

Can we model point scale erosion and deposition? – a test of a soil erosion and Landscape Evolution Model

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Quantifying both hillslope and point scale erosion and deposition patterns and rates is a non-trivial task. Mathematical modelling is one approach with many of the models having the capacity to make hillslope scale predictions at best. However, several new models which use a digital elevation model (DEM) grid to represent topography have been developed which can predict both erosion and deposition at the grid point scale. While these models have been tested at the catchment scale with little evaluation conducted at the hillslope and point scale. Here we evaluate the SIBERIA model. To assess field erosion and deposition rates and patterns we use the environmental tracer ^{137}Cs . The results demonstrate that while the erosion rates at the field site were found to be low (as independently quantified using the environmental tracer), this compared well SIBERIA predictions with the model being independently calibrated. Comparing SIBERIA predicted erosion and deposition patterns along the study hillslope demonstrated that SIBERIA approximated the erosion and deposition patterns as quantified by the environmental tracer. The results show that that a DEM based erosion and deposition model can predict point based soil redistribution patterns. The results provide confidence in the ability of a LEM to predict decadal scale erosion and deposition patterns as well as the potential to predict fine scale erosion and deposition patterns.