LITTER CARBON STOCKS IN FORESTS OF THE US ARE MARKEDLY SMALLER THAN PREVIOUSLY REPORTED

Grant Domke¹, Charles Perry¹, Brian Walters¹, Christopher Woodall¹, Matthew Russell², James Smith³

Abstract—Forest ecosystems are the largest terrestrial carbon sink on earth with more than half of their net primary production moving to the soil via the decomposition of litter biomass. Therefore, changes in the litter carbon pool have important implications for global carbon budgets and carbon emissions reduction targets and negotiations. Litter accounts for an estimated 5 percent of all forest ecosystem carbon stocks worldwide. Given the cost and time required to measure litter attributes, many nations that are signatories to the United Nations Framework Convention on Climate Change (UNFCCC) report estimates of litter carbon stocks and stock changes using default values from the Intergovernmental Panel on Climate Change (IPCC) or country-specific models. Here we present, for the first time, estimates of litter carbon obtained using more than 5,000 field measurements from the national forest inventory of the United States. These field-based estimates mark a 44% reduction (2,081±77 Tg) in litter carbon stocks nationally when compared to country-specific model predictions reported in previous UNFCCC submissions. Our work suggests that IPCC defaults and country-specific models used to estimate litter carbon in temperate forest ecosystems may grossly overestimate the contribution of this pool in national carbon budgets.

¹ USDA Forest Service, Northern Research Station, 1992 Folwell Ave., St. Paul, MN 55108
² University of Minnesota, Department of Forest Resources, 1530 Cleveland Ave. N., St. Paul, MN 55108
³ USDA Forest Service, Northern Research Station, 271 Mast Rd., Durham, NH 03824