

Land Cover Changes between 1977 and 2007 in Horqin Sandy Land, Inner Mongolia Autonomous Region, China

Hasi Bagan, Yoshiki Yamagata, Yoshifumi Yasuoka

Center for Global Environmental Research, National Institute for Environmental Studies, 16-2 Onogawa, Tsukuba, Ibaraki, 305-8506, Japan. Tel: +81-29-850-2567; Fax: +81-29-850-2960; E-mail: hasi.bagan@nies.go.jp

Abstract

Horqin sandy land, which is situated in transition zone from the intensively cultivated plains to the northern grasslands in a semi-arid area of southeast Inner Mongolian Autonomous Region, is known for its intensive land use change and desertification in the past three decades. In this study, the land cover changes for the period of 1977-2007 were determined and analyzed by Landsat remote sensing images. A subspace classification method is employed for land cover classification. The results indicate that the region underwent serious land cover changes: With the increasing human population in the region, the dominant land cover changes were the conversion of grassland and forestland into cultivated land, dry farmland and wetland into paddy field, and fresh water including lakes and rivers are disappearing.

Study area

The study area was in the Horqin sandy land, a semi-arid region in the southeastern Inner Mongolia Autonomous Region, China (Figure 1). The area is located in $42^{\circ}14''$ - $44^{\circ}7''$ N, $119^{\circ}21''$ - $122^{\circ}14''$ E, and covering an area of about 30 000 km².

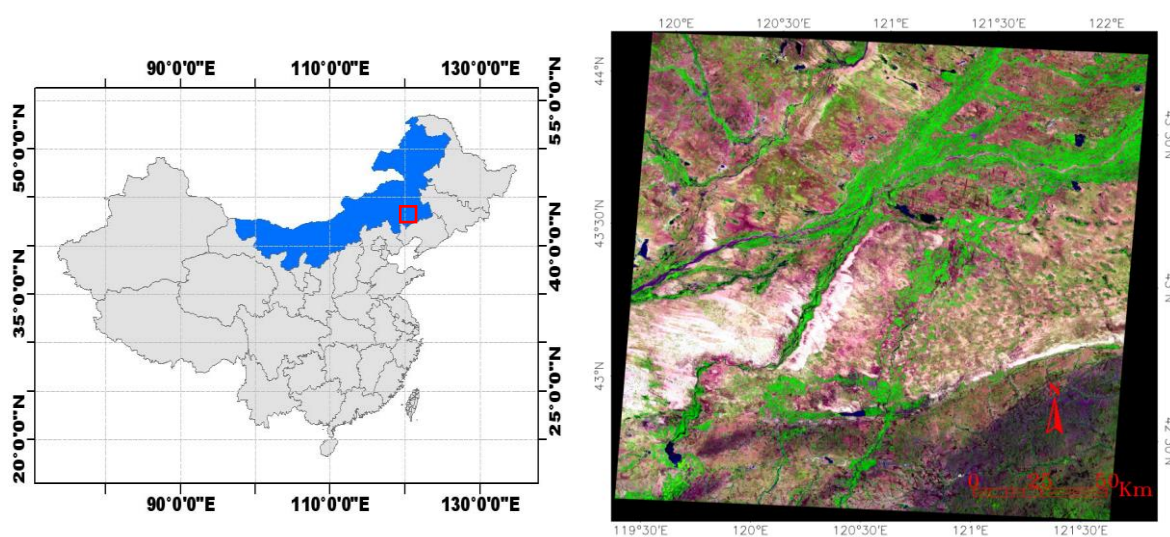


Figure 1. Location of the study area in the Inner Mongolian Autonomous Region, China. The right panel shows the full scene (2004 Landsat TM, RGB = bands 5, 4, 3).

Methods

In this study we present an extended subspace classification method for land-cover classification. The advantages of subspace classification method are subspace methods reduce data dimensionality by incorporating feature selection into the classification process, and they do not require training data to follow a normal distribution.

Results and discussion

The land cover changes for the period of 1977-2007 were determined and analyzed for the Horqin sandy land, using photos from 1977 (MSS), 1987 (TM), 1992 (TM), 1999 (ETM), and 2007 (TM). The ASTER, ALOS, and SPOT-5 image were used as supplement data set. Pre-processing of all data included orthorectification and registration to precisely geolocated imagery. A subspace classification method is developed for land cover classification.

From the time-series classified remote sensing images, we extract the land cover and land cover change information, such as cropland, paddy field, grassland, shrub, forest, wetlands, urban, desert area, bare soil and water from these data. It was clear that the region underwent serious land cover changes: With the increasing human population in the region, the dominant land cover changes were the conversion of grassland and forestland into cultivated land, dry farmland and wetland into paddy field, and fresh water including lakes and rivers are disappearing.

References

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