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| **Best practice for mapping aboveground carbon in Afrotemperate forests**  |
| Under the Paris Agreement, signatories are obliged to reduce carbon emissions and enhance carbon sinks. Multiple global aboveground biomass products are now available; however, they still require additional calibration and validation datasets at the local scale. I use South Africa’s Afrotemperate forests as a case study to investigate best practice for remote sensing aboveground carbon for improving the accuracy of reporting under the Paris Agreement. I collected both field and LiDAR data for three forests in KwaZulu-Natal, South Africa, and tested three different allometric equations for calculating AGC. I used linear models to predict AGC from LiDAR data for both local and multi-site models and then compared the results with two global biomass products. The locally derived allometric produced intermediate AGC values to the temperate and pan-tropical equations and is recommended for use in South African forests. Local LiDAR models for each forest varied in performance with R2 values ranging from 0.16 to 0.75, and RMSE% of 7.3 to 50%. Overall, the multi-site LiDAR model performed better than two of the three local models with a conditional pseudo-R2 of 0.82 and RMSE on 24% (30 MgC.ha-1) and is recommended in the absence of field data. However, since the forest physiognomy is diverse, it is important to take local context into account when interpreting AGC results. Although global biomass products tend to overestimate the carbon in these forests, they can still be used for the UNFCCC’s 2023 global carbon stocktake until further calibration and validation data have been included. While generalized mapping techniques may produce some errors in AGC estimates, it's important to use the data that's currently available and report the uncertainty in the estimates as part of mitigating anthropogenic changes. |