Test-bed
“Muehlbach / Hallstatt”
(Austria – Styria)

Source: MONITOR WP 2 Report “Analysis and Base Methodology”,
Annex II: Test-beds and SWOT-Analyses

Location of the test-bed

The test bed is situated in the southernmost part of Upper Austria near the historical town of Hallstatt. Hallstatt is a World Heritage Site of the UNESCO. West of Hallstatt is a very old salt-mine that is still in operation. In addition to the mining activity the valley of the Muehlbach is an archeological site where remnants of the salt-mining activities in the Bronze Age were discovered. Archeological investigation is still operational. The Salzberg, which is a valley above Hallstatt also hosts a museum, a restaurant and a touristic salt mine.

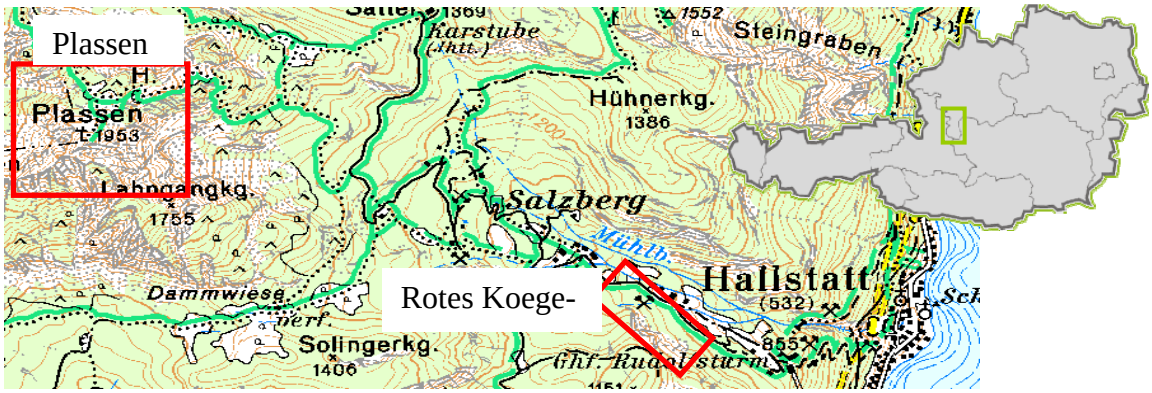
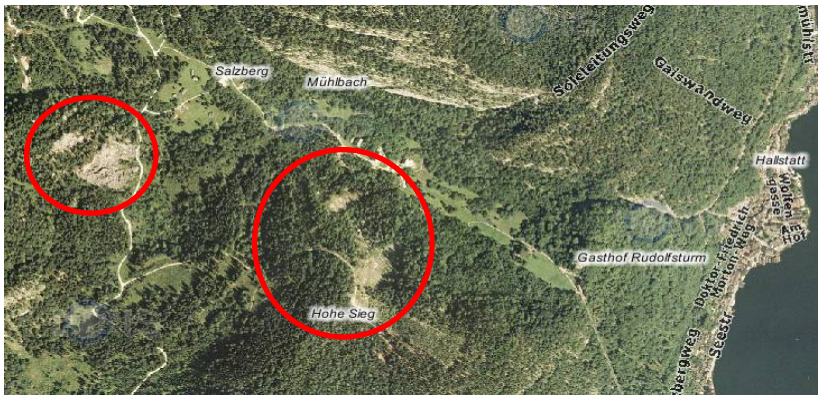


Fig.: Topographical map of the test bed

Geographic description of the test-bed

The test-bed consists of three mountains (Plassen, Solingerkogel with Rotes Koegele and Hohe Sieg) surrounding a Valley that is situated 300 m above the town of Hallstatt, which is located on the western coast of the Hallstaetter See.
The “Plassen” has its peak at 1953 m a. s. l. and has little vegetation-cover and several rock outcrops.

Fig.: The “Plassen” peak area (Orthophoto by DORIS)



The “Solingerkogel” with 1406 m a. s. l., its adjoining hill in the north, the “Rotes Koegele” and the “Hohe Sieg” are situated south of the Muehlbach-valley and show rock outcrops in a forested sourounding.

Fig.: The Area of the “Solinger Kogel” (left) and the adjoining “Rotes Koegele” and the “Hohe Sieg” (right) (Orthophoto by DORIS)

Geological setting of test-bed

The Hallstatt area is dominated of carbonate rocks being located on top of evaporitic sediments consisting of the permo-triasic „Haselgebirge-Formation“ which include salt, gypsum and a high contents of clay minerals. The carbonate rocks show intensive signs of lateral spreading which leads to a breaking of the competent rocks and large rockfalls. These rock falls triggered several debris and mud flows in the valley of the Muehlbach in the past.

Historical information of mass movements in test-bed

Findings in the valley of the Muehlbach proof the occurrence of significant rockfalls and rockslides by slope deposits. Also there is proof of debris flows covering premises of the ancient mining activities in the bronze age. In 1985 there was a rock fall with app. 30000 m³ being detatched from the northern slope of the “Rotes Koegele” toward the “Salzberg”.
From the eastern slope of the Plassen there are several ancient mud flows being triggered by large rock-slides from the eastern face of the Plassen.

Relevance of test-bed regarding MONITOR

The test bed shows several instable sites in competent carbonate rocks, the failure mechanism obviously is “Hart auf Weich” (hard rock on soft base), which leads to significant rock falls. Purpose of the investigation is the probability of these mass movements to reach the mining site and the touristically and archeologically heavily frequented areas in the Muehlbach valley as well as eventually the town of Hallstatt itself. Using geological investigations, modelling (Flac, UDEC, PFC) and monitoring, the relevance of the potential mass movements for the infrastructure on the Salzberg and for the town of Hallstatt should be evaluated.
SAR-Radar measurements can be performed on the “Plassen” and the “Solinger Kogel” as well as for the mudflows in the Muehlbach valley (if possible with existing vegetation). If the investigations lead to results that induce a danger for the existing infrastructure, a monitoring system with early warning features is to be installed.

SWOT-analysis of the test-bed

Strengths:	Weaknesses:
▪ Existing Basis data ▪ Pre-information through studies ▪ Interdisciplinary co-operation ▪ Trans-national co-operation with Italian partners	▪ Difficult identification of benchmarks for measuring methods ▪ Natural hazard processes
Opportunities:	**Threats:**
▪ Modelling of measuring results ▪ Risk analysis ▪ Revision of danger zone plan ▪ Installation of measuring/warning systems ▪ Application GPS – permanent measuring network	▪ Endangerment through potential mass-movements; tourist areas; effects on Hallstatt ▪ Natural hazard processes ▪ Androgens influences (e.g. salt mining)