

Analysis of Remote Sensing Information Extraction and Driving Force in CaoFeiDian Coastline

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Abstract

The shoreline was extracted by the Landsat satellite images from different periods in the area of CaoFeiDian region in the past 30 years. Comparing the coastline of 1987, 1997, 2007 and 2017 of the extracted CaoFeiDian region, the coast of CaoFeiDian area has been greatly changed over the past 30 years. Between 1987 and 1997, there was a slight increase in the length of the shoreline, but the total was 84.105 square kilometers in the sea. Between 1997 and 2007, the length of the period increased by 5.159 km and the area increased by 12.674 square kilometers. Between 2007 and 2017, the size of the coastline increased by 29.172 km and the area increased by 237.4 square kilometers. From the satellite imagery, human factors are the main factors that contribute to the changes of the coastline of CaoFeiDian area.

Key words: Coastline; Remote Sensing; Shoreline types; Image; Algorithm.

1. Introduction

The coastline is the dividing line between the sea and the land, but the more accurate claim is that the water reaches the limits of the land. Due to tidal action and the influence of storm surge and other natural geographical phenomena, the water has a high tide ebb tide, the surface of the ups and downs, and the dividing line between the land and sea is in constant change. Monitoring the changes of the coastline is an important work in coastal zone management, sea level change, and coastal evolution.

Coast coastline with different characteristics of different, in recent years, with the rapid development of CaoFeiDian area economy and reclaiming land from the sea, the construction of ocean engineering, CaoFeiDian area of great changes have taken place in coastal zones, this article through to the CaoFeiDian map for phase, phase of remote sensing image data processing and analysis, find out the suitable for extracting method of CaoFeiDian coastline and used this method to extract, the last 30 years in CaoFeiDian area of coastline evolution analysis of time and space.

2. Data

CaoFeiDian is a strip of sand island beach, which is caused by the removal of the river in Hebei province. Beach outside for ancient Luanhe river alluvial fan formed by scarp, head front 500 ~ 600 meters water depth of 20 ~ 30 meters, so the superior conditions make it a natural deep-water port address in Bohai bay; On the inside of the beach is the ancient Luanhe alluvial fan body, [29]. The surface area of the sea is 4km² when the tide is high, and 20km² is revealed when the tide is low. With the combined effect of tidal currents and local geological conditions, the land, beach and island of CaoFeiDian formed their unique features. Over the past century, the overall pattern has remained largely stable.

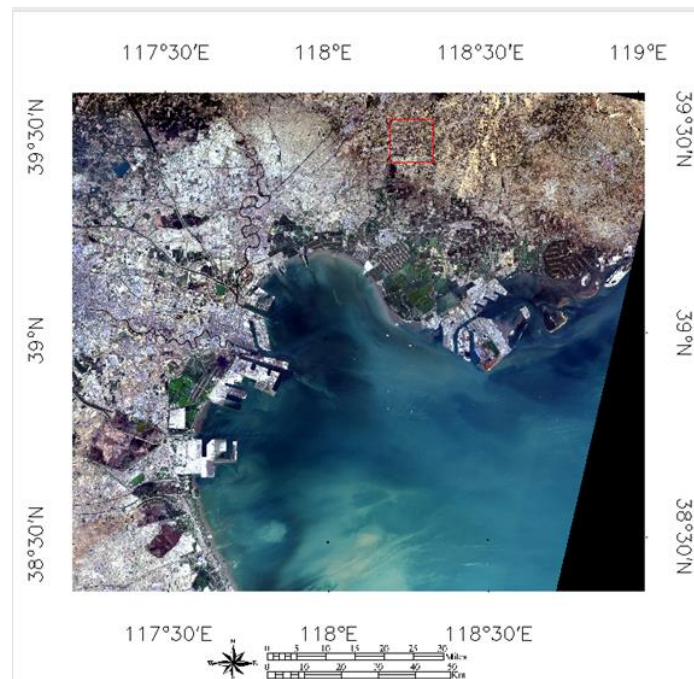


Fig. 1. The study area

The data used in this article are all from the geospatial data cloud, which USES data from 1987 (MSS), 1997 (TM), 2007 (TM) and 2017 (OLI). The Landsat MSS data has a resolution of 60 meters, the Landsat TM reflector is 30 meters in resolution and the OLI data has a resolution of 30 meters, and the full color band resolution is 15 meters. The four sets of data have similar climate and atmospheric conditions and have less cloud, so the image quality is better. The data information is shown in the following table1:

Table 1. CaoFeiDian 4 period remote sensing image information

Stripe	Sensor	Line	Row	Data	Resolution
LM51220331987080FFF06	MSS	122	33	1987-03-21	60m
LT51220331997220HAJ00	TM	122	33	1997-08-08	30m
LT51220332007167BJC00	TM	122	33	2007-06-16	30m
LC81220332017115LGN00	OLI	122	33	2017-04-25	30/15m

3. Methods

Due to some original images are not carried out the basic processing, so need to be in the process of using pretreatment, must first carries on the geometric correction, it is through the use of ground control points and geometric correction model to the correction of the data acquisition process of error, the image projected onto a plane at the same time; The images were then fused to combine images from different channels in the area into a high-quality image. The image Mosaic, in certain conditions, concatenates the remote sensing images into a large, seamless image. The final image is cut, which is to cut in the image, to retain the parts that are needed, and to remove the parts that are not relevant to the research area.

The purpose of the correction of remote sensing image is to eliminate the error and deformation associated with the data acquisition process so that the obtained data is closer to the real value. Data used

in this article have been system radiation correction and geometry correction, image fusion image Mosaic and don't need, only after get the image cropping research area. The cropped 4 images are shown in Fig2 below:

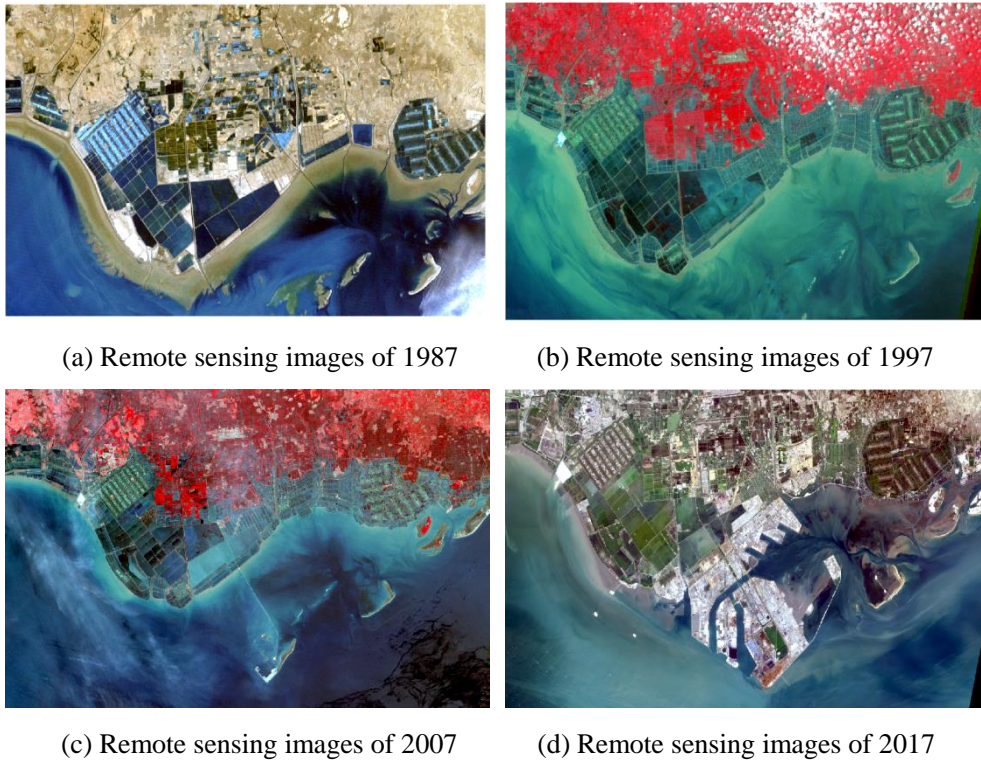


Fig.2. Four Remote sensing images of CaoFeiDian

4. Results and Analysis

By the above, combined with the actual remote sensing images of four periods, we can see that 1987 times of CaoFeiDian coast has not been vigorously development, in the majority with the breeding and saltworks, the sea has a large amount of sludge; In 1997, there was no major change in 2007, and still more farmed. By 2017, there had been a great change in the area of CaoFeiDian, and the construction of the port was greatly developed, making the original shoreline changed greatly.

The analysis shows that the coastal changes in CaoFeiDian region can be summarized as natural factors and human factors. Natural factors include sea-level rise caused by global climate change, geological movement, and sediment accumulation. The human factor mainly includes man-made structures such as harbors, piers, ponds, breakwater, and so on because of the exploitation and utilization of Marine resources. For nearly 30 years, the influence of natural factors on the coastline CaoFeiDian area, more as a result of human to the Marine exploitation and utilization and to build a series of breeding, ports, docks and changed the original coastline.

4.1. Natural factors

CaoFeiDian area is given priority to with muddy coast, there are many rivers to the sea, coastal areas, large and small rivers sediment constantly flow to the sea, carried by the accumulation of slowly in river estuaries and coastal zone, and sediment increase unceasingly, the coastline is constantly pushed into the ocean.

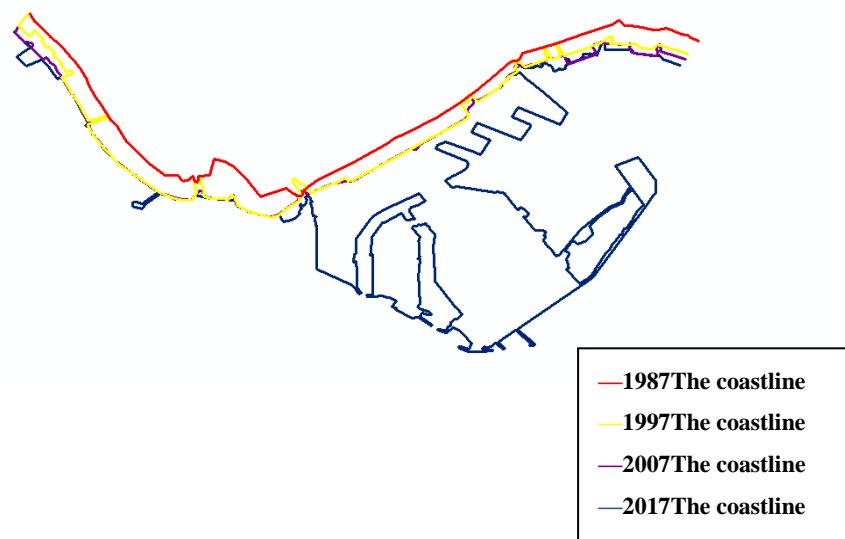


Fig.3. the coastline of CaoFeiDian

4.2. Human factors

CaoFeiDian is located in the coastal areas, since reform and opening up, obtained the rapid development of coastal economy, human activities (such as the construction of the port, yantian, the breeding of expansion) is the main factor of the change of the coastline.

CaoFeiDian port area was luannan a ribbon in the south of the island, give priority to with silt soil, all the year round is not frozen, dark waters, former water depth can be up to 500-25 m, has a wide range, anchorage is wide and the depth of the water - more than 30 m water area of 52 square kilometers. There is no deposit in the water, there is no need for development, and there is a natural channel with a depth of 25m straight through the Bohai strait. The Hong Kong area is closer to the land, deep in the hinterland, easier to build up the sea and land, and the development space is vast. The beaches are wide, the cost of land is low, and the convenience of transportation makes the CaoFeiDian area suitable for the construction of a deep-water port.

Since the beginning of the work of CaoFeiDian project in 1992, more than 50 work achievements and scientific research projects have been completed. In October 2005, it was listed as the first pilot industrial park in the country. In March 2006, it was listed as the national "eleventh five-year" development plan. The establishment of the national economic and technological development zone has accelerated the development of CaoFeiDian, and the uplifted economy has been a powerful booster. The establishment of comprehensive bonded area and circulating economic model area will be more advantageous to the unique location advantage of CaoFeiDian region. The rapid development of the economy objectively changed the direction of the coastline.

Since reform and opening up, the construction of large-scale CaoFeiDian coastal areas and the expansion of a lot of salt and the breeding, constantly moving ocean coastline, in the region of the natural coastline of reducing unceasingly, artificial coast.

5. Conclusions

Over the past 30 years, the coastline of CaoFeiDian has increased by 34.838 km, with the coastal area increasing by 334.152 km². The natural coastline is gradually decreasing; the artificial shoreline is

increasing continuously, especially the increase of the shoreline of the harbor. Under the intervention of human activities, the number of estuary coast of CaoFeiDian in reducing unceasingly, the original sand coast in gradually disappear, along with the constantly advancing to the sea coast, the width of the intertidal zone has also been gradually reduce.

Human activities are the main factors that change the change of CaoFeiDian coastline. In 1987-1997, a large expansion of the coastal areas, such as salt ponds and breeding ponds, led to a massive increase in artificial shoreline, which caused the coastline to be pushed into the ocean. The government should formulate relevant laws and regulations to regulate constraint ocean of human activities, gradually establish a perfect legal system, intensify the management of the agriculture, at the same time can be in the vicinity of a ban on human development island, beach and set up the area and maintain its independence, avoid the excessive expansion of agriculture human damage to the original natural landscape again. We will strengthen the rational development of tourism and prevent human overexploitation of the natural resources of dam.

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