Enhancing global agroforestry maps with high-resolution land use data

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Résumé

Current global agroforestry maps are based on coarse spatial resolution data, limiting their accuracy and reliability for practical applications. This study integrates ESRI cropland maps with three pasture datasets-ESRI, ESA, and Global Pasture Watch (GPW)-to generate three crop-pasture spatial overlays (ESRI × ESRI, ESRI × ESA, and ESRI × GPW). We then combine these three overlays with a 1 m-resolution tree/no-tree map to identify agroforestry trees (i.e., trees on cropland and trees on pasture lands). We evaluate the three resulting maps along with Lesiv and Chapman's existing maps against 8370 ground-truth reference points covering all continents and diverse agroforestry and non-agroforestry classes. The ESRI x ESRI and ESRI x ESA maps identified agroforestry trees with 78% and 74% accuracy, respectively. In contrast, the ESRI x GPW map only classifies 50% of agroforestry trees correctly. The best map (ESRI x ESRI) is able to identify 88.5 % of hedgerow trees, 73.6% of scattered trees, but only 63% of alley cropping trees. The maps by Lesiv and Chapman detect only 36% and 22% of agroforestry trees, respectively, indicating a high underestimation of agroforestry. Our new maps delineate agroforestry areas more precisely, possibly through their improved ability to identify trees on pasture and cropland , rather than relying on coarse resolution grid cells including trees . These findings support our hypothesis that improving the spatial resolution of input data substantially enhances the accuracy and detection of agroforestry systems.

Mots-Clés: Agroforestry, global agroforestry mapping, land use data, accuracy assessement

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