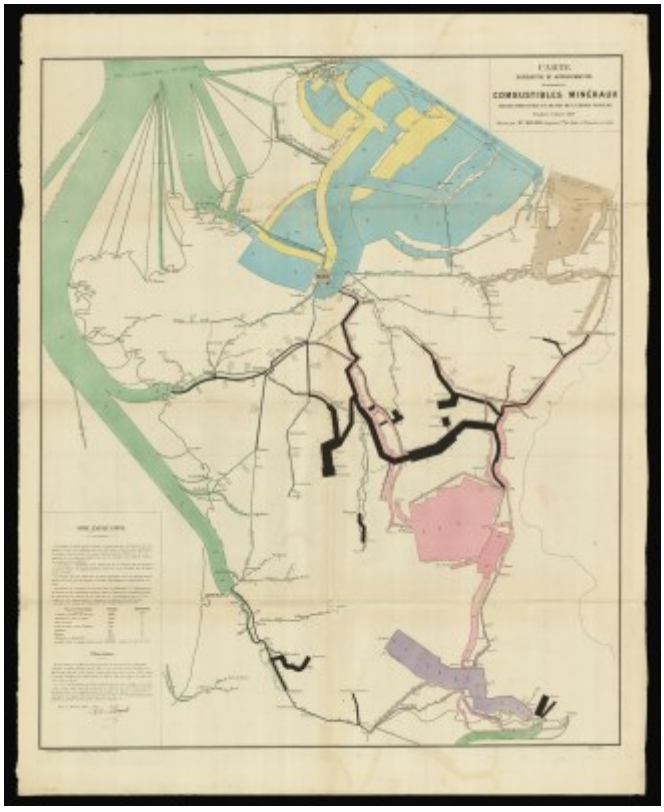


A collection of 46 lithographed maps, 23 of which are inscribed by Charles Minard, with a further 14 signed by Minard; and five publications, three of which are inscribed by Minard.

FROM STATES TO STATISTICS

[Statistical Maps].

Author
MINARD, Charles Joseph

Publication date
1844-1866].

Publisher
Charles Minard,

Publication place
[Paris,

Physical description
A collection of 46 lithographed maps, 23 of which are inscribed by Charles Minard, with a further 14 signed by Minard; and five publications, three of which are inscribed by Minard.

Dimensions

Notes
A comprehensive collection of 60 works by Charles Joseph Minard, pioneer of statistical cartography, comprising 43 of his 71 known works, including the exceedingly rare map of the Russian campaign of Napoleon Bonaparte and Hannibal’s march across the Alps.

Charles Joseph Minard (1781-1870) was “a true pioneer in thematic cartography and in statistical graphics” (Friendly). He began as a civil engineer, and by 1810 was working on behalf of the French government in Antwerp and Vlissingen. Minard went on to have a long and productive career, working on projects throughout Europe, and was named Superintendent of the École des Ponts et Chaussées, the School of Bridges and Roads, in France in 1830. Six years later, he became Inspector of the Corps of Bridges. In 1851, he took mandatory retirement, although still working in an advisory capacity, and undertook private research. This is when his cartographical career began in earnest.

Minard’s genius lay in his realisation that maps could provide visually clear renditions of complicated statistics. He wrote that the aim of his work was not to convey statistical results, but to show the relations between them, which would otherwise have to be worked out by the reader. He would often alter geographical reality on a map in order to make a diagram clearer, and so added the term ‘approximative’ to the title of his works to explain his decision. He was possibly the first to use the flow-map technique (his writing indicates that he believed he had invented it) and he was certainly the first to use pie charts on a map.

The importance of Minard’s work was quickly recognised by the French government. He was awarded the Legion d’Honneur, and throughout the 1850s all Ministers of Public Works in France had their portrait painted with a Minard chart in the background. In 1861, his work was presented to Napoleon III. Minard’s maps were not widely known in his lifetime outside of the intelligentsia and upper levels of government, suggesting that he published them privately (Robinson).

The collection

The collection comprises some 41 separately issued maps and charts and five publications (containing a further 14 maps and charts) by Minard. Most are either signed by him or inscribed to Francois Jacqmin. According to the bibliography of Minard compiled by Michael Friendly, there are 71 known works by Minard; 43 are in this collection. As Minard most likely published his works privately or in journals with limited circulation, and appeared to have often given them personally to friends and colleagues, their print runs are correspondingly small. Whilst individual maps by Minard do appear on the market from time to time, a collection of this size is unusual, and is matched in institutional terms only by the École Nationale des Ponts et Chausées, Minard’s former employer. The Bibliotheque Nationale de France holds only 17 works by Minard. The collection also contains Minard’s maps of the military campaigns of Napoleon Bonaparte and Hannibal, which are extremely rare.

Maps in the collection

The majority of the maps in the collection display commercial information. There are 13 showing the movement of various goods by canal and railway within France. The growing importance of the railway, and its place in the rise of industry, is also shown in the the three maps concerned with the volume of rail passengers on various routes and the number of people already using public coaches along the route of a proposed rail line.

There are also maps devoted to specific exports. There are five maps showing the international and European cotton trade; three showing the coal trade; a map of French wine exports; and a map of the transport of animals to Paris.

Two of the three coal maps are of British coal exports in 1850 and 1864. The 1864 map shows that the majority of coal was shipped to western Europe, followed by Russia, the Ottoman Empire and South America. Interestingly, Malta, Singapore, and Cuba imported large amounts of coal relative to their size, the Caribbean imported more coal than the rest of North America combined. These areas

were European colonies, demonstrating continued colonial investment. Minard also included a graph in the upper right-hand corner of the map, showing British coal production between 1850 and 1864. Production almost doubled in that period, but the most interesting aspect is that less than 10% of British coal was ever exported, showing the dependence of Britain's industrial domination on coal.

The animal transport map is another instance of the growing importance of the railway system. The French rail network has been reconfigured so the thickness of each route represents the quantity of livestock imported to Paris, colour coded for cows, calves, pigs, and sheep. There is a small inset map showing beef imports to Paris in 1828 and 1862. Both reflect a strong demand for beef in the capital.

The collection also includes two population density maps of Spain and Paris. With the latter, Minard was proposing a solution to a question of location for a new central post office in the city in 1867. The map shows Paris divided into arrondissements, each with a black square proportional to their population. The post office should be built at the centre of population density in order to benefit the maximum number of people: the small white dot in the square on the right bank of the Seine marks his proposed location.

Collection highlights

Napoleon and Hannibal

The most famous of Minard's works, these two maps on a single sheet show two doomed campaigns by a pair of the greatest military leaders in history, Napoleon Bonaparte and Hannibal.

The lower map is perhaps the best known of Minard's works, showing the invasion of Russia by Napoleon Bonaparte: it has been called "the best statistical graphic ever drawn" (Tufte). Bonaparte had successfully subdued much of mainland Europe, but faced resistance from the British. He planned to enforce a trade embargo against them to weaken Britain before an attempted invasion. Tsar Alexander I refused to stop trading with Britain through proxies, and Bonaparte formed an army to invade Russia and force his compliance, although the supposed aim of the war was to liberate Poland. The Russian army tactically retreated, evacuating cities along the route of the French army and destroying supplies. The French troops were ill prepared for a Russian winter and succumbed to lack of food, disease and harsh weather. Bonaparte was forced to retreat in December.

Minard gives the original force setting out from Poland as 422,000 men; only 100,000 reached Moscow and only 10,000 returned.
The map is notable not only for the devastating clarity with which it shows the cost of the campaign, but also for the fact that it conveys six types of information: geography, time, temperature, the course and direction of the army's movement, and the number of troops remaining. The widths of the gold (outward) and black (returning) paths represent the size of the force, with a scale of one millimetre to 10,000 men.

The upper map shows Hannibal's march through the Alps from Spain to Italy. Hannibal became the chief commander of the Carthaginian armies during the Second Punic War, the second major war between Carthage and the Roman Republic. His father, Hamilcar, had aimed to conquer the Iberian peninsula and Hannibal was determined to complete his father's work. After conflict with Roman interests in the area, Hannibal decided to attack Rome directly. Although the route over the Alps was treacherous, it would avoid Roman garrisons and he had no navy. It was tactically brilliant, but practically difficult. Minard gives the original strength of Hannibal's army as 94,000 men, dropping to 60,000 after passing through the Pyrenees and again to 25,000 after passing through the Alps.

Minard drew on the works of the Greek historian Polybius, the only contemporary source for Hannibal's exploits, and Jean-Louis Larauza, author of 'Histoire critique du passage des Alpes par Annibal', who tried to ascertain the exact path taken by Hannibal's army. This was and is a source of some uncertainty, as shown by Minard's note on the map, which explains that he has chosen Larosa as the point at which Hannibal crosses the Alps because "there is no final opinion on that point".

The effects of the American Civil War

The map entitled 'Carte… des quantités de coton en laine importés en Europe en 1858 et 1861' shows two flow-maps of the Atlantic trade in wool and cotton, three years apart. The time period covers the beginning of the American Civil War, which was sparked by the slavery policies of the Lincoln presidency. By January 1861, seven of the southern states had seceded to form the Confederacy. The war between the Confederacy and the states who remained in the Union lasted until 1865, and had a devastating effect on American exports. The seven separatist states are marked on both maps. The Confederacy attempted to use 'Cotton Diplomacy', cutting off the cotton supply to force European powers to intervene to save their domestic industries. In 1861, the Union had not yet implemented its wartime blockade of the South, and cotton and wool could still be exported, but Britain and other major customers were worried about the stability of the American supply, investing heavily in production in South Asia.

A line graph in the upper right corner shows the yearly export amounts of wool and cotton for America (blue). There is a sharp drop in exports from 1860, when the issues provoking the Civil War came to prominence. Comparing the two maps gives an even clearer picture of the change; by 1861 the amount of cotton and wool imported into Britain from the East Indies (yellow) had almost tripled, whereas the amount imported from America (blue) had only risen by a paltry 16,000 tons. Britain was then re-exporting the excess to other European countries (pink), at a rate three times higher than before the start of the Civil War.

The ongoing effects are shown by 'Carte… des quantités de coton en laine importées en Europe en 1858 et en 1863', which compares the years 1858 and 1863 (in the middle of the Civil War), by which time the cotton coming out of America has slowed to to a trickle. 'Cotton diplomacy' had failed.

The aftermath of the war is shown by 'Carte… des quantités de coton brut importées en europe en 1858, en 1864 et en 1865', which has maps for each of the title years. The Civil War ended and the United States restarted cotton exports in earnest in 1865. The map shows, however, that although European cotton imports had not recovered to pre-war levels by 1865 (530,600 as opposed to 634,200 tonnes), the market had moved to fill the gap left by the United States, using material from Egypt and India.

The end of slavery

The map entitled 'Carte… représentant pour l'année 1858 les émigrants du globe' shows global emigration in 1858. It highlights an interesting demographic period after the abolition of slavery in Britain (1838) and France (1848), creating a dearth of workers in European colonies. The black lines coming out of Congo to Mauritius and La Reunion show the passage of workers from Africa to work on the sugar plantations owned by the French. The brown lines show the influx of indentured labourers from French settlements in Tamil Nadu in India, to fill the void created by the end of slavery. A substantial number of African and Indian migrants also make their way to the West Indies. The small blue line across the Mediterranean shows French migration to Algeria, one of its richest colonies.

The thick green lines dominating the map show the huge wave of immigration from Britain to America, Canada and Australia; Australia became particularly attractive to prospective settlers after gold was found there. The number of British emigrants to America, however, was dwarfed by the number of Germans; in the period 1840-80, they made up the largest percentage of American immigrants. Migration was motivated by economic prospects and after the 1848 revolutions in some German states, there was also a wave of political refugees fleeing to North America. Brazil gained independence from Portugal in 1822, but immigration there from Portugal actually increased after it stopped being a colony, mainly peasants from rural areas. There was also a substantial minority of immigrants from Germany, to the point that Prussia banned immigration to Brazil in 1859 after reports of ill treatment on coffee plantations

China became an important source of labour in the mid-eighteenth century. The southern areas of the country suffered from political and economic instability, thanks to the weakness of the ruling Qing dynasty and the ongoing Opium Wars with the British. Chinese immigration to Cuba began in 1847 after the abolition of slavery; the Spanish replaced African slaves with Chinese indentured labour. Similarly, Chinese workers were often shipped under contract by agents to California during the Gold Rush, where they faced harsh working conditions and routine violence. The Chinese population in Australia, also spurred by the Gold Rush, grew large enough for the government to initiate anti-Chinese legislation.

The spread of language

‘Carte figurative des mouvements des langues anciennes avant l’ère moderne’ shows the spread of ancient languages across the world. According to the note at the lower left corner, Minard based his map on an article by Louis Ferdinand Alfred Maury (1817-1892), a scholar specialising in archaeology and ancient languages, who served as director-general of the Imperial Archives, and librarian at the Tuileries.

The map shows the migrations of ancient peoples and consequently their languages. The areas are colour coded accorded to language family, with arrow lines showing their movement, annotated with further information. Minard notes, for example, that Chinese is “monosyballique, intonation chantante” – monosyllabic with a singing intonation.

Collection Overview

All measurements given are plate sizes. Where an item is described simply as “Inscribed”, it is inscribed to François Jacqmin; other dedicatees are specified. For holdings, ENPC denotes École nationale des ponts et chausées, and BNF denotes Bibliothèque nationale de France.

Maps
1. Tableau figuratif du mouvement commercial du Canal du Centre en 1844 dresseé par Mr. Minard sur les renseignements de Mr. Comoy.

December 1845. Lithographed map with manuscript pasted slip (348 by 461 mm).

Holdings: ENPC: 5299/C307 P:35. References: Friendly 4.

2. Carte figurative et approximative des marchandises (flottage compris) qui ont circulé sur les voies navigables de France en 1850.

20 June 1852. Signed, with pasted slip to title. Lithographed map (900 by 785 mm).

Holdings: ENPC: 3566/C184, 5267/C306; BNF: Ge B 767. References: Friendly 11.

3. Carte figurative et approximative des tonnages de marchandises qui ont circulé sur les chemins de fer et les voies navigables (et flottables) de France en 1850.

20 September 1852. Signed. Lithographed map (845 by 625 mm).

Holdngs: ENPC: Fol 10975; BNF: Ge C 3522 Ge AA 1034. References: Friendly 12.

4. Carte figurative de l'exportation de la houille anglaise en 1850.

March 1854. Lithographed map (483 by 765 mm).

Holdings: ENPC: Fol 10975, Fol3554; BNF: Ge D 8691; P:37. References: Friendly 13.

5. Carte figurative et approximative des tonnages de marchandises (flottage compris) qui ont circulé en 1850 et 1853 sur les voies navigables de France.

December 1854. Two copies, one inscribed to François Jacqmin and one to "M. Muzaille". Lithographed map (890 by 770 mm).

Holdings: ENPC: Fol 10975, Fol 3562. References: Friendly 14.

6. Carte figurative et approximative des tonnages de marchandises qui ont circulé sur les chemins de fer et les voies d'eau en France en 1853.

28 February 1855. Two copies, one signed and one inscribed to François Jacqmin. Lithographed map (850 by 620 mm).

Holdings: ENPC: Fol 10975. References: Friendly 15.

7. Carte figurative et approximative des tonnages de marchandises qui ont circulé en 1855 sur les voies d'eau et de fer de l'Empire français.

28 February 1857. Inscribed to "M. Thirion". Lithographed map (852 by 627mm).

Holdings: ENPC: Fol 10975; BNF: Ge C 6504 Ge C 3523. References: Friendly 17.

8. Carte figurative et approximative du mouvement des combustibles minéraux sur les voies d'eau et de fer de l'Empire français pendant l'année 1856.

16 March 1858. Signed. Lithographed map (895 by 755 mm).

Holdings: ENPC: Fol 10975, 3555/C184. References: Friendly 19.

9. Carte figurative et approximative des tonnages de marchandises qui ont circulé en 1857 sur les voies d'eau et de fer de l'Empire français.

22 December 1858. Two copies, one inscribed to François Jacqmin and one to "M. Muzaille". Lithographed maps (each 820 by 610 mm).

Holdings: ENPC: Fol 10975. References: Friendly 21.

10. Carte figurative et approximative des combustibles minéraux sur les voies d'eau et de fer de l'Empire français pendant l'année 1857.

27 December 1858. Two copies, both signed. Lithographed maps (each 890 by 750 mm).

Holdings: ENPC: Fol 10975, Fol 3556, 3555/C184; BNF: Ge B 6146; P:40. References: Friendly 22.

11. Carte figurative et approximative des tonnages de marchandises qui ont circulé en 1858 sur les voies d'eau et de fer de l'Empire français.

19 December 1859. Signed. Lithographed map (830 by 605 mm).

Holdings: ENPC: Fol 10975; BNF: Ge C 6628. References: Friendly 26.

12. Carte figurative et approximative du mouvement des combustibles minéraux sur les voies d'eau et de fer de l'Empire français pendant l'année 1859.

3 February 1861. Inscribed. Lithographed map (870 by 730).

Holdings: ENPC: Fol 10975, 3555/C184; BNF: Ge C 3669. References: Friendly 29.

13. Carte figurative et approximative des tonnages de marchandises qui ont circulé en 1859 sur les voies d'eau et de fer de l'Empire français.

28 March 1861. Lithographed map (825 by 600 mm).

Holdings: ENPC: Fol 10975. References: Friendly 30.

14. Carte figurative et approximative des quantités de coton en laine importées en Europe en 1858 et de leur circulation depuis leur origine jusqu'à leur arrivée.

20 April 1861. Inscribed. Lithographed map (474 by 717 mm).

Holdings: ENPC: Fol 10975. References: Friendly 31.

15. Carte figurative et approximative des tonnages de marchandises qui ont circulé en 1860 sur les voies d'eau et de fer de l'Empire français.

13 December 1861. Three copies, signed. Lithographed maps (820 by 595 mm).

Holdings: ENPC: Fol 10975. References: Friendly 33.

16. Carte figurative et approximative des quantités de coton en laine importées en Europe en 1858 et en 1861.

26 July 1862. Two copies, both signed. Lithographed maps (534 by 868 mm).

Holdings: ENPC: Fol 10975. References: Friendly 35.

17. Carte figurative et approximative représentant pour l'année 1858 les émigrants du globe.

26 September 1862. Signed. Lithographed map (505 by 687 mm).

Holdings: ENPC: 3384/C161; LC: G3201.E27 1858.M5 TIL (989687134/MAPS). References: Friendly 36.

18. Carte figurative et approximative des tonnages des marchandises qui ont circulé en 1861 sur les voies d'eau et de fer de l'Empire français.

12 December 1862. Inscribed, with separate handwritten note from Minard pasted on. Lithographed map (820 by 605).

Holdings: ENPC: Fol 10975, 3566/C184. References: Friendly 37.

19. Carte figurative et approximative des tonnages de marchandises qui ont circulé en 1862 sur les voies d'eau et de fer de l'Empire français.

16 December 1863. Inscribed. Lithographed map (820 by 640 mm).

Holdings: ENPC: Fol 10975, Fol 3566. References: Friendly 42.

20. Carte figurative et approximative des poids des bestiaux venus á Paris sur les chemins de fer en 1862.

20 April 1864. Inscribed. Lithographed map (475 by 555 mm).

Holdings: ENPC: Fol 10975. References: Friendly 43.

21. Carte figurative et approximative des quantités de coton en laine importées en Europe en 1858 et en 1863.

4 May 1864. Two copies, one inscribed to François Jacqmin and one to "M. Sausage". Lithographed maps (each 520 by 870 mm).

Holdings: ENPC: Fol 10975. References: Friendly 44.

22. Carte figurative et approximative des quantités de coton brut importées en Europe en 1858 et en 1864.

24 April 1865. Inscribed. Lithographed map (585 by 880 mm).

Holdings: ENPC: 3219/C156. References: Friendly 46.

23. Carte figurative relative au choix de l'emplacement d'un nouvel hotel des postes de Paris.

19 July 1865. Inscribed. Lithographed map (630 by 933 mm).

Holdings: ENPC: Fol 10975, 10970/C589; BNF: Ge C 9553. References: Friendly 47.

24. Carte figurative et approximative du mouvement des voyageurs sur les principaux chemins de fer de l'Europe en 1862.

2 October 1865. Two copies, one inscribed. Lithographed maps (760 by 977 mm).

Holdings: ENPC: Fol 10975, 5862/C351, 5861/C351 (Appendix); BNF: Ge C 8340 Ge B 765; P:38. References: Friendly 48.

25. Carte figurative et approximative des quantités de vin français exportés par mer en 1864.

1865. Inscribed. Lithographed map (545 by 843 mm).

Holdings: Loc ENPC: Fol 10975, 10971. References: Friendly 49.

26. Carte figurative et approximative des populations spécifiques des provinces d'Espagne.

11 January 1866. Inscribed and accompanied by manuscript note from Minard. Lithographed map (280 by 551 mm).

Holdings: ENPC: Fol 10975; P:45. References: Friendly 50.

27. Carte figurative et approximative de la houille anglaise exportée en 1864.

17 September 1866. Inscribed. Lithographed map (605 by 977 mm).

Holdings: ENPC: Fol 10975; BNF: Ge D 4891. References: Friendly 52.

28. Carte figurative des mouvements des langues anciennes avant l'ère moderne.

1867 [?]. Inscribed. Lithographed map (597 by 937 mm).

Holdings: ENPC: Fol 10975, 10973/C590; BNF: Ge C 8693. References: Friendly 54.

29. Carte figurative des mouvements et provenances des céréales importées en France en 1867.

14 May 1868. Inscribed. Lithographed map (565 by 900 mm).

Holdings: ENPC: Fol 10975, 3579/C185 (brochure); BNF: Ge C 9524. References: Friendly 57.

30. Carte figurative des pertes successives en hommes de l'armée qu'Annibal conduisit d'Espagne en Italie en traversant les Gaules (selon Polybe). Carte figurative des pertes successives en hommes de l'armée française dans la campagne de Russie, 1812-1813.

20 November 1869. Signed. Two lithographed maps on one sheet (447 by 523 mm).

Holdings: ENPC: Fol 10975, 10974/C612. References: Friendly 58.

31. Carte figurative et approximative des quantités de coton brut importées en europe en 1858, en 1864 et en 1865.

1866. Inscribed, with separate manuscript note from Minard. Lithographed sheet with three maps and text (533 by 105.

Holdings: Loc LC: G3201.J82 1865.M5. References: Friendly 66.

32. Tableaux graphiques de la production de la houille en Europe de 1848 'a 1863 (y compris anthracite et lignite).

1866. Inscribed. Lithographed chart (517 by 351 mm).

References: Friendly 70.

Publications

33. Des tableaux graphiques et cartes figuratives (E. Thunot, Paris, 1861).
Printed pamphlet (243 by 163 mm), four colour plates, inscribed, yellow paper wrappers.

Holdings: ENPC: Fol 10975. References: Friendly 1.

Containing:

Tableaux figuratifs de le Circulation de quelques chemins de fer, dans lesquels la hauteur des zones avec hachure & indique, selon l'echelle, le nombre de voyageurs qui ont passeé sur les différentes parties d'un chemin. Les chiffres horizontaux indiquent les longeurs parcourues en Kilomètres.

May 1844. Four lithographed graphs on one sheet (314 by 640 mm).

Holdings: ENPC: 5860/C351, 5299/C307. References: Friendly 2.

Carte de la Circulation des Voyageurs par Voitures Publiques sur les routes de la contrée ou sera place le Chemin de Fer de Dijon à Mulhouse.

March 1845. Lithographed map (625 by 885 mm).

Holdings: ENPC: Fol 10975, 4546/C249. References: Friendly 3.

Tableau figuratif du mouvement commercial du Canal du Centre en 1844 dresseé par Mr. Minard sur les renseignements de Mr. Comoy.

December 1845. Lithographed map (313 by 666 mm).

Holdings: ENPC: 5299/C307 P:35. References: Friendly 4.

Statistique comparée du nombre des crimes dans les divers arrondissements des Cours Royales de France en 1825, 1826 et 1827 (Extrait de la Carte) par A. Balby et A.M. Guerry Avocat [on a sheet with] Extrait des Tableaux d'Arithmétique linéaire de William Playfair [and] Tableau des Recettes hebdomadaires des Chemins de fer de l'Ouest en 1858 par Mr. Massicart [and] Principaux Vents qui ont régné au Phare de Cordouan pendant l'année 1842.

Four lithographed maps and plans on one sheet, copied from other works (311 by 445 mm).

34. Libre Échange avec l'Angleterre en Tableaux Graphiques (E. Thunot, Paris, 1867). Printed pamphlet (328 by 250 mm), seven colour plates, inscribed, grey paper wrappers.

References: Friendly 56.

35. La Statistique (Cusset, Paris, 1869). Printed pamphlet (243 by 163 mm), yellow paper wrappers.

Holdings: ENPC: 3474/C171; BNF: Tolbiac RP-9060. References: Friendly 61.

Containing:
École dite Realschulen de Stuttgart. Tableau graphique montrant le nombre d'heures par semaine d'étude du latin diminuant depuis 1818 jusqu'en 1864.

1870 [?]. Lithographed chart (215 by 430 mm).

Holdings: ENPC: Fol 10975. References: Friendly 62.

36. Appendice à la Carte des voyageurs sur les chemins de fer d'Europe en 1862 (E. Thunot, Paris, 1867). Printed pamphlet (305 by 235 mm), unbound, inscribed.

Holdings: Loc BNF: Tolbiac, VP-23831. References: Friendly 67.

Containing:

Carte figurative et approximative du mouvement des voyageurs sur les principaux chemins de fer de Russie en 1863 (appendice à la carte de M. Minard des voyageurs sur les chemins de fer d'Europe en 1962).

1 February 1867. Lithographed map (293 by 470 mm).

Holdings: ENPC: Fol 10975; Ge F 5137. References: Friendly 53.

Carte figurative et approximative des populations spécifiques des provinces d'Espagne.

11 January 1866. Lithographed map (282 by 505 mm).

Holdings: ENPC: Fol 10975; P:45. References: Friendly 50.

37. Appendice à la Carte figurative des céréales importées en France en 1867 (E. Thunot, Paris, 1868). Printed pamphlet (187 by 125 mm), unbound.

Holdings: Loc BNF: Tolbiac, VP-19139. References: Friendly 68.

Miscellaneous
38. Chemins de Fer de Belgique. Mr. Teichmann. Lithographed map (448 by 683 mm).

Bibliography
Michael Friendly, 'Revisions of Minard', Statistical and Computing Graphics Newsletter 11 (1999); Michael Friendly, 'The Graphic Works of Charles Joseph Minard' at http://euclid.psych.yorku.ca/datavis/gallery/minbib.php; Arthur H. Robinson, 'The Thematic Maps of Charles Joseph Minard', Imago Mundi 21 (1967), pp. 95-108; Edward Tufte, The Visual Display of Quantitative Information, (Graphics, 2001).

Provenance
François Prosper Jacqmin (1820-1889). Jacqmin was a railway engineer and worked for the Paris and Eastern Railway Companies, eventually becoming a professor at the École des Ponts et Chaussées in 1864. He received the Légion d'Honneur in 1874.

Price:

Inventory reference: 14275

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