

Rockfall hazard assessment using a high resolution digital elevation model and a 3D rockfall modelling computer program – S. Salvatore Area (Ticino, Switzerland)

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Rockfall is a major threat to infrastructure in mountainous regions. Detailed and reliable rockfall modelling is based on only a few principal input data: an accurate representation of the rockfall prone topography and a mathematical model capable to simulate the rockfall process.

We present the application of rockfall hazard assessment on road infrastructure in the San Salvatore area, nearby Lugano (Ticino, Switzerland) using the only recently available high resolution LIDAR digital terrain model (DTM-AV) and the 3D rockfall modelling program Hy-Stone.

The rockfall modelling code Hy-Stone can use both a lumped mass and hybrid model to simulate the 3D trajectories of rockfalls, considering the presence of obstacles and protective measures, and uses different algorithms to simulate the energy loss at impact. An elasto-visco-plastic impact model is implemented to simulate the impact on soft ground. Hy-Stone takes into account the presence of vegetation and the occurrence of rock fragmentation.

We have analysed some of the major problems in 3D modelling of rockfall and their role in controlling their impact on hazard zonation procedures.

A series of results shows the performance of the model in simulating real rockfall events in the S. Salvatore area. The model results are compared to rockfall talus and historical events. The model results are used to identify the critical parts of infrastructure with respect to rockfalls.