



Impact of human intervention and climate change on the land cover change in the glacial affected area of the Tianshan Mountains

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Abstract: Land use/land cover change (LULC) in glacial affected areas are driven by climate change and human activities. Monitoring and simulation of the spatial and temporal land cover changes in this special region provide scientific basis in understanding the natural environment, helping to reveal the impact of climate change and human activities on LULC. In this study, the Tianshan Mountains (TSM), located in the hinterland of Eurasia, were selected as the study area to investigate the LULC of the glacial affected areas. The relationship between LULC, human intervention and climate change on a large spatial scale were also analyzed. The LULC of the TSM in China for the past 35 years were analyzed using a dynamical change model, a landscape pattern index, a centroid transfer model, and geoinformation TUPU based on the land use data of 1980, 1990, 2000, and 2015. Results show that the areas of cultivated and built-up lands immensely increased by 45.87% and 187%, respectively. Correspondingly, the areas of bare land and ice and snow cover decreased by 27% and 38%, respectively. The land use change in the TSM was characterized by different stages, and high conversion rate and intensity were obtained from 2000 to 2015. The landscape change was mainly reflected in terms of the significant increase in the number of patches and the simplification and regularization of patch shapes. The spatial connectivity of different land use types increased. The temperature and precipitation in the region show an increasing trend, and the melting rate of ice and snow cover significantly accelerated. This study can help to achieve a dynamic LULC model to investigate the interacting influences of climate change and human activities in glacial affected areas.