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Tree Species Maps from Multispectral Airborne Laser Scanning Data

Classification from Optech Titan data with a new mini raster cell method resulting in detailed tree species maps and high accuracy at plot level.
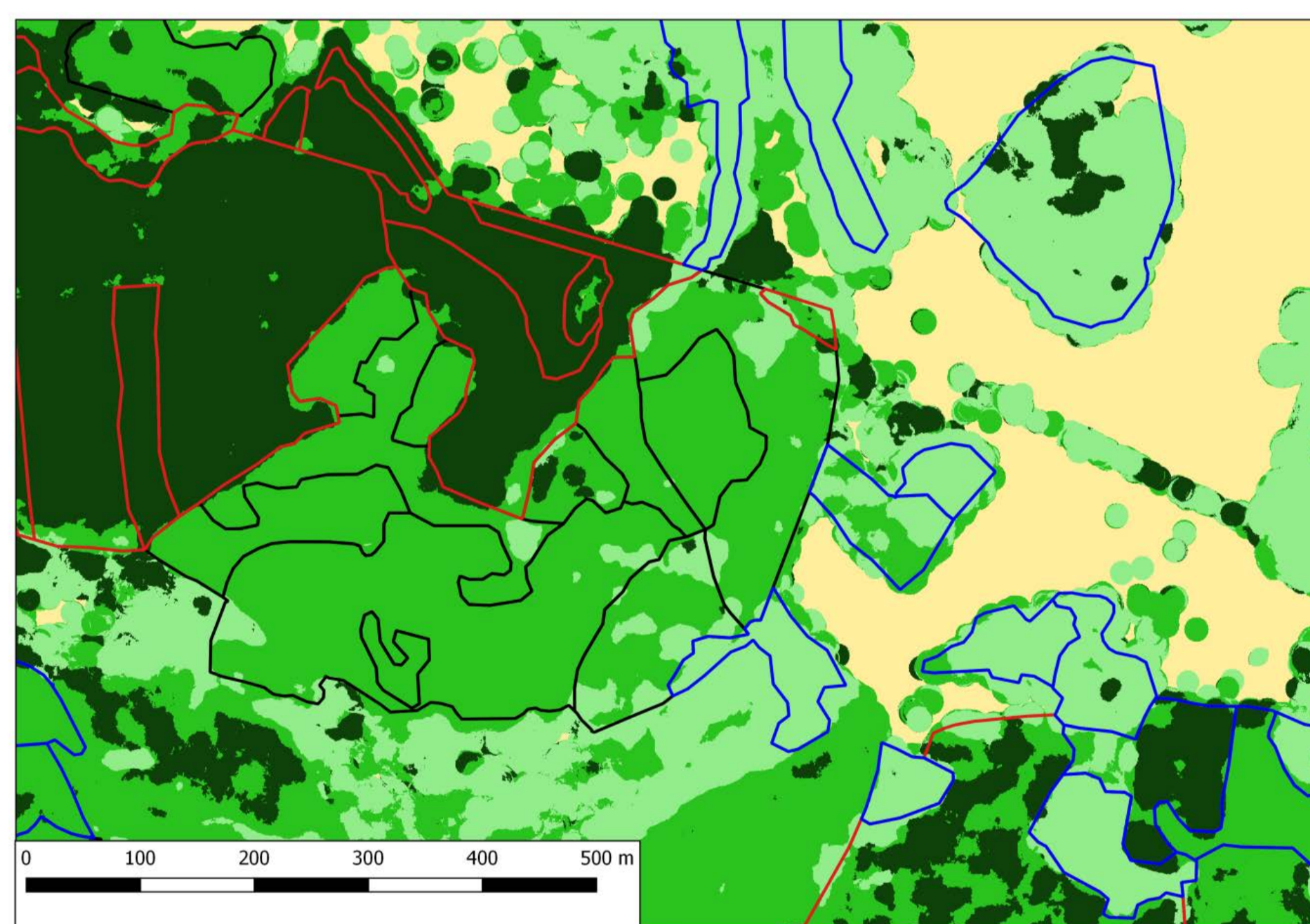
INTRODUCTION

Classification of tree species is still a challenge for remote sensing-based forest inventory. New multispectral ALS systems have recently become available, such as Optech Titan with wavelengths 1550 nm, 1064 nm, and 532 nm, which has been used for individual tree species classification. However, individual tree methods require positions of reference trees as training data.

This study presents a new type of area-based method using small raster cells for classification of tree species from multispectral ALS data. The features used for the tree species classification are derived from the intensity of the different wavelengths in small raster cells using a moving window average approach to allow for a heterogeneous tree species composition. Classification is done for pine, spruce, deciduous forest and mixed forest in a study area located in hemi-boreal forest in the southwest of Sweden.
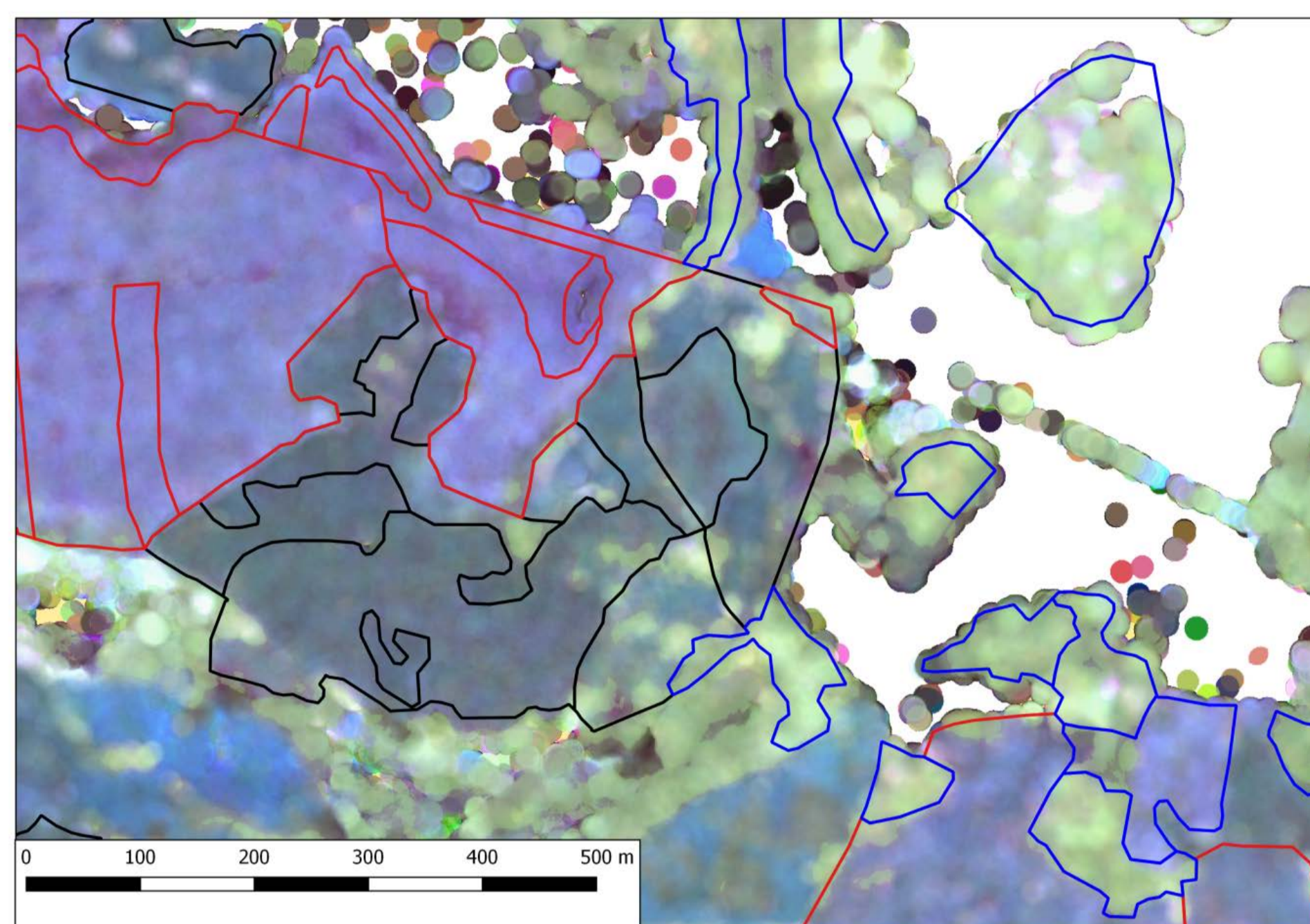
Top: False color composite image of range-corrected laser intensities for returns from the tree canopies with the 1550 nm wavelength displayed as red, 1064 nm as green, and 532 nm as blue The lines are photo-interpreted borders of mature forest stands with red=pine, black=spruce and blue=deciduous trees.
**Bottom**: Classified raster from the mini raster cell method with dark green= pine, middle green= spruce, and light green= deciduous trees.

RESULTS

The classification separated pine-and spruce-dominated plots well
The most common error was for mixed forest plots that were classified as spruce-or deciduous-dominated

Dominant tree species	Correctly classified
Pine	86%
Spruce	96%
Deciduous trees	65%
Mixed	35%
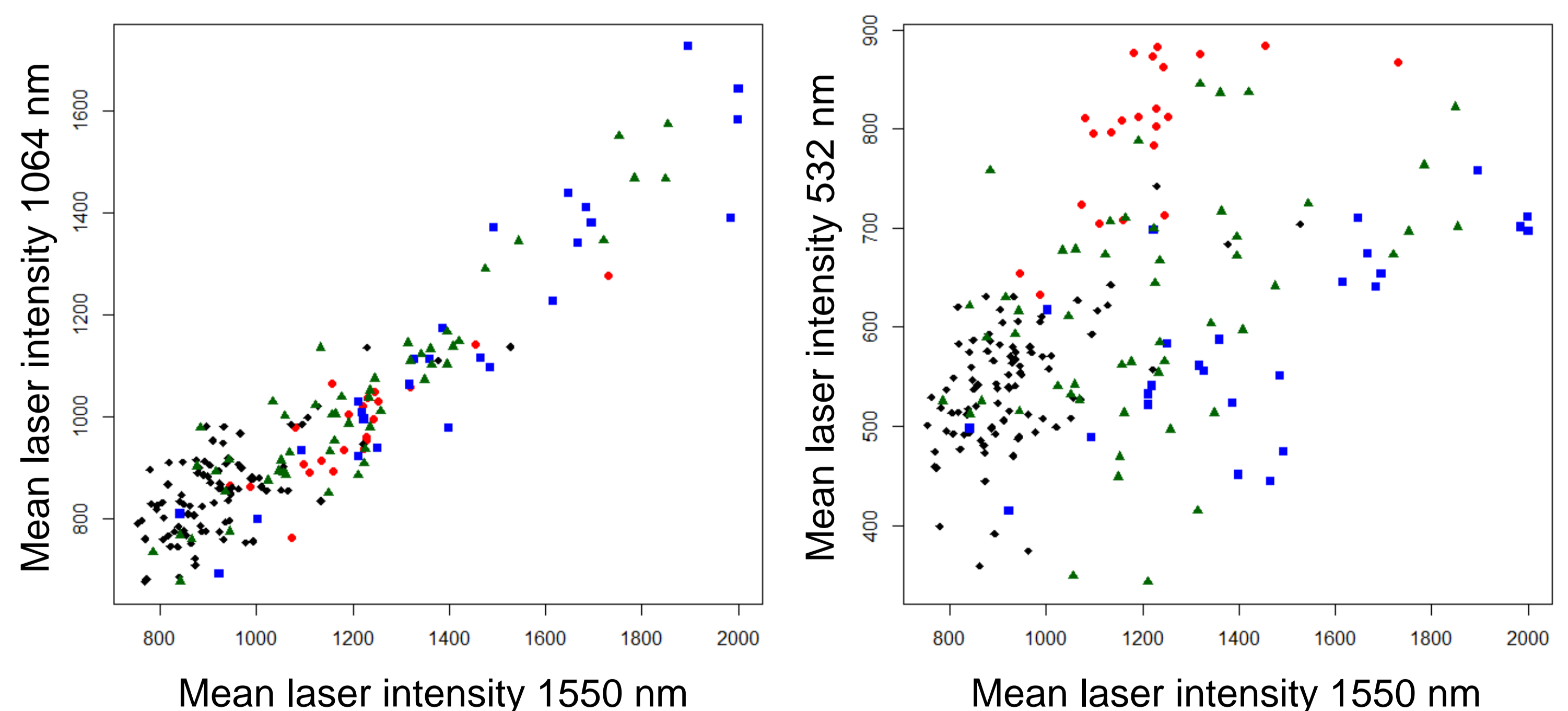
Mean laser intensity in field plots dominated by pine (red), spruce (black) and deciduous trees (blue). The combination of 1550 nm and 532 nm increases the separation between the tree species.