

SEMIAUTOMATIC CLASSIFICATION OF TREE SPECIES BY MEANS OF MULTI-TEMPORAL AIRBORNE DIGITAL SENSOR DATA ADS40

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ABSTRACT:

Temporally frequent, cost-efficient and precise forest information requirements for NFIs, monitoring or protection tasks have grown over time and will continue to do so in the future. New perspectives are given by the airborne digital sensor ADS40, which provides entire image strips with high geometric, radiometric and temporal resolution (every three years for entire Switzerland). This study presents an approach for semi-automated tree species classification in different types of forests using multi-temporal ADS40-SH40 and SH52 images (RGB and CIR) from May, July, October 2007 and August 2008 to support tasks of the Swiss National Forest Inventory. First, forest area was obtained using a fractional tree cover approach combining canopy height models (CHMs) with a logistic regression model. Explanatory variables are derived from high-quality DSMs derived from summer ADS40 stereo-image strips. Based on this forest area, forest composition on tree species level is obtained using logistic regression models with step-wise reduction of the large number of explanatory variables derived from spectral information of the multi-temporal images. The 8 main tree species were therefore classified up to four times providing its spectral variability during the vegetation period. Validation is performed using field samples and revealing a kappa around 0.65. This study reveals the potential and limits of the ADS40 data to extract forest parameters (area, species and composition) and underscores the advantage of a multi-temporal classification of tree species with spectral similarities. Since the input data is available every three years nationwide our approach is very promising for future monitoring and management tasks of a continuous Swiss NFI.

TOPIC: Land cover classification

ALTERNATIVE TOPIC: Multi-spectral and hyperspectral remote sensing