

Summary

Stands growth models enable the assessment of site productivity and the forecasting of changes occurring within the stand. In the face of a changing climate, monitoring the stands growth becomes a crucial task in forest management. It is also essential to develop methods for updating these models under evolving environmental conditions. The aim of this dissertation was to develop calibration and updating methods for height growth models of Scots pine stands, utilizing remote sensing data from airborne laser scanning (ALS) and digital aerial photogrammetry (DAP). The research aimed to demonstrate that these data can replace traditional measurement methods, offering higher accuracy and efficiency. It was shown that ALS data allow for the calibration of regional growth models with high accuracy, surpassing models based on ground measurements. At the same time, it was proven that DAP data, despite the presence of systematic measurement errors, after appropriate correction, can serve as a cheaper and equally effective alternative to ALS. The study developed methods for correcting DAP errors, utilizing reference data from ALS or field measurements, even from different years, enabling the use of archival data sets. The accuracy of the correction depends on the number of established sample plots, and their required quantity can be calculated based on the standard error of the DAP data. It was demonstrated that growth models calibrated on the basis of corrected DAP data exhibit accuracy comparable to models based on ALS. The research findings have significant practical implications, providing tools for effective monitoring and forecasting of forest stand growth, which is crucial for sustainable forest management under climate change conditions. The dissertation introduces a new approach to the use of remote sensing in forestry, indicating the potential for widespread application of DAP and ALS data in the calibration and updating of forest stand growth models.

Słowa kluczowe: LiDAR, DAP, ALS, stand height growth models, site index