



Using elevation gradients to study climate controls on soil carbon dynamics

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Elevation gradients provide the opportunity to study vegetation and climate gradients in a setting where other soil forming factors such as parent material and soil age are held constant. We use the observed changes in radiocarbon content of organic matter fractionated by density and other methods to infer the dynamics of soil carbon and how it varies with elevation along transects in the Sierra Nevada mountains in California, USA. In surface litter layers, changes in the radiocarbon content from 1992 to 2006 in litter layers show that these layers are more dynamic than originally inferred from a comparison based on changes between the 1950s and the 1990s. In mineral soils, fractions often considered to be the most slowly cycling (hydrolysis residue) showed large changes in ^{14}C in the last decade. We use incubations to determine the mean age of carbon respired by microbes along the same gradients; these data are compared to incubations from other sites and show that climate and vegetation are a major controls of the mean age of fast-cycling carbon in litter and soils.