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Mapping residual risk in avalanche-prone areas protected by active/passive defense works

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Correct risk assessment is recognised to be the base for land use planning in avalanche prone areas. Nevertheless, except Iceland, none of the European countries use formal risk calculation for planning purposes. According to the Icelandic method the estimation of avalanche frequency is based on statistical analysis of recorded events. This approach could have some drawbacks with respect to the estimate of risk reduction associated with the realisation of defence works in the avalanche path. We present a risk assessment procedure based on a one-dimensional avalanche dynamics simulation models that has the advantage of adaptability to boundary and initial condition changes given by the realisation of defence works. In particular, the proposed method allows to calculate residual risk after the construction of active or passive defence works along the avalanche track, and gives a substantial help either in the choice of the best technical solution to protect the endangered area (by comparing different solutions in terms of risk reduction versus construction costs) or in the successive phase of land-use planning, making it possible to update the risk maps. For risk and residual risk mapping we build up an automatic procedure using GIS, that allows to easily generate risk contour-lines map from the results of risk calculation along different propagation profiles in the run-out area.