**Object-based Multi-scale Recognition Approach for Residential Landscape Classification**

Lei Zhang

Key Laboratory of Digital Earth Science, Aerospace Information Research Institute, Chinese Academy of Sciences, Beijing, China,

zhanglei@radi.ac.cn

**Abstract:** In using object-based classifier for land cover classification, analysts typically encounter serious issues of producing segmented objects to fit the boundary of real land cover types, they usually occupy different scale levels. This study concentrates on the multi-scale segmentation to reduce errors for object identification. The result reveals that geographic object-based image analysis (GEOBIA) for residential dwellings identification outperforms pixel-based approach, and multi-scale GEOBIA improves recognition accuracy than single-scale GEOBIA. The multi-scale approach produced a significantly higher overall accuracy of 91%, whereas single-scale GEOBIA produced 84% and pixel-based classifier produced 73%. The traditional per-pixel approach is not very efficient in identifying residential dwellings; the dark roofs of residential dwellings have extremely spectral similarity with ploughed but bare cropland, mining mound and brick sites. The segmentation experiment demonstrated that the ratio of shape to spectrum 0.3:0.7 is optimal parameter setting, the weighted adjustment of smoothness and compactness presented no an obvious difference in effect, weight of compactness 0.6 and smoothness 0.4 indicated acceptable selection that regularly shaped segments better match the general form of houses. The shape features including object size, ratio of length to width, and compactness effectively improved spectral identification. The confused types of residential dwellings, industrial zone, and fallow field have best boundary fit at scale level of 20, 30, and 100, respectively. The industrial zone classified at scale level 30 and fallow field identified at scale level of 100 successfully removed the misclassified candidate residential dwellings at scale level of 20. Multi-scale GEOBIA approach has less spectral and shape mixed effects than approach employing single-scale GEOBIA and pixel-based classifier.

**Keywords:** Object-based, Residential dwellings, Rule-based classification, Multi-scale