



Development of Environmental Tracers for Phosphorus and Sediment

Pryce. O, Quinton. J, Heathwaite. L

Department of Environmental Science, University of Lancaster, UK

As the law surrounding standards of drinking and river water quality becomes tighter with the introduction of legislation from Europe, (WFD, CEC, 2000/60), the issue of tracing the sources of diffuse pollutants will become increasingly important in the enforcement of the law. This project will develop a technique for tracing diffuse pollutants, with the objectives of:

- Determining the sources of sediment and phosphorous;
- Providing information on the connectivity of the sediment and phosphorous sources, and;
- Providing information on the relative contribution of different sources of sediment and phosphorous.

The technology relies upon to combination of two novel tracing methods, Rare Earth Elements (REEs) and fluorescent microspheres, into one technique allowing the easy comparison of processes in the different size fractions of soil.

REEs are based around the oxides of the Lanthanides and make excellent tracers for soil erosion, are available as silt size particles and as they bind well and can be easily traced throughout a catchment, using ICP-MS for quantification. The advantages of using REEs are the similar physical properties to soil, meaning they are highly efficient at mimicking its fate. They are capable of developing spatially detailed erosion data as apposed to the common averaged spatial data, due to the availability of over five different REEs meaning a composite technique can be used. More detail information on processes can be gathered to better identify erosion hot spots, leading to more efficient and sustainable remediation techniques as a result.

Fluorescent microspheres have important uses for tracing in physiology and biology but little use has been made of them in soil hydrology. The diameter of the microspheres is comparable to that of the colloidal fraction of soil (1 – 30 μm), which is responsible for the rapid transport of a large proportion of environmental phosphorous, as well as many other environmentally important pollutants.

This poster will report on the findings of initial experimentation on the behaviour of the REE and fluorescent microsphere tracers in soils.