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Novel approaches to understanding carbon redistribution at multiple scales

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Established biogeochemical techniques are used to trace organic inputs typically derived directly or indirectly from plants into soils, sediments and water using lipid biomarkers. Recently, advances in bulk and compound specific stable 13C isotope analyses have provided novel ways of exploring the source and residence times of organic matter in soils using the natural abundance stable 13C isotope signature of C3 and C4 plant end member values. However, the application of biogeochemical source tracing technologies at the molecular level at field to catchment scales has been slow to develop because of perceived problems with dilution of molecular-scale signals. This paper describes the results of recent experiments in natural and agricultural environments in the UK (Collins et al., 2013; Dungait et al., 2013) and United States (Beniston et al., submitted) that have successfully applied new tracing techniques using stable 13C isotope and complementary approaches to explore the transport of sediment-bound organic carbon at a range of scales from the small plot (m2) to field (ha) and small catchment (10's ha).

References

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