

THE GREAT JESUIT SURVEYS OF THE PEOPLE'S REPUBLIC OF CHINA, 1705-1759

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Abstract

Although the Western world had limited knowledge of China by the first century A.D., it took over fifteen hundred years before an accurate portrayal of that ancient realm began to appear on maps produced by Europeans. The catalyst for systematic collection of information concerning the geography of East Asia was the arrival in China of Jesuit missionaries, led by Father Matteo Ricci, in A.D. 1583. These highly educated Renaissance men began to promote Christian religion through a strategy designed to impress Chinese officials and literati with the breadth and depth of contemporary European knowledge, especially in the sciences. One facet of this strategy was the introduction of Western techniques of regional survey and cartographic representation. The preeminence of the Jesuit surveyors and cartographers was culminated by the Great Jesuit Surveys of China from 1705 to 1759. During this period, three surveys took place, and they covered much of Manchu China. Besides providing the Emperors K'ang-hsi and his grandson Ch'ien-lung with a more comprehensive picture of their empire, the Jesuit Surveys also gave Europe the first accurate portrayal of China's geography. And, this representation was so close to the actual that it prevailed on maps of China until well into the twentieth century.

Introduction

Evidence of early recognition of China in Europe can be traced to at least classic Greek maps and literature. The Greek geographer Strabo (ca. 50 B.C.-A.D. 25) makes mention of the Chinese as *Seres* or silk men (Thomson 1948:132) and a map depicting the placement of *Seres* in northeast Asia was prepared in 1883 by E.H. Bunbury. Known as "The World According to Strabo", the reconstructed map (Fig. 1) displays this reference to China during the period of the Han Dynasty (206 B.C.-A.D. 220) just a bit north of the Ganges River (whose course was depicted incorrectly in an east-west manner).

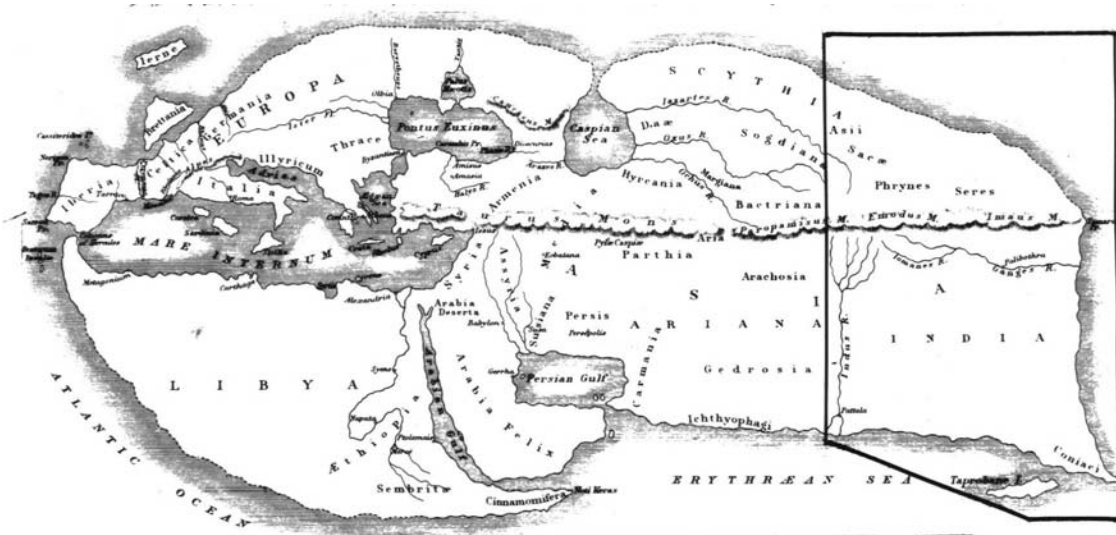


Fig. 1 "The World According to Strabo" from E.H. Bunbury (1883/1959)

European knowledge of China and the Far East, through the next millennium, comes from a limited number of diverse sources. These include references from Ptolemy's world map (also reconstructed by Bunbury), accounts of far-ranging Franciscan missionaries John of Plano Carpini (1245-1247), William of Rubruck (1253-1255), John of Monte Corvino (1291-1294) and Odoric of Pordenone (1318-1320), who were seeking alliances with the Mongols (Yuan Dynasty 1279-1368) against the Muslims while hopefully gaining Church converts, and finally from the well-known story of the merchant Polos—Marco and his father and uncle. Even though there was an increase in information about China reaching Europe, the depiction of that vast land on maps remained, for the most part, spotty and inaccurate. One

further point of confusion was the introduction of the term “Cathay”, most likely by Polo, which was supposedly a nation different from China and with great riches.

Little information on China was forthcoming to Europe following the replacement of the toppled Yuan Dynasty in 1368 by the Ming government, which was less inclined toward foreigners. Diffusion of information was further hampered because of events in Europe such as the Black Plague and the expansion of the Ottoman Turks into western Asia, which greatly impacted safe travel overland. With the advent of improved sailing technology and the increased fervor for market expansion and missionizing in the fifteenth century, Europeans once again appeared on China’s doorstep—this time the Portuguese, who came by sea around Africa. In 1513 Jorge Alvares landed on Lintin Island at the mouth of the Pearl River (Zhujiang) and became the first European since the fourteenth century to reach the ancient realm of China (Penrose 1967:65-66). By the end of the sixteenth century, China had been approached by a variety of trading missions, and the first Jesuit mission to China had finally been realized by Fr. Matteo Ricci.

Maps of China up to this period were primarily coastal depictions as the Ming government restricted European traders and travelers from inland travel. This policy was changed in 1583 to accommodate Fr. Ricci as he obtained formal permission to settle and establish a mission in Chao-ch’ing (Zhaoqing), about 70 kms. west of Canton (Guangzhou). Until his death in 1610, Ricci traveled throughout much of eastern China eventually settling in Peking (Beijing). The maps he made of China began a two hundred year Jesuit tradition in mapping that nation.

During the seventeenth century no fewer than ten Jesuits traveled to China and followed in Ricci’s cartographic footsteps. Many well-known maps and atlases were produced—giving greater knowledge of China to Europe. This period also saw the fall of the Ming Dynasty, and its replacement with the Ch’ing Dynasty in 1644. This is also the time when the second Ch’ing ruler, Emperor K’ang-hsi, began a sixty-one year rule in 1661.

Emperor K’ang-hsi’s life has been well chronicled, and we learn of a man who was interested in geography and traveled far and wide across his empire. Spence (1974:xiii) recounts how K’ang-hsi traveled over 2000 *li* (a unit of Chinese measurement equivalent to about one third of a statute mile) in every cardinal direction from Peking: west to the provinces of Shansi (Shanxi) and Shensi (Shaanxi), north across the Gobi to the Kerulen River, east through Manchuria, and south through China proper to Shao-hsing (Shaoxing), below the Yangtze River (Yangtzi). His travels were guided by interest in his lands, in nature and natural history, and in hunting like his Manchu ancestors. He was also a man of great curiosity, apparently interested in “geometry, mechanics, astronomy, cartography, optics, medicine, music, and algebra” (Spence 1974:xviii), of which many of these topics had been taught to him by the Jesuits who were resident in Peking.

Today, the Jesuit Order is known for an emphasis of scholarly pursuits, and its early roots were no exception. Since the Order’s inception in 1541 by St. Ignatius Loyola, Jesuit priests were educated and trained in a variety of areas including astronomy, mathematics (which encompassed cartography), physics, and geometry. Expertise in these topics aided the Jesuits in obtaining an entrée into the Chinese bureaucracy beginning with Matteo Ricci and culminating with the Great Jesuit Surveys of the eighteenth century.

The 1705 Survey of T’ien-chin (Tianjin)

This initial survey was apparently ordered by K’ang-hsi to investigate the area near T’ien-chin, southeast of Peking. It is an area where many rivers empty into the Gulf of Po Hai (Bo Hai), and was frequently inundated by floodwaters. The survey was completed in seventy days, and a map was produced by the Jesuits which represented “1,700 bourgs et chateaux, sans compter les hameaux; et une infinité de maisons de paysans” (Pfister 1932 1:406). Not much appears in the literature on this event, however it was seemingly the catalyst for the “Great Jesuit Survey” beginning in 1708.

The Great Jesuit Survey (1708 to 1717)

During the latter part of the seventeenth century, K’ang-hsi spent much of his time traveling throughout his lands accompanied by Jesuit priests. Seemingly, one of the most influential was Father Ferdinand Verbiest, who took astronomical observations and determined the height, distance and grade of mountains—involving K’ang-hsi in the process (Spence 1969:29). K’ang-hsi even discussed how he later used Western methods to show his officials methods for measuring distances, the angle of river banks, and surveying plots of lands “even if its borders were as jagged as dogs’ teeth” (Spence 1974:73). This period was also a time when K’ang-hsi expanded Chinese territory into Mongol lands, so that by 1700 the Amur region and Outer Mongolia as far as Hami were under Manchu control. The fact that K’ang-hsi decided to avail himself of Western methods of survey and the labor of the Jesuits shows a ruler who made use of a variety of resources to manage his empire. On July 4, 1708, a full-scale survey of the empire was begun.

The first group of surveyors was comprised of Fathers Joaquim Bouvet, Jean-Baptiste Régis, and Pierre Jartoux. They were to determine the exact situation of the Great Wall from the eastern end at Chanhaikouen (Shanhaiguan) to the

western termination at Chia-yu-kuan (Jiayuguan) (Bernard 1935/36:459). Bouvet fell ill early on, but the other two missionaries were able to complete the work. A map that stretched fifteen feet in length was completed, and the Jesuits returned with it to Peking in January 1709 (Du Halde 1738 1:vii).

K'ang-hsi was so pleased that he dispatched Fathers Régis, Jartoux, and Xavier Fridelli in May 1709 to record the geography of Eastern Tartary (Manchuria) (Du Halde 1738 1:vii). In less than eight months, they recorded information on Liao-tung (Liaodong), the northern boundary of Korea, and the adjacent regions that fall between 40°N and 45°N (Bernard 1935/36:459).

Shortly after finishing this map, they were ordered out again to survey Pe-che-li (Bei Zhili), the provincial seat of the Chinese government. This was completed in June of 1710. Next, K'ang-hsi sent the Jesuits back to Manchuria for further reconnaissance. Between July and December of 1710, the missionaries surveyed the area south of the Amur River (Heilong) around the towns of Mergen (Nenjiang) and Tsitsikar (Qiqihar) (Bernard 1935/36:460). The map of this region, though blank in some areas, apparently satisfied the Emperor.

During 1711 the surveying and mapping project was expanded. Régis and the newly arrived Jesuit Jean-François Cardoso went to Shan-tong (Shandong) province; and Jartoux, Fridelli, and an Augustinian, Fabré-Bonjour, traveled beyond the Great Wall as far as Hami to survey Mongol territory (Mongolia). They returned a year later with their results (Du Halde 1738 1:viii).

K'ang-hsi further increased the ranks of the Jesuit surveyors/cartographers. Four fathers were proposed and approved. Hence, Cardoso was joined by Pierre-Vincent de Tartre to map Shan-si, Shen-si, and Kan-su (now Gansu and Ningxia Huizu), Kyang-si (Jiangxi), Quang-tong (Guangdong), and Quang-si (Guangxi); while Honan (Henan), Kyang-non (now Anhui and Jiangsu), Che-kyang (Zhejiang), and Fo-kyen (Fujian) provinces fell to Régis, Romain Hinderer, and Joseph de Mailla, who also traveled to Tai-ouan (Taiwan). Fridelli and Bonjour finished Se-chwen (Sichuan) and Yun-nan (Yunnan), and after Bonjour's death Fridelli was joined by Régis to complete Quey-chew (Guizhou) and Hu-quang (now Hunan and Hubei) (Du Halde 1738 1:viii).

Finally, by January 1, 1717, all Jesuits had returned to Peking and nothing remained to be done except to make a general map from the smaller ones. In 1718 Father Jaroux presented K'ang-hsi with a finished map, the *Huang Yü Chiang T'u (Royal Map of the Chinese Empire)* (Chen 1978:111). K'ang-hsi secreted the map in the imperial palace, and only a select few of the privileged class were allowed to view it (Chen 1978:112). Nevertheless, the Jesuits were able to "directly or otherwise transmit the survey results to Paris", which were given to French scholars for incorporation into geographies and atlases (Chen 1978:112).

Two resulting major European works were the *Description Géographique, Historique, Chronologique, Politique, et Physique de l'Empire de la Chine* (1735) by J. B. Du Halde and the *Nouvel Atlas de la Chine* (1737) by J.B. D'Anville. Jean Baptiste Du Halde was a French Jesuit who combined the survey results with earlier Jesuit reports and produced an extremely valuable work on China. Several translations and editions have been produced, some with annotated changes such as Edward Cave's English edition of 1738/1741 titled *A Description of the Empire of China and Chinese-Tartary, Together with the Kingdom of Korea and Tibet*, which combines the maps and atlas into one work.

The *Description* is organized into fifteen provincial chapters, though K'ang-hsi increased the number of provinces to eighteen during his reign, and information is given on location, size, extent, population, trade, agriculture, resources, public works, and major towns and cities. The maps were produced as either "general", which depict the provinces, cities, and the empire in totality (Fig. 2), or as "particular", which are individual provincial and town maps such as Peking in Fig. 3.

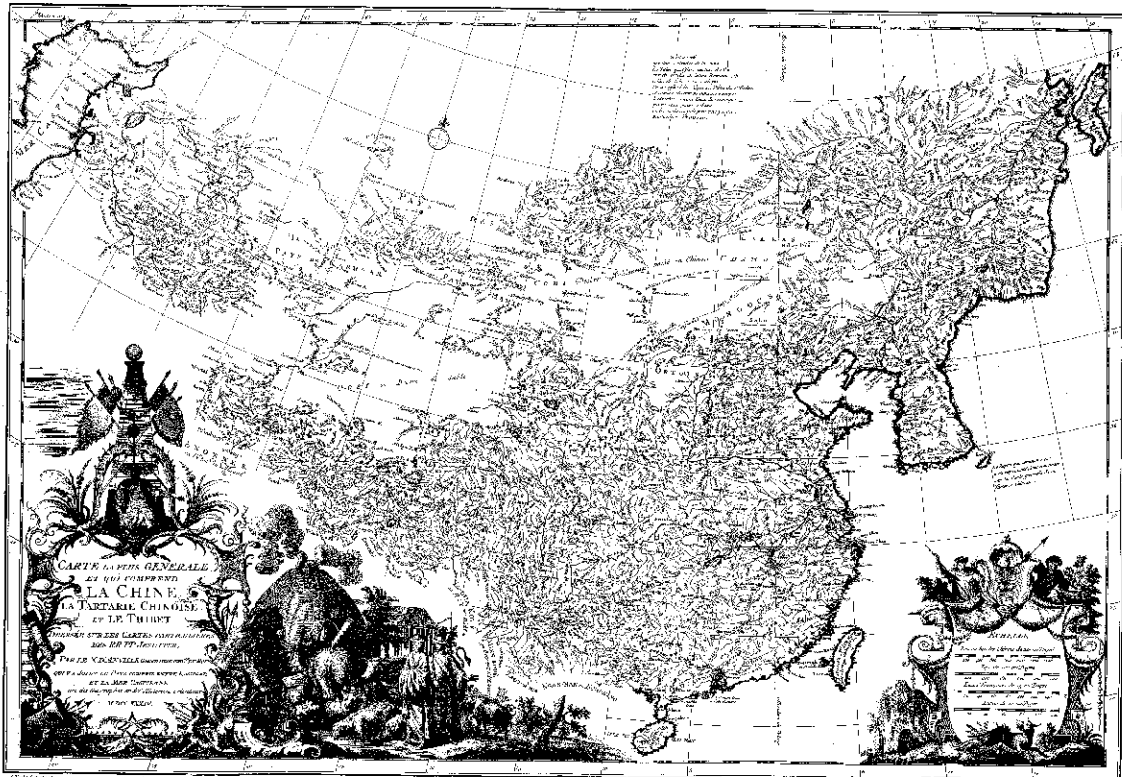


Fig. 2 CARTE LA PLUS GENERALE ET QUI COMPREND LA CHINE, LA TARTARIE CHINOISE, ET LE THIBET (D'Anville 1737)

Plate IV.

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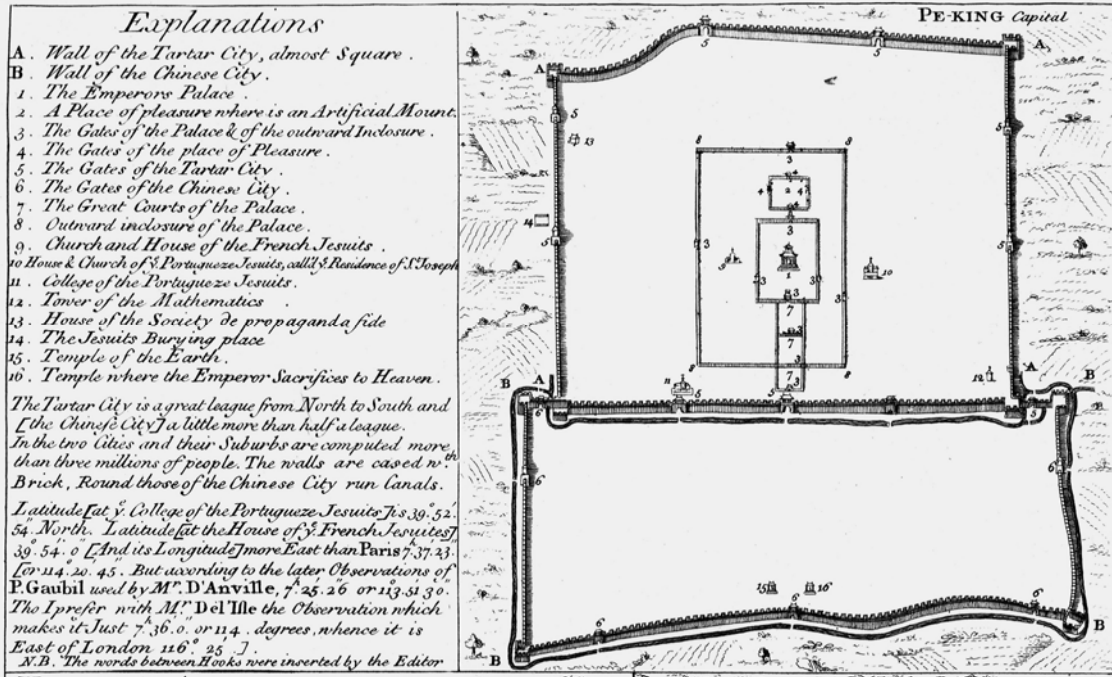


Fig. 3 City of Peking (DuHalde 1738, v. 1)

Surveying Methods

During the eighteenth century Chinese land surveys, the Jesuits derived the latitude and longitude of over six hundred locations. Double lines were drawn on the maps where both the latitude and longitude were determined (Fig. 4). These tended to be cities of the first “rank”. Cities of lesser importance only had their latitude taken as the methods of survey for longitude, according to the Jesuit journals, were quite cumbersome.

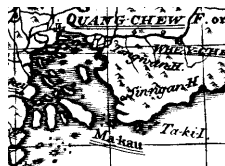


Fig. 4 Area near Canton (shown as Quang-chew) illustrating double lines (Du Halde 1738, v. 1)

The ability to determine a fairly precise latitude dates back to early Greek times when calculations using the *gnomon* (basically a stick in the ground that cast a shadow) were first used. Over time, the astrolabe or “star-measurer” was developed and it was part of the Jesuits’ repertoire. The astrolabe “consisted of a plane circle of metal or wood, fixed or portable, whose perimeter was graduated into 60 or 360 equidistant parts. Pivoted at the center was a tube or solid arm (vane) which served both as a sight for the observer and an indicator of the angle sighted...It was used to measure the angular height of the sun or a star” (Brown 1977:45). Providing that there was a clear view of the heavens, latitude observations could be most readily obtained.

Determination of longitude was another problem, and positional accuracy remained elusive until the latter part of the eighteenth century when a chronometer built by John Harrison finally solved this problem. The theory of longitude determination relies on an accurate timepiece that can be carried to the field or sea without losing even a second. The clock is set to noon at a known location, e.g. Greenwich, and that time is compared to the apparent noon out in the field or at sea. The difference in time is computed based on 15° of longitude (or parts thereof) for every hour’s difference in time—thus revealing the longitude of the survey location. Because Harrison’s invention was not available during these early surveys of China, the Jesuits used two different methods for determining longitude: triangulation and noon sightings in accordance with a pendulum clock. Their preferred method (and ultimately the most frequently used) was the former, because the latter proved to be more cumbersome and unreliable—being impacted by cloudy weather and lack of calibration by the clock’s pendulum.

Triangulation or the “Method of Triangles” has been attributed to a Dutch mathematician, Willebroard Snell. This survey system consists of determining a series of distance and bearing measurements across the landscape in a triangular network to which intermediate topographical features are afterwards adjusted. From the Jesuit reports it is learned that “long chains” (sometimes referred to as “cords”) were used as a means of measuring accurate distance (Ripa 1939:65). The Jesuits also availed themselves of compasses for the bearings, and, when possible, they worked back to their starting point—with the hope of realizing it with little or minimal surveying error. Their initial starting point was a 0° meridian that they measured through Peking. Longitude was drawn on some of the general maps showing origins from both Peking and Ferro as shown in Fig. 5.

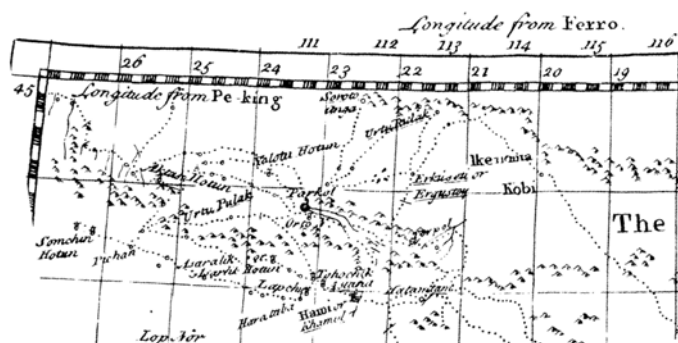


Fig. 5 Northwest corner of the general map of China from Du Halde (1738, v. 1)

Because China is such a large area and the Jesuits and their resources were limited, it cannot be assumed that every area was actually visited or surveyed by them. The Jesuits do comment in the published atlases that they availed themselves of local knowledge held by inhabitants and officials, maps, and histories. In fact, Edward Cave, in his translator’s

preface, comments on this:

It is not to be presumed that every mountain and river was actually surveyed by the Jesuits. It appears by the Table of Longitudes and Latitudes at the end of this book, that they took the Latitudes of all those Capitals, and determined their distances from one another by a Chain of Triangles, for the rest probably making use of the topographical surveys they found in every district. And this Method doubtless was sufficient to produce accurate Maps of any County (Du Halde 1738:iii).

Cave, while lauding the overall Jesuit accomplishments, also took them to task on some cartographic issues. For instance, he criticized the lack of road depiction from place to place, the Jesuits' choice of map projections, some positional errors in the western areas (many marked contrary to what their instruments read), and the distraction that missionizing posed on the Jesuits' surveying tasks. Even so, Cave claimed that this was the most comprehensive and accurate work on China to date.

Even into the nineteenth century, the Jesuit surveys held their own. In 1844, W. Huttman returned a report to the London Geographical Society who had commissioned him to review available maps of China and make recommendations for a new map of the Chinese empire in the interest of commerce. He concluded that the British could either adopt K'ang-hsi's survey as the basis of a new map or allow British maps of China to remain in a state of "great incompleteness and inaccuracy" (Huttman 1968:242-3).

This author has made a comparison between some of the Jesuit maps and modern maps of China. Figure 6 shows the Chinese coastline and major rivers overlaying the J.B. D'Anville "Carte La Plus Generale et Qui Comprend La Chine, La Tartarie Chinoise, et Le Thibet" of 1734. Though there is a small variation in the overall conic projection between the two maps (which might account for some positional error), for the most part, the two maps correspond quite closely. The most notable deviation is the course of the Huang Ho because of a major course change. Considering the methods available then and now, it is indeed amazing that the Jesuits were able to map China so well.

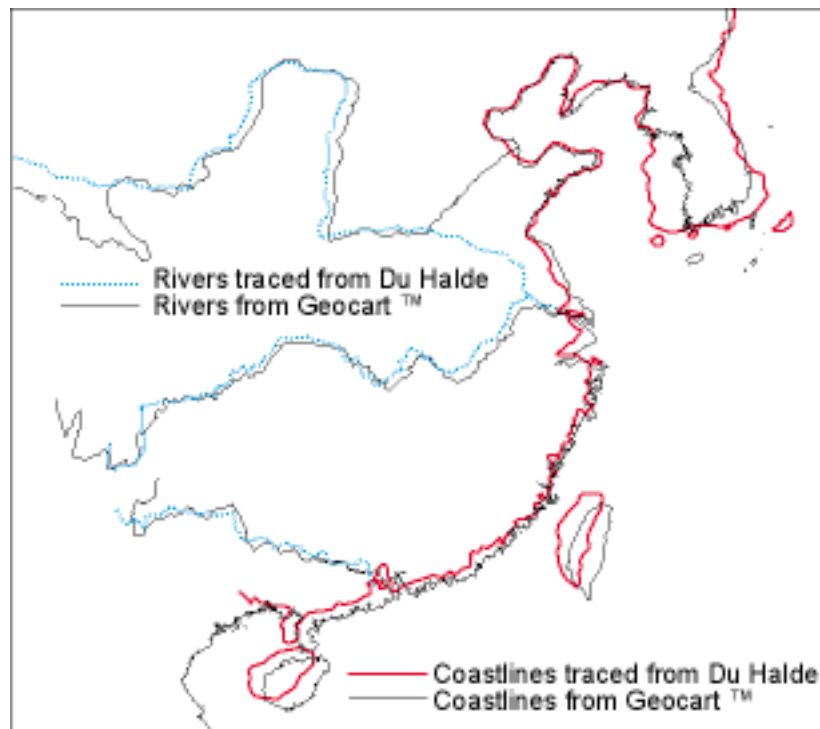


Fig. 6 Comparison of coastlines and major rivers digitized by author from Du Halde (1738) to Geocart™ digital coastlines

The Second Jesuit Survey (1756-1759)

Although the K'ang-hsi survey covered more area than any previous mapping project, by the mid-eighteenth century much of the western portion of China still remained little known to her rulers. Ch'ien-lung, K'ang-hsi's grandson, had added approximately 6,000,000 square miles as he extended the borders of China westward into Eleuth territory at Dzungaria and then into the Tarim basin (Hummel 1943 1:370).

In order to obtain a complete picture of the extensive Manchu empire and to be able to negotiate proper boundaries between China and Russia, Ch'ien-lung ordered a second survey by the Jesuits. Though only a lukewarm friend of the Jesuits, he still chose to enlist them for their cartographic abilities. In 1756 Fathers Felix da Rocha and Joseph d'Espinha were commissioned to complete the survey of Manchu lands.

The two Jesuits traveled west along separate routes: da Rocha journeyed north to the Ili River and Espinha went south and then west. Eventually they met near Chia-yu-kuan and combined their observations (Bernard 1935/36b:472). In 1759 they returned to Peking, and a decade later their observations were compiled with the earlier K'ang-hsi maps to produce an atlas in one hundred and four sheets. The major cartographer for this undertaking was Father Michael Benoist, who produced the map in engraved copper. Chen notes that the same title as K'ang-hsi's earlier production, *Huang Yü Chüang T'u* was used even though maps from the second survey covered a more extensive area (1978:112). Between the earlier K'ang-hsi and the Ch'ien-lung maps there are similarities in place names (Chinese was used in China proper and Manchu in frontier areas such as Korea); the projection with the maps' prime meridian at Peking; and the scale (Chen 1978:112).

The End of the Jesuits in China

Political and ecclesiastical events in Europe eventually led to suppression of the Jesuit Society in 1773. Although rumors traveled more quickly, official news of the Society's suppression did not arrive in China until two years later. Arguments among the various orders in China over Jesuit property were prevalent, and in 1784 the Lazarists assumed the Jesuit missions (Rowbotham 1942:191). The death of the last Jesuit in Peking, Father Jean Amiot, in 1793 ended the Jesuit presence in China—but it did not diminish the influence or the accomplishments of this Catholic mission.

Impact of the Jesuits on the Mapping of China

It is difficult to say how history might have gone without the Jesuit mapping of China. What we can surmise is that as far as information transmission to the West—the Jesuit maps of China gave Europe the first clear look at that immense territory. Certainly the Chinese bureaucracy made some use of this information as well. All things aside, the portrayal of that ancient realm by European standards had never been achieved on this level before, and what remained to be refined thereafter was miniscule in relation to the initial task.

Note:

Because of the historical nature of the topic, the author has chosen to use the original geographic names as found on the Jesuit documents. Pinyin conversion has been added in parentheses after the first usage of a location.

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