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Swiss Practice in Adapting of Hazard Zones in the Influence of Avalanche Protection Measures

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In Switzerland about CHF 1.5 billion were spent since 1951 on structural avalanche protection measures. The most common permanent protection measures are snow supporting structures and earth filled dams. Since the space untouched by natural hazards is small in the Alps, permanent protection measures are essential in order to allow extension of settlement areas. In the last years pressure on authorities increased to reclassify hazard zones after protection measures were built.

At first a short overview of the principles of hazard mapping and the design methods of the different types of protection measures is provided. Then we present the current practice in Switzerland how hazard zones are adapted in the influence of avalanche protection measures.

The quantification of the effectiveness of snow supporting structures and dams in hazard maps is explained in detail with case studies. Snow supporting structures prevent the release of avalanches and reduce the probability of a damaging event. The structure height and the areal extension are crucial for the assessment of the effectiveness. The effectiveness of dams depends mainly on their height and geometry. With both measures first experiences with the adaptation of hazard zones were made. Besides the technical assessment of the effectiveness of protection measures further aspects as future maintenance, uncertainties or the representation of the protected area in the hazard map are important.

For land use planning of protected areas the future development of risk cannot be neglected. Structural protection measures reduce the initial risk to a certain residual risk. If the settlement area is expanded and houses or other infrastructure are built within the protected area the residual risk can soon reach the original risk again. We discuss this

problematic with a virtual example where the development of risk in a protected area is shown in function of different ways of land use. Besides other factors the building density of the protected area and the application of local protection measures for the single buildings are relevant to stabilize the risks. In Switzerland an unified strategy for the rezoning of such protected area is missing Therefore last year a project was set up to develop a general procedure applicable to all natural hazards. First suggestions will be presented.