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Evaluating the role of parameters and of hexagonal neighbourhood on the behaviour of a Cellular Automata model for debris flows

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SCIDDICA is a Cellular Automata model recently developed for the simulation of flow-like landslides. The new release (S4c) has been developed for better modeling both inertial properties of rapid flows, and the effects of collisions among masses. In general, a thoroughly calibration phase is needed for evaluating the ability of a given model to simulate a phenomenon. At this purpose, maps of real cases can be compared with simulations, and a quantitative measure of the quality of the results can be expressed through suitable fitness functions. The trivial comparison of the extent of real and simulated cases can be considered for a simplified, preliminary calibration. When proper input data are available, more articulated fitness functions can be adopted. The optimal set of values for model parameters is obtained at the end of the calibration phase. By using such values, the model is able to simulate the considered real case at best. In this study, calibration has been carried out in an automated way, by means of parallel Genetic Algorithms, and considering real cases of study. A preliminary analysis has also been performed, in order to evaluate the sensitivity of the model with respect to model parameters, and to the orientation of the cellular space. Results evidenced the different role of model parameters and the soundness of the adopted hexagonal neighbourhood.