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UNESCO World Heritage Site Hallstatt: Rockfall hazard and risk assessment as basis for a sustainable land-use planning- a case study from the Eastern Alps

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In times of decreasing financial resources, the demand for the investment in protection measures with a positive return on investment is of high importance. Hazard and risk assessments are essential tools in order to ensure an economically justifiable application of money in the implementation of preventive measures.

Many areas in the Eastern Alps are recurrently affected by rockfall processes which pose a significant hazard to settlements and infrastructures. Complex tectonic, lithological and geomorphologic settings require a sufficient amount of effort to map and collect high quality data to perform a reliable hazard and risk analysis.

The present work summarizes the results of a detailed hazard and risk assessment performed in a community in the Northern Calcareous Alps (Upper Austroalpine Unit). The community Hallstatt is exposed to very steep limestone cliffs, which are highly susceptible towards future, in many parts high magnitude rock failures. The analysis of the record of former events shows that since 1652 several rockfall events damaged or destroyed houses and killed or injured some people. Hallstatt as a Unesco World Heritage Site represents a very vulnerable settlement, the risk being elevated by a high frequency tourism with greater one million visitors per year.
Discussion will focus on the applied methods to identify and map the rockfall hazard and risk, including a magnitude-frequency analysis of events in the past and an extrapolation in the future as well as a vulnerability analysis for the existing infrastructure under the assumed events for the determined magnitude-frequency scenarios. Furthermore challenges for a decision making in terms of a sustainable land use planning and implementation of preventive measures will be discussed.