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Phosphorus, sediment and colloid transfers from grasslands

P. M. Haygarth (1) and the GRASP team (2)

(1) Cross Institute Programme for Sustainable Soil Function, Institute of Grassland and Environmental Research (IGER), North Wyke Research Station, Okehampton, Devon, EX20 2SB, UK (phil.haygarth@bbsrc.ac.uk, phone +44 (0)1837 883534),(2) G. Bilotta, R. Brazier (Department of Geography, The University of Sheffield, Sheffield, S10 2TN, UK), R. Bol, P. Butler, S. Granger, P. M. Haygarth, C. Macleod (Cross Institute Programme for Sustainable Soil Function, Institute of Grassland and Environmental Research (IGER), North Wyke Research Station, Okehampton, Devon, EX20 2SB, UK), J. Freer, T. Krueger, J. N. Quinton (Environmental Science, Lancaster University, Lancaster, LA1 4YQ, UK), L. Gimbert, P. Worsfold (Earth, Ocean and Environmental Sciences, Plymouth University, Plymouth, PL4 8AA, UK), P. Naden, B. Smith (Centre for Ecology and Hydrology (CEH), Wallingford, OX10 8BB, UK)

Sediment and colloids are well established as being efficient ‘carriers’ of rogue pollutants, such as nutrients (particularly phosphorus (P)), pathogens and persistent organic pollutants. This poster will present work from a new project team called GRASP (‘Grassland and Sediment Phosphorus’) funded by the UK government that is attempting to rethink our conceptual model that describes sediment and colloid transfer from grasslands. GRASP aims to examine critical deficiencies in existing knowledge and define key questions and priorities for future science. We will also develop methods of quantifying uncertainties in our observations as well as including this knowledge into our numerical models.

The popular wisdom is that grasslands yield little sediment and colloid material. However, we argue that grasslands possess special characteristics that contradict this perception. Firstly, they exist in temperate wet climates providing plentiful hydrological energy for the mobilisation of particles. Secondly they are often under-drained, providing efficient conduits of transfer to surface water bodies. Thirdly, since grasslands are livestock production systems, implicitly this means that direct defecation by livestock and recycling of manures (collected when animals are housed indoors) presents

a source of colloidal material, vulnerable to mobilisation. Finally, grassland livestock farms often produce fodder crops, such as maize, which involves late season harvesting that leaves the soil surface bare, with particles vulnerable to detachment by autumn and winter rainfall.

As well as highlighting the importance of grasslands as sources of colloids and sediment, our poster will also describe some of the innovative aspects planned for the project. These include (1) use of unique field sized lysimeters for investigation of drained *vs.* undrained plots, (2) the quantification of uncertainty using multiple plots, samples and sites and (3) using tracers to investigate the contribution of manures and slurries through carbon isotope, natural fluorescence and use of artificial particles marked with fluorescence and DNA. We conclude that we need to rethink our conceptual model of P, sediment and colloid exports from grassland, not only in relation to processes, but also in terms of how this is reflected in the uncertainty of current model predictions and how this might be reduced.