

# CEEPUS network CIII-RS-0038: recognition of challenges in geological education in South-Eastern Europe and prompt responds

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poroznosti i naoko vidljivih detritalnih primjesa koji bi kompromitirali rezultate U-Th datiranja. Po jedan uzorak iz najstarijih dijelova preostale dvije jezgre je izdvojen za datiranje. Uzorci karbonata datirani su U-Th metodom koristeći Neptune Plus MC-ICP-MS na Johannes Gutenberg Sveučilištu u Mainzu.

Rezultati datiranja dva odabrana uzorka pokazuju njihovu starost od 129,5 (+/- 0,61) ka BP odnosno čak 644,1 (+93,2/ -53,1) ka BP. Ovi rezultati pokazuju da je glavni kanal Gornje Baraćeve špilje vrlo vjerojatno stariji od 644 ka BP, ali rezultate treba uzeti s oprezom s obzirom da su na samoj granici datiranja U-Th metodom.

S obzirom da prilikom uzorkovanja nije mogao biti dosegnut najniži (najstariji) dio sigastog stupa te da postoji mogućnost da ovo i nije najstarija siga, starost ovog kanala vjerojatno je i veća. To ukazuje da je podzemno otjecanje tamo bilo razvijeno već na prijelazu iz ranog u srednji pleistocen. S obzirom na položaj datiranih siga u kanalu, s velikom vjerojatnošću se može pretpostaviti da je u vrijeme njihovog nastanka kanal već bio potpuno neaktivan. To znači da je tijekom srednjeg pleistocena voda već tekla kroz niže provodnike, vjerojatno današnju Donju Baraćevu špilju. Dobiveni rezultati trenutno predstavljaju podatke o najstarijoj datiranoj sigi u kršu Hrvatske.

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## CEEPUS NETWORK CIII-RS-0038: RECOGNITION OF CHALLENGES IN GEOLOGICAL EDUCATION IN SOUTH-EASTERN EUROPE AND PROMPT RESPONDS

### CEEPUS MREŽA CIII-RS-0038: PREPOZNAVANJE IZAZOVA U OBRAZOVANJU GEOLOŠKIH STRUKA U JUGOISTOČNOG EUROPI I MOGUĆA RJEŠENJA

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Geological education at South-Eastern European universities is developed under the CEEPUS CIII-RS-0038 network (Earth-Science Studies in Central and South-Eastern Europe – EURO Geo-Sci), which includes participating unites from eleven countries: Albania, Austria, Bosnia and Herzegovina, Croatia, Czech Republic, Hungary, Poland, Romania, Serbia, Slovakia and Slovenia. For long 24 years, EURO Geo-Sci continuously promotes sharing of knowledge and know-how via multilevel activities: student mobility, engagement of visiting peer-experts, joint supervision Master and PhD thesis, reinforcing geosciences educational infrastructure of the participating institutions. The network covers wide spectrum of geological disciplines including both fundamental (regional geology, mineralogy, crystallography, geochemistry, petrology, paleontology, structural geology etc) and applied disciplines (e.g. mineral resources, engineering geology, hydrogeology and geophysics). In the past 24 years more

than 1500 individuals used the network through student and teacher mobilities, joint supervision master and PhD projects (successfully defended more than 20) as well as field excursions.

During such a long period, the network is also continuously facing with many internal and external challenges. Internal challenges are related to low-funded, classical and sometimes outdated curricula of some programmes, lack of innovative content and teaching diversity brought by visiting experts and hands-on practical experience for peer academicians as well as for the students. External challenges are related to declining demographic trends and regional brain drain leading to decreasing in number of students, pandemic, unstable political situation (wars) as well as negative public perception of the geology (and mining) sector due to environmental and political activism. Thanks to flexibility of the network and dedicated engagement of the local coordinators, the network responds appropriately to the challenges involving new

courses, networking with current scientific projects, cooperation with industry and serving the society in solving problems concerning pollution, water resources, land sliding, earthquakes, mineral deposits and many others.

For more details about EURO Geo-Sci the following publications are recommended: ŠARIĆ (2022), ŠARIĆ

*et al.* (2022), ŠARIĆ & IONESCU (2018), as well as the network's website: <https://ceepus.rgf.bg.ac.rs/>, facebook page: Ceeplus.RS0038 and instagram page: ceepus.rs0038.euro\_geosci.

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## DEEPWATER-CE: DEVELOPMENT OF AN INTEGRATED IMPLEMENTATION FRAMEWORK FOR MANAGED AQUIFER RECHARGE SOLUTIONS TO FACILITATE THE PROTECTION OF CENTRAL EUROPEAN WATER RESOURCES ENDANGERED BY CLIMATE CHANGE AND USER CONFLICT

### DEEPWATER-CE: RAZVOJ INTEGRIRANOG OKVIRA ZA PROVEDBU KONCEPTA UMJETNOG PRIHRANJIVANJA VODONOSNIKA SA CILJEM ZAŠTITE RESURSA PITKE VODE UGROŽENIH KLIMATSKIM PROMJENAMA I SUKOBIMA KORISNIKA U SREDNJOJ EUROPI

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**Ključne riječi:** *umjetno prihranjivanje vodonosnika, otočki krški vodonosnik, Vis, Hrvatska*

Projekt DEEPWATER-CE provodio se u razdoblju od svibnja 2019. do travnja 2022. sa ciljem razvoja integriranog okvira za provedbu umjetnog prihranjivanja vodonosnika (eng. managed aquifer recharge – MAR). MAR je važan mehanizam održivog upravljanja vodnim resursima, posebice u područjima gdje je kakvoća ili dostupnost vode ugrožena, a temelji se na prikupljanju oborinskih i površinskih voda tijekom vlažnih perioda, njihovom skladištenju (npr. akumulacije) te umjetnom prihranjivanju (npr. utisni zdenci ili infiltracijske zone) u vodonosnik. Projekt je bio sufinanciran iz programa transnacionalne suradnje Interreg Srednja Europa 2014.

– 2020., a uključivao je sedam projektnih partnera iz Mađarske, Njemačke, Poljske, Slovačke i Hrvatske.

U sklopu projekta provedena su interdisciplinarna istraživanja sa ciljem lociranja područja i vodonosnika pogodnih za primjenu metoda umjetnog prihranjivanja. Hrvatsko područje istraživanja bio je otok Vis, koji je, zahvaljujući kvalitetnim krškim vodonosnicima, samodostatan po pitanju vodoopskrbe.

Terenska istraživanja na otoku Visu uključivala su kontinuirana i periodička opažanja, te laboratorijska i raznovrsna terenska istraživanja. Kontinuirano su automatskim mjeračima opažani razina podzemnih voda, temperature i elektrolitičke vodljivosti. Periodička mjesečna opažanja obuhvaćala su razine podzemnih voda i *in*