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Rockfall modelling in high alpine terrain – Validation and limits, Kitzsteinhorn, Hohe Tauern, Austria.

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The study area is situated at the Kitzsteinhorn, located in the Hohe Tauern mountain range. It is made up of rocks of the Glocknerdecke, primarily consisting of limestone-micaschists and greenstones. The infrastructure existing within the study area (ski-slopes, ski-lifts etc.) is directly affected by alterations of the rock mass. The presence of permafrost and the steep and rough alpine terrain are immense challenges for rock fall modelling and validation. In context to climate change, the distribution of glaciers and permafrost is declining and the occurrence of mass movements, such as rock fall events and rock slides is increasing in affected areas. Common models have to be calibrated and adapted and modelled results validated respectively for a better understanding and prediction of these gravitational induced processes. As part of the research project MOREXPERT ('Monitoring Expert System for Hazardous Rock Walls') 2D (Rockfall 7.1) und 3D (Rockyfor3D 4.1) rockfall modelling was applied. The results of the 3D modelling were validated using orthophotos. Using the orthophotos recent rock fall deposits can be very good identified on the "fresh" glacier surface. The results of the modelling coincide with the deposits below the project area on the surface of the glacier, as well as with the blocky deposits along couloirs and flattenings in the rock wall. The main element of uncertainty concerning both models is the ground surface cover with snow and ice, respectively the surface of the glacier. The boundary conditions change within different time scales (hours to years). For this reason every modelling is temporally limited. First step of the modelling approach is to get an overview of the potential rock fall hazard of the whole project area. Geological mapping in combination with 3D rockfall modelling shows good results. Using these results hot spots can be identified for further analysis. As a second step 2D modelling provides a more detailed understanding of rockfall processes in specific areas of the rock wall. The results can be used, for instace, for the design of rockfall protection measures.