15th International Congress of the Geological Society of Greece
Athens, 22-24 May, 2019 | Harokopio University of Athens, Greece
Bulletin of the Geological Society of Greece, Sp. Pub. 7 Ext. Abs. GSG2019-051

The Mavrovouni-1 cave in the flysch of Gavrovo-Tripolis Zone (SW Greece)

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Among several thousands of caves that have been reported in Greece, there are hundreds that have developed in non-carbonate lithology (i.e. Lazaridis et al., 2016 and cited references) and non-pure carbonates, such as breccias and conglomerates (i.e. Vlastaridis et al., 2014). Caves formed in flysch sediments have not identified previously in Greece and even in countries with thousands of recorded karst caves, only few examples are known (i.e. Pavuza, 2013).

The aim of this study is to document the morphology of the Mavrovouni-1 cave formed in flysch deposits and set the basis for further investigation in caves in this lithology and their speleogenesis.

Location and geology

The cave is located at 119 m above sea level (a.s.l.) at the Mavrovouni hill (287 m s.a.l.), which lies between the low mountains of Klokova (1038 m a.s.l.) to the East and Varasova (917 m a.s.l.) to the West. Its entrance (N 38.357470˚, E 21.661114˚) was artificially opened during road construction works.

In the broader area an Upper Eocene flysch formation that consists of three series of sandstones, conglomerates and shales crops out. These rocks belong to the Gavrovo-Tripoli Zone with a total thickness of about 700 m. Furthermore, they overlay almost 900 m thick limestones of Upper Cretaceous and Paleocene-Middle Eocene age (IGME 1991). The cave has been formed in SW dipping beds of polimictic conglomerates with well-rounded cobbles of carbonates and cherts that are alternating with lenses of shales and sandstones.

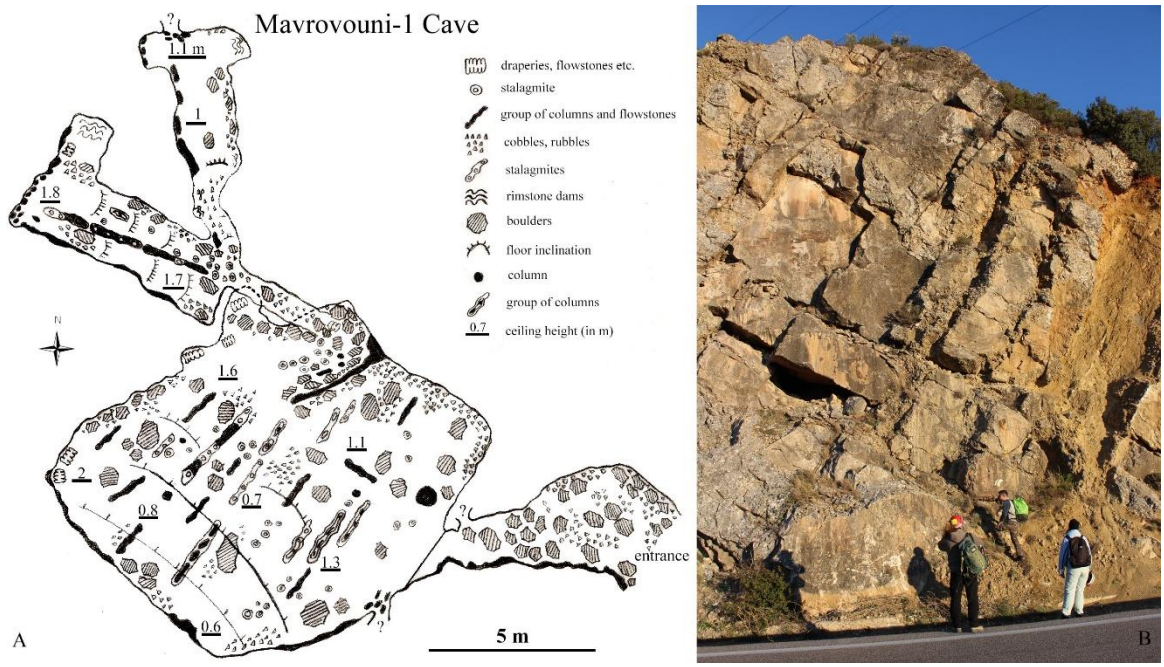

Figure 1. Mavrovouni-1 Cave: A. ground-plan; B. the cave entrance on the section with conglomerates and shales.

Cave description

A detailed survey of the Mavrovouni-1 cave resulted in the ground-plan of figure 1 (for methods see Kalogeropoulos et al., 2008; Trimmis, 2018 and references cited). The cave area is about 140 m2 and total passage length is almost 50 m. It consists of a main chamber that is connected to smaller elongated corridors. The entrance corridor is an about ENE-WSW 9 m long passage that leads to the main chamber that is accessible after climbing a three meters high wall. The main chamber is an about 10x10 m space of low height ranging from 0.6 to 2 m. The chamber is connected through a narrow passage at the NW edge to a bifurcating corridor. The latter consists of a 7 m long ascending part towards the West and another 7 m long descending part towards the NNW. The height of this part ranges from 1.4 to 1.8 m.

The side walls and the cave-ceiling are characterized by the absence of typical dissolutional features (see i.e. Lauritzen and Lundberg, 2000; Gunn, 2004; Ford and Williams, 2007; White and Culver, 2005) and they form planar surfaces. Furthermore, the floor is covered by boulders.

The cave is moderately decorated mainly with common types of speleothems, such as stalagmites, stalactites, coralloids, draperies, soda-straws, flowstones, rimstone dams, shelfstones, some less common such as the eccentrics and the rarely reported yet in Greece cave-blisters (see Hill and Forti, 1997 for nomenclature). However, most of the speleothems are

dry and some of them corroded. It worth's to mention that the largest columns, stalagmites and stalactites were formed along NE-SW and NW-SE directions due to their relation with rock discontinuities.

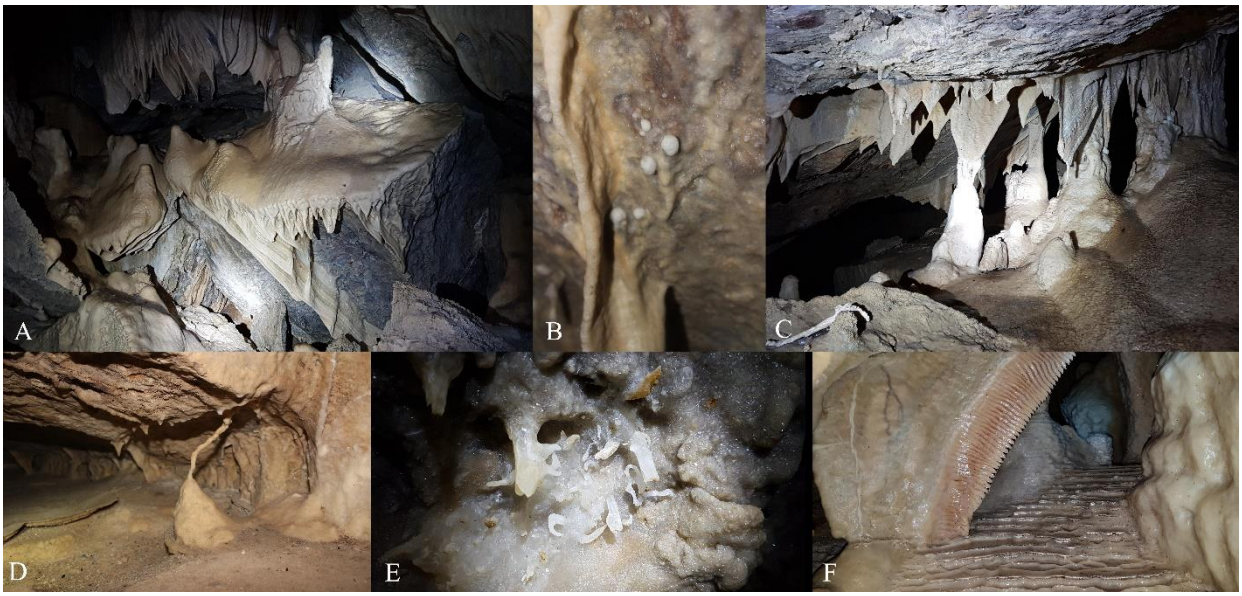

Figure 2. Speleothems from Mavrovouni-1 Cave: A. flowstone and stalagmites on collapsed boulders; B. Cave blisters (diameter ~1cm); C. columns, stalagmites and draperies along joints; D. a deflected stalactite connected to a stalagmite in a dry pool; E. eccentrics; F. drapery and rimstone dams.

Concluding remarks

- The Mavrovouni-1 cave has been mainly formed along a NW-SE direction that is more or less parallel to the strike of the bedding. Joint-controlled walls and ceiling are also related to breakdown morphology that appears in the cave.
- Commonly caves found in Flysch have been developed by tectonics and have a crevise morphology (i.e. Pavuza, 2013; Lenart et al., 2014). However, the Mavrovouni-1 cave is morphologically differentiated by crevises and resembles typical karst cavities. The presence of speleothems is indicative of the conglomerate's solubility by the seepage water. Thus, a dissolution process succeeded by breakdown is plausible.
- Some of the speleothems found in the cave are rarely reported in Greece, such as the cave-blisters (see also Sotiros Cave in Athens; V. Athanassopoulos in Lazaridis [coordinator, 2019]).
- Although, flysch outcrops are not attractive to cave exploration and survey due to the scarcity of cavernous forms, the future study of flysch caves in Greece should first focus in their discovery and identification in the field. Mavrovouni and the surroundings is a promising area for such a research.

Acknowledgments

We thank the geology students and cavers Kyriaki Fellachidou, Alkiviadis Sideridis and Xenofon Simos for their assistance during the field work.

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