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Rockfall-induced impact force causing a debris f a volcanoclastic soil slope: a case study in southe Italy

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Abstract. On 10 January 2003, a rockfall of approximately 10 m^3 af cliff some 25 m high located along the northern slopes of Mt. St. Ar (Nocera Inferiore, province of Salerno) in the southern Italian regic Campania. The impact of boulders on the lower sector of the slope which detrital-pyroclastic soils outcrop, triggered a small channelle flow of about 500 m^3. Fortunately, no damage nor victims resulted landslide. Several marks of the impacts were observed at the cliff outside the collapsed area, and the volumes of some fallen boulde subsequently measured. By means of in-situ surveys, it was possil reconstruct the cliff's geo-structural layout in detail. A rockfall back was subsequently performed along seven critical profiles of the en slope (surface area of about 4000 m^2). The results of this numerica modelling using the lumped-mass method were then used to map kinetic iso-energy curves. In the triggering area of the debris flow, falling boulder of 1 m^3, the mean kinetic energy was estimated at 1 this value being equivalent to an impact force, on an inclined surfa some 800 kN. After landing, due to the locally high slope gradient 45°), and low angle of trajectory at impact (about 23°), some boul down the slope as far as the endpoints. The maximum depth of penetration into the ground by a sliding block was estimated at ab cm. Very likely, owing to the high impact force of boulders on the s soil slope outcropping at the cliff base, the debris flow was trigger undrained loading conditions. Initial failure was characterized by a translational slide involving a limited, almost elliptical area where t pyroclastic cover shows greater thickness in comparison with the surrounding areas.

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