

## **Documentation and evaluation of slope instabilities and other geological phenomena in the Geopark Bohemian Paradise (Czech Republic)**

Oldřich Krejčí (1), Vladimíra Krejčí (1), Lilian Švábenická (1), and Filip Hartvich (2)

(1) Czech Geological Survey, Czech Republic (oldrich.krejci@geology.cz), (2) Institute of Rock Structure and Mechanics of the Czech Academy of Sciences (hartvich@irms.cas.cz)

Geographically, the area is part of the Bohemian Cretaceous Basin, the unit Jičín Hilly land. Since October 2005, the area belongs to the European Geopark UNESCO Bohemian Paradise. The reason of the protection is a major complex of rocks, natural forest communities and geomorphological valuable territory.

The territory has been newly geologically mapped in a scale of 1 : 25,000. Sediments of the Czech Cretaceous Basin covers an area of 181 km<sup>2</sup> and were deposited transgressively on the Permian – Carboniferous and crystalline basement of the Bohemian Massif. Except for locally developed basal sediments of fluvial origin they are mostly shallow marine sediments. Middle Turonian to Lower Coniacian rocks of the Jizera lithofacies are dominant by calcareous sandstones deposited under extremely dynamic conditions. Scattered alkaline volcanics penetrate the older formations as small intrusions and form locally preserved bodies at the surface.

Area is strongly predisposed to the development of various types of landforms by structural segmentation of the Cretaceous sandstones and claystones and by Plio-Pleistocene inverse erosion.

Numerous archival manuscripts are available from this area together with published geological, engineering-geological, geomorphological and historical papers. This is due to the fact that in 1926 a large landslide destroyed a substantial part of the village Dneboh, situated on the slope below a rock castle Drabske Svetnicky.

Drabske Svetnicky is a ruin of a 13th century castle. It is located on the ragged edge of a sandstone cliff high above surrounding landscape. The castle covers a group of seven sandstone rocks, connected with wooden bridges. In the 50ies of the 20th century, an increased attention was paid to Drabske Svetnicky by experts on medieval architecture and a restoration of the original state of the castle rock was accomplished.

Remnants of pottery and other findings suggest that the plateau region of the castle was first inhabited from the Neolithic period to the early Bronze Age (3000 to 1700 BC) almost continuously until the mid-15th century.

Precise topographic maps of the rugged sandstone terrain and steep rock slopes do not exist. Our detailed 3D block model is based on the results of detailed geodetic survey of the situation within the rock castle and on laser trigonometry data. The area was further explored by air methods LIDAR (Light Detection And Ranging). Results of the LIDAR photos interpretation was used to clarify the extent of landslides in the environment of the rock city. In 1990, regular measurement of relative movements broken sandstone towers started in order to confirm or refute the current activity of slope movements. The acquired LIDAR data confirmed the continuous slope movements at an average rate of up to 2 mm/ year.