AN INCREMENTAL CELLULAR MODEL FOR DEBRIS/MUD FLOWS OF INCREASING COMPLEXITY

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Cellular Automata (CA) are applied for the modeling of complex phenomena, which behaviour can be described in terms of local interactions of their constituent parts. They are based on a regular division of the space in cells; each characteristic that is relevant to the evolution of the system and relative to the space portion corresponding to the cell, is individuated as a substate; variation of substates depend on interactions among substates inside the cell (internal transformations) and local interactions among cells. At the time t=0, cells have arbitrary substates and the CA evolves changing the substates of all the cells simultaneously at discrete time steps.A CA model SCIDDICA (Smart Computational Innovative method for the Detection of Debris/mud flow path with Interactive Cellular Automata, to be read as she'ddrekah), was developed for landslides with different complexities; here, a higher complexity is managed adding new local interactions and internal transformations to the more simple models.SCIDDICA was applied successfully to the landslides of Tessina (Italy) and Mount Ontake (Japan). The landslide of Tessina coincides with the basic model; the model for Mount Ontake is a crucial extension of the basic model. The last application concerns the landslides of Sarno (Italy), which are a more complex phenomenon, because there is an avalanche-like effect in soil erosion during the evolution of the phenomenon. It was modeled with new substates, local interactions and internal transformations. The main results of the simulations of the landslide of Tessina and Mount Ontake are discussed together with the first results concerning the extension of the model to the Sarno landslide.