

MWP – Young Researcher Abstract 2026

Project title: Detection of old-growth forests using airborne laser scanning and other auxiliary data combined with National Forest Inventory field plot data	
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Abstract (approx. 200 words): Old-growth forests (OGFs) are critical reservoirs of biodiversity, but their identification at large spatial scales remains challenging. In boreal regions, intensive forest management has fragmented remaining OGFs, creating an urgent need for scalable mapping approaches to support conservation and climate policies. This study developed a nationwide framework for detecting OGFs in Finland using multi-source remote sensing (RS) data. Framework combined airborne laser scanning (ALS), Sentinel-2 satellite images, aerial images and auxiliary variables derived from the Finnish multi-source National Forest Inventory (NFI). Three alternative OGF definitions with increasing ecological strictness were evaluated using over 26,000 NFI plots. Classification was tested using Random Forest, Extreme Gradient Boosting (XGBoost) and logistic regression. XGBoost consistently yielded highest classification performance, with F1-scores up to 0.63 depending on the OGF definition. Stand age was regarded as one of the most important predictor variables across the models, while ALS-derived structural variables and Sentinel-2 spectral indices substantially improved classification accuracy. Variables derived from spring and early summer satellite images were more informative than late-summer images, indicating that phenological timing influences OGF detectability. The results demonstrate the potential of integrating RS and machine learning for large-scale OGF mapping and provide practical tools for biodiversity conservation, forest restoration, and climate change mitigation.	
Key words: old-growth forest, remote sensing, airborne laser scanning, Sentinel-2, national forest inventory	