

HGG001-10

Room:201A

Time:May 26 11:20-11:35

Landform and Land Cover Changes by Human Activity on the Sanjiang Plain, China

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Objective

Sanjiang Plain is located in Heilongjiang Province in northwest China, surrounded with three rivers, Amur, Sung Hua and Ussuri. There were much wetland in this place, but the wetland had been reclaimed by the Chinese government from the 1980s. To grasp how wetlands were cultivated was important, but there were merely fragmentary statistic data.

In this study, the landform map was made in advance, agricultural increase was grasped the cross-sections of the wetlands made and how wetlands decreased were clarified by satellite data. The landforms on which wetlands were reclaimed were clarified conclusively.

Methods and Results

The authors used SRTM (Shuttle Radar Topography Mission) by NASA to make the elevation map and cross-section of the Sanjiang Plain. Sanjiang Plain was very low and flat in the middle and lower reaches of the Amur River. Landform is very flat except for some hills and mountains. The difference of the elevation is about 5 - 25m from the river.

JERS-1/SAR by JAXA data used L-band which was most suitable to observe soil water. Because the resolution of JERS-1/SAR is high (18m), the land form is classified by visual observation of texture on image.

The landform map was made by elevation map and JERS-1/SAR data. There were floodplains around rivers. The alluvial plain was surrounded with the rivers. There were three terraces on the alluvial plain. The lower and middle terraces were each separated into two terraces. The gentle slopes on the base of the mountains were around mountains. The dissected terrace valley and the swampy area on the lower and upper terraces were on the alluvial plain. Some old river course and old swampy areas were distributed near the Amur River and the Sung Hua River. Natural levees are well-developed along the Amur River. The wetlands were distributed mainly on the floodplains.

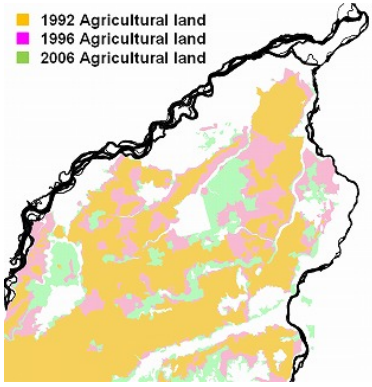
As for reclaimed land, false color of Landsat/TM was used because land cover could distinguish with a high degree of accuracy by visual observation of texture on image. The reclaimed land map of 1992, 1996 and 2006 was made. The reclaimed land had been increased from 1992 to 2006 except for Honghe national natural reservation area. The reclaimed lands were increased mainly in the alluvial plain and the floodplain from 1992 to 1996. The reclaimed lands were increased mainly in the dissected terrace valley and the swampy area on the terrace from 1996 to 2006.

In the wetlands in the field investigation, the vegetations on the wetlands were recorded and the heights of slightly elevated areas were measured with a hand level (Nobel K50-1560). The cross-sections of the wetlands on the selected landforms were made. The forms and vegetation of wetlands differs on different landforms. *Carex spp.* and *Gramineae gen. spp.* which were found typical in wetlands were the main vegetation in wetland on all landforms. In the wetlands on the lower floodplain and dissected terrace valley, there were some submerged areas. In the wetlands on the swampy area on the terrace, there were alternately dry area and wet area. In the wetlands on the alluvial plain, there were also alternately dry area and wet area but drier than the wetlands on the swampy area on the terrace. In the wetland on the mountains, there were relatively many kinds of plants.

The areas of wetlands and crop lands were calculated by JERS-1/SAR and LANDSAT/TM from 1992 to 1996. The crop lands had increased on all landforms. The wetlands on alluvial plain had been mainly cultivated.

Conclusion

The wetlands on the alluvial plain had been reclaimed mainly. [22:32:20] The alluvial plain wetlands were easy to reclaim because they were relatively flat and dry without trees. The wetlands on the swampy area on the terraces were wet and suitable for making rice paddy. The wetlands on the lower flood plains were not good for agricultural land because they were sometimes damaged by flood.



Keywords: geomorphological map, JERS-1/SAR, wetland