



Slope stability in the Moravian karst

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Moravian karst is one of the Czech National Parks with typical karst phenomena that is under governmental protection. The Moravian karst is of Middle up to Devonian age. The basal clastic strata lie discordantly on the Proterozoic granitoids of Brno igneous massif. In the overburden, there are strata of Carboniferous Culmian sediments. During Neogene age the Moravian karst was overflowed with sea. Marine clay and sand could be found in some caverns. During the Quaternary period different gravel and sand as postglacial and river sediments were deposited in some valleys. Finally the surface was covered with loams and debris. In recent years special attention has been paid to the rock wall in the locality Bila Voda. Large rock falls have been observed in this place since the half of the nineteenth century. The periodicity of these falls was approximately 65 years. Because this rock wall is situated very close to road, long-term engineering-geotechnical and geodetic prospection was made.

One of the goals of project GACR N. 205/04/0047 focused on Bila Voda ponore has been determination of movements rock blocks in the sinking of the Bila voda brook. The 29 points have been stabilized on rock blocks in the summer 2004. Determination of rock blocks movements was done using a special approach. In the protected area of the Moravian karst is not allowed to use pillars as stable observation stations. In the end of narrow valley, where the water is sinking are very difficult conditions to find suitable stable places for observation stations. Between blocks occur a mixture of cobble gravel, clay loam and wooden ends. Due to high humidity of the air rock blocks are very slippery. The observed points on blocks are placed close to edges of blocks. Therefore is not possible to use them as observation stations. The observation stations were chosen as free on relatively stable places ensuring safe observations.

The attitude of total station is determined by 6 parameters, similarly as in photogrammetry an exterior orientation parameters. The methods of precise levelling and space intersection were used. The coordinates of points were computed using robust adjustment by modul Polar of the programme system ORIENT (TU Vienna). Achieved accuracy was about 1 mm and is sufficient for this purpose. After great flood in the spring 2005 were measured second stage and in the summer 2005 the third stage. The average subsidence of points were 11 mm from summer 2004 to summer 2005. The planimetry movements were about 5 mm and there are directed to the sinking point of brook. For understanding of the space relations in the neighbourhood of ponore was has been evaluated 3D model. Polar method with prismaless mode measurement and photogrammetric method were used. Visualizations above the model were made.