Project Title: Spatial-temporal models for FIA data: Combining plots across time and space for time-specific and change estimates of forest biomass stocks

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Progress

We completed a major milestone in our project, publishing a manuscript in *Spatial Statistics* (May and Finley, 2025). This manuscript describes a spatio-temporal model capable of inferring forest attributes at particular points in time and change across time using the FIA plot network. A `Julia` package implementing the model is available at `https://github.com/PaulBMay/SpaceTimeMultiscale.jl`. Dr. Finley's graduate student Elliot Shannon has already used this model to estimate loss in forest carbon due to natural gas well development in the Ohio River Valley and has submitted a manuscript describing these results to PNAS (Shannon et al., 2025).

Next Period Plans

During this next period, we will begin incorporating Landsat time-series data into the spatio-temporal model. This will allow more precise estimation of forest variable status and change at finer spatial and temporal scales, as well as enable disturbance classification and attribution of forest losses.

Problems/Delays

Due to unexpected staffing losses in FIA Spatial Data Services, Dr. May still does not have a MTA. This creates a challenge to our Next Period Plans. Dr. Finley has an existing MTA, so our current plan is conduct sensitive analyses requiring confidential coordinates at MSU.

References

May, P. B. and Finley, A. O. (2025). Spatial–temporal prediction of forest attributes using latent gaussian models and inventory data. *Spatial Statistics*, 69:100917.

Shannon, E. S., Finley, A. O., and May, P. B. (2025). Quantifying impacts of natural gas development on forest carbon. *bioRxiv*, pages 2025–06.