

Evaluation of an object-based classification framework to extract basic urban land cover information from high-resolution, multi-spectral and LiDAR data

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Abstract

This study focuses on the evaluation of an object-based image analysis (OBIA) approach to extract basic urban land cover (LC) information from high-resolution, multi-spectral (MS) and light detection and ranging (LiDAR) data. Particular emphasis is put on the assessment of the transferability of the proposed method. For this purpose, the developed ruleset is applied to four sets of MS and LiDAR input data covering three different urban study areas. Subsequently, the robustness of the developed ruleset is evaluated by comparing the accuracies of the produced LC maps. The results of this study demonstrate that the presented classification scheme is well-suited for the accurate, consistent and transferable mapping of urban environments. User's and producer's accuracies observed for all maps are almost consistently above 80 %, in many cases even above 90 %. Only few larger class-specific errors of commission and omission occur mainly because of the rather simple, but yet effective classification rules applied to the image objects. Apart from these errors, overall accuracies and the kappa coefficient of agreement underline the high quality of the mapping results and the transferability of the proposed method.

Keywords

Object-based; Urban; Land Cover; Mapping; Evaluation; Accuracy; Transferability; Robustness; High-Resolution; Multi-Spectral; LiDAR; Data Fusion.