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1 Slope movements in the Moravian Karst, Czech Republic

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One of the most frequent types of slope deformation in karsts regions, that influenced the human safety, is the rock fall due to frost weathering. The risk of this movement is first of all increased by unexpected climatic and hydrological changes, but tourist and engineering activities also. Therefore to solve this problem from the engineering geological point of view is very important, especially in the interaction with civil engineering activity.

Slope movements in the karst regions in Moravia were the subjects of research in the last ten years. Based on the results obtained, the surroundings of the Bílá voda creek ponore in the Moravian Karst was chosen as one of the most important places. This area is under the administration of Protected Landscape Area (CHKO) of Moravian Karst**.** In the past several rock collapses occurred, and at present time, the slope stability in surrounding of the road III/378 represents the greatest risk. The safety of people is in jeopardy as well.

From the second half of 19^{th} century some of the significant geologist and spaeologist did the research of rock slope stability near this ponore.

Geology

The area of our interest is situated on the NE border of the Moravian karst, which tectonically adjoins with Culmian sediments of Drahany highland by two faults direction WNW – ESE. The border between Devonian and Culmian sediments is approximately

500 m NW from the locality close to Holstejn village.

The carbonates of the Moravian karst are represented by middle up to upper Devonian limestone of Vilémovice type. They are light, massive rocks with several calcite veins. Irregularly, in dm thickness, grey-rose limestone of so called Krtiny type is also represented.

Karstification in this area is irregular, from small fissures to big caverns. The surface of these holes is smoothed by underground water erosion. Some of the tectonic discontinuities are healed with calcite with slickensides. The main faults are steep with plastic deformation in their vicinity. Majority of discontinuities is filled with limonite; some of them are filled with ochre or rustic clayey loam.

Gravel, sands, limestone debris and loam represent quaternary sediments. Recent gravel in the Bila voda valley is irregularly transported not only in the creek bed, but also in the underground caves system also.

Hydrogeology

The area of interest is a typical karst with karstic hydrogeology and permeability.

Bílá voda creek runs from the village Holstejn in the deep valley between the rock massive on which are the ruin of Holstejn castle and the rock slope of our interest. The creek bed of the ponore has the character of cascade. It disappears under the slope of the road III/3783. The water level of Bíla voda creek depends on precipitation and the season. The highest water level is usually in February and the hundred year water. Under these circumstances the water runs over the high of 450.0 m a.s.l. and fills all caverns under the road. During dry seasons the ponore is dry and this is the possibility for speaelogists to enter and map the cave system.

1.0.1 Field investigation and measurement

New geological mapping, geomorphologic investigation, underground hydrogeological observation, the geophysical and geodesic measurements were carried out. The investigation included the evaluation of collapsed rock blocks at the bottom of the valley also. According to the geodetic measurement the movement of one of the blocks was 10 cm. From all geophysical methods used, good results were obtained from measurement of the surface temperature, when up to now not known caverns close to the surface were discovered.

Based on the resistivity and temperature measurements the digital map was elaborated and for construction of the characteristic profile the program RES2DINV (FEM) was used.

The observation and monitoring of the slope above the ponore and under the road is to be continued and according to the results obtained the reconstruction of the road will be realised.