The Blue Maps of China:
Considerations of Materiality and Function in China and Japan

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Abstract

In China, during the early decades of the nineteenth century, two series of large format maps, one terrestrial and one celestial, were printed using blue colourant. The pigment used for the blue colour was Prussian blue, making these maps probably the earliest large-scale application of the use of this colourant in China. Also unusual, as in typical map printing practices the outlines and texts are printed on a white ground, is that these maps were printed in the opposite, in the uniquely Chinese manner of rubbings. The combination of size, colour, and presentation formats made these maps unique objects, and these visually striking qualities quickly made them popular in China and Japan. This chapter will introduce the production and distribution circumstances and the materiality of these maps, in an effort to more fully understand how these maps functioned in early nineteenth century China and Japan.

Keywords

History of cartography, Qing, Japan, Suzhou, celestial mapping, terrestrial mapping, material culture, blue

Introduction

In China, during the early decades of the nineteenth century, two series of maps, one terrestrial and one celestial, were printed using blue colourant. They are printed in the manner of a rubbing from a stone stele, in that the outlines and annotations are left white, while the majority of the paper is coloured in shades of bright blue. Both the terrestrial and celestial maps were printed on multiple sheets of paper designed to be mounted in eight, and in one case of the celestial map, six hanging scrolls. They were printed on a large scale, measuring generally 130 x 230 cm.

when all eight sheets were assembled together.[1] They were designed to be impressive and even intimidating, implying that they were presentation pieces intended for public display, and not for intimate or personal display.

The terrestrial maps, of which most editions are entitled *Geographical Complete Map of the Everlasting Unified Qing Empire* (*Daqing wannian yitong dili quantu* 大清萬年一統地理全圖), present the realm of the Qing Empire (1644–1911) and selected surrounding regions.[2] The map emerged from the legacy of the Huang family of map makers that began with Huang Zongxi's 黃宗羲 (1610–1695) now lost map of 1673 through his grandson Huang Qianren's 黃千人 (1694–1771) 1767 printed map of the Qing empire.[3] Most extant prints of the map do not contain any information about where and when they were made, but several editions do bear notes placing the date and place of production between 1812 and 1825 in Suzhou, one of the economic and intellectual centres of the empire at the time and throughout much of China's imperial history.

The four extant editions of the celestial maps entitled *Complete Map of Unified Star Configurations in the Heavens* (*Huntian yitong xingxiang quantu* 渾天壹統星象全圖) appeared in the same period, dated to 1822 and 1826. These celestial maps present a planisphere of all the known stars and extensive descriptions of known celestial bodies and their related celestial mechanics.

The manner of presentation of white characters on a solid colour, here blue, should be understood within the context of making rubbings from stone steles and ancient bronzes. In China, rubbings were an essential component of long-established epigraphic study and associated collecting practices, as well as specific calligraphic practices. To make a rubbing from an engraved stone stele, slightly moistened paper would be fixed on the stone, and then an inked (typically in black) dauber (fabric over cotton wadding), would be tamped down onto the paper-

[1] The exact measurements vary up to ten centimetres, as some sheets were either made shorter or trimmed while the celestial maps are generally a few centimetres shorter in height.

[2] Other versions of the blue map are titled *Daqing wannian yitong dili tu* and *Daqing wannian yitong tianxia quantu*. The title using *tianxia* instead of *dili* is in line with Huang Qianren's 1767 title *Tianxia yutu* 天下輿圖 in contrast to the more Western and perhaps consciously updated term "geographical" (*dili*).

[3] For a scan of the 1767 edition held by the Bodleian Library in Oxford, see https://iiif.bodleian.ox.ac.uk/iiif/viewer/cd99ecf7-f62c-44df-97c4-6e804bf8aed0#?c=0&m=0&s=0&cv=0&r=0&xywh=2315%2C2851%2C8203%2C4158.

covered stone. The ink would adhere to the raised paper making the areas of the stone carved away appear in white. The rubbing method of production has been confirmed for two copies of the terrestrial maps through microscopic examination at the Weissman Preservation Center at Harvard University (see appendix), and is assumed to also be the case for the celestial maps pending future confirmation. For these blue maps, the medium the maps were carved into was likely wood or possibly stone in at least one case. For a printed map this aesthetic was highly unusual, in that the mapmakers made a conscious choice to produce these blue maps to look like rubbings. As both the celestial and terrestrial maps appear to have this very specific and unusual aesthetic, this suggests a close link in the production of these two series of maps.

These maps were produced at a time when the expansion of the empire half a century earlier under the Qianlong emperor (r. 1736–1796) was concluded and the Qing empire was at its greatest extent, including Outer Mongolia, Tibet, and Xinjiang. Qianlong's reign had not only seen a vast expansion of the empire but also a relatively strict censorship. With the changeover to the next emperor, Jiaqing (r. 1796–1820), this censorship relaxed, resulting in the dissemination among the learned elite of geographical knowledge that before had been restricted to the court, a process that saw even greater expansion during the following Daoguang period (r. 1821–1851).[4]

At the time of production, these maps were extremely popular, as demonstrated by the more than thirty copies of the terrestrial map and more than ten copies of the celestial map still extant in collections around the world. In particular, these maps were consumed in Japan, as evidenced by the large number of extant copies that were mounted in Japan, using specifically Japanese formats of folding screens, sliding doors, and as folded single-sheet maps, changing the original mounting technique Chinese mapmakers had intended for these maps.

These large format bright blue printed maps are unique not only within a Chinese map making context but also in a world map making context. We are left with a number of questions about the identity of the persons behind the production, the reasons for the production, the materials used, and, in the context of this volume, most importantly the question of why blue colourant

[4] Mosca 2011; Zhang 2020.

was used. This chapter will discuss some of these questions and focus in particular on the material aspects of the map, both in terms of production in China as well as its post production methods of display and resulting functionality in Japan.[5]

The terrestrial map

The *Geographical Complete Map of the Everlasting Unified Qing Empire* is based on Huang Qianren's 1767 map (figure 1). Huang's map depicts a large Qing empire at the centre, surrounded by selected neighbouring regions. As explained in the preface to the map, the impetus was the expansion of the empire and the desire to highlight these new regions. The geographical extent shown on the blue map is essentially identical to Huang's model, the major difference being that, while Huang's map was square, the blue map is stretched horizontally into an elongated rectangle when all eight scrolls are placed together.

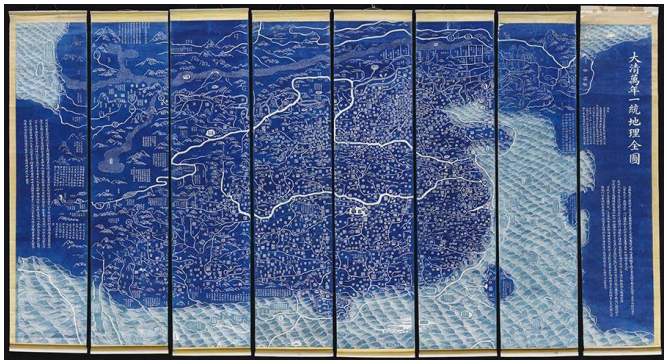

Figure 1. *Geographical Complete Map of the Everlasting Unified Qing Empire* (*Daqing wannian yitong dili quantu*), after 1815, 8 hanging scrolls, blue ink on paper, British Library, London. BL15406_b ©The British Library Board.

The blue terrestrial map was printed in at least ten editions (see Table 1). Seven of these were printed from woodblock, while one was from stone (type A). These editions can be divided into two sets with most extant copies being from the second set. While all maps of the second set have the same title (ending in *dili quantu*, "complete terrestrial map"), two editions from the first set slightly change the final binomial terms to *dili tu* ("terrestrial map") or *tianxia quantu* ("complete map of all under heaven"). Perhaps the most striking visual difference between the

[5] The technical analysis focuses on the colorants. Analysis of the binding material and paper are still pending.

two sets is the way most of the toponyms are displayed. On the maps of the first set, some characters are white encircled by a white oval ring, while those of the second set are blue within a solid white oval. Although these different ways of circling the place names are minor, they create subtly different visual presentations. Another less evident but certainly important difference is that inland province borders that appear dotted on the maps of the second set do not appear on the first set.

Between the editions of a set, there are minor differences. Those of especially type E and F, and to a certain extent the version held by the MacLean Collection in Illinois (type G, Figure 2), are hardly distinguishable and were certainly meant to be identical, but close analysis shows that they were indeed made from different woodblocks.

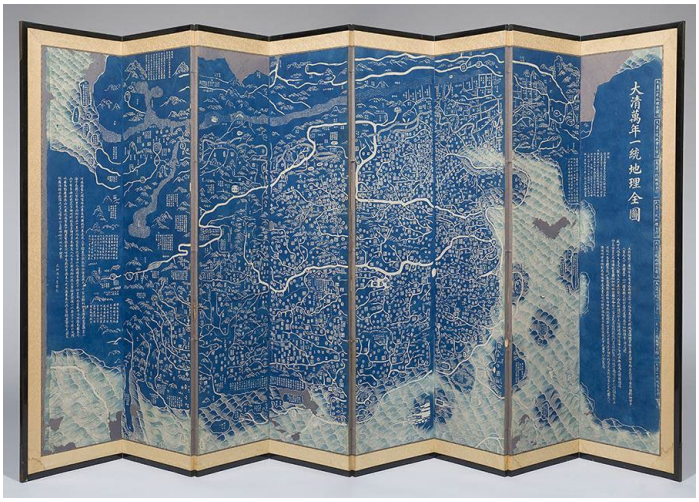

Figure 2. *Geographical Complete Map of the Everlasting Unified Qing Empire* (*Daqing wannian yitong dili quantu*), after 1815, eight-panel folding screen, blue ink on paper, 112 x 249 cm, MacLean Collection, Illinois. MC29793, © MacLean Collection, Illinois

Set	Type	Last characters of title	Date	Note on publisher	Collection (selection)

1	A	*dili tu*	1812	Carved in stone in Near Bamboo Studio (Jinzhuzhai) in Guwu 古吳近竹齋鐫石	Kōbe City Museum (Japan), Beijing University (China)
	B	*dili quantu*	1816	Carved in the Ink Forest Hall (Molintang) in Guwu 古吳墨林堂鐫	Beijing University (China), Shandan Museum in Gansu (China)
	C	*Dili quantu*	1816	Carved in the Ink Forest Hall (Molintang) in Guwu 古吳墨林堂鐫	Società Geografica Italiana (Italy)
	D	*tianxia quantu*	1823	Made by the master of the Accumulated Blessings Hall (Jiqingtang) in Huqiu of Gusu 姑蘇虎丘積慶堂主人製	Previously in the collection of Floyd Sully (Canada)
2	E	*dili quantu*	undated [after 1815]	None	Bibliothèque nationale de France, Beijing National Library (China), Yokohama City University Library (Japan), British Library (UK), Waseda University (Japan), Harvard University (USA), and several in private collections
	F	*dili quantu*	undated [after 1815]	None	Museum Volkenkunde in Leiden (The Netherlands), Library of Congress (USA)
	G	*dili quantu*	undated [after 1815]	Made in the Cultivated Ink Collection (Wenmozhai) in	MacLean Collection (USA)

				Huqiu of Wu 虎邱吳文墨齋製	
	H	*dili quantu*	1823	Carved in stone by Zhou Yuchang in Huqiu of Gusu 姑苏虎邱周裕昌刻石	Private collection (?)
	I	*dili quantu*	1825	None	Ryūkoku University, Jissōin Temple (Japan)
	J	*dili quantu*	undated [after 1815]	None	University of Chicago

Table 1. List of editions and basic information of the blue terrestrial maps.

The editions with the most extant copies (types E [Figure 2] and F) are undated, but some of the lesser-known editions help identify the production period. Those from the first set are all dated: September 1812, 1816, and 1823. Two editions of the second set were made in 1823 and 1825. The 1816 version mentions a previous edition of October 1812, for which the printing blocks had become worn from repeated use so that new printing blocks had to be carved. It appears then that two editions were made in succession in 1812, although only one is extant. This statement on the 1816 version also confirms the popularity of the map. The undated maps from the second set were likely also produced around the same time, as they show administrative changes from 1815.[6] All editions from the two sets thus seem to have been produced between 1812 and 1825.

Several editions provide clues to where the maps were produced and by whom. All of the maps from the first set include a short note on the first or last panel that mentions places that can be linked to the city of Suzhou and its surrounding areas, either directly by referring to its nickname Old Su (Gusu), a district in the city named Tiger Hill (Huqiu), or more generally the region Old Wu (Guwu), comprising parts of Jiangsu and Zhejiang provinces, where Suzhou is located. The various

[6] See Bao n.d., 2. Bao Guoqiang also mentions further place names that were not updated despite administrative changes that would put the date of types E to G to before 1821. However, the mapmaker might have overlooked the change. Indeed, the 1825 version presents the situation from before 1821.

editions also mention sobriquets, libraries, or studios of different scholars who sponsored production at the end of the preface on the first panel or at the left edge of the last panel. Suzhou as a place of production for maps of the second set is also found on the editions of the MacLean Collection (Figure 2) and a rare edition by a certain Zhou Yuchang 周裕昌, which note they were made at Tiger Hill.

While Zhou Yuchang also made a city map of Suzhou in 1822,[7] the studio names are obscure and do not seem to have been well established.[8] However, the many dates and people named on these maps indicate a great flexibility and willingness to customize the printing and speak to the maps' popularity.

The celestial map

The *Complete Map of Unified Star Configurations in the Heavens* was printed in four dated editions, two in 1822 (Figure 3), one in the third month (April) of 1826 and one in the fourth month (May) of 1826 (see Table 2). One of the two 1822 editions is in eight sections, the other only in six. The layout of all editions can be divided into three parts, each using a different calligraphic style. On all editions, the first section is dedicated to the large eight-character title in seal script (*zhuanshu* 篆書), while the last section contains an inscription in clerical script (*lishu* 隸書), giving some general information about the map, which differs between the 1822 and the 1826 editions.

[7] Li 1996: 109.

[8] None of them appears in the extensive catalogue referencing names and studio names of the Qing (Yang and Yang 2001) and searches in the full text databases of local gazetteers, both the Erudition? *Zhongguo fangzhi ku* 中國方志庫 and LoGart at the Max Planck Institute for the History of Science in Berlin have yielded no results (https://logart.mpiwg-berlin.mpg.de/LGServices2/#/).

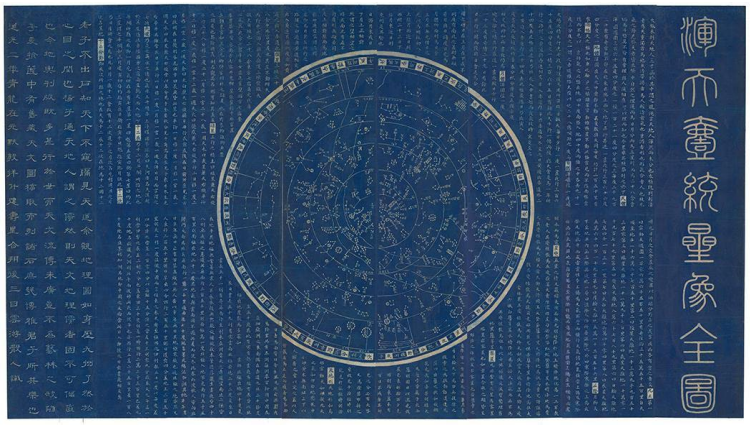

Figure 3. *Complete Map of Unified Star Configurations in the Heavens* (*Huntian yitong xingxiang quantu*), 1822, framed, blue ink on paper, 124 x 226 cm. © Crouch Rare Books, London.

The main text written in standard script (*kaishu* 楷書) on six (or four on the six panel print) sections, is structured along sixteen (or eleven on the six panel print) section heads demarcated by white boxes with blue character titles. The 1822 editions divide the text into two bodies, top and bottom, with a gap in between, while on the 1826 editions the text is in continuous columns from top to bottom. Another notable difference visually is the ecliptic, the band around the planisphere, which, on the eight-sheet 1822 edition is marked with a much narrower band.

Type[9]	Date	Credited author	Number of scrolls	Collection
A	1822	Yunyou Sanren 雲遊散人	8	Konkō Library (Japan), Miyajima Kazuhiko (Japan), Tsujiyoshi Family Collection (Japan), Crouch (UK), private collections in China
A’	1822	Yunyou Sanren	6	Ōmura City Archives (Japan),

[9] The naming of the types follows Miyajima and Hiraoka 2016.

				Matsūra Historical Museum (Japan)
B	April 1826	Song Tao 松濤	8	Tsūyama City Museum (Japan)
B’	May 1826	Qian Yong 錢泳	8	Adler Planetarium (USA), Jissōin Temple (Japan), Crouch (UK)

Table 2. List of basic information and extant editions of the blue celestial map.

The blue celestial map is based on a model by Huang Shang 黃裳 (1146–1194), a scholar active in the Southern Song (1126–1279) court, who created a celestial map entitled *Tianwen tu* 天文圖 as well as a terrestrial map *Dili tu* 墜理圖 in the 1190s.[10] Both of those maps were engraved into stone steles in 1247 by Wang Zhiyuan 王致远 (1193–1257) and still stand today in the Confucian Temple in Suzhou. The making and distribution of rubbings of these two steles, which continues to this day, likely played an active part in choosing the rubbing presentation style of the blue maps.

All four editions copy the text and the eleven section headings of Huang’s *Tianwen tu*, each with a similar box around the section title.[11] These section headings present the Chinese characters themselves in blue on white, while the primary text is white on a blue field; the same aesthetic used in the terrestrial maps. The section headings are: celestial bodies (*tianti* 天體), terrestrial bodies (*diti* 地體), the two poles (*liangji* 兩極), the sun’s body (*riti* 日體), the moon’s body (*yueti* 月體), longitudinal stars (*jingxing* 經星), latitudinal stars (*weixing* 緯星), the Milky Way (*tianhan* 天漢), the twelve two-hour periods of the day (*shi’er chen* 十二辰), the twelve positions (*shi’er ci* 十二次), the twelve boundaries (between celestial and terrestrial realms, *shi’er fenye* 十二分野). The three eight-section editions of the celestial blue map include new information in five

[10] The celestial map is illustrated in Needham 1959, Fig 106 and Stephenson 1994: 547. The terrestrial map in Cao et al. 1990: plates 70–72.
[11] For a discussion and full translation of the *Tianwan tu*, see Rufus and Tien 1945.

additional headings: the nine heavens (*jiutian* 九天), the three boundaries (*sanji* 三際), star transformations (*xingbian* 星變), guest stars (novas and comets, *kexing* 客星), and the shape of heaven and earth (*tiandi xing* 天地形).

The blue celestial map presents an updated version of Huang Shang's map of the 1190s. The use of Huang's *Tianwen tu* in this early nineteenth century map may be understood within the paradigm of the Chinese term *gujin* 古今, used in other Chinese maps of the period.[12] *Jin* means the here-now while *gu* means an unspecified there-then. The two terms knit together—*gujin*—suggest a conversation between temporalities, a notion of time in which an unspecified past of memory is actively integrated with the present of lived experience. From their position in the now, Chinese intellectuals could search the unsorted, non-linear past for patterns and precedents that would clarify the present.[13] In the notion of *gujin*, Chinese intellectuals actively joined past and present through a process of deliberate recovery and application. Thus, while it may on the surface appear curious that a twelfth century star chart has relevance in the early nineteenth century, it is a proven and effective way to present new information within a Chinese intellectual construct. The opportunity to illustrate what is new is juxtaposed with what is known, making it all familiar and approachable while also placing it all within a Chinese intellectual tradition.

There are three different authors between the four editions; Yunyou Sanren (Cloud Wandering Idler), Song Tao, and Qian Yong (1759–1844).[14] Nothing is known of Yunyou Sanren, who signed the two 1822 editions. Likewise mysterious is the person who signed the April 1826 edition of the blue celestial maps, "the former Hanlin Academician Song Tao." The name appears to be a sobriquet, judging from a seal on the map, maybe of a certain Yang Huaiyi 楊懷義, an otherwise unknown person.[15]

[12] Pegg 2020.
[13] Kern 2003; Wu 1995: 18–19.
[14] Miyajima 1994: 599 Fig. 14.12 illustrates the April 1826 version. The copy in the Adler Planetarium is missing the final scroll (far left). See Lacy 2007: 40–41
[15] Miyajima and Hiraoka 2016: 76.

The edition made one month later, in May 1826, on the other hand, does give us more concrete clues. It is signed by Qian Yong, a poet and author as well as an accomplished calligrapher.[16] That the celestial map was designed with multiple styles of calligraphy suggests that a calligrapher, like Qian Yong, designed the text layout. Qian had studied calligraphy and was a practitioner in the early nineteenth century. This was a time when the collecting, making of rubbings and copying of calligraphy found on ancient stone steles (*bei* 碑), and the rubbings of calligraphy on ancient bronze vessels or from copy books of calligraphy (*tie* 帖) schools were popular and when studying ancient script styles was significant.[17] The thirteenth century stele the blue celestial map is based on as well as its rubbing would have been known and appealed to a specialist of the stele school. The manner of printing the blue maps in the aesthetic associated with rubbings also hints to a connection to this stele school. As all editions of the celestial map have this same layout it seems that the calligrapher consultant, again likely Qian Yong himself, was an integral part of the production of all editions.

The 1822 editions are signed and dated using a rather complex set of celestial systems that convert in their simplest manner to "Yunyou sanren records this on the third day, third month, *renwu* year, second year of Daoguang (March 25, 1822)."[18] This system of dating is unusual in that it uses the Jupiter cycle, Big Dipper cycle, and lunar cycles and requires a specialized training and knowledge base. This implies that an individual with a specialist interest in astronomy was involved in the production of this map. While this group of three signatures and dates does provide some answers, and again confirms a flexible production process, at the same time they

[16] Extant copies of Qian Yong's calligraphy visually confirm that the calligraphic style, based on the stele school of calligraphy on the last scroll of the May 1826 blue map, is the same.
[17] Ho 2016.
[18] The date reads in Chinese: 道光二年，青龍在元默敦牂，斗建寿星，合朔 后三日，雲游散人識. That can be translated "Second year of the Daoguang (reign), (when) the Green dragon (of the Jupiter cycle) is in the *yuanmo* position (equivalent to the *ren* heavenly stem) and the *dunzang* position (equivalent to the *wu* earthly branch, or the more standard Chinese cyclical date of *renwu*). It continues, "when the Dipper handle (*doujian*) points to the longevity star (*shouxing*, which indicates the third month). And the *heshuo* (binomial term used for the moment when the moon goes into conjunction with the sun, the moment of the end of a lunar cycle of 28 days and beginning of the next, often used for first day of the lunar month) three days after" (*housanri*, would be the third day). This is an unusual and highly specialized dating system.

present other questions. Why three different signatures? And why were the later two editions produced only a month apart?

Colour

The most striking feature of these maps is of course the blue colour that sets them apart from other Chinese maps produced at the time.[19] The blue colour itself used for printing was first assumed to be Chinese indigo, which differs from Indian and others, derived from the *Baphicacanthus cusia Brem* plant. In China, Chinese indigo has been used in colouring paper since the Tang dynasty (618–907). It is generally associated, as it is in all of East Asia, with high quality Buddhist sutras in combination with gold and silver colourants and thus within a religious context, with numerous examples extant in scroll and book formats.[20] The use of blue colourants, like cobalt and azurite, was expensive and associated with luxury, but other blue colourants that were less expensive, like indigo and later Prussian blue, were used in minor ways in printed books from the seventeenth century onwards.[21] The scale of use of blue for these maps and the secular use of the blue printed paper make these maps significant.

Preliminary tests however indicate that the blue used for these maps is Prussian blue, a ferric (iron) hexacyanoferrate which was first synthesized accidentally in Berlin by Johann Jacob Diesbach, a Swiss painter and colourmaker, in 1706. The Weissman Preservation Center (WPC) at Harvard University has conducted tests on two copies of the terrestrial map from the Harvard-Yenching Library. Using multimodal imaging, spectral reflectance, and x-ray fluorescence the WPC has confirmed the use of Prussian blue for their two copies (see appendix).[22]

[19] Numerous examples of similarly arrayed and titled, both manuscript and printed, maps of the period can be found. These other combinations of colour include the printed and hand-coloured version at the Library of Congress (http://hdl.loc.gov/loc.gmd/g3200.ct003403) or a black version using the same rubbing technique as the blue version. See Pegg 2014, fig. 7.
[20] Tanabe 1988: 52–63.
[21] Lin 2012: 37–38.
[22] Testing on other copies including the celestial maps is pending. For comparative study used for Japanese prints of the period see: Villafana and Edwards 2019.

Prussian blue had been imported to Guangzhou by the English East India Company (EIC) at least since 1775. Especially in the period from 1795 onwards, large quantities arrived in China through this channel, making this an important trade item for the EIC.[23] Curiously, from around 1827 onwards, the EIC seems to have stopped bringing the pigment to China. In the late nineteenth century, English visitors reported a Prussian blue factory in Guangzhou.[24] Given that Chinese exports of Prussian blue to Japan increased significantly in 1826, one might speculate that the Chinese already knew how to and did produce Prussian blue in the mid-to late 1820s.[25]

In the early nineteenth century, much of the pigment seems to have been used to brighten the colour of tea and later Prussian blue was used in painting practices or printing as found in paper currency of the 1850s.[26] The discovery of the use of Prussian blue in the case of the blue maps has important historical implications as these maps likely demonstrate the first large-scale use of Prussian blue for printing in China thirty to forty years earlier. They were also produced around the time when Chinese manufactures learned to make the pigment locally and were less dependent on imports, although the time frame may still suggest imported Prussian blue for the maps.

Generally, two tones of blue are used in the terrestrial maps. A dark blue was used for land and a lighter tone of blue was used for the oceans. On the other hand, most extant versions of the celestial map were only printed in the darker blue. However, the six-scroll 1822 edition printed the inside of the ecliptic in a light blue and only the surrounding texts in dark blue, following the pattern of two hues of blue like the terrestrial maps.[27]

Patterned combinations of light and dark blue that differ between varying editions of the terrestrial map can also be seen. In some cases, for example, the islands in the ocean have a large

[23] Pritchard 1957: 131, 133. In several nineteenth century Chinese sources and dictionaries, Prussian blue is recorded as *yangdian* 洋靛 (foreign indigo).

[24] Bailey 2012: 118.

[25] Before 1826, China exported only small quantities of Prussian blue to Japan and mostly the Dutch traded with the pigment. With the Chinese taking part in the trade, the price fell significantly. Smith 2005: 240–41; Bailey 2012: 119.

[26] Bailey 2012: 188; Shi and Li 2013: 896.

[27] This print is held by the Ōmura City Archives 大村市立史料館. For a reproduction, see Miyajima and Hiraoka 2016: 84.

dark blue surrounding halo, while others have smaller haloes of dark blue. While the dark blue shade appears consistent on all extant versions of the maps, the lighter shades include turquoise and light greenish hues.[28] These shades are achieved through varying the amount of Prussian Blue, thinner layers of pigment can read as these other tones. This multi-toned use of blue pigment in particular was developing at the same time in Japan with the introduction of Prussian blue into the work of woodblock print, *ukiyo-e*, artists like Katsushika Hokusai 葛飾北斎 (1760–1849) and Andō Hiroshige 安藤広重 (1797–1858).[29]

In addition to the printed two hues of blue, we can find several additional colours of as yet unidentified colourants on some editions of the terrestrial map, but none on the celestial ones (Figure 4). Several editions mark the area surrounding the long strip of dots to the north of China proper in a maroon colour more clearly demarcating the Gobi and Taklamakan deserts. This desert strip was an important element on Chinese maps from the mid-sixteenth century onward, so the special attention it received on the blue map is not surprising.[30] On the 1812 edition (type A), the area was already printed in brown, while on more than half of the extant prints of the other editions, this maroon colouring was applied by hand after printing. On many prints, the desert is the only non-blue, non-white element, but one edition highlights the so-called five sacred mountains in red, and another one redraws the dotted internal borders of the Qing empire in a now brownish-yellow colouration.[31] These hand-coloured additions reveal reading practices of later owners of the maps. They can be understood as practices parallel to those of annotating written texts, which sometimes include circles, underlinings and other symbols, usually in red or black, to mark elements the readers found of interest.

[28] It is possible these differences can be attributed to the conditions under which images were digitally captured although calibrating some of the scans with provided colour charts still shows differences in the shade of light blue.
[29] Smith 1986.
[30] On the desert on Chinese maps, see Papelitzky 2021.
[31] The red mountains are found on the Waseda University Library copy and the yellow borders on the print held by the Bibliothèque nationale de France. The five sacred mountains, each associated with a cardinal direction, are Taishan 泰山 (east, present-day Shandong), Hengshan 衡山 (south, present-day Hunan), Huashan 華山 (west, present day Shaanxi), Hengshan 恆山 (north, present-day Shanxi), Songshan 嵩山 (centre, present-day Henan). See Wilkinson 2018: 412-13.

Figure 4. Details of hand-colouring applied after printing. Top: maroon desert (Harvard-Yenching Library, T 3080.8 4831); lower left: yellow internal borders (Bibliothèque nationale de France, GE A-1096); lower right: red mountains (Waseda University Library, ル11 01159). © Harvard-Yenching Library; Source gallica.bnf.fr / BnF; Waseda University Library.

Mounting and displaying the maps

The editions of the blue terrestrial and celestial maps exist today in a variety of mounting styles, ranging from traditional Chinese mounting as hanging scrolls, to specifically Japanese formats, to framed versions done in more recent years. The makers of these maps likely printed the multiple sheets with the intention that they should be mounted in China as a set of hanging scrolls. Typically, sets of multiple scroll landscape paintings of this scale would be mounted, in China, as a continuous image in a style known as the panoramic screen (*tongjing ping* 通景屏), with no borders or gaps in between the scrolls, and a one-colour border (*yise biao* 一色裱) in minimal proportions done in paper or brocade below and at the top of each scroll. This Chinese style of mounting can be seen in numerous extant editions of the blue maps (Figure 1).

An unusual detail of the terrestrial maps is that many of the known prints include a set of eight title slips printed vertically and stacked on the far-right exterior edge of the first sheet for most editions, or the last sheet in the case of the 1825 edition. The map's title in an abbreviated form (*Daqing yitong dili quantu*) is repeated eight times in individual rectangular bordered boxes. These are not part of the map proper but were nevertheless incorporated into the printing of the

map. The intentional inclusion of these eight slips would indicate that the maps were to be mounted as hanging scrolls, with the title slips cut off, separated and placed outside the mount as labels on the exterior of the rolled scroll. That these title slips were meant to be cut off is made especially evident in the case of the 1825 edition, as they would have been displayed in the middle of the map if not cut off and not on the outer edge as in all other cases.

Historically, title slips were produced and added during the mounting process, entirely separate from printing, when a work was mounted onto the backing paper that helps protect the original work. It is quite unusual that title slips were part of the original printed work, to be removed by the mount maker. Mount makers would not alter the original work in any way unless they were part of the overall production process. This implies that the printer and mount maker, typically unrelated craftsmen, collaborated in the production of the blue terrestrial map project.

However, the terrestrial maps were not always mounted immediately by a mount maker associated with this project, as can be seen by numerous copies of this map (especially but not exclusively those that had been mounted in Japan) that still have the title slips intact on the first or last sheet. When the maps arrived in Japan and were sent to be mounted, the Japanese mount makers would not consider altering the original work and so the title slips were left intact on the map. That we still have versions with the title slips attached suggests that some of the maps were distributed as unbound sets of sheets without having been mounted in the intended hanging scroll format.[32]

After having been printed, the maps appear to have been distributed widely and seem to have been popular in Japan in particular, as attested by many extant editions either still located in Japan or showing signs of having been mounted in Japan (around half of the extant maps do have such a connection). The mounting practices in Japan differed greatly from those intended by the Chinese production team of mapmakers/printers/mounters. In early modern Japan, a number of different presentation formats were available for the mounting of large printed visual materials like these blue maps. Two were architectural and relatively expensive to produce: sliding doors

[32] One complete set of eight unmounted sheets, currently stored as a single roll, is held in the Harvard-Yenching Library collections.

(*fusuma* 襖) and the folded screen (*byōbu* 屏風), which are both large and physically divide space. Another two were smaller and presentational: hanging scrolls and bound-with-covers folded sheets. The Japanese style mounting of the folded sheet map has two covers, mounted on the back in opposite corners of the map proper, that protect the map when folded. These traditional Japanese style mounts functioned differently and were created for different audiences: the former generally for elite audiences and the latter for the larger general population. This variety again emphasizes that the maps must have been distributed as loose sheets, as otherwise it would have been cost prohibitive to change the presentation format.

Mounting the terrestrial map as sliding doors made for a permanent display. Only one such example is known, which, according to the provenance record, was found in a late Edo period house.[33] The maps were mounted with two scrolls centred on each door, for a total of four doors, and backed onto Japanese paper. Other sheets of paper in the surrounding doorway date to 1853, suggesting that the *fusuma* mount was made sometime thereafter.

Examples of both the terrestrial and the celestial map were mounted on folding screens (Figure 2). Screens were used to divide and create smaller spaces within rooms. In Japan, folding screens were typically made in pairs of six panels, with each screen of the pair to be placed in opposition within a large interior space. One would sit between them on the floor creating an intimate immersive setting. A Japanese pair of six-panel map screens might combine a map of the world and a map of the Japanese archipelago. Although architectural, folding screens were temporary and would be folded and stored when not in use. One could thus change the immersive setting, thematically or seasonally, by changing the screens. The blue maps' atypical dimensions meant that making them into screen panels required special configurations; a screen of eight narrow panels, as found with the terrestrial MacLean version (Figure 2), or as a screen of four panels, where two map sheets were mounted on each panel, as found on two screens—a terrestrial 1825 edition and a celestial May 1826 edition—both currently held by the Jissō-in Temple 実相院 in

[33] The *fusuma* set was in auction, Christie's London cat. 16019, 12/12/18, lot 191. The catalogue entry provides an image of the sliding doors in situ.

Kyoto.[34] Both these screen formats are rather unusual in a Japanese context and were obviously customized to accommodate the eight-section nature of the blue maps. The MacLean example is a stand-alone single folding screen while the Jissō-in examples are in the more typical paired configurations. One might speculate that the Maclean terrestrial edition was originally paired with a celestial edition for a truly impressive presentation of the mapped universe in blue.

For the Japanese presentation formats used in mounting the blue maps, scrolls and folded sheet maps could easily be stored away and taken out for any occasion. One edition of the blue terrestrial map mounted in Japan in the hanging scroll format is held by Waseda University Library. This set exemplifies differences between Chinese and Japanese hanging scroll mounting preferences. Similar to a Chinese style scroll mounting, the eight sections are mounted in the panoramic screen style arrangement of a continuous image carried over multiple scrolls without borders between them. However, instead of using only a one colour border above and below the map, in this case the mounter used a two-colour mount style (*erse biao* 二色裱) using two separate border colours, the preferred style in Japan. What is particularly unique about this edition is the use of the title slips. They were cut off from the first sheet as intended, but instead of using them as actual title slips glued on the outside of the scrolls, they are glued on the inside as part of the mount, centred above the map proper and inset as part of the mounting. This mounting of the title slips was very unusual for both Chinese and Japanese hanging scrolls, making for a unique overall presentation.

An example of the blue terrestrial map in the bound-with-covers folded map style mount is now in the ethnological museum (Museum Volkenkunde) in Leiden, The Netherlands.[35] This copy was collected and brought back to the Netherlands in 1830 by Philipp Franz von Siebold (1796–1866), a German doctor appointed by the Dutch East India Company (VOC) to the Japan factory in Nagasaki. Siebold served two tours in Nagasaki in the late 1820s and the early 1860s.

[34] Miyajima and Hiraoka 2016: 77. Another eight-panel folding screen was for sale in Sotheby's London May 13, 2021, *Travel, Atlases, Maps and Natural History,* lot 46.

[35] Another blue terrestrial map mounted as a folded case map can be found in the Harvard Yenching Library Collection.

The Leiden-Siebold blue map was mounted in Japan where it was backed and trimmed to be exactly rectangular when it was folded in the preferred traditional Japanese manner of map mounting. In the case of the Leiden-Siebold blue map, the mounting process required the mounter to cut a long thin triangular strip from the top left edge, bottom up, and apply it on the bottom edge left, justified in an effort to make that corner a true right angle.[36] A number of the maps Siebold brought back from his first trip were likewise mounted as folded sheet maps. They all have covers made of paper board covered in pale blue paper with a printed pattern of scrolling vines and plum blossoms. On the front cover, a title slip displays the map's title in large Chinese characters flanked on the right by small Japanese characters (*hiragana*) to indicate the pronunciation. Daan Kok, curator for East Asia of the Volkenkunde Museum, concludes that these paintings were all likely acquired, either through purchase or gift, during Siebold's trip to the Edo court in 1826.[37] It was after that trip and before 1828 that Siebold himself commissioned the mounting of the blue map and these paintings in Nagasaki using this distinctively patterned pale blue paper.[38] The Leiden-Siebold blue map presents another unique circumstance in that the mounting took place in Japan, specifically Nagasaki, but was commissioned by a European, layering the mounting aesthetics further still.

Conclusion

The two series of blue maps, terrestrial and celestial, were both made at about the same time in the first decades of the nineteenth century, using the same production methods resulting in similar visual presentations. Most editions were printed on eight sheets and intended to be mounted into hanging scrolls. The printers used the same blue colouring, designed and printed in the manner of rubbings from stone steles, that was part of long-established calligraphic and collecting practices in China, a manner not typical for printed maps. Given all the similarities, it is

[36] There are other cases where the mounter has trimmed the maps, sometimes even resulting in the loss of content. See for example the celestial map at Kankō Library and the terrestrial maps at the British Library and the MacLean collection.

[37] E-mail exchange January 2021.

[38] Although the use of relatively inexpensive paper mounts was typical for maps, the use of an inexpensive paper to mount expensive high-end paintings by artists like Kunitsugu and Hokusai would not be consistent with Japanese taste, confirming that Siebold was the one to commission the mountings. There is also a group of unmounted paintings in Leiden's collection. E-mail exchange with Daan Kok in January 2021.

quite likely that the terrestrial and celestial maps were intended as sets by the Chinese makers, just as Huang Shang's thirteenth century terrestrial and celestial maps formed a set.

The notes on the terrestrial editions clearly locate the place of production in Suzhou, a wealthy cultural and intellectual centre in China. The celestial map as well is tied to this city: one of the signers of the celestial maps, Qian Yong from Changshu, visited nearby Suzhou several times in his life and the source for the map, Huang Shang's star chart stele, likewise was located there. The makers of these maps were probably a group of collaborative literati from the Suzhou area.

Both maps reference long lineages of mapmaking traditions of earlier periods. The celestial map clearly copied a map that was over five centuries old and the terrestrial map also follows a lineage of maps several centuries old, even though it explicitly only refers back to a map from half a century earlier. Despite new geographic information becoming increasingly available in the early nineteenth century, the mapmakers chose to keep true to this old lineage of mapmaking, in line with the *gujin* paradigm, presenting an iconic and familiar image from the past reintroduced intentionally in order to present new information visually and textually.

Each of the extant prints is unique in its own way, not only when they come from different editions, but even prints of the same editions exhibit their own characteristics. These specificities were introduced at different stages of production, some such as the different inking of dark and light blue of the terrestrial maps came at the beginning of printing, others such as the hand colouring of the maroon desert, red mountains, and yellow borders were added later. Even more wide-reaching differences are found in the mounting techniques of both the terrestrial and celestial maps, with some maps seemingly mounted right after printing, others only being mounted later to a variety of formats, in different circumstances after having likely been circulated as unmounted sheets of paper.

The variety of mounting styles alone provide a fascinating case study of not only aesthetic practices but also of function in nineteenth century Japan and China, with an additional European twist. The presentational mounting of the blue maps on scrolls functioned as part of occasional display practices. On sliding doors, the blue map became permanently displayed and assumed a more decorative function. Even the semi-permanent folding screens create a decorative space,

although they can also make the maps a potential point of conversation. This range of mounting formats indicates a map that was customized for a variety of purposes, making the blue maps highly versatile images of the world and the sky.

The printed use of blue pigment on this scale was unheard of before the making of these maps and these maps are the earliest known examples of widespread use of Prussian blue in East Asia. Prussian blue possesses excellent properties for printing and was a pigment that in China at the time was likely cheaper than other blues such as indigo and azurite. The import of the pigment by the East India Company, and possibly even southern Chinese manufacture of the pigment mean that there was a large enough supply of the colourant in the early nineteenth century to allow for such a large scale project, resulting in the production of a popular map in a new material form.

There was something special about these blue maps. Was it the colour? The subject matter? The scale? The time and the place? A combination of all those factors? In any case, the collaboration of mapmakers, printers, and mounters in China and Japan resulted in the successful production of these blue maps.

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Appendix

Technical Examination of the Blue Terrestrial Map of China

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Harvard Yenching Library has two copies of the blue terrestrial map printed in a deep blue and a paler green-blue ink.[39] Each copy consists of eight vertical panels. Copy 1 is mounted and folded in a book format. Copy 2 consists of loose, individual unmounted panels. The Weissman Preservation Center examined both copies to identify the printing technique and colourants.

A clue to the map production lies in the unprinted areas, where recesses and wrinkles in the paper suggest it was pressed into the matrix cavities before inking (figure 5). This leads us to believe the maps are rubbings. Had the maps been relief-printed, we would expect to see the blue areas recessed. It is unclear what the matrix was made of (wood, stone, clay or metal), but the majority of strokes suggest a carving. The green-blue ink was applied first, followed by the darker blue with a fair amount of overlap in the transition. The inks were probably applied with a cloth-covered dauber as a textile weave is visible in the lighter areas.

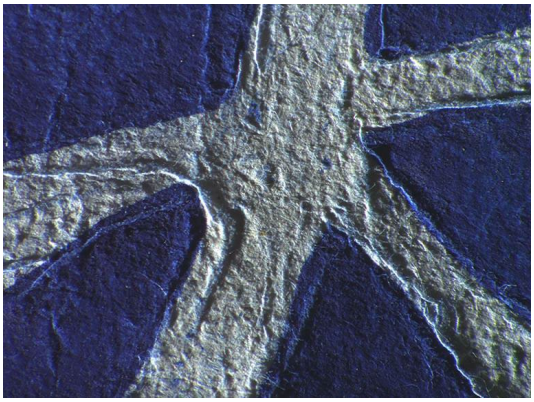

Figure 5. *Geographical Complete Map of the Everlasting Unified Qing Empire* (*Daqing wannian yitong dili quantu*), folded single-sheet, blue ink on paper, Harvard-Yenching Library, panel 1. Raking light of character at 15x magnification showing unprinted areas recessed and associated wrinkles indicative of a rubbing. (Image width is 20.4 mm).

The blue inks were characterized using two complementary, non-invasive analytical techniques: X-ray fluorescence (XRF) spectroscopy and spectral reflectance and imaging. Both techniques confirmed Prussian blue for the dark blue and green-blue inks.

XRF spectroscopy was performed on the dark blue, green-blue, and unprinted areas of copy 1 (figure 6).[40] Iron is the predominant element in both blues, by which we may infer the presence

[39] Call number: T 3080.8 4831. http://id.lib.harvard.edu/alma/990097474670203941/catalog.

[40] XRF measurements were performed using a Bruker TRACeR III-V XRF portable analyzer equipped with a rhodium x-ray tube, silicon pin detector, and 3 x 4mm oval spot size. All measurements were taken with no filter or vacuum

of Prussian blue ($Fe_4[Fe(CN)_6]_3$).[41] Moderate calcium peaks of comparable intensity were found in the spectra of all three areas of interest, likely due to calcium carbonate in the paper. Aluminium, potassium, and sulphur were also present, probably due to the common use of aluminium potassium sulphate as an extender in the manufacture of Prussian blue.[42] No other elements were detected. The maps' two distinct values may have been achieved by dilution, the addition of organic colourants, or both.

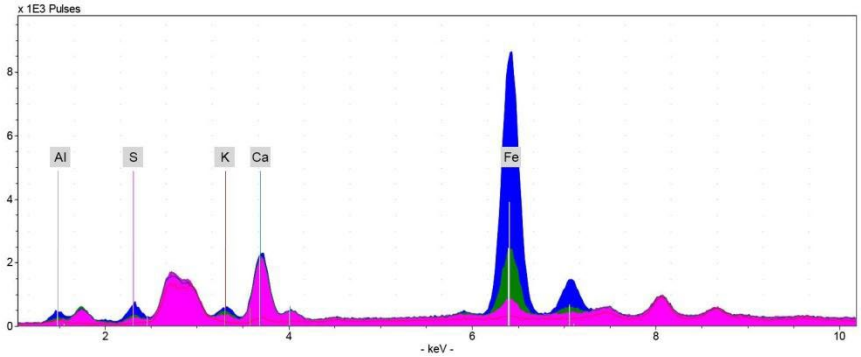

Figure 6. *Geographical Complete Map of the Everlasting Unified Qing Empire* (*Daqing wannian yitong dili quantu*), folded single-sheet, blue ink on paper, Harvard-Yenching Library, XRF spectra showing dark blue ink (in blue), green-blue ink (in green), unprinted paper (in pink), and instrument contribution (in red).

Spectral reflectance and imaging were performed using the Video Spectral Comparator 8000.[43] In both copies, the dark blue ink matches the visual behaviour of Prussian blue by absorbing infrared light and appearing dark around 550-650nm and remaining dark to 1000nm. In contrast, indigo reflects in the infrared range, thus appearing light.[44]

The spectral reflectance curves of the dark blue ink matched the spectra of reference pigments of Prussian blue evaluated at the same time with peak maxima around 460-465 nm and absorption from around 600 to 1000 nm.[45] The spectral reflectance of the green-blue colourants and prepared washes of Prussian blue reference pigments were very similar to each other and mimicked the spectra of the dark blue ink and reference samples but displayed a greater and

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with the energy and current set at 40kV and 10 µA, respectively. The collection time for each analysis was 120 seconds. Spectra were collected with S1PXRF software (3.8.30) and processed with ARTAX software (8.0.0.446).

[41] Iron was identified by its characteristic X-ray emission lines. The photon energies of Fe in the blue spectra are as follows: $K\alpha_1$ 6.45 KeV and $K\beta_1$7.06 KeV. XRF can only detect elements heavier than sodium (Z=11), it cannot provide elemental information on organic compounds such as the cyano complex of Prussian blue.

[42] Kirby and Saunders 2004.

[43] Optical examination was completed using the Weissman Preservation Center's Video Spectral Comparator (VSC 8000) manufactured by Foster and Freeman, Ltd. UK. The VSC allows examination using incident and transmitted visible, ultraviolet, and near infrared light. Spectral reflectance is measured between 400 and 1000 nm.

[44] Villafana and Edwards 2019.

[45] Reference pigments: Winsor & Newton Prussian blue watercolour dot chart: alkali ferriferrocyanide (PB27, 77510). Gamblin Prussian blue dry powder: Ferri-ammonium ferrocyanide (PB27:1, 77510:1). Indigo powder and painted swatch with gum from conservation workshop on pigments with Cheryl Porter.

broader reflectance between 500-550 nm, likely an effect of reflectance of the paper support. The alteration of the Prussian blue or addition of organic yellows is not ruled out.

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