



Catchment scale soil erosion prediction using digital elevation based models - an assessment of approaches at the decadal to millennial time scales

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The ability to measure and model soil erosion and resultant land surface change provides insight and understanding into landscape evolution as well as a range of environmental impacts and land degradation issues. In recent decades a number of DEM based soil erosion and landscape evolution models have provided new tools to assess erosion rates and landscape stability over times scales from 10's to 1000's of years. The models examined here, SIBERIA and CAESAR, both have the capability to simulate catchment wide erosion and deposition over these time scales. They are both cellular, operate over a digital elevation model of the landscape and represent fluvial and slope processes. However, they were initially developed to solve research questions at different time and space scales and subsequently the perspective, detail and process representation vary considerably between the models. This presentation describes how both models are applied to a study catchment where soil erosion rates have been closely monitored over the last 10 years. Results show that two different landscape evolution models (CAESAR and SIBERIA) can produce quantitatively and qualitatively similar sediment transport outputs over similar time periods, despite having significant differences in their design, process representation, parameterisation and operation. It also shows how the different approaches taken by these two models, one event based one using longer term averages, can be complimentary depending upon the research question to be addressed. Further, by comparing two quite different numerical models, this study provides a novel test of the metrics often used to calibrate and validate soil erosion and landscape evolution models.