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Recent Expansion of Paddy Field Area in the Heilongjiang Province of China Detected by Using Remote Sensing Data

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China is the world largest rice producing country and rice is cultivated under various climatic conditions in the country. The Heilongjiang Province located in the northernmost is one of the major rice producing area and its contribution to the national production has been increased during the last decades. One of the major reasons of relatively high increase of rice production in this province was the growing demand of high quality rice in other provinces and another major reason was its spatial capacity to be developed for paddy field. Although annual averaged temperature is low due to the location in the high latitude zone, a considerable area of the Province except for the northernmost part exhibits the condition with potentially rice grown temperature. The trend of increase of paddy field for the whole province could be recognized by statistical information. However, available data, which might be incompletely assembled by unit area, showed limitation for analyzing the features of spatial distribution and its temporal change.

This study attempted to develop a method to estimate the area of paddy field for the whole Heilongjiang Province using MODIS data and also to analyze the features of changes of distribution of paddy field in recent years. Through the examination of two-dimensional scattergram of NDVI (Normalized Difference Vegetation Index), calculated from Band 1 and Band 2, and NDBSI (Normalized Difference Bare Soil Index), calculated from Band 1 and Band 7, the author could find a systematic pattern between the placement in the scattergram and the percentage of area of paddy field per pixel. Then, an integrated index, PI (Paddy Index), which was defined schematically in the scattergram, was introduced to formulate for estimating area of paddy field. The estimation accuracy was examined by comparing with the area of paddy field obtained from Landsat-TM data and showed a certain consistency of distribution except for a part of water bodies.

The spatial distribution of paddy field was estimated for the year from 2003 to 2007 by adopting the method mentioned above. During this period, a notable expansion of paddy field was identified in the Sanjiang Plain located in the eastern lowland part of the Province. The trend of expansion was especially accelerated after 2006. Another considerable expansion was recognized in the middle of the Province at around northern side of the major river run from west to east. Contrastively, Wuchang County located in the southern part, which was known as high quality rice production area, showed stable or even decreasing tendency of area of paddy field in this period. This might be related with the acreage of non-paddy but potentially suitable for rice cultivation area at the year of 2003.