THE REMOTE SENSING STUDIES ON COASTAL ZONE AND ISLANDS IN CHINA BY USING IKONOS SATELLITE IMAGES

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ABSTRACT:
IKONOS satellite images are important information sources with very high spacial resolution as today's remote sensing studies and their applications. The coastal zone and islands are complex objects with multi-dimension and multi-scales, and their detections have special requirements. The paper shows some results on the detecting of coastline and its constractions as well as some object features over seas from the islands by using IKONOS remote sensing images. The results indicate that it is of great potential to detect coastal zone and islands and so on marine objects with larger scales.

1. INTRODUCTION

Recently, a sereis of remote sensing satellites with high spacial resulution are launched in the world. IKONOS satellite images are one of the important information sources with very high spacial resolution as today's remote sensing studies and their applications. There are spacial resolutions for IKONOS images: 1m black-and-white band, 4m multispectral bands and 1m color(Pan-shapened). Table 1 shows the basic parameters of IKONOS.

Table1. IKONOS basic parameters

Bands	Resulutions(m)	Wavelength (ìm)	Radiation resolution	Imaging time
Black-white,Pan,	1	0.45,0.90	11bit	2001.7.22
Blue,Band1,	4	0.45,0.53		
Green,Band2,	4	0.52,0.61		
Red,Band3,	4	0.64,0.72		
Near-infrared,Band4,	4	0.77 0.88		

From Table.1, We can see that the images not only have a very high spacial resolution, but also higher spectral resolution and radiation resolution. So IKONOS images are of wide application potencial in the ocean, agriculture, forest, lands, city constraction and communication and so on.

The coastal zone and islands are complex objects with multi-dimension and multi-scales, and their detections have special requirements. IKONOS images are a ideal satellite remote sensing information sources for coastal zone and islands. The studies show that remote sensing of the detail local areas with large scales are very significant.

The results on the detecting of coastlines and their constractions as well as some object features over seas from the islands by using IKONOS remote sensing images have been obtained. The results indicate that it is of great potential to detect coastal zone and islands and so on marine objects.

2. THE CHOICE OF STUDIED AREA AND TECHNICAL APPROACHES

The study area is choscen at Nanji islans of Zhejiang Province in east China Sea. The study area of essential island is about 8 km^2. Its coastline length is about 33km. This is a national marine nature reserve as multi-biocoenose, which established in 1990 with approval of the state councial, one of the first five marine-typed nature reserve. In December1998, Man and the biosphere program of UNESCOaffiliated it as the only marine nature reserve in China. It is a marine ecology-system reserve, which mainly protectshellfish, algae and their ecology environment. It is the confluence of Taiwan warm current and the Zhejiang-Jiangsualongshore current, with special ecology environment, various species and complex fauna and flora. With preliminary investigation, there are 421 species of shellfish, 174 species of Macro benthic algae, both of which are 20% of the total species of China and 80% of zhejiang Province,459species of micro-algae, 397 species of fish, 257 species of crustaceans and 158 species of other marine creatures in the reserve.

IKONOS imagery processing and the extraction of key information is very important in order to achieve the coastline and inland features and their parameter estimations.

2.1 The geomatric correction of the images

The geomatric correction of remote sensing images include the choice of transfer
Schemes and correcting methods, achievement of the controlling points, the boundalies of output images, pixel sizes of images and resamples of imagery grey etc.

The transfer schemes are divided into both directing and indirecting methods. The indirecting method is chosen in the study.

The determination of transfer method. Second-order multi nomial is chosen. More than 6 control points are required because there are 12 unknown data in the multinomial.

2.2 The fusion method of remote sensing images

There are a lot of approaches for imagiery fusion, for example,HIS tansfer,essential component analisis, wavelet transfer and so on. Here HIS transfer conbines with other methods. The fusion is carried out after image enhance and its grain.

The imagery fusion is perfected by using the part image of IKONOS black -and- white band and multi-spectral. Of the m, multi -spectral are chosen as the groups of 432,342 and 321 respectively, and then the excellent images with rich information are obtained.

2.3 The extraction of coastline and island land covers

In the studies Envi software and supervised classification is applied to extract various information.

2.4 The analysis of the detecting differences of islands

3. THE RESULTS OF THE STUDIES

The interesting results on information exaction of the coastline and island land covers and the detail objects with the smaller sizes are obtained by using IKONOS satellite images. The examples for some results are shown.

3.1 The detection of coastline for Nanji islands

The information extraction of coastline is directly seperated by throshord method. Fig.1 shows the constline pattern. Fig.2 gives their constraction distribution. The typic classes of coast zones are rock coast, sand coast and man-made coast and so on.

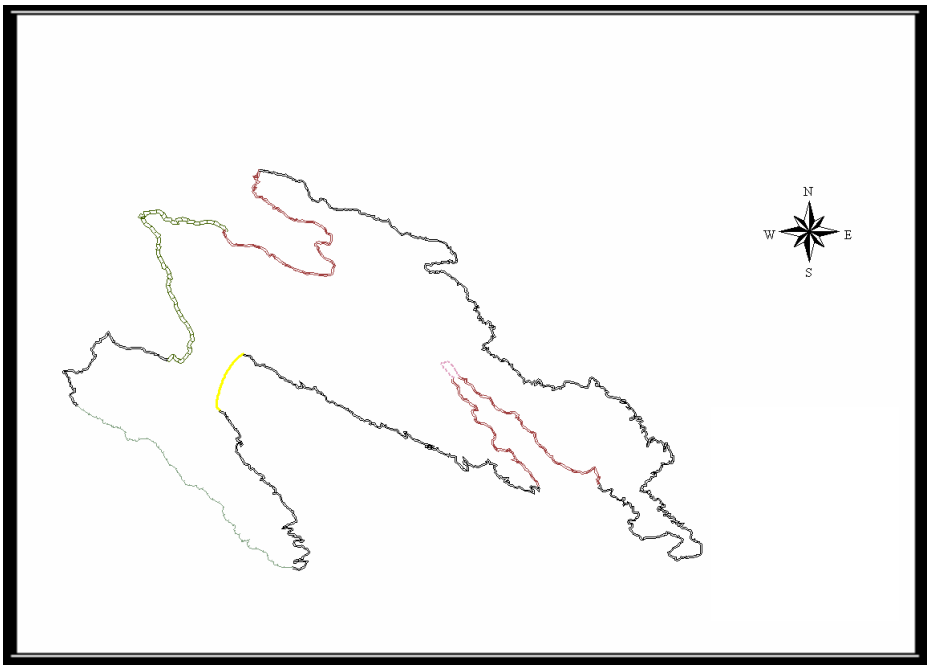

Fig. 1 The detection of coastline types

Rock coast sand coast man-made coast

Fig.2 The coastal constractions for Nanji islands

3.2 The land coverage and their classification for Nanji islands

The land classifcation based on supervesed classification, threshold method vegetation index,and man-machine exchange method and so on. The compositions of multi-spectral IKONOS image(2,3,4 bands) are finished, and then classifications are conducted. Fig.3 shows the typic classes of Nanji island coverages.

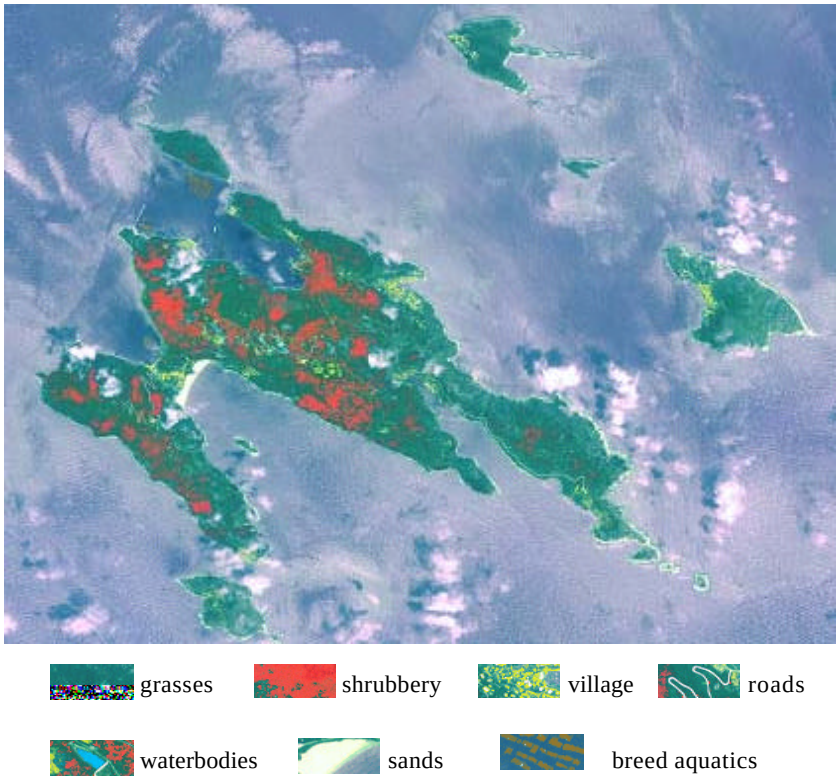

Fig. 3 Results of land cover sclassification

4. DISCUSSION AND CONCLUSION

IKONOS satellite images is one of today's important and key remote sensing information sources because they are of very high spacial resolutions. Their studies for the remote sensing of coastal zone and islands with smaller areas and detail constractions are of a great potential. Those images will get widely and widely applications in many areas. The results of the studies have dimonstrated these conclusions.

The studies indicat that application developments of IKONOS images to various regions may be to solve some difficulties. The first of them is that so smoller a rea is difficult to find a lot of controlled points that effect their application areas, and the second is that the costs of the images are so much expensive that many users considered as difficult to accept.

We believe that These problems will be solved with the developments of remote sensing technologies and a series of satellite with more high resolution is launched.

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