Geophysical Research Abstracts
Vol. 12, EGU2010-2805, 2010
EGU General Assembly 2010

Enhancing the magnetism of soil: the answer to soil tracing?

Alona Armstrong, Barbara Maher, and John Quinton
Lancaster University, Lancaster Environment Centre, Lancaster, United Kingdom (alona.armstrong@lancaster.ac.uk)

Diffuse pollution is of concern given the impacts on aquatic ecosystems and the introduction of legislation such as the European Water Framework Directive. In order to reduce or halt such pollution it is essential to elucidate its provenance. Furthermore, there is a need to quantify contemporary erosion rates. Many tracers have been trialled to do this, however, they utilise tracers made from foreign materials such as fluorescent beads and rare earth oxides. This casts doubts on the validity of the results given the different physical characteristics and the consequent influences on their transport. A limited number can be used to trace different size fractions, which is of importance given the selective nature of erosion and the known enrichment of nutrients and contaminants in the finer fractions. We present preliminary data which investigates the use of soil which has been heated to enhance its ferrimagnetic content, as a tracer. To characterise the magnetic signature of the soils we performed a suite of measurements including high and low field susceptibility, anhysteretic remanent magnetization, alternating frequency demagnetisation (10, 20, 30, 40, 60, and 80 mT), and isothermal remanent magnetization (10, 20, 50 100, 200, 300 and 1000 mT). Various inter-parametric ratios were calculated from these measurements to enhance differentiation between the heated and unheated soil samples. These measurements were carried out on the bulk soil and the <2, 2-8, 8-16, 16-32, 32-64, 64-125, 125-250, 250-500, and 500-1000 μm size fractions to assess the potential of this method to trace size selective erosion of soil and associated nutrient transfer.