1st TERRABITES Symposium
Hamburg, Germany, 9-11 February 2010
TERRABITES-85

What C isotopes (especially ^{14}C) can tell you about the sources of soil CO_2 and CH_4 efflux

S. Trumbore (1) and F. Hopkins (2)
(1) MPI for Biogeochemistry, Germany, (2) UC Irvine, USA

The carbon isotopic (^{13}C and ^{14}C) signatures of in C-containing trace gas efflux from soils provides information about the sources of C used to produce those gases, the processes involved in production, consumption and emission. Isotopic signatures are further important because they can be scaled spatially to assess the importance of a given process beyond the soil profile. C isotopes have proved useful in partitioning sources of CO_2 and CH_4 efflux (substrate and microbial process involved). In addition, use of labeled substrates allows tracing of specific pathways and the timescales on which they occur. The time series of change in the radiocarbon content of the atmosphere, and the ability to correct radiocarbon data for mass dependent fractionation using ^{13}C data, allow us further information that uses the age of various C substrates to determine the combination of substrates and also to detect shifts in substrate balance with N-deposition or climate. This talk will focus mostly on the use of radiocarbon to partition respiration by the age of C sources and what can be learned about temperature dependence and substrate limitation in decomposition of older C substrates using incubations.