# Simplifications and parameters calibrations in kinematic models for debris flows.

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The simulation of physical processes involved in debris flow propagation are generally performed through simplified mathematical models. These simplifications may be made on the basis of experimental investigations or theoretical assumptions. The more complete models generally imply the introduction, in the differential equations, of a series of parameters that take into account different phenomena, such as bed erosion/deposition, solid-fluid interactions or pore pressure fluctuations. A kinematic model is here proposed to simulate the behaviour of water-sediment currents on steep slopes with variable cross section geometries and a fixed bed. The closure equation employed in the model, in its simplest formula, implies the calibration of just two rheological parameters. An explicit numerical scheme is proposed to solve the differential equations system. The model has been applied to a debris flow occurred in 1994 in the Moscardo torrent in Italy, and the simulation parameters have been thus calibrated. In spite of its simplicity, the model proves to be suitable to be calibrated on the available data, that are an upstream and a downstream lymnograph. Actually the simulations allow a univocal estimation of the calibration parameters, which would not be possible for more complex models which thus would not allow a physical understanding of the underlying processes.