

VARIATIONS IN CANOPY AND LITTER INTERCEPTION ACROSS A FOREST CHRONOSEQUENCE IN THE SOUTHERN APPALACHIAN MOUNTAINS

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Variations in evapotranspiration (ET) have been well documented across a variety of forest types and climates in recent decades; however, most of these data have focused on mature, second-growth stands. Here we present data on two important fluxes of water, canopy interception (Ic) and forest floor litter interception (Iff), across a chronosequence of forest age in the southern Appalachian Mountains. We used climate stations and throughfall collectors to measure gross rainfall and estimate Ic at each site and used a non-linear mixed model to determine the effects of forest age and precipitation on stand Ic. We also collected forest floor biomass monthly at each site and used these data in a model of litter wetting and drying to determine the quantity of water lost to Iff. Precipitation varied from 1679 to 2095 mm yr⁻¹ across sites and across years (2011–2013). Canopy interception increased rapidly with forest age and then leveled off to a maximum of ~11 percent in an old-growth mixed hardwood site. Despite differences in forest structure, forest floor biomass did not vary with age, suggesting either lower decomposition rates in younger sites, or likely high decomposition rates across all sites. Unlike Ic, modeled estimates of interannual variation in Iff were insensitive to annual rainfall amount and were dependent primarily on forest floor biomass. At all sites, Iff accounted for 4–6 percent of total precipitation and varied primarily due to differences in rainfall among sites with a higher percentage of Iff in sites with lower rainfall. Additional measurements are currently underway to validate the litter interception model using litter moisture probes and forest floor wet and dry weights. Improved estimates of interception will contribute to our understanding of how forest structure and climate variability affect forest water use and help improve models of rainfall partitioning across the broader matrix of forest age classes.

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