Geophysical Research Abstracts, Vol. 7, 03389, 2005
SRef-ID: 1607-7962/gra/EGU05-A-03389

Risk Analysis and Risk Management Maesstobel

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The Maesstobel with a catchment area of 0,42 square kilometres, shows significant hazard potential due to rockslide in its upper reach. According to a geological study, this rockslide sped up in the course of 1999. The hazard scenario is such that 800.000 m^3 of rocks and debris flows tumbling down could impound the receiving water of the Suggadin stream; there is thus the danger of dam failure and a subsequent flood wave. The hazard zone map of St. Gallenkirch, which was approved in 2002, features sizable hazard zones of high impact at the Suggadin stream's deposition fan.

The objective of the project was as follows: on the basis of new insights and recordings of the Maesstobel catchment area, the hazard potential and the consequences of a subsequent flooding for the settlement area of St. Gallenkirch were to be assessed, and on this mitigation measures were to be derived to minimize the risk. A geological in-depth study carried out by the Geognos Bertle company provided the basis to estimate the volume of the rock slide. Due to the new results, experts of different disciplines determined for the design event a cubature of 150.000 m^3 of rocks and debris flows at the immediate confluence with the Suggadin river. This is the expected volume that initiates the impounding of the Suggadin river up to a height of 15 meters. Moreover on the basis of a digital terrain model made up of laser scan data a hydrological and hydraulic simulation was carried out.

The hydrological calculation was carried out for the whole catchment area of the Suggadin river by the HEC-HMS model. The hydraulic simulation as well as the dam failure scenario was arranged in three consecutive sections. Section 1 involved simulating a debris flow in the Maesstobel, including its confluence with the receiving river and the resulting maximum pileup height. This simulation was made with a hydraulic 2D software package. A rheological reading of debris sampling served as a basis for

this. Section 2 dealt with the dam failure scenario, which contains possible types of dam failure with successive flooding. These calculations were made with the help of a 1D model. Section 3, finally, contains the canyon range and the deposition fan, as well as the town area of St. Gallenkirch. In this section, the worst case scenario of a flood wave was simulated (2D simulation model), and the areas along the deposition fan which are potentially endangered were determined. Building on these results and insights, a bundle of measures are now to be designed as a part of risk management.