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Scale dependency for assessment of biodiversity indicators from different remote sensing data sets *

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Knowledge of tree species distribution and forest structures is important for biodiversity studies. The accuracy and information content of species maps and structural indicators produced by using remote sensing images vary with scale, sensor, classification algorithm, verification design and natural conditions like tree age, forest structure type or density. Imaging spectroscopy reduces the inaccuracies due to detailed spectral response on species identification while LiDAR and stereo optical data however can provide information on structure. The quality is very much dependent on the scale effect respectively on point cloud density and cannot be neglected. This study aims to bridge the knowledge gap in understanding the scale effect and point cloud density for tree species and structural mapping.

For the tree species investigations airborne (HyMAP) and one spaceborne (Hyperion) imaging spectroscopy dataset with pixel sizes of 4 m, 8 m and 30 m respectively were selected to examine the effect of scale. Normalized digital surface model (nDSM) derived from LiDAR data was used as additional information to examine the effect of multi-sensor information. Six different sets of predictor variables (reflectance value of all bands, selected components of a minimum noise fraction, vegetation indices and each of these sets combined with LiDAR derived height) were explored at each scale. Supervised kernel based (Support Vector Machine) and ensemble based (Random Forest) machine learning algorithms were applied on the dataset to investigate the effect of classifier.

For structure information analysis different digital airborne stereo photographs have been analysed as well as 3-D stereo high resolution satellite data. In addition LiDAR data with different point density are under examination.