



Catchment scale soil evolution model mARM: integrating dynamic soil properties in landform modelling

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Soil functional properties are an important factor in many hydrological and geomorphological processes. Their spatial distribution is complex and can vary significantly at both hillslope and catchment scale. Predicting detailed soil distribution is therefore important and challenging and yet to be fully achieved. The processes controlling soil development are mostly understood, even if only qualitatively, but their implementation in landform modelling is extremely difficult due to their complexity. We have developed a three-dimensional soil evolution model (mARM) which uses advanced numerics to achieve an extremely computationally efficient algorithm. Using mARM we can explore a wide array of soil development principles and simulate their effect on soil grading distribution in time (millions of years), space (catchment scale) and with depth through the profile. mARM is intended to be integrated into a landform evolution model which will allow, for the first time, to explore (in detail) the impact of dynamic soil development and characteristics on landform processes. Here we present mARM principles in the context of integrating soil evolution modelling in landform simulation.