Cellular Automata modeling of shallow landslides

G.G. Anagnostopoulos, M. Konz, and P. Burlando

ETH Zurich, Institute of Environmental Engineering, Switzerland (anagnostopoulos@ifu.baug.ethz.ch)

The use of Cellular Automata is extended in various disciplines for the modeling of complex system procedures. Their inherent simplicity and their natural parallelism make them a very efficient tool for the simulation of large scale physical phenomena. We explore the framework of Cellular Automata to develop a physically based model for the spatial and temporal prediction of shallow landslides. Particular weight is given to the modeling of hydrological processes in order to investigate the hydrological triggering mechanisms and the importance of continuous modeling of water balance to detect timing and location of soil slips occurrences. Specifically, the 3D flow of water and the resulting water balance in the unsaturated and saturated zone is modeled taking into account important phenomena such as hydraulic hysteresis and evapotranspiration. The infinite slope analysis is coupled to the hydrological component of the model for the computation of slope stability. A test case of a serious landslide event in Switzerland is investigated for the verification of the model.