



Investigating the use of organic biomarkers as tracers of organic matter on hillslopes

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We present the results of using different organic biomarker compounds as tracers for components of slurry-derived organic matter in water and on eroded soil using small- and large-scale laboratory experiments. The small-scale experiment consisted of a 30 cm³ soil lysimeter set up with an application of bovine slurry on the surface with rainfall simulated until the system reached hydrological equilibrium. Analysis of lysimeter soil cores and the leachates from the base of the soil were used to identify the most suitable biomarkers to trace organic matter which is: 1) particulate and bound to soil, 2) free particulates, 3) colloidal and 4) dissolved. For example, the biomarker compounds, 5-stigmastanol and 5-epistigmastanol, are widely used to trace the fate of faecal contamination of soils and water courses, and their abundance was used to track the movement of the hydrophobic component of the slurry. The findings from the lysimeter experiment are applied to a large-scale erosion experiment on the University of Bristol's TRACE experimental hillslope facility where the soluble and sediment-bound organics are traced through different hydrological pathways and on transported sediment. The organic biomarker compounds are being used to determine: (a) organic matter sources, (b) selectivity, (c) transport processes, and (d) mineralization, as affected by hydrological processes and erosion and deposition. This information will be used to answer questions concerning how particular components of organic matter behave under specific hydrological and erosion/deposition conditions and determine how this relates to carbon-cycling in soils.