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A new method for avalanche hazard mapping over undocumented areas

M. Barbolini, F. Ferro and M. Pagliardi

FLOW-ING – Environmental Egineering, La Spezia, Italy (info@flow-ing.com / Fax: +39 187 529777)

An innovative methodology to perform avalanche hazard mapping over large-areas is presented and discussed. The method combines GIS tools, computational routines and statistical analysis in order to allow a “semi-automatic” definition of areas potentially affected by avalanche release and motion. The method includes two distinct modules. The first module serve to define potential avalanche release zones, on the base of simple rules related to slope inclination, morphology and vegetation. For each potential release zone a second module provide an automatic definition of the areas potentially affected by the avalanche motion and run-out. That is done by a specifically implemented “flow-routing-algorithm”, named A.F.R.A., which allow to determine the flow behaviour in the track and in the run-out zone. Actually, to estimate the avalanche outline in the run-out zone A.F.R.A. uses a “run-out-cone”, essentially a 3D projection of the run-out-angle, whose proper value comes from a statistical analysis of historical data (from a pre-existing data-base). The method requires as input parameter only a digital terrain model and an indication of the areas covered by (protective) forest. The procedure allows for a rapid mapping of large areas, in principle does not requires any historical information and can be very useful as a first scanning of the territories potentially affected by avalanche, as well as a verification of existing historical information.