

# **The Technology and Practice of Marine Delimitation of Nantong City**

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## **Abstract**

To solve the conflicts of marine boundaries between adjacent administrative areas, safeguard social stability of coastal regions, and promote sustainable development of ocean economy, Chinese government embarked on the delimitation of sea areas between different provinces and counties from the year 2002. Nantong City is a coastal city, which lies in the southern part of Jiangsu Province, possessing four marine boundaries of five coastal counties necessary to be delimited. This paper introduces the working methods of marine delimitation of Nantong City, chooses the technical methods of marine delimitation suitable for it, and puts forward boundary schemes. The achievement of this paper is the application and extension present marine delimitation theories on marine delimitation of radial sand ridges, and it also enlightens the delimitation of sea areas with similar topographical characteristics.

## **1. Proposal of the problem**

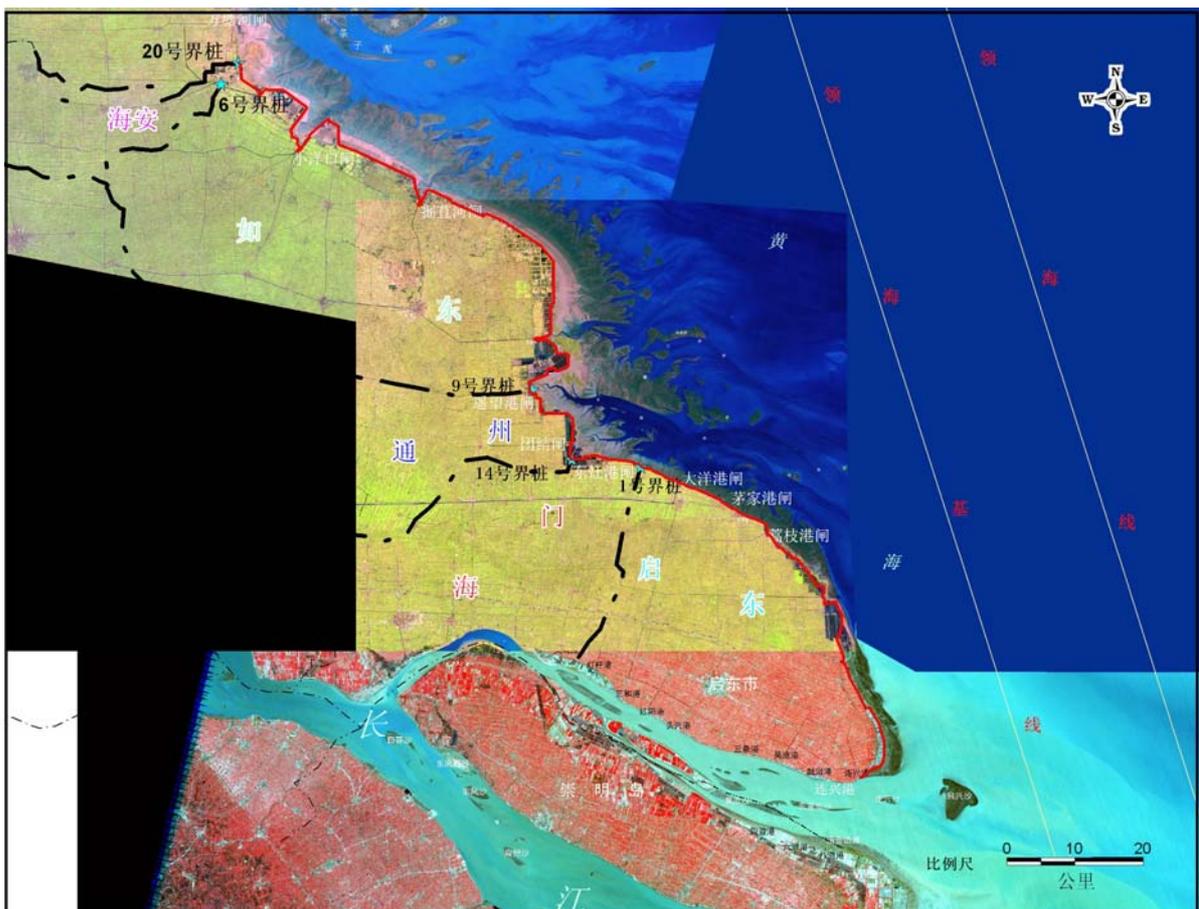
Since the foundation of People's Republic of China, the delimitation of land administrative areas of coastal provinces, municipalities, and cities has undergone several considerable changes, owing to historical changes, reform of management system, economic development and so on. Every change of the delimitation of land administrative areas results in the change of boundaries of them. Sea areas of different periods are adjacent to different administrative areas, which leads to the obscurity of sea area boundaries between different provinces and counties. With the development of science and technology and the enhancement of ocean consciousness, ocean industry has become a new economic development ingredient of coastal areas. As a result, the struggle for islands, beaches, and oceans becomes more and more apparent. Generally speaking, the sea area disputes of the administrative areas of our country can be classified into the following three categories: dispute of island ownership, dispute of tidal flat exploitation, and dispute of coastal area usage. The focus of the disputes includes both the struggle for the exploitation benefits of fishery and other biological resources and the struggle for the administrative management range of geographical areas. In order to keep the social stability of sea areas, enforce effective administrative management, and promote sustainable development of ocean economy, the State Council of People's Republic of China decides to enforce the delimitation of marine administrative areas between different provinces and counties. The National Ocean Bureau is in charge of the organization and enforcement of marine delimitation, and the people's governments of coastal cities are in charge of the delimitation of marine administrative areas between counties. This is the first enforcement of delimitation of marine administrative areas in the history of China.

Marine delimitation is both a political and a legislative action of the government, which locates the marine management boundaries between coastal administrative areas and adopts some technical methods on the basis of related rules and programs. Nantong sea area locates in the radial sand ridge area and the marine boundaries of coastal counties are not accurate enough,

so fishermen are often troubled by disputes about the working range. Because the complicated topography and landform of Nantong sea area is in contradiction to the boundary theories, the people's government of Nantong City can not enforce marine delimitation through organizing negotiation between county governments and must adopt some technical methods to locate marine boundaries fair and reasonably.

## 2. Marine delimitation range of Nantong City

The sea area of Nantong City lies in the southern part of Jiangsu sea area. It is adjacent to Yancheng Dongtai City of the province in the north and borders on Shanghai in the south. According to the rules of our country, the range of marine delimitation includes the inland sea and territorial sea of our country, and the boundary starts from the end of the land boundary towards one side of the inland sea and ends in the line of the territorial sea. According to this, the range of marine delimitation of Nantong City is the sea area between the coastal line of the city and the line of the territorial sea of Nantong sea area(fig.1). This city has five coastal counties and cities: Hai'an County, Rudong County, Tongzhou City, Haimen City and Qidong City, and it has six related marine boundaries: Antai Line (between Hainan County of Nantong City and Yancheng Dongtai City), Ruhai Line (between Rudong County and Hainan County), Tongru Line (between Tongzhou City and Rudong County), Tonghai Line (between Tongzhou City and Haimen City), Qihai Line (between Qidong City and Haimen City), and Suhu Line (between Jiangsu Province and Shanghai City). Among them, Ruhai Line, Tongru Line, Tonghai Line, and Qihai Line belong to the boundaries of marine administrative areas between counties of Nantong City, Antai Line is the boundary of marine administrative areas between Nantong City and Yancheng City, and Suhu Line is the boundary of marine administrative areas between Jiangsu Province and Shanghai City. Tongru Line, Tonghai Line, and Qihai Line are adjacent to each other, and Ruhai Line is a little far from the above three boundaries, so the study range of this paper is limited in the southern part of Nantong sea area to put forward the technical schemes of the three boundaries.



**Fig.1. Marine delimitation range of Nantong City**

### **3. Working methods**

This paper tries to find technical referential schemes through collecting relative materials, field work, and adopting suitable technical methods, and then choose a technical scheme through comprehensive analysis.

#### **3.1 Material Collection**

Materials about the area such as environment, resources, economic situation, the present situation of ocean exploitation and management, disputes about ocean exploitation, and the remote sensing picture of the sea area are collected.

#### **3.2 Field work**

The coastal line is measured according to relative rules and programs of delimitation. Investigation about the topography and landform of the tideland and shallow sea and the present situation of ocean exploitation is enforced.

#### **3.3 Analysis and arrangement of the materials**

Materials are arranged and analyzed, and then charts and statistics about the result of the analysis are made with the help of MapInfo Software.

#### **3.4 Putting forward the technical referential schemes**

The technical referential schemes are put forward through choosing suitable technical method of marine delimitation.

#### **3.5 Adoption of the delimitation scheme**

The delimitation scheme is adopted through comprehensive analysis and comparison.

### **4. General situation of the sea area**

#### **4.1 Coastal line**

Coastal line is the boundary between ocean and land, which refers to the average trace line between water and land when the spring tide reaches climax. The coastal line of Nantong sea area starts from the No.20 boundary marker between Nantong and Yancheng in the north and ends in Lianxing Harbor in the south. Because standard sea walls have been built in Nantong sea area and floodgates have been built for rivers, standard sea walls and floodgates are considered as the coastal line of Nantong City. Differential GPS is used to carry out coordinate measurement of the breakpoint and feature point of the coastal line and main characteristic line, and materials about the coastal line are analyzed and arranged. Then the boundary between the sea and the land of Nantong City is located, i.e. the coastal line that the delimitation needs. (fig.1)

#### **4.2 Topography and Landform**

The coast of Nantong City belongs to silty mud coast. The tidal flat from the land to sea can be classified into the following four categories: grass shoal, suaeda salsa mudflat, sediment mixed beach, and sand fly beach. The landform of the benthal can be classified into the following two categories from north to south: radiating sand ridges and Yangtze River underwater delta. The sea area to be delimited lies in the radial sand ridge area and sandbank water system is the major landform characteristic. As a comparatively independent dynamic landform system, now the situation of radial sand ridges is in accordance with polyspoke, divergence, and tidal current dynamic field, and the general situation of radiating alluvia spinal group combination and tidal channel is comparatively stable. Because the wind erodes the

outside of the shoal and the tidal polyspoke and divergence transport part of the erosive sands to the middle of the coast, the dynamic form of radial sand ridges is also characterized by the erosion of the outside shoal and the deposit of shallow beach in the inner margin region.

### 4.3 Ocean exploitation and management

According to the investigation and analysis of materials, the main ocean industry of Nantong sea area include fishery, marine transportation, seashore tourism, ocean pharmacy, salt industry, ocean chemical engineering, ocean electric power, and so on. In 2005, the total income of ocean economy of Nantong City was 28,839,460,000RMB, and the total income of ocean fishery and relative industries amounted to 10,310,430,000RMB. The rising income of ocean economy was 11,970,890,000RMB, and the rising income of ocean fishery and relative industries added up to 4,005,040,000RMB.

Except the exploitation items of Nantong sea area approved by the country and Jiangsu Province according to Sea Area Law, other exploitation items are approved by Nantong municipal government or government of the county according to the exploitation category and scale. Figure 2 and table 1 is about the present situation of the exploitation and management of Nantong sea area.

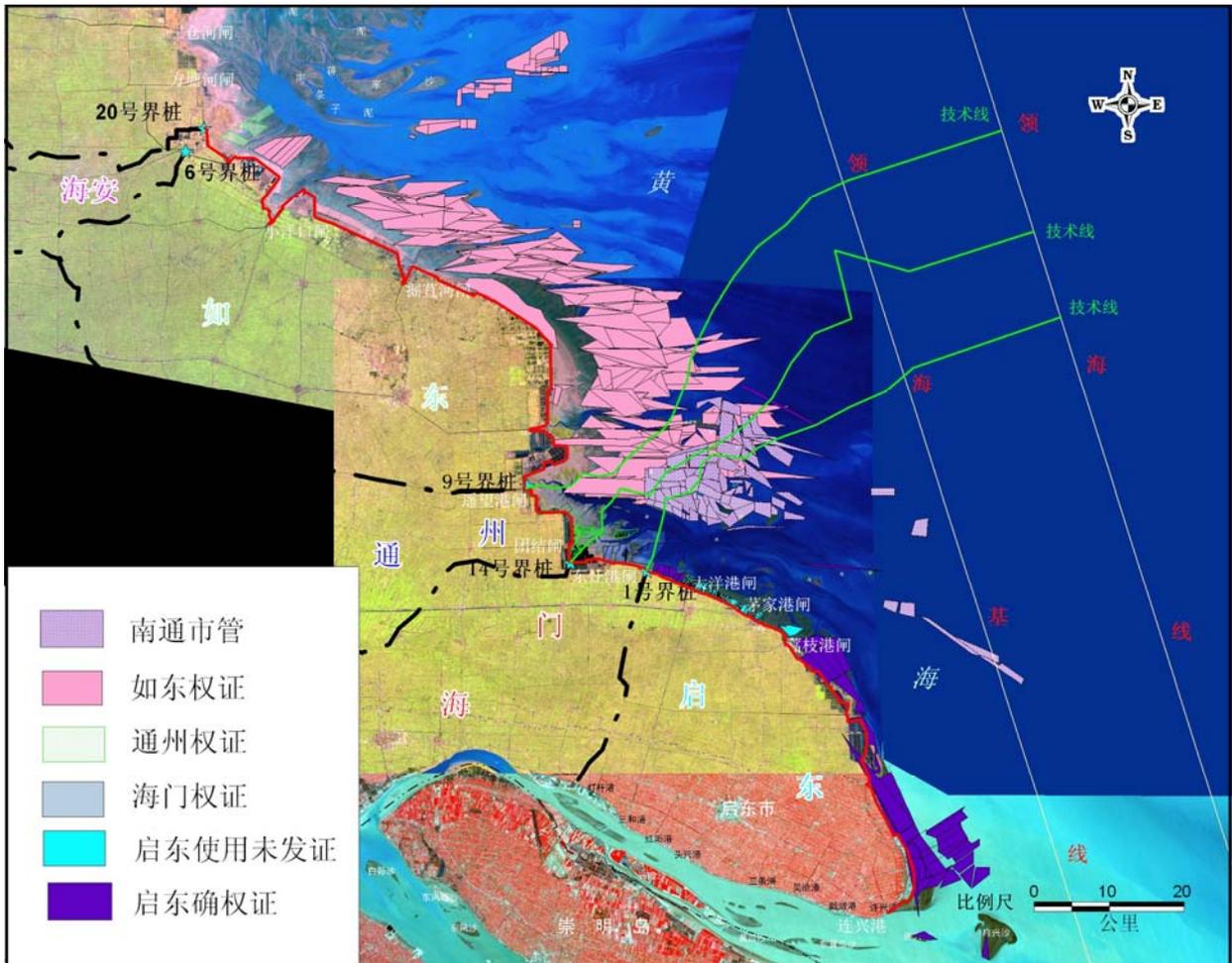


Fig.2. The present situation of the exploitation and management of Nantong sea area

**Table 1. The present situation of the exploitation and management of Nantong sea area**

County/city	Area (km <sup>2</sup> )
Rudong County	766.26
Tongzhou City	21.4
Haimen City	24.35
Qidong City	129.03
Nantong City	138.5
	Disputed area (km <sup>2</sup> )
Rudong County and Tongzhou City	1.55
Tongzhou City and Haimen City	3.31
Rudong County and Nantong City	76.42

## 5. Delimitation scheme

### 5.1 Technical methods

The main methods of marine delimitation include equidistance line method, vertical coast trend strike line method, method of equal proportion, longitude partition method and latitude partition method. But the outside of Nantong coast is a broad radiative shoal. The tidal range is large and the topography changes frequently, and the coast line is tortuous, in the shape of double L, so it is unfair to adopt longitude partition method and latitude partition method to investigate and locate the middle line. Besides, both sides have not agreed on the partition ratio, and fishermen are often troubled by disputes about the working range, so the method of equal proportion is also not suitable for the delimitation of this sea area. If the vertical coast trend strike line method is adopted, the length of the coastal line chosen to ascertain the main trend of the coast is of great randomness. The internationally universal equidistance line method of marine delimitation can not only locate the middle line very fair according to the trend of the coastal line but also decide the length of the chosen coastal line according to the investigation of the length of the middle line. As a result, it avoids the randomness of other methods used to decide the length of the coastal line. So the equidistance line method is chosen to ascertain the technical referential schemes of Nantong sea area. (fig.2)

### 5.2 Adoption of the technical scheme

The technical referential scheme of Nantong sea area decided according to the equidistance line method is not in accordance with the actual range of marine management and exploitation of the coastal counties (fig.2), but it conforms to the tie-land tidal section. So the boundary scheme of the tie-land tidal section is decided according to the technical referential scheme in combination with the actual management.

Rudong County, Tongzhou City, Haimen City, and Qidong City have all expressed their viewpoints about the administrative right of the waist sand tidal outside the tie-land tidal. Now this sea area is unitedly administrated by the Ocean Bureau and Fishery Bureau of Nantong City. This sea area is a little far from the coast, but it has good prospect of ocean exploitation. The waist sand tidal is also the main region of Lvsi Harbor exploitation of Nantong City, so it is necessary for the municipal government to design and manage unitedly. Because of the present

situation of administration and the exploitation prospect of the above mentioned sea area, a sea area can be established, which can be managed and exploited by Nantong City.

The marine delimitation scheme of Nantong City (fig.3).

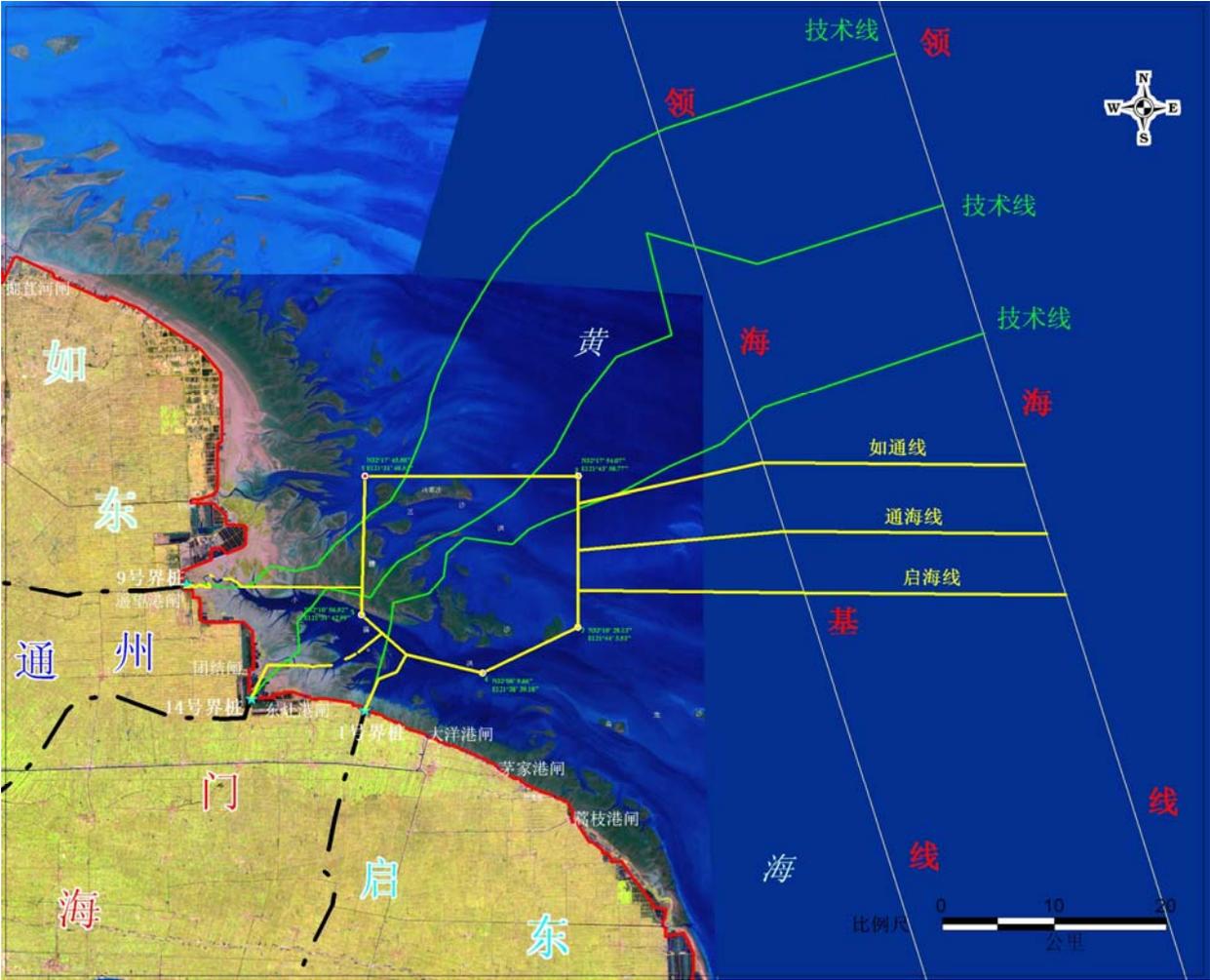


Fig.3. The marine delimitation scheme of Nantong City