

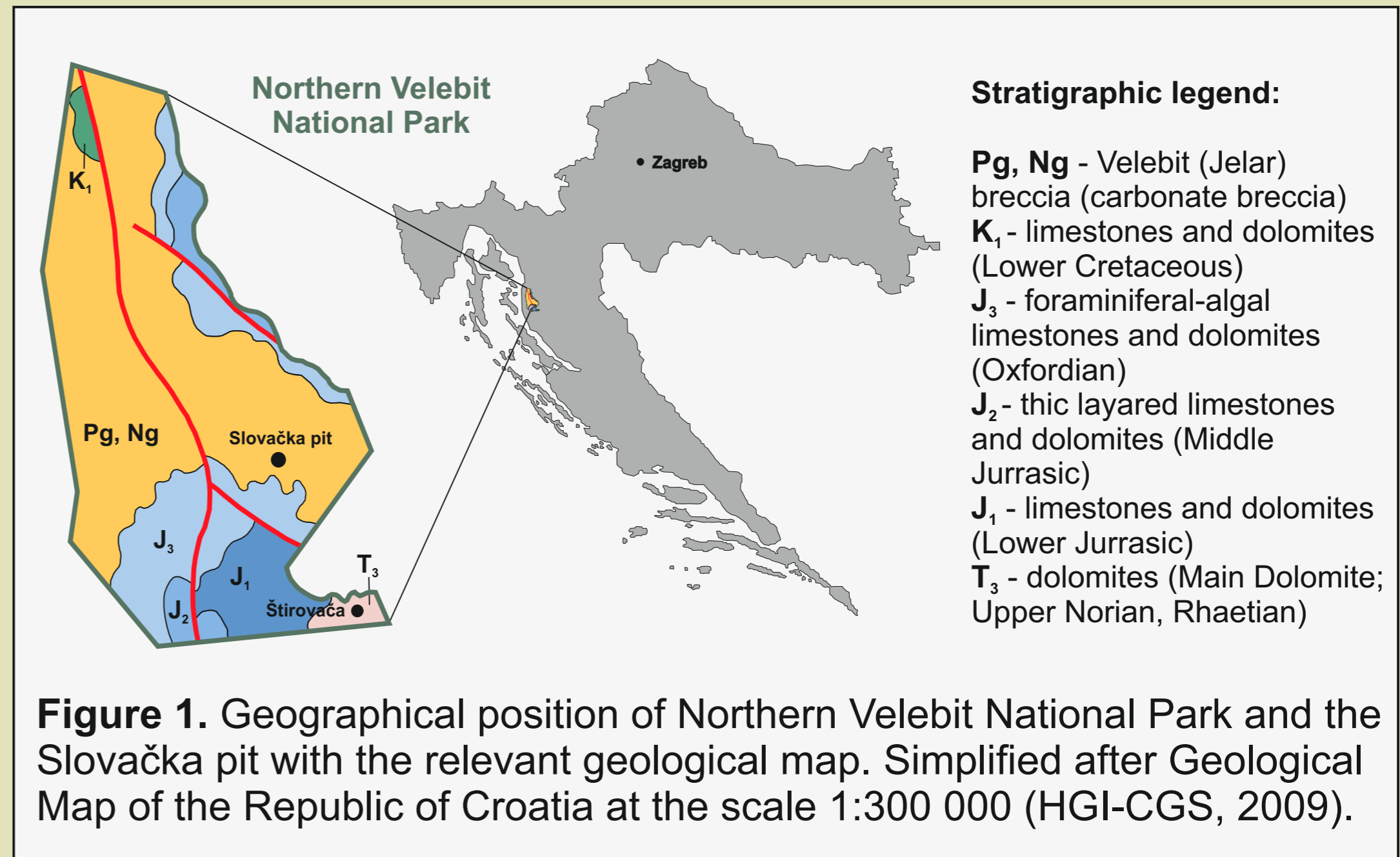
# STRATIGRAPHIC PROFILE OF SLOVAČKA PIT

## Northern Velebit, Croatia

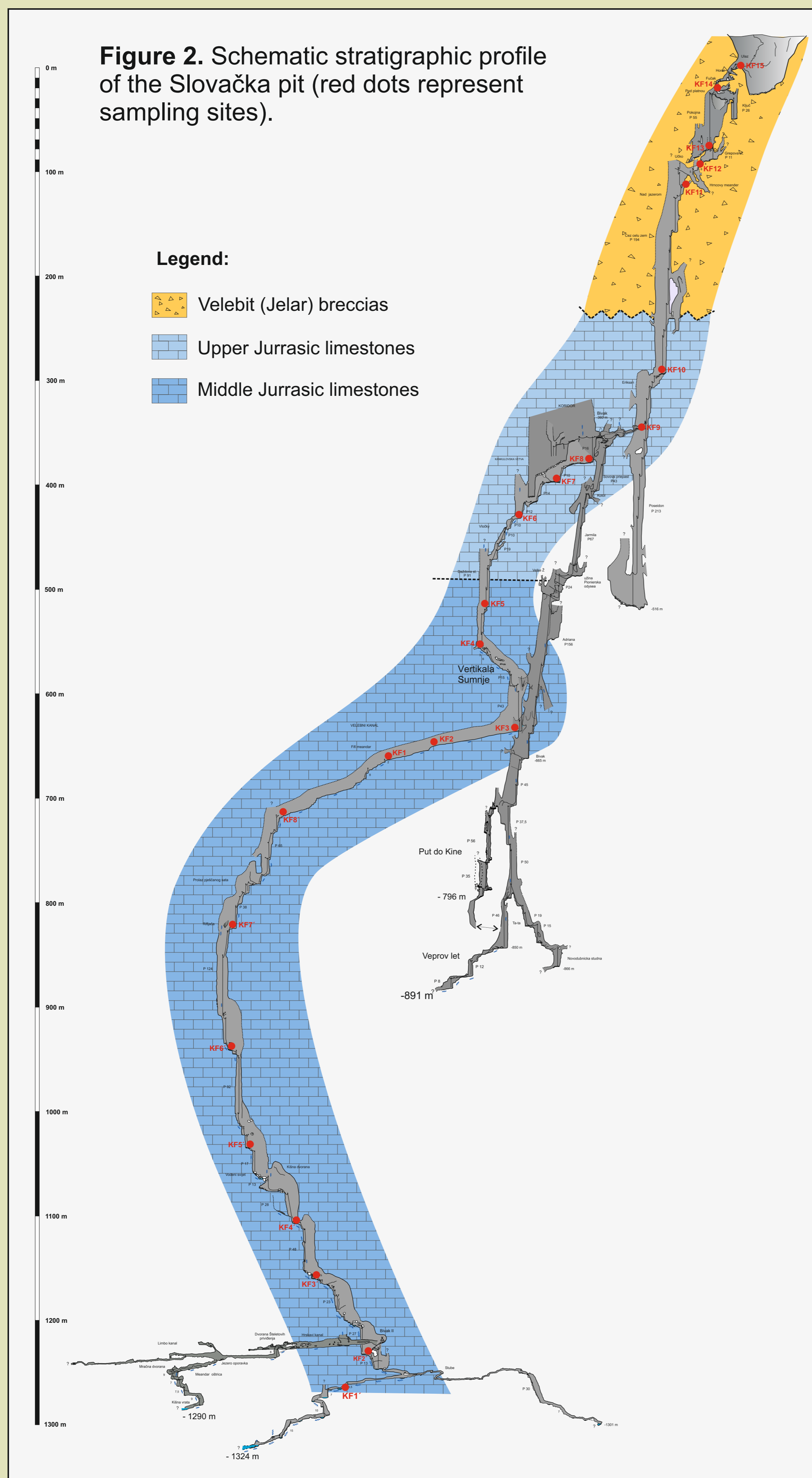
Filip ŠARC<sup>1,2</sup>

The Slovačka pit is the second deepest pit in Croatia (-1324 m). It is located in strict reserve "Hajdučki i Rožanski kukovi" within the borders of the Northern Velebit National Park on mt.Velebit (Fig.1.). In summer of 1995, Slovak speleologists found the entrance which is situated at 1520 m above sea level and named the pit after Slovakia. During the pit exploration, Damir Lacković and Branislav Šmida made some geological observations which were published in Acta Carsologica, 1999.

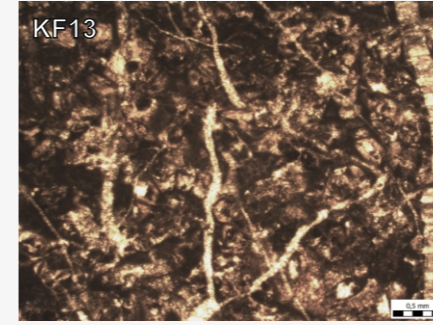
The area around the pit geologically consists of Velebit (Jelar) carbonate breccias and Jurassic limestones in erosive contact (Fig.1.). Aim of the research was to establish the depth of erosive contact in the pit and stratigraphic division of underlying Jurassic limestones. The geological survey was carried out through the main channel to the depth of 1290 m during expeditions in 2017 and 2018.



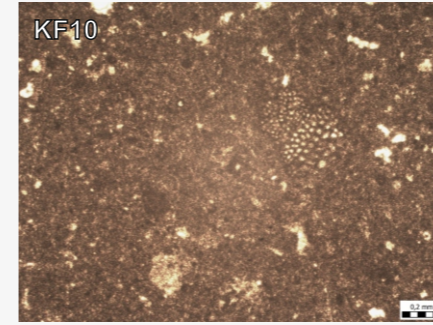
**Figure 1.** Geographical position of Northern Velebit National Park and the Slovačka pit with the relevant geological map. Simplified after Geological Map of the Republic of Croatia at the scale 1:300 000 (HGI-CGS, 2009).



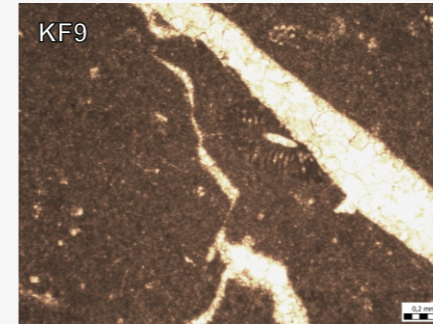
**f) KF13** - lithoclast of carbonate breccia which contains frgments of dasyclad alga *Clypeina jurassica*



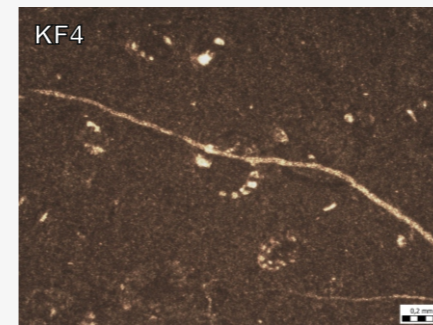
**e) KF10** - peloid-bioclastic wackestone with foraminifera *Curnubia palastiniensis*



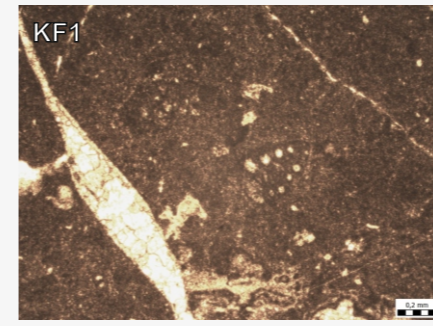
**d) KF9** - bioturbated foraminiferal mudstone to wackestone with algae *Salpingoporella sellii*



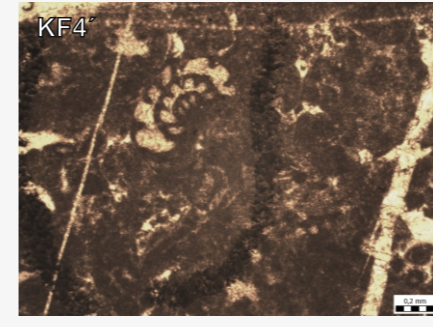
**c) KF4** - foraminiferal mudstone with formaminifera *Paleopfenderina sp.*



**b) KF1** - foraminiferal mudstone to wackestone with foraminifera *Pseudomarsonella sp.*



**a) KF4'** - intraclastic-peloid packstone to grainstone with foraminifera *Mesoendothyra croatica*



**Figure 3.** Micro-photographs of thin rock sections  
Photo: dr.sc. Maja Martinuš

### Results:

- Three stratigraphic units were confirmed by petrographic analysis of thin rock sections:

Middle Jurassic limestones, Upper Jurassic limestones and Velebit (Jelar) carbonate breccias (Fig.2.)

- Middle Jurassic limestones are mostly dark mudstones to wackestones with foraminifera, bioclasts of benthic foraminifera, echinoderm spines and dasyclad alga. Their micritic structure with poor fossil content (mainly benthic forams) indicates a deposition in shallow, well protected, low energy environment of carbonate platform (Flügel, 2004). According to fossil content limestones belong to Bajocian-Callovia, 170-163 mya (Fig.3a to Fig.3c)

- Upper Jurassic limestones are light gray wackestones to packstones and show shallowing and significant increase in environment energy. Limestones contain bioclasts of benthic foraminifera, echinoderms, dasyclad alga and stromatoporoids with occurring bioturbations. Fossil content of limestones indicates Oxfordian-Kimmeridgian, 163-152 mya (Fig.3d & Fig.3e)

- Velebit breccias are structurally immature sediments with poorly rounded and sorted clasts of limestones various sizes (Bahun, 1974). Some clasts in breccia contain fragments of dasyclad alga *Clypeina jurassica* (Fig.3f).

- Although Lower Jurassic is not proven by fossil content, deepest sample indicates facies characteristic for upper part of Lower Jurassic

- The border between Middle and Upper Jurassic is presumed at 480 m.

- Erosive contact between Upper Jurassic limestones and Velebit breccias is presumed at 230 m.

### References:

- Bahun, S. (1974): Tektogeneza Velebita i postanak Jelar naslaga. Geološki vjesnik, 27, 35-51.  
 Flügel, E (2004) Microfacies of carbonate rocks, analysis, interpretation and application. Springer, Berlin Heidelberg, New York, 976 str  
 Fugagnoli, A(2000) Fisticord of Everticyclammina Redmond 1964 (E. praevirguliana n. sp.; Foraminiferida) from the Early Jurassic of the Venetian Prealps (Calcarei Grigi, Trentoplatorm. Northern Italy). Journal of Foraminiferal Research 30, 126-134.  
 Velić, I (2007) Stratigraphy and palaeobiogeography of Mesozoic benthic foraminifera of the Karst Dinarides (SE Europe). GeologiaCroatica 60, 1-113.  
 Croatian Geological Survey (2009): Geological Map of the Republic of Croatia, 1:300.000, Croatian Geological Survey, Department of Geology, Zagreb.  
<http://speleologija.eu/slovačka/> 09.06.2019.

**Acknowledgements:** Special gratitude to Speleological department PDS Velebit and all the people who supported the exploration with their work.



<sup>1</sup>Speleological club Ozren Lukić, Hercegovačka 109, 10000 Zagreb, Croatia

<sup>2</sup>Speleological department PDS Velebit, Radićeva 23, 10000 Zagreb, Croatia