

CEEPUS network CIII-RS-0038: More than two decades of supporting current educational and scientific trends in geosciences

Kristina Šarić, Ana Fociro, Michael Wagreich, Hugo Ortner, Christoph von Hagke, Hans-Jürgen Gawlick, Eva Gerlšová, Elvir Babajić, Darko Tibljaš, Sibila Borojević Šoštarić, Miklos Kazmer, Jolanta Burda, Ela Machaniec, Adriana Trojanowska Olichwer, Ágnes Gál, Paul Tibuleac, Luka Gale, Ondej Nemeц, Igor Duriška, Volker Höck, Corina Ionescu



Дигитални репозиторијум Рударско-геолошког факултета Универзитета у Београду

[ДР РГФ]

CEEPUS network CIII-RS-0038: More than two decades of supporting current educational and scientific trends in geosciences | Kristina Šarić, Ana Fociro, Michael Wagreich, Hugo Ortner, Christoph von Hagke, Hans-Jürgen Gawlick, Eva Gerlšová, Elvir Babajić, Darko Tibljaš, Sibila Borojević Šoštarić, Miklos Kazmer, Jolanta Burda, Ela Machaniec, Adriana Trojanowska Olichwer, Ágnes Gál, Paul Tibuleac, Luka Gale, Ondej Nemeц, Igor Duriška, Volker Höck, Corina Ionescu | Proceedings III Congress of Geologists of Bosnia and Herzegovina with international participation, Neum, 21 -23.09.2023 | 2023 | |

<http://dr.rgf.bg.ac.rs/s/repo/item/0008052>

Дигитални репозиторијум Рударско-геолошког факултета Универзитета у Београду омогућава приступ издањима Факултета и радовима запослених доступним у слободном приступу. - Претрага репозиторијума доступна је на www.dr.rgf.bg.ac.rs

The Digital repository of The University of Belgrade Faculty of Mining and Geology archives faculty publications available in open access, as well as the employees' publications. - The Repository is available at: www.dr.rgf.bg.ac.rs

Udruženje/udruga geologa u Bosni i Hercegovini

ZBORNİK RADOVA

III Kongres geologa Bosne i Hercegovine

sa međunarodnim učešćem

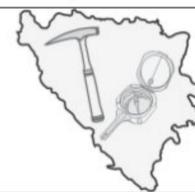


PROCEEDINGS

III Congress of Geologists of Bosnia and Herzegovina

with international participation

Neum, 21. – 23.09.2023. godine



Izdavač / Publisher

Udruženje/udruga geologa u Bosni i Hercegovini
Association of geologists in Bosnia and Herzegovina

Glavni urednici / Editors-in-chief

Ferid Skopljak, Elvir Babajić, Ćazim Šarić

Tehnička priprema / Technical Preparation

Dr.sc. Ćazim Šarić. dipl.ing.geol.

Štampa:

„Štamparija Fojnica” d.o.o. Fojnica, BiH

Tiraž:

150 primjeraka

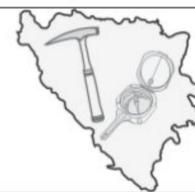
Napomena: *Autori su odgovorni za sadržaj i kvalitet svojih radova*

Note: *The authors are responsible for the content and quality of their papers*

ZBORNIK RADOVA

III KONGRES GEOLOGA BOSNE I HERCEGOVINE

ISSN 1840-4073

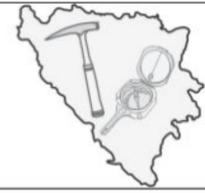


Organizacioni odbor / Organizing Committee

Mr.sc. Alojz Filipović - predsjednik
Prof. dr.sc. Ferid Skopljak - potpredsjednik
Branko Ivanković - potpredsjednik
Prof. dr. sc. Kenan Mandžić
Nenad Toholj
Mr.sc. Vedad Demir
Mr.sc. Cvjetko Sandić
Prof. dr. sc. Aleksej Milošević
Prof. dr. sc. Elvir Babajić
Josip Marinčić
Stanko Ljubić
Sedin Alispahić
Dr. sc. Ćazim Šarić
Evica Golić-Divković
Pero Jokanović
Željko Zubac

Naučni odbor / Scientific Committee

Akad. Enver Mandžić (Akademija nauka Bosne i Hercegovine)
Akad. Hazim Hrvatović (Akademija nauka Bosne i Hercegovine)
Akad. Neđo Đurić (Akademija nauka Republike Srpske)
Profesor emeritus Sejfudin Vrabac (Rudarsko geološko građevinski fakultet Tuzla)
Profesor emeritus Izet Žigić (Rudarsko geološko građevinski fakultet Tuzla)
Prof. dr.sc. Zoran Stevanović (Rudarsko geološki fakultet Beograd)
Prof. dr.sc. Ranko Cvijić (Rudarski fakultet Prijedor)
Prof. dr.sc. Dinka Pašić-Škripić (Rudarsko geološko građevinski fakultet Tuzla)
Prof. dr.sc. Sibila Borojević-Šoštarić (Rudarsko geološko naftni fakultet Zagreb)
Prof. dr.sc. Zoran Nakić (Rudarsko geološko naftni fakultet Zagreb)
Prof. dr.sc. Đenari Ćerimagić (Građevinski fakultet Sarajevo)
Doc. dr.sc. Boško Vuković (Rudarski fakultet Prijedor)
Dr. sc. Slobodan Radusinović (Geološki zavod Crne Gore)
Dr.sc. Stjepan Ćorić (Geološki zavod Austrije)
Dr.sc. Miloš Bavec (Geološki zavod Slovenije)
Prof. dr.sc. Slobodan Miko (Hrvatski geološki institut)
Prof. dr.sc. Dragoman Rabrenović (Geološki zavod Srbije)
Prof. dr.sc. Tea Kolar-Jurkovšek (Geološki zavod Slovenije)
Prof. dr.sc. Ljupko Rundić (Rudarsko geološki fakultet Beograd)



SPONZORI / SPONSORS

Generalni sponzor:

D.O.O. „IPIN Institut za primijenjenu geologiju i vodoinženjering” Bijeljina

Pokrovitelji:

“ADRIATIC METALS” Bosnia & Herzegovina

“DRILLEX BH” d.o.o. Vareš

„LYKOS BALKAN METALS” d.o.o. Bijeljina

Donatori:

“GEOCON” d.o.o. Čitluk

“ZAVOD ZA VODOPRIVREDU” d.d. Sarajevo

“ENOVA” d.o.o. Sarajevo

“IPSA INSTITUT” d.o.o. Sarajevo

“GEOKONZALTING” d.o.o. Sarajevo

“GEORESURSI” d.o.o. Zvornik

„IBIS - INŽENJERING” d.o.o. Banja Luka

“KRIPTOS” d.o.o. Milići

„IRM - Bor” d.o.o. Zvornik

“DRINA RESOURCES” d.o.o. Bijeljina



SADRŽAJ / CONTENT

STRATIGRAFIJA - PALETOLOGIJA - TEKTONIKA / STRATIGRAPHY - PALEONTOLOGY - TECTONICS

Zijad Ferhatbegović, Sumeja Durmić

ANALIZA MIKROFOSILA DONJEG BADENA NA PROFILU GORNJA TUZLA-POVRŠNICE
AN ANALYSIS OF THE MICROFOSSILS IN THE LOWER BADENIAN ON THE GORNJA
TUZLA-POVRŠNICE PROFILE

Katica Drobne, Mladen Trutin, Stjepan Ćorić, Vlasta Premec-Fuček, Morana Hernitz-Kučenjok,

Johannes Pignatti, Aleš Vršić, Miloš Bartol, Miloš Markič, Uroš Premru, Matej Dolenc

HERCEGOVINA, KAO POLUOTOK PALEOGENSKE JADRANSKE KARBONATNE

PLATFORME DOKAZAN SA KRUPNIM FORAMINIFERAMA U BIOZONAMA

SBZ 1 - 17, SA NANOPLAKTONOM NP 5 - 6, NP 11 - 17 I BIOSZ 1 - 4.

HERZEGOVINA, AS A PENINSULA OF THE PALEOGENE ADRIATIC CARBONATE PLATFORM,

PROVED WITH LARGER BENTHIC FORAMINIFERA IN BIOZONES SBZ 1 - 17, WITH

NANNOPLANKTON NP 5 - 6, NP 11 - 17 AND BIOSZ 1 - 4.

MINERALOGIJA - PETROLOGIJA - GEOHEMIJA / MINERALOGY - PETROLOGY - GEOCHEMISTRY

F. Jovanoski, I. Mitev, D. Rogozareva-Stavreva, Z. Ilievski

MINERALOŠKO-PETROGRAFSKA, KEMIJSKA I RTG DIFRAKCIJA PRAŠKA ANALIZA ANTIČKIH

UZORAKA MALTERA SA ARHEOLOŠKOG NALAZIŠTA "STOBI" - R. MAKEDONIJA

MINERALOGICAL-PETROGRAPHIC, CHEMICAL AND X-RAY POWDER DIFFRACTION ANALYSES

OF ANCIENT MORTAR SAMPLES FROM THE ARCHAEOLOGICAL SITE

"STOBI" - R. MACEDONIA

Selma Ćatić

MINERALNO-HEMIJSKA KARAKTERIZACIJA CRVENOG MULJA SA DEPONIJE

DOBRO SELO KOD MOSTARA

MINERAL AND CHEMICAL CHARACTERIZATION OF THE RED MUD FROM THE

DOBRO SELO DEPOSIT NEAR MOSTAR

Danica Srećković-Batoćanin, Suzana Erić, Nikola Novičić, Nikola Pašajlić, Natalija Batoćanin

EPIDOTIZACIJA SANIDINA U KVARCLATITU GROTA

EPIDOTIZED SANIDINE IN QUARTZ-LATITE FROM GROTA

Amer Smailbegović, Enes Šerifović

POJAVE MINERALIZACIJE KOBALTA U OFIOLITSKIM ZONAMA SJEVEROZAPADNE BOSNE I

HERCEGOVINE

EVENTS OF COBALT MINERALIZATION IN OPHIOLITIC ZONES OF NORTHWESTERN BOSNIA AND

HERZEGOVINA

Alisa Babajić, Elvir Babajić

PETROGRAFSKA NOMENKLATURA MAFITNIH EKSTRUZIVNIH STIJENA

KONJUH PLANINE

PETROGRAPHIC NOMENCLATURE OF THE KONJUH MOUNTAIN MAFITE

EXTRUSIVE ROCKS



Elvir Babajić, Alisa Babajić, Selma Gegić

GEOHEMIJSKA DISTRIBUCIJA POTENCIJALNO TOKSIČNIH ELEMENATA U SPREČKOM POLJU
OPĆINE LUKAVAC

GEOCHEMICAL DISTRIBUTION OF POTENTIALLY TOXIC ELEMENTS IN THE RIVER SPREČA
FIELD OF THE LUKAVAC MUNICIPALITY

Evica Divković-Golić, Ljubomir Gajić, Dražan Tokanović, Vladimir Jovičić

GEHEMIJSKI ATLAS REPUBLIKE SRPSKE

GEOCHEMICAL ATLAS OF THE REPUBLIC OF SRPSKA

Tatjana Blagojević, Radoslava Pijunović

UTICAJ PROMENE DTV I HEMIJSKOG SASTAVA PEPELA NA RAD KOTLA TE „STANARI”

INFLUENCE OF THE LCV AND CHEMICAL COMPOSITION OF ASH ON THE

OPERATION OF THE BOILER OF A TERMAL POWER PLANT „STANARI”

HIDROGEOLOGIJA - INŽENJERSKA GEOLOGIJA - GEOFIZIKA / HYDROGEOLOGY - ENGINEERING GEOLOGY - GEOPHYSICS

Ivan Antunović, Danijela Ljubić, Stanko Miškić

PROVEDENA ISTRAŽIVANJA I IZRADA DUBOKOG BUNARA NA IZVORIŠTU

BLACE KOD NEUMA

RESEARCH AND CONSTRUCTION OF A DEEP WELL AT THE SOURCE OF

BLACE NEAR NEUMA

**Vesna Ristić Vakanjac, Saša Milanović, Ljiljana Vasić, Boris Vakanjac, Saša Bakrač, Radoje Banković,
Veljko Marinović**

UTICAJ KLIMATSKIH PROMENA NA VODNE RESURSE: PRIMER SLIV REKE MLAVE

THE IMPACT OF CLIMATE CHANGES ON WATER RESOURCES, CASE STUDY MLAVA RIVER BASIN

**Jovana Mladenović, Kresojević Milan, Dušan Polomčić, Dejan Đorđević, Boris Vakanjac,
Jugoslav Nikolić, Vesna Ristić Vakanjac**

KVANTITATIVNI STATUS PODZEMNIH VODA ALUVIJONA VELIKE MORAVE

(POTEZ BAGRDAN - UŠĆE)

QUANTITATIVE STATUS OF UNDERGROUND WATER OF VELIKA MORAVA ALLUVIUM

(BARGDAN - CONFLUENCE)

Ivan Antunović, Danijela Ljubić, Stanko Miškić

ZAŠTITA PODZEMNIH VODA ŠPILJE VJETRENICA

GROUNDWATER PROTECTION OF WINDSCREEN CAVE

Ferid Skopljak, Tamara Marković, Amir Jahić, Ćazim Šarić

POJAVA HIPERTERMALNE VODE I VODENE PARE USLJED SAMOZAPALJENJE UGLJA NA

LOKALITETU BRIJESNICA VELIKA, DOBOJ ISTOK, BOSNA I HERCEGOVINA

APPEARANCE OF HYPERTERMAL WATER AND WATER VAPOR DUE TO

SELF-IGNITION OF COAL IN BRIJESNICA VELIKA LOCATION, DOBOJ ISTOK,

BOSNIA AND HERZEGOVINA

Ćazim Šarić, Ferid Skopljak, Merisa Kaljanac

TERMALNE VODE U TURISTIČKOJ PONUDI OPĆINE OLOVO

THERMAL WATERS IN THE TOURIST OFFER OF THE MUNICIPALITY OF OLOVO

**Vesna Ristić Vakanjac, Marina Mitrašinović, Veljko Marinović, Saša Milanović, Ljiljana Vasić,
Branislav Petrović, Petar Vojnović**

ANALIZA USLOVA FORMIRANJA OTICAJA REKE RESAVE (ISTOČNA SRBIJA)

ANALYSIS OF OUTFLOW FORMING CONDITIONS OF THE RESAVA RIVER

(EASTERN SERBIA)



Damir Halilagić

130 GODINA PROCESA ODVODNJAVANJA PODZEMNIH I POVRŠINSKIH VODA RUDNIKA
UGLJA "KREKA"

130 YEARS OF THE GROUND AND SURFACE WATER DRAINAGE PROCESS OF THE
"KREKA" COAL MINE

Ćazim Šarić, Ferid Skopljak, Sabit Begić, Senahid Kovačević

PRIRODNE I EKONOMSKE KARAKTERISTIKE GORNJEG TOKA RIJEKE KRIVAJE SA
FOKUSOM NA POJAVU TERMALNIH VODA

NATURAL AND ECONOMIC CHARACTERISTICS OF THE UPPER COURSE OF THE
RIVER KRIVAJA WITH A FOCUS ON THE EMERGENCE OF THERMAL WATERS

Josip Terzić, Božo Padovan, Maja Briški, Jasmina Lukač Rebereski, Ivana Boljat, Tomislav Novoseli

MAPIRANJE TOKA PODZEMNE VODE U NEPOSREDNOM ZALEĐU KRŠKOG PRIOBALNOG
IZVORA GOLUBINKA KOD ZADRA KORIŠTENJEM ELEKTRIČNE TOMOGRAFIJE

MAPPING OF GROUNDWATER FLOW IN THE DISCHARGE ZONE OF THE COASTAL KARST SPRING
GOLUBINKA USING ELECTRICAL TOMOGRAPHY

Dinka Pašić-Škripić, Šerifa Buševac Gorak

KARAKTERIZACIJA VODNIH TIJELA PODZEMNIH VODA PODRUČJA KLADNJA

CHARACTERIZATION OF WATER BODIES OF GROUNDWATER IN THE KLADNJA AREA

Amir Jahić, Dinka Pašić-Škripić, Izet Žigić

KLIZIŠTE NA REGIONALNOJ CESTI R-456 PRIBOJ-SAPNA, STACIONAŽA 14+750 km

LANDSLIDE ON REGIONAL ROAD R-456 PRIBOJ-SAPNA, STATION 14+750 km

Цвјетко Сандић, Ковиљка Лека

КЛИЗИШТА НА ПРОСТОРУ ОПШТИНЕ ТЕСЛИЋ

LANDSLIDES OF THE TERRITORY OF TESLIĆ MUNICIPALITY

**RUDNA LEŽIŠTA I EKONOMSKA GEOLOGIJA /
ORE DEPOSITS AND ECONOMIC GEOLOGY**

Emina Ademi, Taletović Nermin

GEOLOŠKE I HIDROGEOLOŠKE KARAKTERISTIKE VAREŠA SA OSVRTOM NA
LEŽIŠTE RUPICE

GEOLOGICAL AND HYDROGEOLOGICAL CHARACTERISTICS OF VAREŠ WITH
REFERENCE TO THE RUPICA DEPOSIT

Boris Vakanjac, Rashkhan Nurgali, Rajko Kondžulović, Saša Mil. Stanković, Marko Stojanović,

Byambabadrakh Bayarsaikhan, Mendbayar Javkhlan

POTENCIJALNOST NA URAN ISTRAŽNOG PODRUČJA AIL DADIIN KHAR TOLGOI-2
(JUGOISTOČNA MONGOLIJA)

URANIUM POTENTIAL OF THE EXPLORATION AREA AIL DADIIN KHAR TOLGOI-2
(SOUTHEAST MONGOLIA)

Emina Brkić, Ismir Hajdarević, Mevlida Bajrović

UGLJEVI FEDERACIJE BIH, REZERVE, PERSPEKTIVE EKSPLOATACIJE I UPOTREBE U
SVJETLU ENERGETSKE TRANZICIJE I PROCESA DEKARBONIZACIJE

COALS OF THE FEDERATION OF BIH, RESERVES, PERSPECTIVES OF EXPLOITATION
AND USE IN LIGHT OF THE ENERGY TRANSITION AND DECARBONIZATION PROCESS



GEOTURIZAM - PALEOGEOGRAFIJA GEOMORPHOLOGY - GEOTURISM – PALEOGEOGRAPHY

Alen Lepirica

VELIKA KRAŠKA POLJA BOSNE I HERCEGOVINE
LARGE KARST FIELDS OF BOSNIA AND HERZEGOVINA

Milorad Kličković

DIVERZITET KARSTNIH PROCESA
THE DIVERSITY OF KARST PROCESSES

Ahmed Džaferagić

PROSTORNI RASPORED I GUSTOĆA VRTAČA U VANJSKIM DINARIDIMA BOSNE I HERCEGOVINE
SPATIAL DISTRIBUTION AND DENSITY OF DOLINES IN EXTERNAL DINARIDES OF BOSNIA AND
HERZEGOVINA

Ljiljana Grujičić-Tešić

VRELO GRABOVICE – OBJEKAT GEONASLEĐA
GEOHERITAGE OBJECTS THE SOURCE OF GRABOVICA – GEOHERITAGE OBJECTS

GEOLOGIJA - OBRAZOVNI SISTEM I ASOCIJACIJE GEOLOGY - EDUCATION SYSTEM AND ASSOCIATIONS

**Kristina Šarić, Ana Fociro, Michael Wagreich, Hugo Ortner, Christoph von Hagke, Hans-Jürgen
Gawlick, Eva Gerlšová, Elvir Babajić, Darko Tibljaš, Sibila Borojević Šoštarić, Miklos Kazmer, Jolanta
Burda, Ela Machaniec, Adriana Trojanowska Olichwer, Ágnes Gál, Paul Tibuleac, Luka Gale,
Ondej Nemeč, Igor Duriška, Volker Höck, Corina Ionescu**
CEEPUS MREŽA CIII-RS-0038: VIŠE OD DVE DECENIJE NEGOVANJA SAVREMENOG
OBRAZOVANJA I NAUČNIH TRENDOVA U GEONAUKAMA
CEEPUS NETWORK CIII-RS-0038: MORE THAN TWO DECADES OF SUPPORTING CURRENT
EDUCATIONAL AND SCIENTIFIC TRENDS IN GEOSCIENCES

Iris Vuković Kartal

EVROPSKA FEDERACIJA GEOLOGA I POGLED U BUDUĆNOST - PRIMER TIMREX PROJEKTA
EUROPEAN FEDERATION OF GEOLOGISTS AND THE OUTLOOK INTO THE FUTURE -
THE TIMREX PROJECT EXAMPLE



**III KONGRES GEOLOGA
BOSNE I HERCEGOVINE
SA MEDUNARODNIM UČEŠĆEM**



**GEOLOGIJA - OBRAZOVNI SISTEM I ASOCIJACIJE
GEOLOGY - EDUCATION SYSTEM AND ASSOCIATIONS**

Neum, 21.-23.09.2023.



CEEPUS NETWORK CIII-RS-0038: MORE THAN TWO DECADES OF SUPPORTING CURRENT EDUCATIONAL AND SCIENTIFIC TRENDS IN GEOSCIENCES

Kristina Šarić¹, Ana Fociro², Michael Wagneich³, Hugo Ortner⁴, Christoph von Hagke⁵, Hans-Jürgen Gawlick⁶, Eva Gerlšová⁷, Elvir Babajić⁸, Darko Tibljaš⁹, Sibila Borojević Šoštarić¹⁰, Miklos Kazmer¹¹, Jolanta Burda¹², Ela Machaniec¹³, Adriana Trojanowska Olichwer¹⁴, Ágnes Gál¹⁵, Paul Tibuleac¹⁶, Luka Gale¹⁷, Ondej Nemeč¹⁸, Igor Duriška¹⁹, Volker Höck⁵, Corina Ionescu¹⁵

¹University of Belgrade (Serbia), Faculty of Mining and Geology; kristina.saric@rgf.bg.ac.rs;

²Polytechnic University of Tirana (Albania), Faculty of Geology and Mining;

³University of Vienna (Austria), Department of Geology;

⁴University of Innsbruck (Austria), Institute of Geology, Faculty of Geo- and Atmospheric Sciences;

⁵Paris Lodron University of Salzburg (Austria), Department of Geography and Geology;

⁶Montanuniversität in Leoben (Austria), Department of Applied Geosciences and Geophysics;

⁷Masaryk University in Brno (Czech Republic), Department of Geological Sciences;

⁸University of Tuzla, (Bosnia and Herzegovina), Faculty of Mining, Geology and Civil Engineering;

⁹University of Zagreb (Croatia), Faculty of Science;

¹⁰University of Zagreb (Croatia), Faculty of Mining, Geology and Petroleum Engineering;

¹¹Eötvös Lorand University Budapest (Hungary), Institute of Geology;

¹²University of Silesia in Katowice (Poland), Institute of Earth Sciences in Sosnowiec;

¹³Jagiellonian University in Cracow (Poland), Institute of Geological Sciences;

¹⁴University of Wrocław (Poland), Institute of Geological Sciences;

¹⁵Babeş-Bolyai University Cluj-Napoca (Romania), Department of Geology;

¹⁶Alexandru Ioan Cuza University of Iasi (Romania), Department Geology and Geochemistry;

¹⁷University of Ljubljana (Slovenia), Department of Geology;

¹⁸Comenius University in Bratislava (Slovakia), Department of Mineralogy and Petrology;

¹⁹Technical University in Košice (Slovakia), Institute of Geosciences.

Key words: student and teacher mobility, Alpine-Carpathian-Balkan-Dinaride geological realm, fundamental and applied geology

Abstract

The CEEPUS network CIII-RS-0038 “Earth-Science Studies in Central and South-Eastern Europe (acronym: EURO Geo-Sci)” is one of the oldest active networks within the CEEPUS program, which has been continuously awarded for 24 years. It is dedicated to the development of both fundamental and applied geosciences by creating a unique educational system among universities belonging to the Central and South-Eastern Alpine-Dinaride-Carpathian-Balkanide geological region. So far, the performance of student and teacher mobilities, as the most significant activity of the Network, has involved 19 participating units (faculties) from 11 countries; it resulted in more than 1500 awarded exchanges and about 20 successfully defended MSc and PhD theses in the frame of Joint Supervision programs. With respect to traditional topics and learning modes, EURO Geo-Sci continuously incorporates new knowledge, modern analytical methods and up-to-date learning approaches (e.g. online lectures and consultations) into the educational system.



It helps the participating units to readily respond to many societal challenges, such as the protection of critical infrastructure and water resources, solving environmental problems, or searching for new geo-sources.

1. Introduction

Nowadays geology and the whole geosciences evolve into one of the scientific disciplines that are deeply involved in multidisciplinary research and applications. This is greatly enhanced due to the growing needs of the modern society, which all have a 'geo' significance, such as the preservation of water resources, problems of climate crisis and environmental pollution (air, soil and water), the quest for new and sustainable sources of energy, the lack of new mineral raw materials as, e.g., needed for the energy transition, the exploitation problems of the existing resources. The importance of geology is also reflected in the civil fight against geological hazards and risks (e.g., earthquakes, tsunamis, landslides, volcanic eruptions and others; see Cvetković, ed., 2019; Šarić et al., 2022). In addition to all of the mentioned above, geology also has a special place in preservation of cultural heritage and geotourism research (see Vitezović et al., eds., 2020).

Such high demands of our society made it clear that there is a large necessity to further develop geological education in a group of countries that are geographically related and share common societal interests. The CEEPUS (Central European Exchange Program for Studies) network no. CIII-RS-0038 entitled "Earth-Science Studies in Central and South-Eastern Europe (acronym EURO Geo-Sci) has been established following this idea. Its main aim is to work on the development of higher education systems in the field of geosciences in Central and South-Eastern Europe, more precisely in the geologically unique and simultaneously extremely heterogeneous and complex Alpine-Dinaride-Carpathian-Balkanide geological realm. Instead of focusing on one restricted geological area, the Network chooses to focus on the geology of a much wider orogenic belt that underwent similar geological evolution and therefore shares many similar characteristics and common interests. In this way, by reinforcing basic geological disciplines through a systematic approach (from fieldwork that involves collecting samples and field data by a geological hammer and a geological compass to the acquisition and interpretation of modern analytical data using most sophisticated instruments) (Figure 1-c), EURO Geo-Sci contributes to the education in both fundamental and the applied geological disciplines for providing our society with training experts who are ready to respond to all professional challenges.

This paper first briefly explains what the CEEPUS program is, and then describes how the EURO Geo-Sci network operates through several segments. The reader can learn more about the Network history, the area that is covered by the cooperation, the aim and the mission as well as about the mobility of students and teachers, which is the most important activity within EURO Geo-Sci. Illustrations of EURO Geo-Sci activities can also be found at <https://ceepus.rgf.bg.ac.rs/>.



2. What is the CEEPUS program?

Central European Exchange Program for University Studies - CEEPUS is a program of student and teacher mobility within the Central European universities. Along with Austria, the program's founder country, there are other participating members: Albania, Austria, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Hungary, Moldavia, Montenegro, North Macedonia, Poland, Romania, Slovakia, Slovenia, Serbia and Universities of Priština, Prizren and Peć from Kosovo (<https://www.ceepus.info/content/about>). As it is reported by Šarić (2022), “the main aims of the program are the improvements of education standards in geosciences through academic mobility of students and teachers within the Central and partly within the Southern European region. The mobility involves short and semestral courses, issuing of common diplomas and recognition of ECTS acquired during the outgoing visits, all with the general aim at establishing a common European Higher Education Area”.



Figure 1. Complex geological research and education start in the field with collecting samples, field observations and measurements and continue in modern instrumental laboratories; a – Prof. Bernhard Fügenschuh (University of Innsbruck, Austria) gives field lectures to students from Serbia; b – field work with a student group (Katarina Raičević from University of Belgrade, Serbia, with students and professors from Eötvös Loránd University Budapest, Hungary); c – BSc student Filip Rajković from University of Belgrade (Serbia) is preparing samples for further analyses for his mobility stay at University of Salzburg (Austria) in school year 2023/24.

2. CIII-RS-0038: EURO Geo-Sci network

2.1. Brief history of EURO Geo-Sci

EURO Geo-Sci network (CIII-RS-0038: „Earth-Science Studies in Central and South-Eastern Europe”) is one of the oldest CEEPUS networks, established back in 1999 by Prof. Volker Höck (Paris Lodron University of Salzburg, Austria), who was the first network coordinator. About ten years later, the Network coordination was taken over by Prof. Corina Ionescu (Babeş-Bolyai University Cluj-Napoca, Romania). Dedicated and enthusiastic efforts of these two pioneer coordinators have resulted in the creation of a stable and active Network ready to follow new trends in geology and to accommodate with many difficulties that can endanger its mission.



In 2019, Prof. Kristina Šarić (University of Belgrade, Serbia), as the third and the actual Network coordinator, took an advantage to continue with this rich tradition but at the same time she faced with unexpected challenges (her first coordination school year 2019/'20 was a pandemic year with lockdowns) and new directions of the Network development (active incorporation of the awarded mobilities into activities of current scientific programs, e.g. Recon Tethys project, stronger cooperation with geological and mining companies, free access to the Scientific Webinar sessions organised by University of Wrocław - Institute of Geological Sciences to all EURO Geo-Sci participating units etc). This common enterprise has involved all the local coordinators of participating units and resulted in continuously awarded applications for all 24 years of the Network existence. At the moment, the Network has 19 participating units from eleven countries, which are gathered in a Network consortium represented by the local coordinators (one teacher from each participating unit), who accepted a voluntary engagement and continuous work during whole academic years.

2.2. The EURO Geo-Sci mission, area and participating units

As it can be seen from the description of EURO Geo-Sci: “the Network aims at improving the quality of teaching and training in fundamental and applied geosciences within the unique Alpine-Dinaride-Carpathian-Balkanide geological realm. The main expected outcomes are: a) diversification of teaching topics and methods, b) strengthening geo-interdisciplinarity, c) increasing the scientific contribution through improved learning and teaching standards, d) contributing to the overall development of geosciences in the region, and e) providing measurable contribution in many societally relevant aspects: e.g., environmental problems (air, water and soil pollution), water and ore resources, geo-hazards (landsliding, floods), preservation of cultural heritage. This makes the EURO Geo-Sci network a perfect mode of multidisciplinary cooperation in education and research in this region”.

The number of participating units is flexible and depends on the actual interest of new faculties to join the Network or on possible resigns of inactive participating units (Šarić & Ionescu, 2018; https://ceepus.rgf.bg.ac.rs/?page_id=39). With very small variations, the number of the participating units continuously has steadily increased from the foundation of the Network until today, proving that the Network received substantial recognition from geological educational entities of Central and South-Eastern Europe.

At the moment, the Network consists of 19 faculties from 11 countries: Albania (Polytechnic University of Tirana), Austria (Universities of Innsbruck, Salzburg, Vienna and Montanuniversitaet Leoben), Bosnia and Herzegovina (University of Tuzla), Croatia (two faculties from University of Zagreb), Czech Republic (University of Brno), Hungary (Eötvös Lorand University Budapest), Poland (Universities of Wrocław, Silesia in Katowice and Jagiellonian University Cracow), Romania (Babeş-Bolyai University Cluj-Napoca and Alexandru Ioan Cuza University Iași), Slovakia (Comenius University Bratislava and



Technical University Košice), Slovenia (University of Ljubljana) and Serbia (University of Belgrade) (https://ceepus.rgf.bg.ac.rs/?page_id=39). This covers almost 85% of the surface of the whole CEEPUS area (Figure 2a, b). The Network is pleased to announce that for the application 2023/24 two new units joined the Network: University of Tuzla, Faculty of Mining, Geology and Civil Engineering (Bosnia and Herzegovina) and University of Zagreb, Faculty of Mining, Geology and Petroleum Engineering (Croatia) (Figure 3a-c).

2.3 Main activities within EURO Geo-Sci

Main activities within the Network are dedicated to student and teacher mobilities through which continuous improvement of the learning process in geosciences is realized (Figure 3d-f). Students staying at host universities are attending theoretical and practical courses with special emphasis on subjects that are absent from the curriculum of their home faculties. The mobility of teachers includes the holding of courses, but also individual work with students of all study levels (BSc, MSc and PhD students). Teachers are also involved in the so-called Joint Supervision programs, which encompass the guidance of students through their preparation of BSc, MSc or PhD theses by two teachers (from their own and the visiting institution). The wide range of geological disciplines covered by the EURO Geo-Sci network program comprises activities that can be illustrated through the following description: from the geological hammer to excited electrons and from field descriptions to the prediction of geological events (volcanic eruptions, landslides, earthquakes). This actually means that we start with field measurements and sample collections, then continue with laboratory preparation of the collected samples up to the application of a large number of the most modern instrumental methods, such as digital polarisation microscopy and scanning electron microscopy with energy-dispersive and wave-length spectrometry, electron back scattered diffraction technique, cathodoluminescence analysis, freezing-heating stage in fluid-inclusion studies, thermochronological methods, porosity-permeability lab instruments, numerical modelling techniques, and many others, as well as professional softwares (example from University of Zagreb, Faculty of Mining, Geology and Petroleum Engineering: <https://www.rgn.unizg.hr/hr/software>).

Apart from performing the awarded mobilities, other important Network activities are annual meetings of the local coordinators, consultations with all interested groups and potential stakeholders (Figure 3g-i) and dissemination and outreach tasks of EURO Geo-Sci (Figure 3j-l).

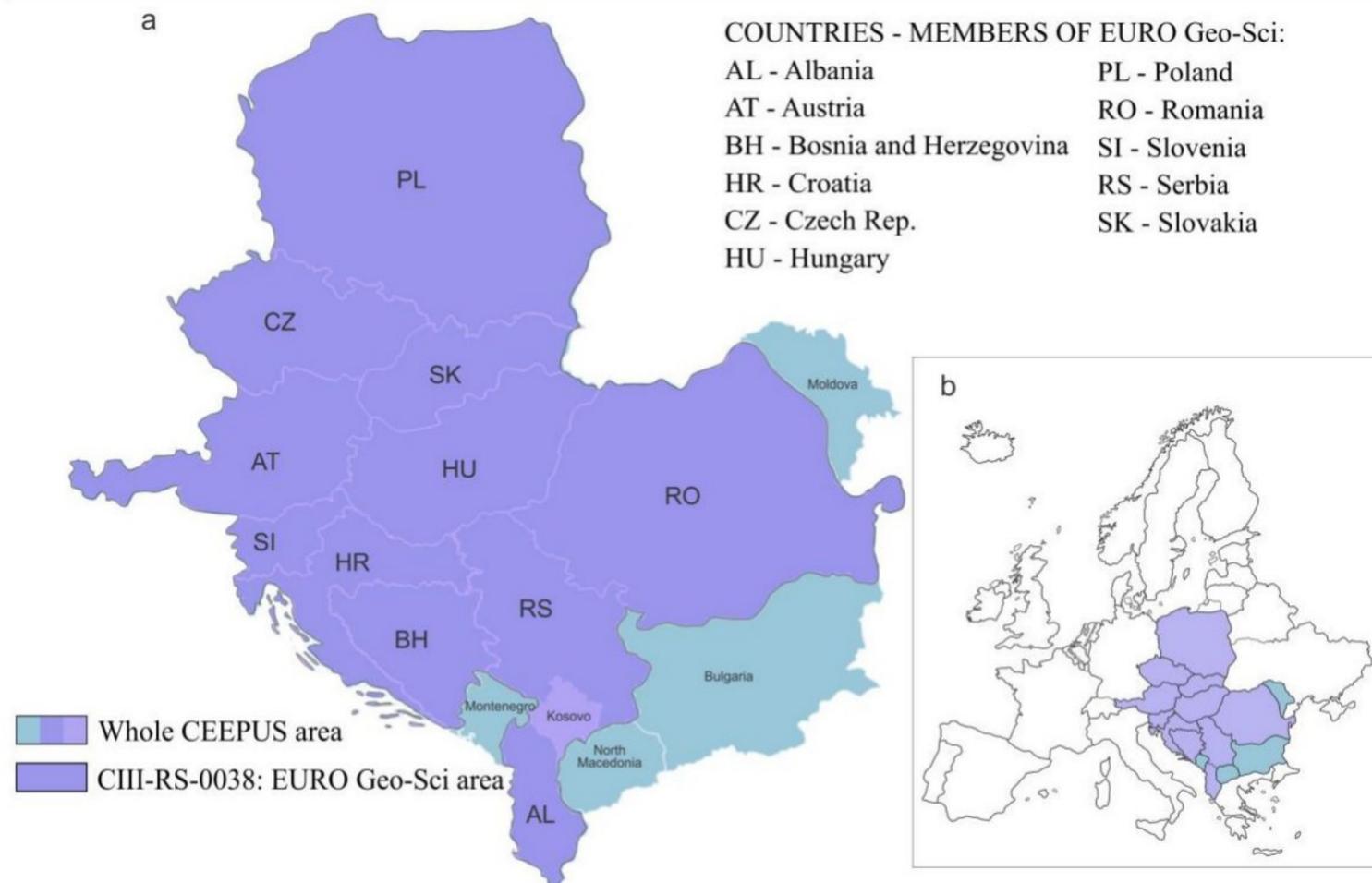


Figure 2. a - the map of the entire CEEPUS area with countries that participate to EURO Geo-Sci network (modified from <https://www.ceepus.info/content/about>), b - position of the CEEPUS area in Europe.

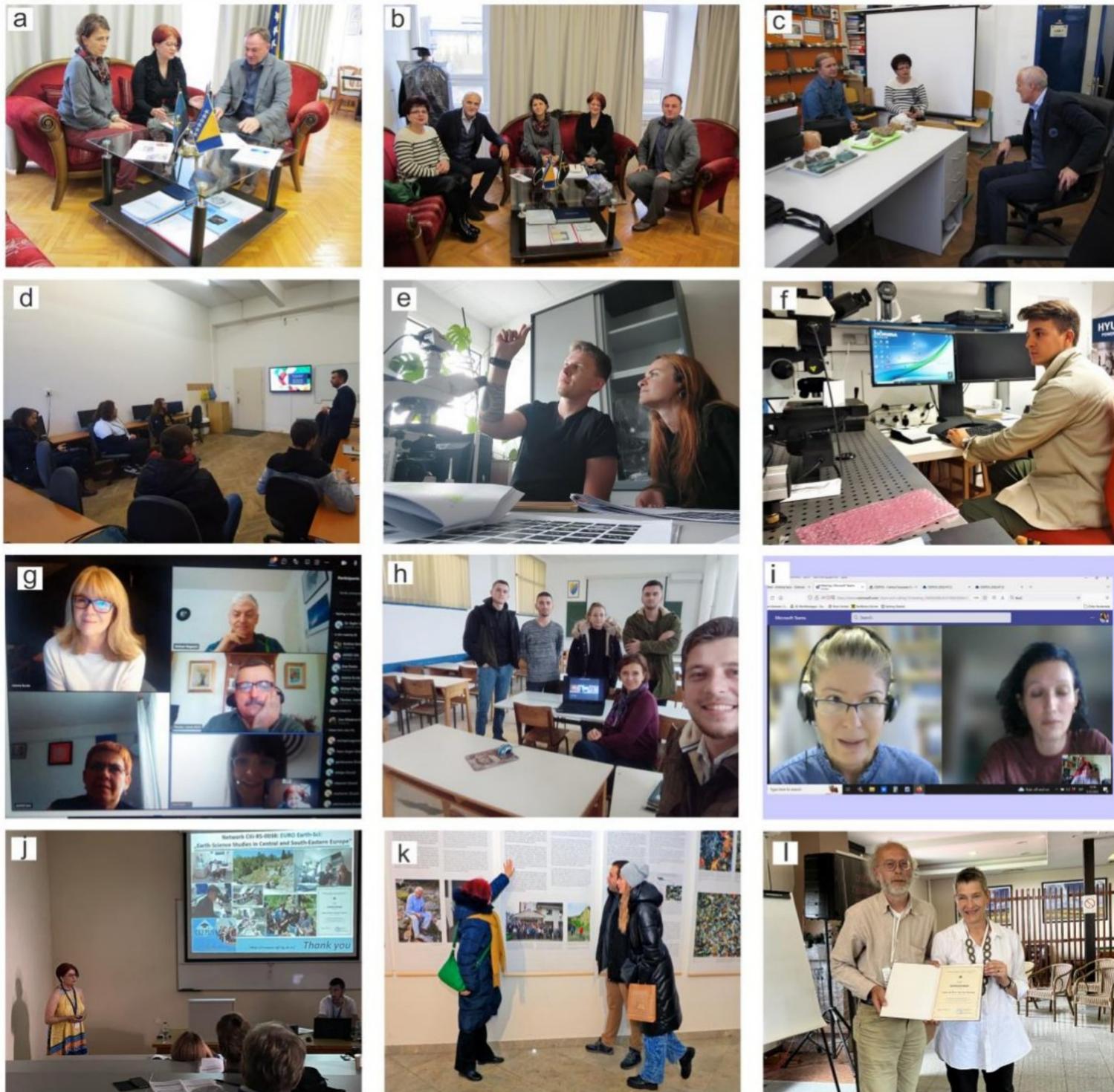


Figure 3. Some of the activities performed within the EURO Geo-Sci network: a-c - visit of Prof. Kristina Šarić, Network coordinator and academician Prof. Vladica Cvetković, former local coordinator from University of Belgrade - Faculty to Mining and Geology (UB-FMG) to Tuzla, consultations with colleagues from the University of Tuzla - Faculty of Mining, Geology and Civil Engineering (Prof. Kemal Gutić - dean, Prof. Elvir Babajić - local coordinator, Prof. Rejhana Dervišević, Prof. Zehra Salkić), preparations and signing the CEEPUS documents: Letter of Intent and Letter of Endorsement; d-f - mobilities as the main Network activity: d - lectures of Prof. Jatun Pekmezi from Polytechnic University of Tirana given at the Technical University in Košice (Slovakia), e - PhD student Adam Wierzbicki from the Jagiellonian University in Krakow (Poland) during his visit to University of Vienna (Austria); f - PhD student Stefan Petrović from UB-FMG (Serbia) during his visit to Montanuniversitaet of Leoben (Austria); g-i - communication and consultations: g - annual online meeting, h - consultations with students from University of Tuzla - Faculty of Mining, Geology and Civil Engineering, i - consultations with local coordinator Prof. Sibila Borojević Šoštarić from University of Zagreb - Faculty of Mining, Geology and Petroleum Engineering and Ms Tanja Veljak from National CEEPUS Office (Croatia); j-l - dissemination activities: j - presentation of the EURO Geo-Sci by the Network coordinator Prof. Kristina Šarić at XXII International Congress of the Carpathian-Balkan Geological Association (2022, Plovdiv, Bulgaria), k - promotion of EURO Geo-Sci in Serbia within the exhibition entitled: „Illuminating rocks – scientific & artistic journey through the rocks and 150 years of cooperation between Austria and Serbia in the field of geology“ (author: Network coordinator Kristina Šarić, co-operators are Adrein Fiex, cultural attaché of the embassy of Rep. of Austria in Serbia, Hans-Jürgen Gawlick, professor from Montanuniversitaet Leoben; supported by Austrian Cultural Forum Belgrade and UB-FMG. l - Prof. Hans-Jürgen Gawlick (Montanuniversitaet Leoben, Austria) awarded by the certificate of appreciation Prof. Biljana Abolmasov (dean, UB-FMG) for his contribution to the CEEPUS network from UB-FMG (Serbia) at XVIII Serbian Geological Congress (2022, Divčibare, Serbia).



It is also worth noting that student and faculty staff mobilities are often used for establishing and developing new research methods at corresponding institutions. Some recent examples include the visits of PhD student Stefan Petrović and Dr. Miloš Velojić to Leoben, who received training in studying fluid inclusions (heating/freezing stage) and brought newly acquired knowledge back to their home institution (University of Belgrade – Faculty of Mining and Geology) (Šarić, 2022).

2.4. Challenges and future

Such a long-lasting network is continuously faced with challenges imposed by various circumstances. As Borojević Šoštarić and Šarić (2023, in press) reported, the challenges can be divided into internal (e.g., outdated curricula of some programs, the lack of innovative content, the inactivity of some local coordinators, local university administrative loads) and external (e.g., the presence of other networks which offer higher financial support for the applicants, effects of demographic trends and regional brain drain processes, pandemics, unstable political situations, negative public perceptions of the geological-mining sector due to environmental and political activism).

Identifying challenges and recognizing new needs and circumstances that can affect both geological sciences and society are some of the most important guidelines for maintaining the Network performances in the future. The close involvement of active students and young enthusiastic researchers in their early post-doc phase in the Network guarantees a dynamic momentum to face such challenges and to constantly grow and adapt to the great societal challenges associated with geosciences. Care about the future of the Network is also marked by cooperation with other complementary networks within CEEPUS as well as by the recognition of the quality of EURO Geo-Sci by other institutions, such as for instance European Federation of Geologists (EFG). Namely, Network coordinator Prof. Kristina Šarić and Ms. Maria Tzima, coordinator of the EFG Panel of Experts and Education, are designing the way by which EURO Geo-Sci can contribute to the academic platform that is currently being established by EFG. Moreover, the planned cooperation between EURO Geo-Sci and EFG is fully approved and supported by Mr. Michael Schedl, secretary general, from Central CEEPUS office.

3. Conclusion

The CEEPUS network CIII-RS-0038 "Earth-Science Studies in Central and South-Eastern Europe (acronym: EURO Geo-Sci)" focussed on improving education and research in the field of fundamental and applied sciences, consists of 19 faculties (participating units) from 11 countries. In its duration of 24 years, the Network has continuously followed current trends in geology and applied new achievements in geological education and research. The Network value can be easily measured through multiple successfully defended MSc and PhD theses done within Joint Supervision programs, through cross-institutional assistance and technical expertise for establishing new methods and modernizing laboratories, as well as in holding numerous courses outside the existing curriculum at visiting participating units.



Particular importance is related to activities that contribute to better visibility of the Network for both the academic community and public sector in each participating country. This is especially true when dealing with the sustainable exploration of mineral resources, the study and protection of water resources, problems of environmental pollution, the prediction of geological hazards and risks, and with many other societal relevant aspects and challenges. The future of EURO Geo-Sci, regardless of the importance of education and research in the field of geology, will also depend on the enthusiasm and commitment of the local coordinators, the help of relevant ministries and other institutions, as well as on the ability to respond to unpredictable challenges.

Acknowledgements

This publication is financed by the Contract on realization and financing of scientific research of SRI in 2023“, No. 451-03-47/2023-01/200126. The coordinators thank to Central CEEPUS office (Michael Schedl, Marlene Grubeck-Grabner and Katrin Weber), to Tobias Stengg, all National CEEPUS officers and to faculties' boards for their dedicated work, help and support. We also thank to all applicants who successfully realized their mobilities, as well as to GemHunters.rs for continuous volunteering work on the network website updating. We appreciate help of Suzana Erić and Vladica Cvetković for the final preparation of the text.

References

1. Borojević Šoštarić, S. & Šarić, K., (2023): CEEPUS Network CIII-RS-0038: recognition of challenges in geological education in South-Eastern Europe and prompt responds. 7th Croatian Geological Congress, Poreč, Croatia, in press.
2. Cvetković, V., (ed), (2019): Geohazard in Serbia in the 21st Century – Knowledge is the best bastion against the natural disasters. Serbian Academy of Sciences and Arts, Lecture series 5, 129 pp. ISBN 978-86-7025-844-0.
3. <https://ceepus.rgf.bg.ac.rs/>
4. https://ceepus.rgf.bg.ac.rs/?page_id=39
5. <https://www.ceepus.info/content/about>
6. <https://www.rgn.unizg.hr/hr/software>
7. Šarić, K., (2022): CEEPUS network CIII-RS-0038 at the Faculty of Mining and Geology, University of Belgrade: more than twenty years of contribution to student and teacher mobility. XVIII Serbian Geological Congress "Geology solves the problems", June 1-4, 2022, Divčibare, 228-229.
8. Šarić, K., Fociro, A., Wagneich, M., Ortner, H., von Hagke; C., Gawlick, H-J., Gerlšová, E., Tibljaš, D., Kazmer, M., Bujtor, L., Burda, J., Machanec, E., Trojanowska Olichwer, A., Gál, Á, Tibuleac, P., Gale, L., Fridrichová, J., Duriška, I. (2022): CEEPUS network CIII-RS-0038: improving geological education to better serving the society. In: Eds: I. Peytcheva, A. Lazarova, G. Granchovski, R. Ivanova, I. Lakova, L. Metodiev, XXII International Congress of the Carpathian-Balkan Geological Association, 7–11 September 2022, Plovdiv, Bulgaria, *Geologica Balcanica*, 250 p.
9. Šarić, K. & Ionescu, C., (2018): The CEEPUS network “Earth-Science Studies in Central and South-Eastern Europe” – nineteen years of challenges and success. XXI International Congress of the Carpathian Balkan Geological Association (CBGA), Salzburg, September 10-13, 2018, (Eds): Franz Neubauer, Uwe Brendel & Gertrude Friedl, *Geologica Balcanica*, Abstract Volume, 388 p.
10. Vitezović, S., Šarić, K., Antonović, D., (eds), 2020: Current Interdisciplinary Studies in Technology in the Archaeology of the South-East Europe. First meeting of the Section for Archaeometry, Archaeotechnology, Geoarchaeology and Experimental Archaeology. Conference proceedings, Belgrade, February 28th 2020, Serbian Archaeological Society. ISBN 978-86-80094-10-6.