Paper title: Remote Sensing Image Geo-cognition Approach to Land Type Classification
Presenting author: Wang Jing
Title: Professor
Affiliation: China Institute of Land Surveying and Planning, Ministry of Land and Resources, No.37 Guanyinyuan Xiqu, XiCheng District, 100035, Beijing, China
Email: wjing0162@yahoo.com.cn
Co-authors:
Chen Yongqi, Chair professor, *Department of Land Surveying and Geomatics,* Hong Kong Polytechnic University, Hongkong
He Ting, PHD, China Institute of Land Surveying and Planning, Ministry of Land and Resources
Liu Aixia, PHD, China Institute of Land Surveying and Planning, Ministry of Land and Resources

Remote Sensing Image Geo-cognition Approach to Land Type Classification

Wang Jing [a,b], Chen Yongqi [b], Lv Chunyan [a] , He Ting [a], Liu Aixia [a]

a Key Laboratory of Land Use, China Institute of Land Surveying and Planning, Ministry of Land and Resources, Beijing，China

b Department of Land Surveying and Geomatics, the Hong Kong Polytechnic University, Hongkong

ABSTRACT: Land change analysis or landscape analysis and planning are based on land types, often derived and updated through physiognomy, topographhty, soil, vegetation, land use /land cover and remote sensing images. It is an ecologically homogeneous tract of land which describes characteristics of the most obvious land attributes. It is a fiat object which is delineated not by *sharp* outer boundaries but rather by boundary-like region which is to some degree indeterminate and is calculated by scientific research. Land type classification based on land resources survey was demonstrated that it is difficult to quantify due to lack of suitable classification approaches and classified units and the lack of appropriate updated information of vegetation, soil and land use/land cover is widely regarded as a major obstacle. The study is to investigate and develop the geo-cognition approach of remote sensing images to land resources and to apply it in determination of land units and classification of land types. The approach is tested in a study site located in Hengshan county in ShanXi province, where is in the agriculture-pasture mixed area in Loess Plateau in China with complex physical geographical situation. Results showed that there are three levels in the process of remote

sensing image cognition on land types, namely spatial feature perception, spatial object cognition and spatial pattern cognition. The approach of remote sensing image geo-cognition on land resources included four levels of remote sensing image pre-processing and analysis, visual cognition on images, logical cognition on images and land knowledge mining based on integrating geosciences knowledge and geographical information in the support of geo-analysis models. Under the approach framework and the analysis process from spatial features to spatial objects and to spatial pattern, it was applied in classification of land types using Hyperion image. The characteristics (features of vegetation, soil and landform, etc.) and spectral features of each land types are analyzed, and the land units as spatial objects are segmented through integrating Hyperion image, DEM, land use map, soil map, field survey data, etc. A reliable method for land type classification integrating Hyperion image and multi-source data (such as vegetation, soil parameters, DEM) and geosciences knowledge by object-based analysis is proposed and applied in the study site. The application results showed that determining the land units by combining Hyperion images, geographical information, DEM and geosciences knowledge using image segmentation is of significance. Results at different scales showed that the overall classification accuracy is relatively high, ranging from 72% to 88%, with an average slightly above 81%. The classification result at scale 100 seemed to provide more accurate results for mapping land types with an overall accuracy of 0.8832 and Kappa coefficients of 0.8610 and most of land types had higher user's and producer's accuracy at scale 100 when compared to the results at other three scales. It also showed that the approach for land type classification is significant and appears potential for land type classification aiming to land assessment and planning. Though the approach appears potential for land type classification, some issues must be deeply discussed, such as input data layers in the process of determining land units and suitable function models in the process of classification.

KEY WORDS: remote sensing image geo-cognition; land type; land unit; Hyperion