



Uranium-series ages from the Pal-voelgyi Cave, Budapest, Hungary

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One of the most important information in geological research is the age of formation. A cave's life is determined by its water content. While water is present in the passages, dissolution can proceed. As soon as the water-level drops, the erosion of the cave begins. Some of the cave minerals precipitate under the water level, while others above it. In rare occasions, minerals arise close to the karstwater surface, thus they are good indicators of paleo water levels. These minerals can give the most important information about cave evolution.

Cave rafts start to precipitate on the surface of hot-water lakes. After a thin film of calcite forms, the moving or dripping water breaks the thin crust and the broken rafts sink to the bottom of the lake, where precipitation can continue. As a result, cave rafts of thickness from a tenth of millimetre to a few centimetres can develop.

Several thermal karstic caves are known in the Rózsadomb area of Budapest, the capital of Hungary. In this small, 5-6 square km territory, hot water rises along tectonic lines, while different ion-content water leaks down from the surface and mixing corrosion occurs. With its more than 13 km length, the Pál-völgyi Cave is the largest cave in the area, in which cave rafts are very common.

Karstwater and consequently its precipitations are devoid of thorium but contain uranium at the time of formation, thus their age can be easily determined from the decay equation. Uranium series age determinations of cave raft accumulations were carried out to investigate the water level drop in the Pál-völgyi Cave. Samples from different altitudes were collected and analysed. The dating method is based on $^{234}\text{U}/^{230}\text{Th}$ measurements using ICP-MS analysis, allowing small sample quantities and an upper limit of age determination at cca. 400–500 ka.

Using the ages, the water subsidence history was reconstructed. The water filled out the main passage level until 320 ka ago. Since then, the water level has been fast dropping, with an average rate of 0.1-0.2 mm/y.