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Abstract

Indigenous forests cover 24% of New Zealand and provide valuable ecosystem services. However, a national map of forest types, that is, forest alliance groups, does not exist at an appropriate level of detail. We show how optical satellite data from Sentinel-2 may be combined with radar (Sentinel-1 and PALSAR) and canopy metrics from LiDAR in a support vector machine classification to produce a regional map of forest alliance groups. The Wellington region in New Zealand is used as the study area because it has complete LiDAR coverage. A five fold cross-validation showed that the best combination of bands and metrics was bands 2, 3, 4, 5, 8, 11, and 12 from Sentinel-2, VH/VV from Sentinel-1, HH from PALSAR, and mean canopy height and 97th percentile canopy height of LiDAR, which gave a mapping accuracy of 80.9%. This accuracy would be sufficient for several management applications for indigenous forest in New Zealand, including biodiversity management, carbon inventory, pest control, ungulate management, and disease management. National application of the method will be possible in several years once national LiDAR coverage is achieved through the Regional Development Program.