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# Introducing an objective stochastic impact law for simulating rebounds in 3D rockfall models: simulated vs. experimental data

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To reduce the risk posed by rockfall, rockfall simulation models are increasingly used for calculating required strengths of protection measures such as nets and dams or for making hazard maps. A key process that has to be simulated in such models is the rebound, for which a wide range of algorithms is currently available. Each of these algorithms requires its specific set of parameters. In general these parameters are difficult to estimate objectively in the field. This explains the large variation in the results when applying different models, or even the same model used by different operators, at the same site. To come up with a more objective procedure we tested a stochastic impact model, based on numerical simulation and reduced scale experiments of soil/boulder interaction during the impact phase. For five ratios between the size of the falling rock and the mean size of the soil particles (1:1 up to 5:1), impact parameter sets have been derived. The advantage of this method is that only the size of the falling rock and the mean soil particle sizes have to be estimated in the field. Both algorithms have been implemented in the 3D rockfall simulation model Rockyfor and tested using the data from the real size rockfall experiments carried out in Vaujany. The results show that the algorithms predicts well the observed mean velocities, jump heights and energies that were recorded with digital cameras at two positions along the test slope. In addition, the model predicted the runout zone well. Observed extreme energies and jump heights, however, were underestimated. During this presentation we will present the used algorithm, its underlying theory, detailed simulations results

and possible future improvements.