

# ANALYSING SPATIO-TEMPORAL PATTERN OF LAND COVER CHANGE USING MULTI-TEMPORAL SATELLITE IMAGES

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## ABSTRACT:

This study attempts to quantify spatial pattern of land cover due to both human activities and natural factors. The basic approach is to derive and interpret spatial pattern metrics of multi-epoch trajectories of land cover change. This method integrates multi-temporal and multi-scale remotely sensed data from various sources. The history of land cover change for every location in the study area is traced, and nature, area extent and spatial pattern of such changes are also described. The generic approach of this study is based on post-classification comparison method. First, multi-temporal land cover types are derived based on a unified land cover classification scheme and from classification of multi-temporal remotely sensed imagery. Categorical land cover change trajectories are then established and reclassified according to the nature and driving forces of the change. Finally, spatial pattern metrics of the land cover change trajectory classes are computed and their relationships to human activities and environmental factors are analysed. A case study has been conducted in the aridzone of China. To establish landuse change trajectories, all classified images were integrated in GIS. Spatial pattern of farmland has been quantified by calculating class-level landscape metrics of farmland change trajectories. Different from the traditional landscape metrics on land cover types, the metrics based on change trajectories that can better reveal spatial pattern of changes. In the environment, the supply of arable land has been considered to be unlimited but use of such land is severely limited by the supply of water. Our approach does not only consider the spatial pattern of expanding farmland, but also take into account the process of land cover change. Through using multi-temporal images, the causes and consequences of farmland expansion can be better monitored and understood. The results show that farmland has rapidly increased in the study area during the study period. In contrast, signs have been shown that the lack of water supply has resulted in farmland abandonment that could cause severe land degradation due to salinity and wind erosion. Large-scale commercial agricultural practice has obviously increased demand on natural resources, particularly the water resource. When the shortage of water supply happens, newly cultivated farmland is more likely to be abandoned. It is therefore fearful that the rapid expansion of agricultural land may not be sustainable in unfavourable environmental conditions. Although challenges remain with numerous research questions unanswered, the study nevertheless encourages further effort to develop more advanced methodology for establishing more robust and reliable spatial pattern indicators, so that spatio-temporal pattern of land cover change can be better understood.

**TOPIC:** Change detection and process modelling

**ALTERNATIVE TOPIC:** Remote sensing applications