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Preliminary results on the geology and evolution of the Iza cave (Rodnei Mountains, N Romania)

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Iza Cave is located in the Rodnei Mountains (Eastern Carpathians, N Romania). It was explored for the first time in 1977 (Viehmann, 1979). Its reported passage length was 2.3 km, for a maximum depth of 170 m. A new survey is presently in progress, with more than 3.5 km of passages currently mapped. This survey also includes a detailed geologic mapping. Iza is an active ponor cave with two main rivers, confluencing near a terminal sump. The affluent (ca. 10 l/s in low flow), fed by small allogenic streams, is presently not affected by floods, while the main river (20 l/s in low flow) can transport huge loads of trees and debris, and may possibly swell up to several cubic meters per second. The hydrogeological regime is therefore very contrasting between low flow and flood.

The cave is developed along the contact between a sedimentary series consisting of Eocene conglomerates and limestones, and a discordant crystalline basement, made up of quartz micaschists with garnet, marbles and marble breccias. Initially metamorphosed in amphibolite facies, the basement units were also affected by a lower intensity variscan retrograde metamorphism in greenschist facies. The sedimentary series begins with a thin discontinuous conglomerate layer with carbonate matrix and with rounded quartz clasts, assigned to Lutetian. The conglomerates and the overlying Priabonian limestones form a faulted monocline, dipping 10-20˚W. Limestones range from open-shelf wackestones and packstones with coral-algal crusts at the cave

entrance, to nummulitic sandstones near the system resurgence. The Eocene series is covered by Oligocene deposits consisting of black shales and sandstones.

The geological make-up of the area has a strong influence on the cave morphology. Passages in Iza cave essentially follow the limestone/micaschist contact and descend with more or less the same inclination. Most passages are guided by fractures, with the main passage placed along parallel faults with displacements up to 10-15m. Passages developed entirely in limestones show a labyrinthic pattern with rather small cross sections, while larger passages occur in areas of schists and marbles, showing preferential erosion and/or weathering of the metamorphic basement. As a result, most of the largest spaces in the cave are entirely within the schists and marbles, and the limestone/conglomerate forms a flat roof at the contact. This feature is often observed in caves that develop at a lithologic contact in the vadose zone. The allogenic inflow and the fracture-guided character, coupled with the lack of fossil passages, make us think that the Iza cave genesis is largely due to vadose inflow at the contact zone with the overlying Oligocene deposits, and to epiphreatic outflow at the lowermost possible point. The floodwater would dam up behind constrictions and create diverted routes or floodwater mazes, and flow as torrential river in areas without constrictions, following the example of a floodwater cave (Palmer, 1972).

Speleothems are scarce, calcite stalactites grown along faults and smaller fractures in the ceiling being the exception. However, due to the varied nature of the host rocks inside the cave, several peculiar cave deposits have formed. The water altered the micaschists to a large extent in some places, leaving a weathering crust up to 30 cm thick. This crust consists of clay minerals such as kaolinite and illite, remnant minerals such as quartz and micas, along with gypsum, iron oxi-hydroxides and sulphates and possibly allophane.

At a first glance, the main cave passage appears to have a simple genesis and a short history. However, several features seem to complicate the story: The presence of several partially eroded flowstones and clastic sediment terraces high above the present passage level, the size of the affluent passage compared with the present water flow, and the large room located at the upper part of the affluent passage are some arguments in favor of a more complex evolution.

References

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