Specific inventory for geological diversity and geological heritage of the Ubavica cave

(Gjonovica - North Macedonia)

Analysis and cataloging with diffractometric X-ray and final report

The Ubavica Cave is at the Bukovik Mountain, right above the old Gostivar-Kičevo road, near the village of Gorna Gjonovica. It formed along a fault line stretching north to south. This fault line runs to the surface of the mountain. The cave is almost entirely covered by an underground river, permanent underground waterway. Water over the millennia has carved its way into the rocks and, during its work, has created a wonderful work of art: The Beuty and all this splendor is probably due to the rocks that form the cave. Digging the cave the water has created several columns, galleries, ponds and an underground waterfall 5 to 6 meters high. A temple of limestone where monumental stalactites and stalagmites shine with their own light and the places where the limestone is cracked small concretions show all their shine and transparency.

In summer 2018 different types of rocks were sampled inside the cave in order to create a specific inventory for geological diversity and geological heritage (catalog).

Samples collected in the Ubavica cave, in order to define the minerals that make up the rocks and therefore their geological origin, were carried out with a Philips PW1830 powder diffractometer with PW3710 generator and copper anticathode, installed at the X-ray Diffraction Laboratory of the University of Urbino. The operating conditions were 35 kV of voltage and 30 mA of current. The acquisition times used were 0.02 ° 2Θ and 1 sec of scan step. The collection interval was 2-65 ° 2Θ.

UC#R1

ALABASTER: soft, smooth, fine-grained sedimentary gypsum rock. Variety of gypsum. $CaSO_4$ $2H_2O$

UC#R2

CALCITE: carbonate mineral, is the most stable polymorph of calcium carbonate $CaCO_3$

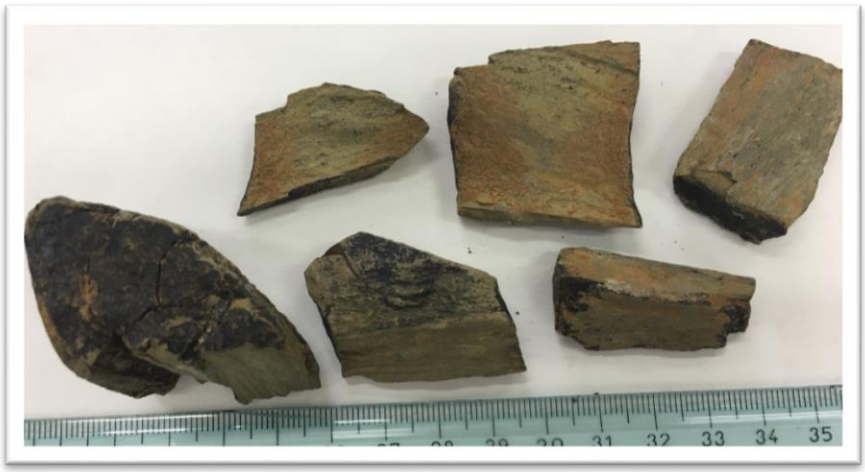
UC#R3

CALCITE: carbonate mineral

UC#R4

SCHIST: fine-grained metamorphic rock fragment. Presents elements such as *muscovite*, *hematite* and *phyllosilicates*. Base piece (oldest rock on site).

UC#R5



SCHIST: large-grained metamorphic rock fragments and planar schistosity. Presents elements such as *muscovite* and *phyllosilicates*. Base piece (rock less mature than UC#R4).

UC#R6

VOLCANIC ROCK: fragment of volcanic rock, acid effusive (porphyry type). *Lava* or *rhyolitic imbrite*, rich in quartz. The black patina of opaque minerals consist of *pyrolusite*, manganese oxide (*iron* and *limonite*).

The analysis performed indicates that the cave was formed in different geological periods. Very ancient metamorphic rocks of the basement and volcanic rocks have been identified, as well as limestone, calcite and alabaster. Various minerals have also been found such as gypsum, calcium carbonate, iron, limonite, muscovite hematite, phyllosilicates, quartz and dolomite. Geological diversity present in the Ubavica cave makes the site of extreme importance in order to understand the geological evolution of this area. It would be very important to preserve the cave (geological heritage) to transform it into a geological laboratory also in order to preserve the most precious asset it contains: drinking water.

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