Epiphreatic development phases in the Ochtinská Aragonite Cave: Revision high-resolution magnetostratigraphy of cave sediments

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The complicated multi-phased genesis of the well-known Ochtinská Aragonite Cave (Revúcka Highlands, southern Slovakia) has still been the object of ongoing research. Revision high-resolution paleomagnetic sampling of the sedimentary profile in the Oválna Passage followed original pilot sampling of the profile in 1999 (only 5 samples; Bosák et al., 2002). High-resolution re-sampling by 40 samples in 2013 covered 60 cm thick profile. The Bunhes/Matuyama chron boundary (0.78 Ma) was more precise determined at 13 cm below the top of the profile. Newly, the short normal polarized magnetic zone at 33 cm below the profile top was interpreted as the Jaramillo event (0.99 to 1.07 Ma). The depositional rate between the Brunhes/Matuyama boundary and the upper boundary of the Jaramillo magnetic zone is about 0.09 $cm.ka^{-1}$ (19 cm long section deposited during 210 ka). The very slowly depositional rate resulted from slow water flow with only occasionally turbid water loaded only in extremely fine-grained material (clays; i.e. highly sieved material). If the depositional rate has been similar also in the lower section of the studied profile under the Jaramillo magnetic zone (28 cm long section deposited during 310 ka), the sedimentation on the bottom bedrock began ca 1.3–1.4 Ma ago. The prevailing NE–SW direction of magnetic lineation from the anisotropy of magnetic susceptibility measurements indicates uniform direction of water flow during the accumulation of sediments, i.e. from the Hlboký Dome through Oválna Passage to Sieň mliečnej cesty Hall. The age of flowstone covering the sedimentary profile is 177 ka (Bosák et al., 2002), therefore these sediments were eroded in the period from ca >780 up to 177 ka, most probably as a result of oscillations of groundwater table up from lower cave levels. The water table oscillation and its long-lasting stagnation resulted in the origin of the principle flat ceiling (Laugdecke) between the Oválna Passage and Hlboký Dome. This ceiling cut an older ceiling cupola-like form with aragonite and calcite fills. Based on their U-series dating (Bosák et al., 2002), the flat ceiling corrosion can be dated into the period between 405 and 177 ka.

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References:

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