Abstract

The thesis focuses on metrics of vertical structure of vegetation derived from UAV LiDAR data and their use for multitemporal classification of selected species of arctic-alpine tundra in the Krkonoše Mountains. The metrics are selected based on a literature search focusing on low and shrubby stands. Random Forest algorithm and permutation feature importance, drop column importance and individual predictor performance is used to determine the suitability of metrics for distinguishing tundra vegetation. Subsequently, a fusion with multispectral data is performed and influence of the LiDAR derived variables on the refinement of classification results is determined. The use of metrics derived from a digital surface model obtained by image correlation of multispectral data is also examined. Maximum height followed by minimum height, canopy relief ratio and coefficient of variation yielded the best results, they achieved an overall classification accuracy of 67.3% for Bílá louka meadow and 62.3% for Úpské rašeliniště bog. Fusion with multispectral data led to an increase in overall accuracy up to 2 %. In case of vegetation structure derived from the digital surface model, similar results were achieved apart from higher stands. LiDAR data did not prove to be beneficial in distinguishing grass communities but managed to identify trees and higher stands.

Keywords: UAV LiDAR, vegetation, grasslands, arctic-alpine tundra, Krkonoše Mountains, classification, random forest.