Geophysical Research Abstracts,
Vol. 11, EGU2009-13962, 2009
EGU General Assembly 2009

Exploring mobilisation and transport of diffuse substances using multiple sediment and colloid tracers applied to a temperate grassland catchment.

S Granger (1), J Hawkins (1), and the GRASP Team

(1) 1Soil Cross Institute Programme, North Wyke Research, Biogeochemistry of Soil and Water Team, North Wyke, Okehampton, Devon EX20 2SB, UK. (kit.macleod@bbsrc.ac.uk), (2) Centre for Ecology and Hydrology, Wallingford, Oxford OX10 8BB, UK., (3) School of Geography, Archaeology and Earth Resources, The University of Exeter, The Queen's Drive, Exeter, Devon EX4 4QJ, UK., (4) Natural Resources Department, Cranfield University, Cranfield, Bedfordshire MK43 0AL, UK, (5) Lancaster Environment Centre, Lancaster LA1 4AP, UK, (6) School of Geographical Sciences, University of Bristol, University Road, Bristol BS8 1SS, UK, (7) Environmental Tracing Systems Ltd, The Coach House, Bannachra, Helensburgh,G84 9EF, UK

The mobilisation and transport of diffuse substances from livestock grassland systems to surface water bodies is known to impact aquatic ecology and human health. Diffuse substances include sediment and colloidal material detached from the soil surface and subsurface and colloidal material solubilised by water travelling across and through the soil matrix. Improving understanding of the dominant processes controlling the mobilisation and transport of sediment and colloid associated materials requires the application of established and novel tracing methods.

In this study our objective was to link mobilisation from the plot to head water catchment scales by tracing the movement of slurry material delivered to a first order stream through the application of natural and artificial fluorescence and rare earth oxide (REO) tracing techniques. Slurry treated with fluorescent beads or REO's was applied to a hydrologically isolated field within a ∼40 ha catchment. Novel natural fluorescence techniques were used to assess the presence of dissolved slurry material through the distinctive signature of samples in drainage waters. The particulate phase of slurry was traced using artificial fluorescent beads manufactured to represent two particulate phases of slurry: organic and mineral. The bead treated slurry was applied homogeneously across the entire field. REO treated slurry was applied in five 1 ha contour zones across the field, each zone receiving slurry labelled with different REOs. Surface drainage was monitored and sampled at a v-notch weir placed at the hydrological outlet of the field and at a trapezoidal flume at the catchment outlet.