

# ROCKFALL DYNAMICS IN CAVES: VELEBIT MT., CROATIA

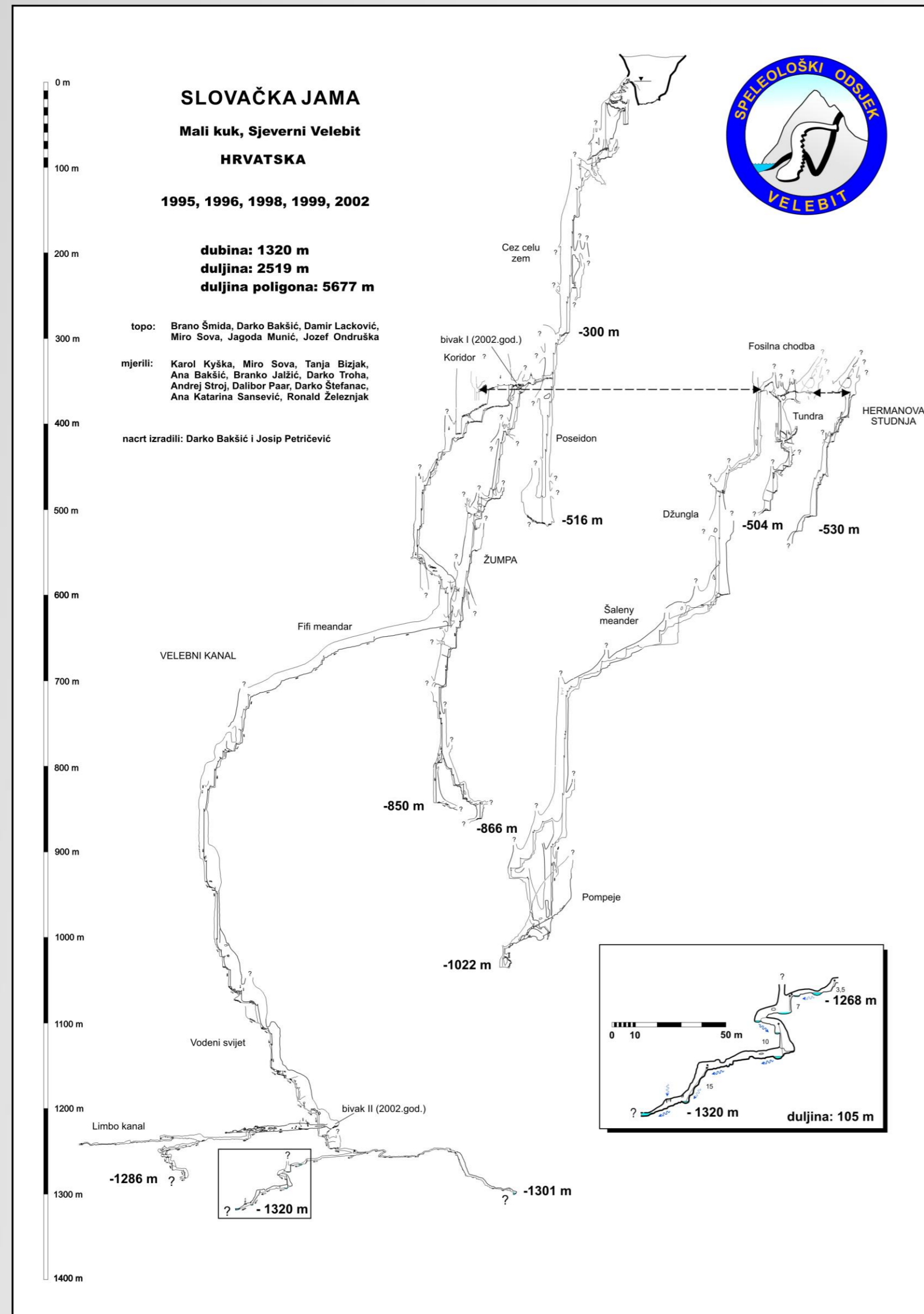


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## SLOVAČKA PIT

**Location: Northern Velebit National Park    Depth: 1320 m    Length: 5677 m**



Studies have named geologic structure, type of water recharge, and changes in base water level to be main controlling factors of speleogenesis. The complexity of karst cave systems is even more increased by a large number of fractures and cavities in karst landscape being enlarged by meteoric water dissolution. Such speleogenesis is made possible by carbon dioxide being absorbed from air and soil. Contrarily, so called "boulder caves" originated by rockfall and debris accumulation were given their own lithological and morphological cave category as pseudokarstic caves. Such natural processes of sudden rockfall, other than water erosion, frost weathering and temperature change, is even more common in non karst cave systems. However, occasionally observed rockfall in karst cave systems is yet to be assigned a quantitative value when it comes to cave formation. An ongoing study in Slovačka pit (Northern Velebit, Croatia) is yet to yield results necessary for understanding rockfall dynamics in karst cave systems.

## LITHOLOGY

The upper part of the Slovačka pit (up to 300 m deep) extends into the Jelar breccias. They are light brown to dark gray in color, with dip angle about 35° to the south (measured at the bottom of Cez celu zem vertical). Around the depth of 305 m the breccias are followed by dark gray limestones (possibly from Jurassic). Beneath them, dark gray to black breccias reappear (from the beginning of the Črevo vertical at depth of 363 m all the way to the depth of 598 m).

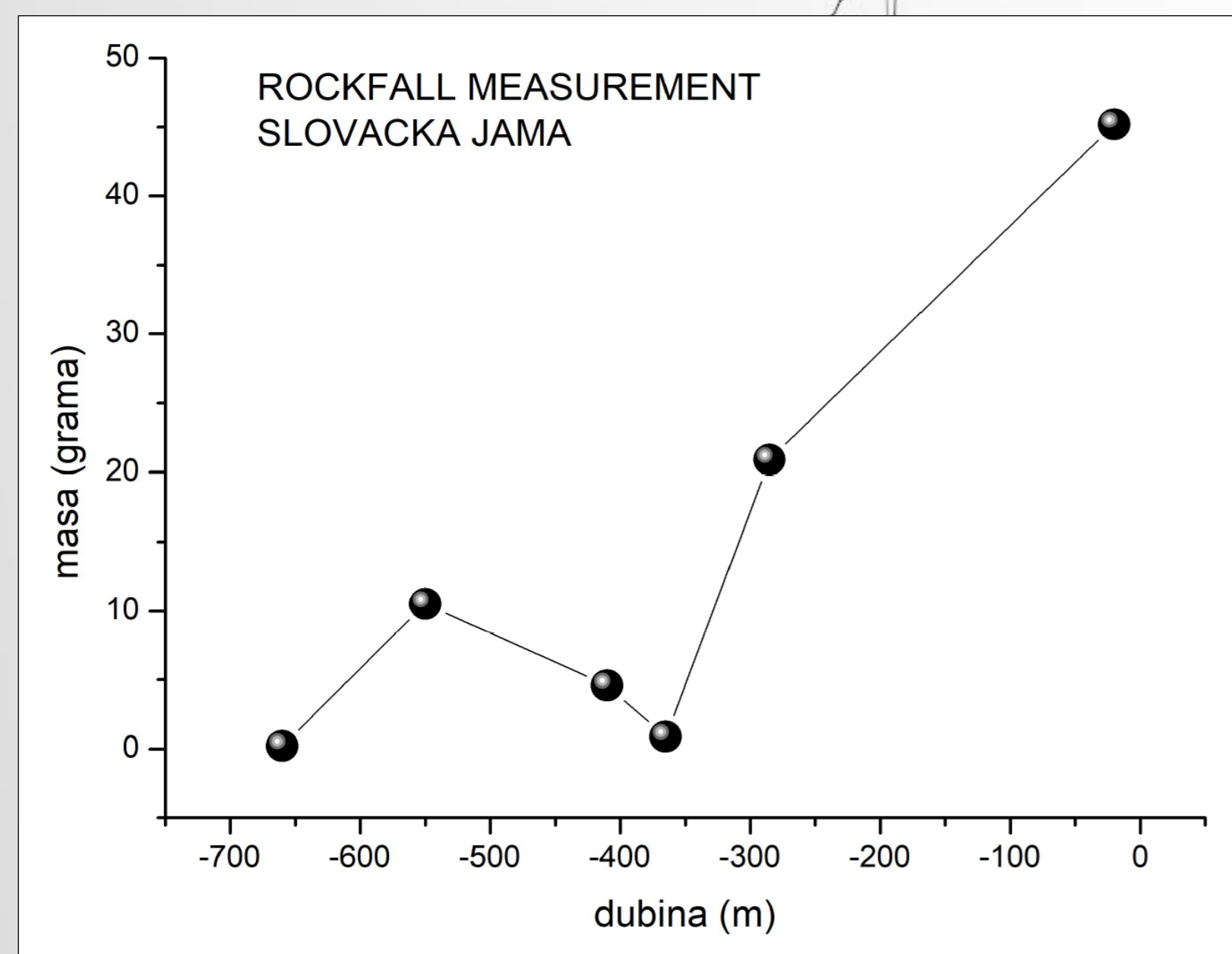
Both Šaleni and Fifi meander are developed in carbonates with clay sedimentary admixture. Impurities in the limestones at a depth of 600 to 700 m are probably the cause of the narrowing of the channel.

The lower parts of the pit are developed in carbonates - Patkov skok in very dark limestones. The ceiling of Pompeji hall is made up of dark gray cracked limestones. The upper half of the Tundra channel is made up of very dark to black limestones, and below them Jelar breccias reappear (in the Savana vertical light brown, in the Tajga dark brown to dark gray).

## TECTONICS

Channel orientation at the entrance part of the pit corresponds to north-south orientation of the cracks on the surface. The lower parts (Koridor, Tundra channel and Pompeji) consist of NE - SW oriented channels. The western side of the Koridor channel and the ceiling of Pompeji are slickensides (polished fault surface) on which there has been (and still is) a more pronounced movement of the blocks. As in Lukaina pit, the vertical parts of Slovačka pit were formed by the corrosive impact of water on existing faults, as well as collapse of larger blocks. Larger verticals, such as Cez celu zem, Poseidon and the vertical above the 1st Croatian bivouac at the depth of 376 m, were formed by the collapse of barriers between several connecting smaller verticals. In Koridor channel the collapse was probably accompanied by a vertical shift.

## MEASUREMENTS TO DATE



MEASURING POINT	POINT MARKING	DATE	LOCATION
M07	R2	30.7.2016 20:05	Near Fifi meander entrance
M01	R1	29.7.2016 21:20	Beneath first vertical jump
M20 (M08)	R3	30.7.2016 23:58	
M09	R4	31.7.2016 04:54	Beneath first Croatian bivouac
M10	R5	31.7.2016 17:33	Fosilni hodnik channel right before bivouac
M05 (M11)	R6	31.7.2016 22:02	At the bottom of the vertical