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| **Estimation of Above-Ground Biomass in Forested Areas of Hawaii and Spain Using Small Area Estimation with LiDAR Auxiliary Information and GEDI** |
| **Introduction/Aim:** Stand exams and field plots with low positional accuracies are commonplace in informing forest management operations, yet they are underused in remote sensing analyses. Area-level models, allow combining remote sensing data with this kind of observations to estimate forest attributes for stands and management units of similar size. LiDAR data have been used in operational forest inventories for over a decade (Mauro et al., 2017) and the Global Ecosystem Dynamics Investigation (GEDI) spaceborne sensor provides auxiliary information that can be used with field plots with low positional accuracy to fit area-level models (Hunka et al., 2023). This study compares direct estimators of Above Ground Biomass (AGB) with no auxiliary information to area-level EBLUPs using LiDAR and GEDI auxiliary information. **Methods:** Comparisons were conducted in pine-dominated forests in Spain and eucalyptus-dominated forests in Hawaii—comprising 23 and 62 management units and 140 and 150 ground plots. To assess the performance of each method, root mean squared errors for stand-level estimates were compared.**Results:** Preliminary findings suggest that direct field estimates have larger RMSEs than area-level EBLUPs based on either LiDAR auxiliary information. In Spain, field estimates demonstrated the highest level of uncertainty, with relative errors reaching 27.09%, in contrast to the 9.77% relative errors obtained using the small area estimation method. Consequently, area-level EBLUPs improve accuracy over direct estimates. This enhancement is particularly valuable considering the modest cost of getting low-precision field plot coordinates. Results referring to the use of GEDI as a supplementary source to field data remain inconclusive at this stage.These results have important applications in operational settings, demonstrating that existing databases of field plots with low positional accuracy, can still play an important role when combined with remote sensing data.**References:**Hunka, N. et al. 2023. On the NASA GEDI and ESA CCI biomass maps: aligning for uptake in the UNFCCC global stocktake. [*Environ. Res. Lett. 18 124042*](https://iopscience.iop.org/article/10.1088/1748-9326/ad0b60) Mauro F., et al. 2017. Analysis of area level and unit level models for small area estimation in forest inventories assisted with LiDAR auxiliary information. [*PLoS ONE 12(12): e0189401*](https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0189401) |