Investigation of marks for deep karstification in the carbonate aquifer system of Buda Thermal Karst

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The hypogenic karst systems are presently less known, in which case the dissolution of carbonates is influenced by deep originated gases, fluids and energy (Palmer, 1991; Klimchouk, 2007). The understanding of these karstification processes is difficult because of the limited access and sampling possibility of this part of rock volume. There is no doubt that the aggressivity of the fluid is responsible for the deep karstification processes but the causes of aggressivity can be hardly investigated (Goldscheider *et al*., 2010). One of the type areas of the hypogenic karst systems is the Buda Thermal Karst (Fig. 1.).

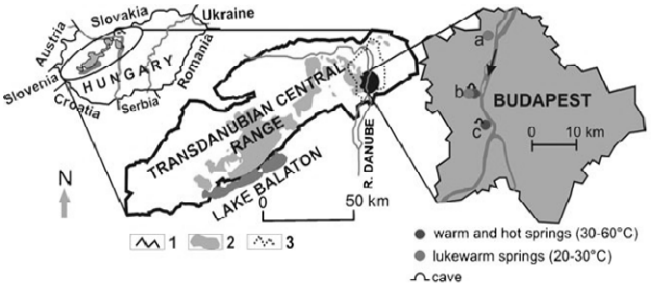

Fig. 1.: Location of the Buda Thermal Karst in the Transdanubian Central Range and the natural discharge areas in Budapest. Legend: 1: Subsurface boundary of Mesozoic carbonates, 2: Uncovered Mesozoic carbonates, 3: Buda Thermal Karst, a–c northern, central and southern discharge areas (Erőss, 2010)

In the understanding of the hypogenic karstification processes the interpretation of geological logs of deep drillings can be helpful. During the work the marks possibly referring to the hypogenic karstification were collected and were inserted to a database. To the documentations 78 water exploration wells were used which were drilled in Budapest and its surroundings, and from these 46 were involved in the evaluation. The marks referring to deep cavities which were took into consideration are as follows: the presence of the dissolution caves and the fissured sections in the carbonates, the detected mud losses during drilling, and the materials filling out the fissures, such as calcite and argillaceous, silty fillings. In addition, traces of iron-oxide, pyrite precipitates, the presence of stylolite and carbonate rock debris, and the location of supposed faults and structures were also collected which can be also important during the research. The results were displayed on maps (Fig. 2.) and on a geological section in order to determine the location of those sections which are affected by cavities and their relationships with the lithology and the structures.

It could be concluded that mud losses and cavities can occur in all carbonate rocks, even in marls. The correlation of the cavities with structural elements sometimes was detected but in other cases it was not demonstrable. Nevertheless it should be noted that the wells are pointwise and their scale can not be compared with the mapping scale of the structures. Based on the derived maps we determined that cavities can be observed in more well logs from the covered karst compared to the uncovered karst. Taking into consideration the elevation range of the cavities along the section great variability was found. The occurrence of cavities in the wells extends from some meters to 300-350 metres. In the wells multilevel cavities were found affecting different formations. However there were no cavities effecting both the Triassic and the Eocene formations. Examples from the documentations evidence that pyrite-, iron oxide and calcite precipitates often accompany the cavities in the depth.

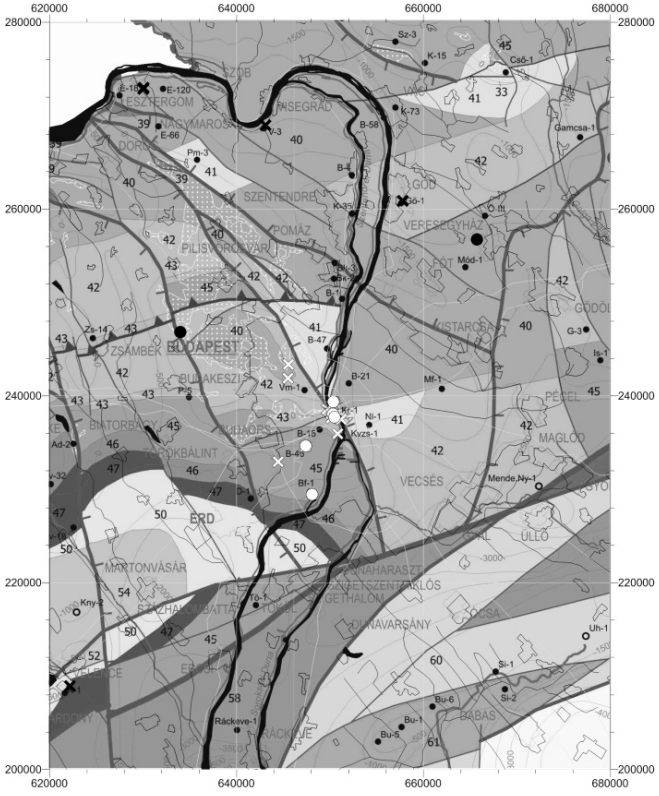

Fig. 2.: Location of the thermal wells drilled in the Dachstein Limestone (black points and symbols x) and the Hauptdolomit (white points and symbols x) and in the previous units occurring cavitation and/or mud losses (points) (Geological map: edited by Haas, 2010)

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