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Radiocarbon constraints on carbon cycling in plants and soils

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Tracing 'bomb' radiocarbon produced by atmospheric testing of atomic weapons through vegetation and soils provides information of the dynamics of terrestrial carbon cycling on timescales of years to centuries. Processes operating on these timescales are of interest because they regulate key functions in long-lived plants and regulate the potential for increasing soil carbon storage. However, the multiple pathways taken by carbon transiting ecosystems from photosynthesis to respiration and decomposition complicate the quantitative interpretation of radiocarbon observations. In the 14Constraint project, we are exploring how to optimize measurements of radiocarbon as well as to improve their interpretation by providing constraints for comparison with models. This talk will focus on efforts to synthesize global radiocarbon measurements of mean age and transit time, and suggest ways forward to improve process-level understanding.