

An Overview on the Ancient Charts in China From the Fifteenth to the Eighteenth Century

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Introduction

The cartography in China has passed through a long history of development. As early as more than 2000 years ago, there were topographic maps of high quality appeared. The marine cartography has also been developed quite early in China. It is recorded in the ancient books that there are original nautical charts appeared in the twelfth century; nevertheless, they haven't been handed down. The earliest charts which have been preserved till now are *Guide Chart for Seaway* drawn in the fifteenth century. This paper discusses respectively several main ancient charts in China from the fifteenth to the eighteenth century.

Guide Chart for Seaway

Guide Chart for Seaway was included in *Talking about Seaway* as an annex. *Talking about Seaway* is a book similar to the current *Sailing Directions*. *Talking about Seaway* was written around the years from 1411 to 1415 without presenting the author's name (Fig.1). The book summed up the predecessors' experience in navigating. *Guide Chart for Seaway* is possibly based on the nautical charts drawn in a still earlier period, from twelfth century to the fourteenth century.

Guide Chart for Seaway is composed of 6 sheets that can make up a long sheet in all. The coordinate of the chart indicates the right side of the chart directs to the south, the left side to the north, the upside to the east and the down one to the west. The chart covers the area that starts from Nanjing in the west, goes eastward along Yangtze River down to the sea, from there, the river mouth, goes separately southward along the coast to Ningbo and northward along the coast to Liaodong Peninsula.

The contents in *Guide Chart for Seaway* are in a simple form. There are riverbanks, coastline and notes for place names presented along the coast in the chart (See Fig.1).

There are some simple explanations and notations in the chart. The chart itself can't be used independently for navigating at sea unless the explanation in *Talking about Seaway* is used coordinately at the same time.

Coastal Configuration Map

In the Ming Dynasty, books with similar contents to today's *Sailing Direction* maintained some primitive nautical charts. This kind of chart is so-called *Coastal Configuration Map*, which is different from *Guide Chart for Seaway* in form. For example, the attached chart in the explanation of how to voyage from China to Japan in *Compilation of Japan Charts* by Zheng Ruoceng is a sort of coastal configuration map.

The sea routes introduced in *Compilation of Japan Charts* (1561) conclude the

ones from Taicang to Japan and from Fujian to Japan. The space of the whole page is divided into two parts. In the up part, there are the graphs of mountains. In the down part, there is the textual description for the mountains (See Fig.2).

The mountains were used as the ground objects for the navigation channel. There are all together 33 figures of mountains and islands in *Compilation of Japan Charts*. The figures give us a clear show of the profiles of the mountains and islands and they are drawn in simple lines. There are the mountains' names noted in the center of the mountains one by one. At that time, the whole graph was applied just like the views of nautical charts in modern time.

Zhenghe's Nautical Charts

Zhenghe's Nautical Charts were formerly called *The Charts for the Area Starting from Bao Chuan Chang, Through Long Jiang Guan to Foreign Countries*. They were published at first in *Wu Bei Zhi* —— a collection of military books (1621) and compiled by Mao Yuanyi of the Ming Dynasty. As a result of Zhenghe's Expeditions to the Western Ocean, the charts were general called *Zhenghe's Nautical Charts* for short.

When *Zhenghe's Nautical Charts* were collected into *Wu Bei Zhi*, the form of the charts changed from the original scrolls to a book. According to the current binding method, there are 44 pages of charts altogether: 40 pages of nautical charts and 4 pages of astronavigation charts.

Various navigation materials had been collected in the primitive charts before Zhenghe's fleet began to go on the long voyages. The primitive charts were revised and complemented during each voyage and then processed to form *Zhenghe's Nautical Charts* finally completed around the early 15th century ⁽²⁾.

Zhenghe's Nautical Charts are characterized by five features ⁽³⁾. First, the representation on the chart contents concerning navigation was emphasized. The contents included coastlines, shoals, towers, rocks, temples and flagpoles which could be recognized from seaward and be used to help mariners with their ship positioning. The contents also included various places' names and notes; descriptions of routes, bearings and distances. All of these were closed concerned with navigation.

Secondly, the components appearing in different areas' sheets were quite distinct so that the navigation features of the area were not represented in the same way. From Nanjing to the mouth of Yangtze River, for example, the ship could only be set on a course along the coast; therefore, the description of the routes was not expressed in the charts; instead, the coastal hilltops and landmarks were depicted in greater detail to aid positioning. From the mouth of Yangtze River to Malacca Strait, ships proceeded southward along the seacoasts mainly by using magnetic compasses at that time and for this reason, the bearings and distances were expressed in detail. When navigating in the area of the Indian Ocean, the mariners fixed their positions by using compasses and astronavigation method. Thus, not only the general description of routes, but also the heights of the celestial bodies were show on the sheets (See Fig.3).

Thirdly, each chart was compiled specially in accordance with the different positions of the routes. Routes shown in *Zhenghe's Nautical Charts* from Nanjing to the

entrance of Hormuz Strait were successively drawn from the right to the left on each sheet; therefore, the orientation of each sheet was different. The top part of the sheets covering the area from Nanjing to the mouth of Yangtze River directs to the south, and the top part of the sheets covering the area from the mouth of Yangtze River to the Malacca Strait directs to the north or northwest. The coasts of the Indian Ocean had been squeezed onto the sheets of that Ocean, arranged in the upper and lower halves of the sheets so that the Ocean's graphic appeared like "a long gallery". The top of the sheets directs to the east.

The fourth feature of the charts is that the description of routes was given in detail and with good accuracy. The descriptive information included bearings and distances as well as notes for depths of channels and the descriptions of rocks. In comparison with the modern compass, one of the 24 bearing angles appearing on the ancient compass rose is equivalent to 15 degrees and the accuracy of the bearings can be expressed up to 7.5 degrees. The distance was measured in Geng (a measure system for distance). A Geng is approximately equal to 12.5~18 sea miles. The depth was expressed in Tuo (a measure system for depth) which is equal to 1.75 meters. The descriptions for more than 100 routes were given in *Zhenghe's Nautical Charts*. Comparing the above descriptions with the routes shown in the modern nautical charts of the world, we can find that the description is quite perfect.

Finally, four sheets of astronavigation charts were provided. A picture of a sailing ship was placed in the center of each sheet, expressing the constellations used with their names, bearings and heights around the picture. The height of each celestial body was measured in Zhi (a measure system for altitude)(See Fig.4). It is generally acknowledged that a Zhi is approximately equal to 1.9 degrees.

Coastal Defence Chart by Zheng Ruoceng

Coastal Defence Chart by Zheng Ruoceng is a kind of littoral military map. Before the Ming Dynasty, military maps were mainly used for frontier defence of land territory. From the fourteenth to the sixteenth century, Japanese pirates often harassed along the southeast coast of China. *Coastal Defence Chart* was compiled for the purpose of strengthening military defence in the coast territory.

There were many coastal defence charts drawn in the Ming Dynasty. The most important one is *Coastal Defence Chart* by Zheng Ruoceng.

Zheng Ruoceng is a famous geographer on coastal geography. *The Theory of Long Coast Defence Chart* (1561) by Zheng Ruoceng included 72 coastal defence charts. These charts were afterwards compiled into *On Nautical Chart Compilation* (1562), *Essay of Zheng Kaiyang* (1693) and so on, and spread far and wide in China.

Coastal Defence Chart covers the area starting from the boundary between Vietnam and China in the south to Liaodong Peninsula in the north, and also includes Hainan Island. The disposition of these charts is generally taken coast area as the center of a chart. In this way, it is not only suitable for chart compilation, but also can achieve reasonable area scale between land and sea. All of the coastlines, harbors and river mouths were drawn up in detail in the charts and the military installations for coastal defence were emphasized with a prominent representation (See Fig.5).

The Ocean Shipping Chart in the Ming Dynasty

The Ocean Shipping Chart in the Ming Dynasty was a special chart used for shipping of the grain from South to North in China. Now we can find *The Ocean Shipping Charts in the Ming Dynasty* only in the map atlas of the Ming Dynasty. For example, there are the ocean shipping charts in *Guangyutu* edited by Luo Hongxian.

Guangyutu has 4 pages of the shipping chart. The coordinate of the chart shows that the right side indicates the north, the left side indicates the south, the top part is land and the low part is sea. It covers the area starting from Liaodong Peninsula in the north to Fuzhou of Fujian Province in the south. The content is very simple and only several big rivers and populated places along the coast are indicated in the land area. In the sea area, there are notes of islands' names, symbols for sea waves and the two highlight lines used to display especially the sea routes (See Fig.6).

General Coastal Chart in the Qing Dynasty

General Coastal Chart in the Qing Dynasty was drawn in the Qing Dynasty and mainly presented the coastal circumstances in China. The chart first appeared in the book called *Outlook on the Coast States* (1730) and was corrected and redrawn for several times in later time. It finally became a map that had a certain influence upon the Qing Dynasty⁽⁴⁾.

The whole *General Coastal Chart in the Qing Dynasty* is composed of:

- 1) *East Hemisphere Map*;
- 2) *Coast Chart of China's Mainland* (from Yalu River in the north to the boundary between Vietnam and China in the south);
- 3) *West Coast Chart of Taiwan*;
- 4) *East Coast Chart of Taiwan*;
- 5) *Peng Lake Chart*;
- 6) *Hainan Island Chart*.

The original charts were in the form of a long scroll. Now they are block-printed into a book. The manuscripts of *General Coastal Chart in the Qing Dynasty* collected in Beijing National Library are still in a scroll form. They were compiled in 1790 and 1793 separately. Each chart roll is 9m long and 30cm in width.

East Hemisphere Chart of *General Coastal Chart in the Qing Dynasty* shows us the position of China in the earth and the general circumstances about the sea and foreign countries around as well. The other charts indicate the geographic features of the mainland coast and islands of China. The geographic contents are quite clear and elaborate. In early Qing Dynasty, there undertook an extensive land surveying and as the results, there were some new maps generated. Since *General Coastal Chart in the Qing Dynasty* adopted the abundant data in those new maps, representation in the shape of the coastal line and the disposition of the islands, etc., are much more accurate than that of *Coastal Defence Chart in the Ming Dynasty* (See Fig. 7).



Fig.3 Zhenghe's Nautical Charts



Fig.5

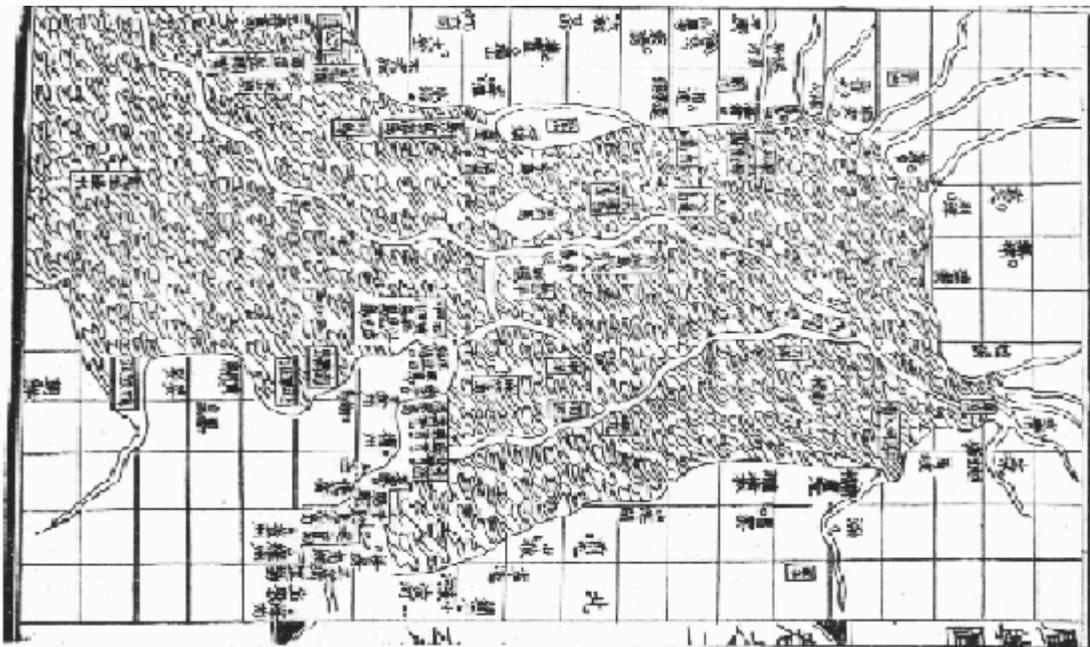


Fig.6

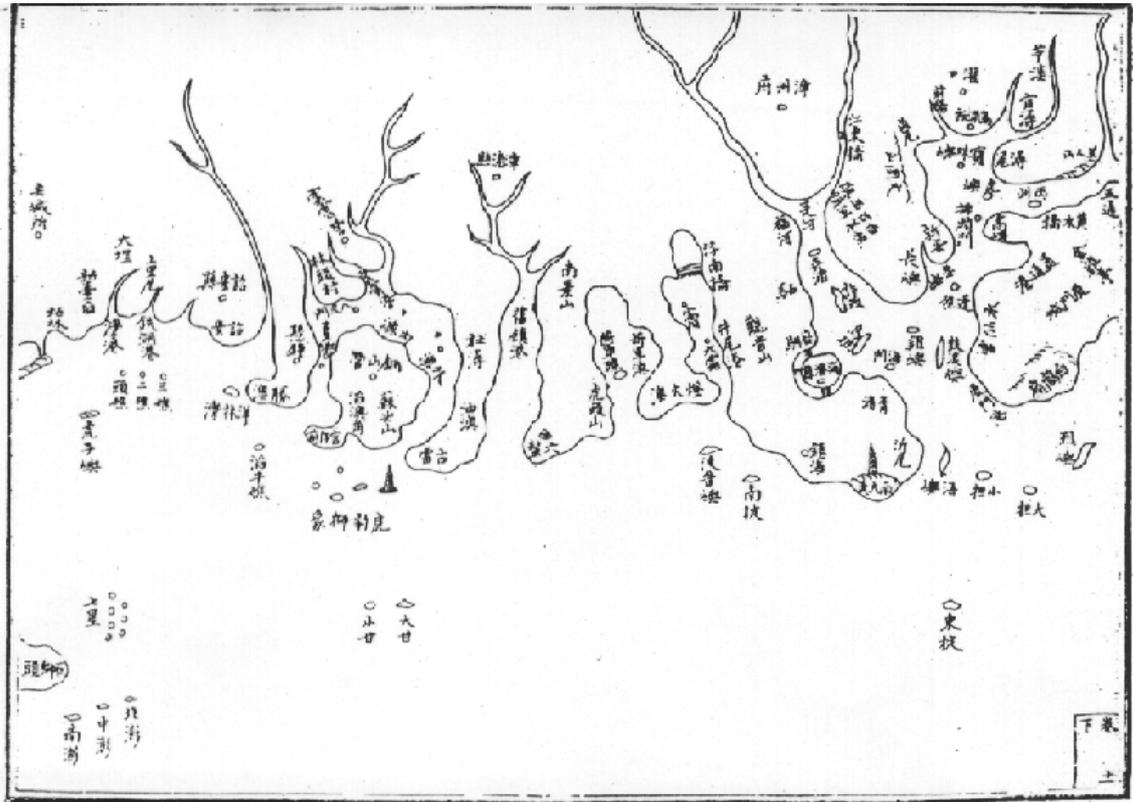


Fig. 7 General Coastal Chart in the Qing Dynasty

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