



Assessing trends in forest demography and carbon cycling in forest plots, satellite data, and Earth system models

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Understanding and predicting tree demographic rates of mortality, growth, and recruitment in response to climate fluctuation has the potential to improve vegetation and carbon cycle models. In particular, tree mortality has a strong potential to influence carbon turnover times in forests and thus the long-term dynamics of carbon sequestration, yet the temporal trends in carbon cycling across multiple biomes is largely unknown. We analyze the carbon turnover time in long-term forest plots, satellite, and Earth system model simulations and assess trends in turnover time and their drivers. We find declines in carbon turnover times in multiple biomes and that the broad patterns are largely captured in all three diverse datasets. We identify several key drivers and uncertainties and emphasize that long-term forest monitoring networks are greatly needed to assess trends in tree mortality and forest carbon cycling.