

# INTEGRATING FIELD PLOTS, LIDAR, AND LANDSAT TIME SERIES TO PROVIDE TEMPORALLY CONSISTENT ANNUAL ESTIMATES OF BIOMASS FROM 1990 TO PRESENT

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**Abstract**—We are developing a system that provides temporally consistent biomass estimates for national greenhouse gas inventory reporting to the United Nations Framework Convention on Climate Change. Our model-assisted estimation framework relies on remote sensing to scale from plot measurements to lidar strip samples, to Landsat time series-based maps. As a demonstration, new field plots are strategically located across six diverse Landsat scenes within the major forested regions of the US. To distribute the plots across structure and cover gradients within each scene, we use forest structure metrics derived from recent lidar acquisitions. Landsat time series are used to derive disturbance and recovery history metrics that, when linked to the plots and the lidar strip samples, facilitate improved mapping of current biomass. Because the mapping model is based on Landsat history metrics it can be walked back in time to 1990, using Landsat data acquired since 1972. This provides a temporally consistent approach for mapping biomass at an annual time-step, using a model that has well characterized errors from diagnostics associated with the plots and lidar strip samples from the current period.

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