Geophysical Research Abstracts, Vol. 7, 01835, 2005
SRef-ID: 1607-7962/gra/EGU05-A-01835

Land management, climate change and coarse sediment delivery in an upland environment

(1) SN Lane and (2) SC Reid

(1) Department of Geography, University of Durham, UK, (2) Department of Geography, University of Leeds, UK (s.n.lane@durham.ac.uk)

This paper is concerned with evaluating the potential role of both climate change and land management in influencing the delivery of coarse sediment to upland rivers. First, we present a new treatment for shallow, translational mass movements that includes an explicit treatment of the connectivity of failed material to the drainage network. Second, we present a three-fold validation of this approach based upon: (a) mapped failures within two extreme storm events; (b) comparison of model predictions with continuously recording coarse sediment sensors; and (c) comparison of modeled estimates of sediment production and in-channel sedimentation. Third, and given the very encouraging validation results, we simulate the effects of both land management changes and climate changes on sediment delivery rates. This analysis shows that whilst future climate changes are likely to result in significantly enhanced sediment delivery rates, most of the sediment continues to derive from a very small percentage of the catchment where changes in land use (deforestation) coincide with glacial drift material and certain types of drainage basin topography. Targeted landscape restoration in these zones can be used to reverse these land management effects and hence cope with climate change. This is important as it provides a completely different framework for managing coarse sediment in rivers: it no longer requires expensive and (under the Water Framework Directive) increasingly challenged river engineering methods; rather it opens up the possibility of true source control.