Kurzbericht

Gewährleistung der Nährstoffnachhaltigkeit in den Wäldern von Rheinland-Pfalz - Bewertung des Einsatzes von Debarking Heads

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Abstract

The objective behind this report was to identify an ordinary least square regression model to generate predictions of the standing timber volume associated to a sample location of the Third German Forest Inventory (*BWI3*). The motivation was the consequent integration of the model in model-assisted regression estimators for domain estimations over the entire state- and communal forests of the federal state of Rhineland-Palatinate (Germany). This imposed the restriction on the predictor variables to be available over an area of 6155 km^2. Both LiDAR derived height metrics and information from a satellite-based tree species classification map were available and considered as potential predictor variables. In this context, we also introduce a calibration technique to minimize the effect of misclassifications in the tree species predictor variable on the regression model properties. Since the angle count sampling technique applied in the *BWI3* survey leads to ambiguities in the choice of a suitable extraction area (support) for each predictor variable, a model selection procedure was developed to identify the best performing support settings. The mean canopy height and the main tree species of a sample location turned out to be valuable and meaningful predictors. Heterogeneity in the LiDAR data due to time lags and quality variations could considerably be adjusted for by including quality information as a categorical variable in the regression model. The regression model achieved an overall adjusted R^2 of 0.49 and a cross validated root mean square error ($RMSE_{cv}$) of 132.12 m^3/ha. The model accuracy yet turned out to be particularly higher in regions where the LiDAR acquisition year was identical with the year of the terrestrial inventory (R^2 of 0.57).

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