**

*Figure 1. (a) Locations of seven NEON temperate forest sites used in this study (b) Proportion of basal area attributed to arbuscular mycorrhizal (AM)- and ectomycorrhizal (ECM)-associated tree species within the plots where soil was collected in each site.*



*Figure 2. Proportions of total soil C in the a) free particulate fraction (CfPOM), b) occluded particulate fraction (CoPOM), and c) mineral-associated organic matter (CMAOM) fraction in plots situated along a gradient of tree mycorrhizal dominance in seven forested NEON sites (see Table 1 for site abbreviations). Points represent individual plots within each study site (n=46). Lines reflect the best fit from linear models specific to each study site.*

**

*Figure 3. The influence of tree mycorrhizal dominance (%ECM tree basal area) on MAOM C (a-b) and N (c-d) proportions and concentrations in seven forested NEON sites with respect to climate decomposition index (CDI). CDI represents the mean values and variability of monthly temperature and precipitation in each site (see Methods for details and calculation). Each point represents the slope of the relationship between MAOM C or N and plot-level ECM dominance within a site (as in Figure 2). Panels a and c show the strength and direction of changes in the proportion of C and N in MAOM with increasing ECM tree dominance in each site, while panels b and d show the strength and direction of changes in the concentrations of mineral-bound C and N with increasing ECM dominance. Points above the dotted line represent positive slopes (i.e. soils in these sites show an increase in MAOM C and/or N with increasing ECM dominance; n=7 for all sites except TREE and HARV [n=6]).*

**

*Figure 4. Concentrations of MAOM C and N in soils from 7 forested NEON sites (see Table 1 for site definitions) versus concentrations of oxalate-extractable iron (FeOx) in bulk surface mineral soils. Individual points represent measured values of FeOx from the same bulk mineral soil samples used to determine MAOM and POM content via density fractionation (n=46).*



*Figure 5. SOM C:N in soils from 7 forested NEON sites (see Table 1 for site abbreviations) along gradients of tree-mycorrhizal associations ranging from AM-dominated to ECM-dominated forest plots within each site. Individual points represent measured ratios of carbon to nitrogen in density fractionated fPOM, oPOM, and MAOM samples (n=47).*

**

*Figure 6. Mean (± SE) Delta 14C of MAOM from six NEON temperate forests (ORNL was omitted due to site-level 14C contamination). Values greater than zero indicate a modern origin of MAOM C with shorter turnover times; negative values indicate older C (i.e. C fixed pre- 1950). Individual points represent MAOM isolated from mineral horizon soil samples (0-30 cm) collected along tree-mycorrhizal gradients within each site. Sites ordered by increasing climate decomposition index.*