Geophysical Research Abstracts, Vol. 7, 09026, 2005
SRef-ID: 1607-7962/gra/EGU05-A-09026

Cellular modelling of flood inundation in geomorphologically changing catchments

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This presentation demonstrates the potential applications of the CAESAR landscape evolution model in flood inundation and flood frequency analyses. CAESAR is a cellular automaton model, applying simple physically-based process rules to simulate fluxes of water and sediment. The model can be run at different spatial scales (1 - 100 km2), either in reach-mode or in catchment-mode. Temporal scales can range from months to millennia, at high resolution time steps (sub-second to minutes). CAESAR's ability to simulate geomorphological change can improve long-term flood inundation estimation, because morphological changes within the catchment or river system can alter the hydraulic capacity of the channel and adjacent floodplain. Simulations of flood events in the Upper River Severn (Wales, UK) illustrate how fluvially-driven geomorphological change affects flood frequency, magnitude and inundation extent.