

## **A BRIEF DISCUSSION ON ZHENG HE'S NAUTICAL CHARTS**

### **AND THE PRESENTATION OF THE ANCIENT-PRESENT CONTRAST OF ZHENG HE'S NAUTICAL CHARTS**

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#### ***Abstract***

Originally, Zheng He's Nautical Charts were published in *Wu Bei Zhi* (a collection of military books, 1621), Vol. 240, compiled by Mao Yuanyi of the Ming Dynasty. The charts are thought to have been drawn in the early 15th century.

For more than one hundred years, scholars worldwide have been doing research on Zheng He's Nautical Charts and have published many books and theses. On the basis of these previous works, the author has continued to investigate the charts from the angle of marine cartography, written several papers, and compiled the *Ancient-Present Contrast of Zheng He's Nautical Charts* (which were exhibited at the XIIIth International Hydrographic Conference) as a chief editor. This paper describes the features of Zheng He's Nautical Charts briefly and introduces the newly-compiled *Ancient-Present Contrast of Zheng He's Nautical Charts*.

#### **INTRODUCTION**

Zheng He's Nautical Charts were formerly called the *Charts for Starting from Bao Chuan Chang, through Long Jiang Guan to Foreign Countries*. They were published in *Wu Bei Zhi* — a collection of military books, 1621 — and compiled by Mao Yuanyi of the Ming Dynasty. As a result of Zheng He's Expeditions to the Western Ocean, the charts were generally called *Zheng He's Nautical Charts* for short, and Xiang Da published a book by using this shortened name in 1961.

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

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

For over one hundred years scholars at home and abroad have been doing textual research on Zheng He's Nautical Charts and have published many books and theses. On the basis of his predecessors' research, the author continued to investigate the charts from the angle of marine cartography, wrote several papers and compiled the *Ancient-Present Contrast of Zheng He's Nautical Charts* as a chief editor. The basic features of Zheng He's Nautical Charts are described briefly, and the compilation of the *Ancient-Present Contrast of Zheng He's Nautical Charts* is introduced, in the paragraphs which follow.

### THE FEATURES OF ZHENG HE'S NAUTICAL CHARTS

Zheng He's Nautical Charts, the cartographic works produced more than five hundred years ago, are characterized by five features.

First, the representation on charts of information concerning navigation was emphasized. This kind of information included coastlines, shoals, towers, rocks, temples and flagpoles which could be recognized from seaward and be used to help mariners to position their ship; various place names and notes; and descriptions of routes, bearings and distances. All of them were closely concerned with navigation (Fig. 1).

Secondly, the components appearing on different areas' sheets were distinct, so that the navigation features of the area were represented. From Nanjing to the Yangtze River mouth, for example, the ship could only be set on a safe course along the coast; therefore, the description of routes was not expressed on the charts; instead, the coastal hilltops and landmarks were depicted in greater detail to aid positioning. From the Yangtze River mouth to the Malacca Strait, ships proceeded southward along the sea coasts mainly by using magnetic compasses at that time; for this reason, the bearings and distances were expressed in detail. When navigating in the area of the Indian Ocean, ships kept their position by using compasses and astronavigation, thus not only the general description of routes, but also the heights of the celestial bodies were shown on the sheets.

Thirdly, all the sheets were arranged in accordance with the positions of the routes. Routes shown on Zheng He's Nautical Charts, from Nanjing to the mouth of the Hormuz Strait, were successively drawn from right to left on each sheet; therefore, the orientation of each sheet was different. The top of the sheets from Nanjing to the Yangtze River mouth pointed to the south, and the top of the sheets from the Yangtze River mouth to the Malacca Strait pointed to the north

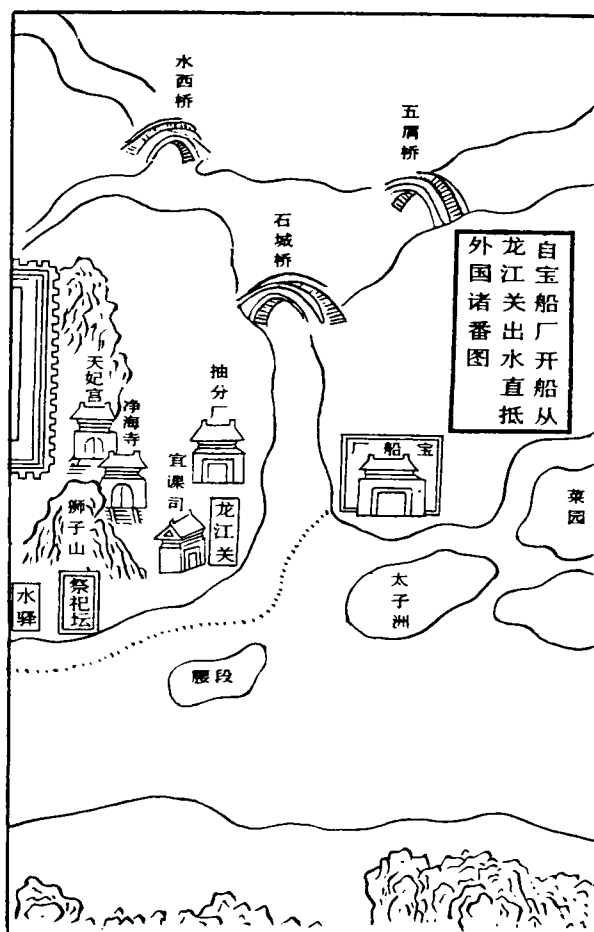


FIG. 1.— Part of Zheng He's Nautical Charts.

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 pointed 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 bearings can be expressed up to 7.5 degrees (Fig. 2). The distance was measured in Geng (a measure of distance), each Geng approximating 12.5 to 18 sea miles. The depth was expressed in Tuo (a measure of depth) which is equal to 1.7 meters. The description of more than 100 routes was given on Zheng He's Nautical Charts. Comparing the description with the routes shown on the modern Map of World Communications, we can find that the description is perfect.

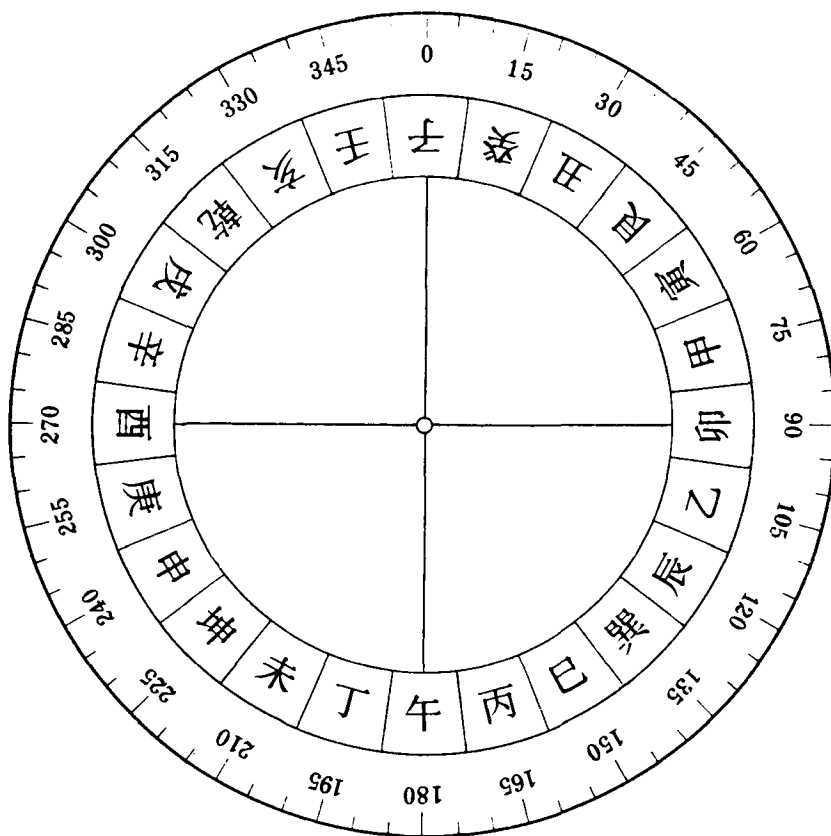


FIG. 2.— Compass rose.

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 of altitude). It is generally thought that a Zhi is approximately equal to 1.9 degrees (Fig. 3).

### THE PRESENTATION OF ANCIENT-PRESENT CONTRAST OF ZHENG HE'S NAUTICAL CHARTS

In commemoration of the 580th anniversary of the great navigator's expeditions to the Western Ocean, the Ancient-Present Contrast of Zheng He's Nautical Charts were published in 1985. The charts are made up of the ancient Zheng He's Nautical Charts and the newly-compiled route chart of Zheng He's Expeditions to the Western Ocean. The ancient charts were merged into eight segments, each 45.5 cm in length and 12.5 cm in width. The dimensions of the newly-compiled chart are 98 × 57.5 cm. The whole sheet, including decorations, is 250 cm long and 76 cm wide. The Naval Hydrographic Institute was responsible

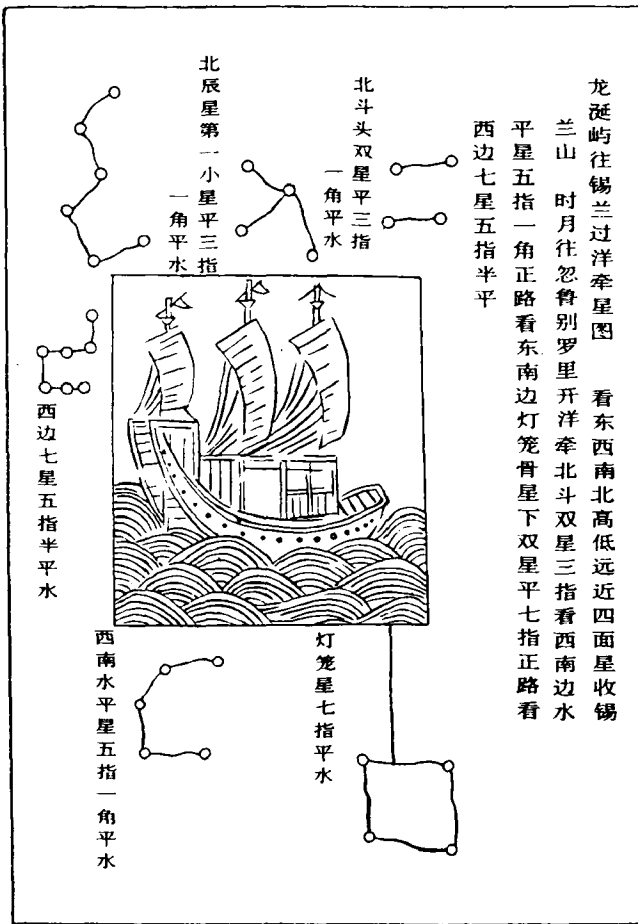


FIG. 3. — One of the astronavigation charts.

for compiling the charts. The Navigation History Research Unit of Dalian Marine College and the China-Western Communication History Research Division of Shangdong University participated in the textual research of place names and the check of routes against the authoritative texts.

During the construction of the Ancient-Present Contrast of Zheng He's Nautical Charts, the ancient parts were replotted according to the original charts published in Wu Bei Zhi. Some information located on the edges of each original chart was reprocessed for chart matching. Notes and place names on the original charts were reproduced because they were clear enough for readers to distinguish them, whereas the contents, locations and arrangements of the notes on the originals were preserved. As a result the ancient parts of the charts are useful both for general readers to understand Zheng He's Nautical Charts and for specialists to research them further (Fig. 4).

The newly compiled route chart of Zheng He's Expeditions to the Western Ocean was compiled according to modern charts with a range from 10°00'00" S to 40°08'30" N and 34°00'00" E to 127°38'48" E. The range covers the whole area of



FIG. 4. — Part of the ancient charts of the Ancient-Present Contrast of Zheng He's Nautical Charts (epitome).

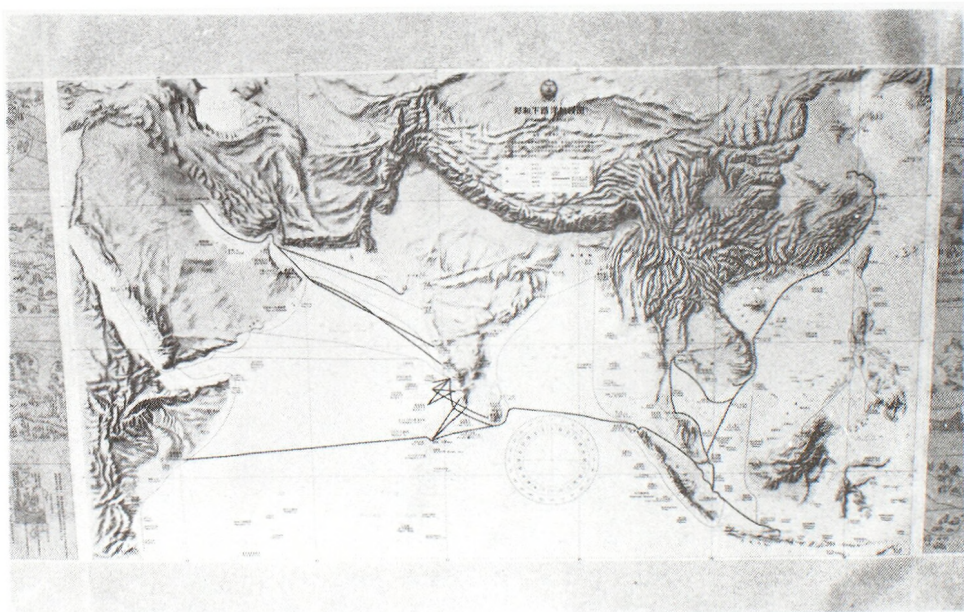


FIG. 5. — The new-compiled route chart of Zheng He's Expeditions to the Western Ocean (epitome).

Zheng He's long voyage. Comparing the above chart with the ancient charts which had no strict mathematical basis, we used the Mercator projection, obtaining a clear geographical concept for the area of Zheng He's expeditions.

The geographical features of the route chart, such as coastlines, coral reefs, shoals, depths, water systems ashore and coastal cities and towns were shown and the relief shading was used to represent the landform (Fig. 5).

Place names, the key information of the charts, including names of countries and cities, as well as geographical names such as the oceans, bays, straits, islands, rocks, shoals, hillpeaks and capes, were separately shown in both their present and ancient form.

Routes were also important information and were provided according to the examined and corrected routes drawn on the original charts in *Wu Bei Zhi* and other literature.

Zheng He's Nautical Charts are Chinese cartographic masterpieces produced in the 15th century. They are very valuable for investigating the history of Chinese marine cartography, the communications between China and foreign countries, navigation, and so on. The presentation and publication of the Ancient-Present Contrast of Zheng He's Nautical Charts have resulted in improved conditions for publicizing and researching age-old marine charts.

### References

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