

Landslide inventory and rockfall risk assessment of the Monte Pellegrino Oriented Nature Reserve area (Sicily)

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In the last 20 years the natural oriented reserve of Monte Pellegrino is affected by several rockfall events. This sector of the Northern Sicily is a strategic urban area and represent the most important element of both the religious and cultural tradition and landscape for the city of Palermo. The rockfalls are here the major natural threats and represent a relevant risk of people, structures and infrastructures and prevents the economic and social development that could be made by high tourist potential of the area. For the above mentioned reasons a detailed geological and geotechnical study in order to define a quantitative risk analysis is now being carried out, concurrently with the implementation of the landslide inventory essential for analysis and monitoring. Monte Pellegrino, located along the Alpine orogenic belt (Catalano et al., 2013) in the emerged Sicilian fold and thrust belt, is an isolated carbonate massif characterized by the presence of poor rock masses and steeply sloping hillsides. The quantitative risk analysis was performed through several steps and taking into account the provisions of directive which is in force in the local institutions. The spread of a rockfall depends on many control factors such as geological setting and geomechanical features for both source area and below area, it is therefore necessary to define different input elements: an inventory of landslides, a database of factors and a dataset that contains the results of the on-site inspections like the geostructural and geomorphological data. The archive of landslides occurred over a period of 20 years was created; the spatial database (constructed in accordance with the standards) contains information on the identification code and date of the event, location, type, involved lithology and related thematic maps. Other thematic maps are those requirements deriving from the factors layers as tectonic features, morphological characteristics, geometric attributes of the slope, type of coverage, structures and infrastructures, trajectory of the block and the stop point. The above mentioned steps allow the implementation and calibration of the model for rockfall analysis; in particular, by means back-analysis stage it is possible to determine the restitution and friction coefficients through a comparison of the points where the rock blocks stop in the simulation with the rockfall history stop points. The next step we took is to produce the map of those areas with different degree of risk defined through the density of the trajectories reconstructed through the model. Finally, are presented here two between the cases studied needed to set up the forecasting model for the rockfall trajectories.

Catalano, R., Valenti, V., Albanese, C., Accaino, F., Sulli, A., Tinivella, U., Gasparro Morticelli, M., Zanolli, C. & Giustiniani, M. (2013): Sicily fold-thrust belt and slab roll-back: the SIRI.PRO. seismic crustal transect. *Journal of the Geological Society*, 170, 451-464.