Geophysical Research Abstracts
Vol. 15, EGU2013-3030, 2013
EGU General Assembly 2013

How can we best use radiocarbon data to support models of organic matter cycling in ecosystems?

Susan Trumbore and Marion Schrumpf
Max-Planck Institute for Biogeochemistry, Earth System Science, Jena, Germany (trumbore@bgc-jena.mpg.de)

The radiocarbon signature of organic matter stored in, or respired from, ecosystems provides a strong constraint for testing the timescales of organic matter cycling in ecosystems, and for testing ideas about the processes controlling stabilization and destabilization of C in soil. Radiocarbon integrates the total time C spends in an ecosystem since originally being fixed from the atmosphere, which includes storage time in plants before being used to grow tissues, the lifetime of the tissues themselves, the time it takes for them to decompose. For example, in forested ecosystems, much of C that has ages of a decade or more can be derived from roots that have themselves lived up to a decade and this influences the 14C age of light fraction soil organic matter and respired CO_2 from these ecosystems. Another example is the link between depth profiles of C and radiocarbon, which reflect stabilization mechanisms on at least two timescales. Finally, the changes in radiocarbon over time, tracked by repeated sampling, provide a clear constraint on C dynamics and indicate that traditional soil fractionation methods are not successful because of the mix of ages represented in the C that is isolated. This talk explores some of these patterns in terms of their use for answering questions important for improving models of soil organic matter cycling.