Application of Landsat ETM images for spatial property analysis of tidal flat in west Seohan bay, North Korea

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Abstract: In this study, as the passing of a year, the changes of tidal flat area in Seohan Bay, North Korea was monitored through using Landsat ETM Data and the ancient topological map.
The map to present tidal flat distribution characteristic based on the ancient topographical map (1918) was constructed as GIS DB.
In addition, a tidal flat distribution map was estimated by using the satellite images with unsupervised classification method. Even though it is difficult to approach to study area, it was possible to gain the data and to monitor the change of the coast tidal flat by comparing to area change yielded.

Keywords: tidal flat, mud flat, sand flat, unsupervised classification,

1. Introduction

In case of Korea, a tidal flat of inter tidal zone has been the main residential grounds as marine products cultivating for people in the west and south coast as well as reclaimed for the use of fertile cultivation land, industrial land and urban area.

Jo H. R. and Jo M. H (1999) studied to classify the micro-landform into 3 topographical classes such as mudflat, mixed flat, sandflat in Joolpo bay tide flat, Jeonrabuk province based on ISODATA method of unsupervised classification by using Landsat TM.

In order to analyze the spatial distribution of floating sand in a lake, which has a coast area and vase range watermark area, has been performed by using the reflection value acquired by submarine optical equipment having SeaWiFS band range by Jung J. C (1999).

However, it is so difficult not only to research in the tidal flat study but also to approach to the coast environment in North Korea from the political point of view this situation, the change of tide flat in North Korea could be monitored and analyzed by using the ancient topological map and satellite images in every year.
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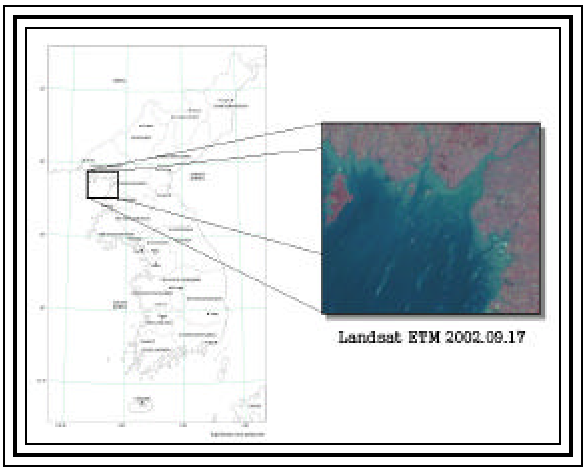

Fig. 1.The Study area, Seohan bay, North Korea

2. Materials and method

Seohan bay where is a shaped a triangle between cheolsan bay in Pyongbok and Janghyon bay in Hawnghae was selected for the study area and the ancient topological map, was made between 1918 and 1920 and Landsat ETM on 17th September, 2002 were used as study materials.
After constructing GIS DB such as tracing, vertorizing, coordination projection and conversion for the ancient topological map, a distribution map was prepared for the

suitable study purpose by using ArcView 3.2 and ArcGIS 8.1 S/W and applied through the unsupervised classification method.

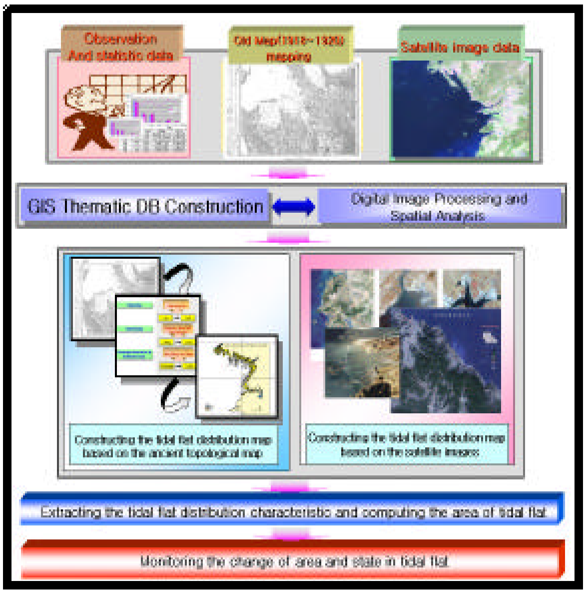

Fig. 2.The Study flow

3. Preparing the tidal flat distribution map based on the ancient topographical map

GIS database was constructed by drawing the tidal flat distribution map based on the 33 ancient topographical map sheets which converse the entire seohan bay in North Korea. As the result of analyzing the tidal flat area in study area, marsh and salt marsh, are spread on yong-am bay of the upper stream along the costal and kwang-ryang bay of lower stream, did not exist.

Finally, the areas of sand flat, mud flat, and salt farm were clarified as 278.97㎢, 671.23㎢, 6.33㎢, respectively and most area was composed of sand flat and mud flat.

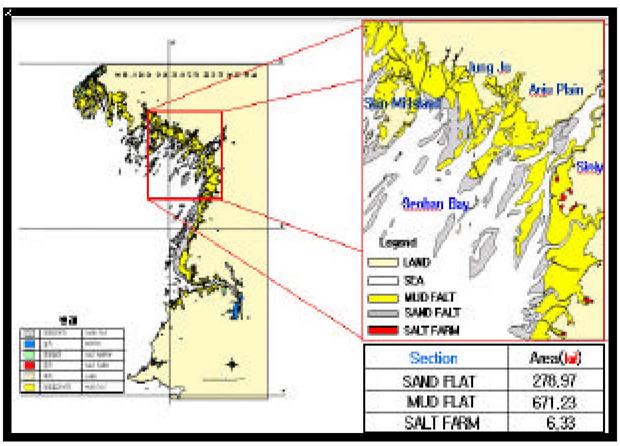

Fig. 3.The tidal flat distribution map (1918)

4. Classifying the tidal flat distribution map based on the satellite images data

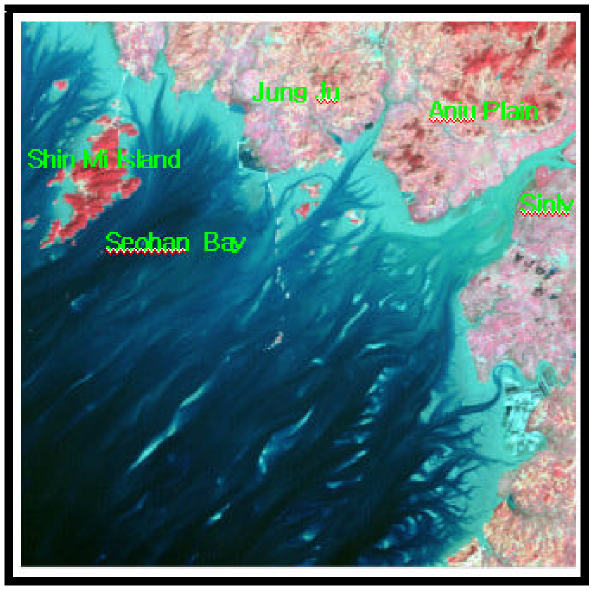

Fig. 4. Landsat ETM false color composite images, band (4/3/2)

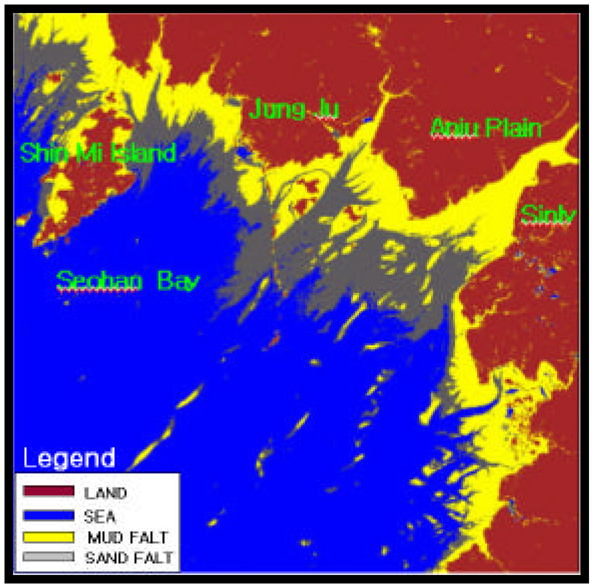

Fig. 5. Unsupervised classification image using the tidal flat distribution map

The tidal flat was detected through the satellite images data on 17th September, 2002 and the ISODATA Clustering based on minimum spectral distance of unsupervised classification method was performed to construct the tidal flat distribution.

Finally, the areas of sand flat and mud flat were clarified as 405.9㎢ and 455.8㎢ respectively and salt farm, which had been in 1918, did not exist.

5. Conclusion

As the result of comparing each tidal flat distribution map based on the ancient map and satellite map, 126.93㎢ of sand flat increasing and 215.43㎢ of mud flat were detected reducing. thus, the area of land was increased from 945.3㎢ up to 1049.1㎢. This result might cause the nature reconstruction project in North Korea, which has been undertaken form 1981. This result could be monitored on the overlay analysis based on the change of land use
For the future works, more accurate geometric correction should be performed through not the ancient topological map but the recent satellite image, which has the high accuracy in the view of geometric correction. Also, the characteristic will be clarified through the composition and characteristic of band.

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