



7th International Symposium
MINING AND ENVIRONMENTAL PROTECTION
25 - 28 September 2019., Vrdnik, Serbia

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MINING AND ENVIRONMENTAL PROTECTION

BOOK OF ABSTRACTS

**Vrdnik,
25 - 28 September 2019**

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7th International Symposium

MINING AND ENVIRONMENTAL PROTECTION

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PLENARY SESSION

MICROBIAL DIVERSITY IN UNIQUE WORLD MINE ALLCHAR - RESERVOIR OF MINERALS AND MICROBES

Vaso Taleski¹, Ivica Dimkic², Blazo Boev¹, Ivan Boev¹, Sanja Zivkovic³, Milka Zdravkovska¹, Slavisa Stankovic²

¹ University "Goce Delcev" Stip, North Macedonia, vaso.taleski@ugd.edu.mk

² University of Belgrade, Faculty of Biology, Serbia

³ University of Belgrade, Institute of Nuclear Sciences Vinca, Serbia

Abstract: *Allchar is one of the oldest mines in the Republic of North Macedonia, situated in the southern part of the country. Some legend suggests that mine was in use from ancient - antic time, but other information estimates its use since 12th or 13th century. Exploitation was focused on arsenic-antimony ore.*

From 47 worldwide registered minerals containing thallium (Tl), 13 exists in Allchar. Thallium is extremely interesting for the science as a geochemical detector of solar proton-proton neutrinos. Allchar is known as a unique mine in the world, richest of purest (contains only traces of K, Cr, Fe, Cu, Pb and Zn) deposits of lorandite (TlAsS₂), the most common mineral containing thallium.

Aim of this study was detection of presence of microbes and microbial diversity (bacteria and fungi) using metagenomic methods and bioinformatic analysis.

Six samples from three different areas of the mine were investigated. DNA was extracted with special kit for environmental samples.

Results, presented through the Krona viewer, showed presence of huge microbial community. On phylum level most dominant in all samples were Proteobacteria (36-43%). In two samples, results for fungi showed presence of fila Ascomycota and Zygomycota. ICP-OES analysis prepared according EPA method 3051a, detected 25 elements and high concentration of As and Tl.

Key words: *microbial diversity, thallium, metagenomic, thalium, mine Allchar*

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Belgrade, Serbia**

PROGRAMME
OF THE 7th INTERNATIONAL SYMPOSIUM ON
MINING AND ENVIRONMENTAL PROTECTION

25.09.2019 WEDNESDAY

15.00 -19.00	Arrival and Registration of Participants
19.00	Welcome Cocktail

26.09.2019 THURSDAY

09.00-11.00	Arrival and Registration of Participants
11.00-11.30	The Opening Ceremony of the Symposium
11.30-14.00	Plenary Lectures
Presentation of ZAM - SERVIS s.r.o., Czech Republic	
Presentation of Educational project "Dubrovnik International ESEE Mining school" (acronym DIM ESEE), European Institute of Innovation and Technology EIT – RAW MATERIALS	

Jorge Loredó Ivica Ristović, Andrijana Nedeljković, Spain, Serbia: THE PROBLEM OF CONTAMINATED LAND WITH HG FROM MINING ACTIVITIES THROUGH TWO CASE STUDIES IN SERBIA AND NORTHERN SPAIN

Phan Quang Van, Dao Trung Thanh, Nguyen Phuong, Trinh Dinh Huan, Robert Moeckel, Thomas Heinig, Vietnam, Germany: AN ASSESSMENT OF NATURAL RADIOACTIVITY IN THE NAMXE RARE EARTH DEPOSIT, LAICHAU PROVINCE, VIETNAM

Robert Sajin, Slovenia: SOIL POLLUTION AS A CONSEQUENCE OF MINING AND METALLURGICAL ACTIVITIES (STUDY CASES FROM FORMER YUGOSLAVIA)

Marija Zivkovic, Serbia: EFFECTS OF ENERGY PRODUCTION AND CONSUMPTION ON AIR POLLUTION IN SERBIA

Branko Lekovic, Vesna Karovic Maricic, Dusan Danilovic, Serbia: MUD TREATMENT IN OFFSHORE DRILLING

14.00-15.00	Lunch Break
15.00-19.00	First Working session

Hartwig Gielisch, Germany: COAL FIRES - A SERIOUS PUBLIC HEALTH DANGER CASE STUDIES FROM INDIA AND CHINA

Javier Menéndez, Jorge Loredó, Spain: CIRCULAR ECONOMY IN MINE CLOSURE PROCESSES: CLEAN ENERGY PRODUCTION AND ENERGY STORAGE SYSTEMS

Nikoleta Mikusová, Gabriel Fedorko, Vierošlav Molnár, Slovakia HOW TO USE DECISION-MAKING METHODS FOR WASTE MANAGEMENT

Predrag Dašić, Serbia: ANALYSIS OF THE APPLICATION OF RESPONSE SURFACE METHODOLOGY (RSM) IN MINING

Jasminka Alijagic, Robert Sajin, Slovenia: HOW TO IMPROVE SPATIAL MAPPING USING VARIOUS MODELLING TECHNIQUES?

Nediljka Gaurina-Medjimurec, Borivoje, Pasic, Igor Medved, Petar Mijic, Croatia: DRILLING WASTE INJECTION

Karolina Novak Mavar, Nediljka Gaurina-Medjimurec, Lidia Hrnčević, Croatia: CARBON CAPTURE, UTILIZATION AND STORAGE (CCUS) - THE ENVIRONMENTAL IMPACT FROM PROJECT START TO CLOSURE

Zoran Despodov, Dejan Mirakovski, Zoran Panov, Vanco Adjiski, North Macedonia: THE IMPACT OF THE OLD MINING WORKS IN BENTOMAK MINE - KRIVA PALANKA ON THE CONSTRUCTION OF THE ROAD INFRASTRUCTURE

Milena Lekic, Gordana Gajic, Jelena Mutic, Ivica Ristic, Serbia: DIRECTIONS FOR ECOLOGICAL RESTORATION OF LIGNITE COAL MINE OVERBURDEN DUMPS IN SERBIA—CASE STUDY OPEN PIT 'DRMNO'

➡ Bogoljub Vuckovic, Bojan Dimitrijevic, Hranislav Stojkovic, Serbia: ENVIRONMENTAL RISKS, NATURAL INDICATORS AND BENEFITS OF GEOLOGICAL EXPLORATION OF COAL, KOLUBARA COAL MINES, SERBIA

Radule Tosovic, Serbia: THE IMPORTANCE OF ECONOMIC ANALYSIS FOR DEFINITION OF SUSTAINABLE DEVELOPMENT OF MINERAL RESOURCES

Aleksandar Madzarevic, Dejan Ivezić, Marija Živković, Milos Tanasijević, Serbia: ENVIRONMENTAL ENERGY SECURITY INDICATORS AS TOOLS FOR ENVIRONMENTAL PROTECTION

Nikoleta Mikusová, Gabriel Fedorko, Vierošlav Molnár, Slovakia: EVALUATION OF CLEANER PRODUCTION AND TECHNOLOGIES IN THERMAL POWER PLANT

➡ Jovana Galjak, Jelena Djokic, Irma Dervisevic, Gordana Milentijevic, Jasmina Dedic, Serbia: ENVIRONMENTAL IMPACT OF THERMAL ELECTRIC POWER PLANT OBILIC IN CHANGING CLIMATIC CONDITIONS

Vladimir Malbasic, Vojislav Timarac, Republic of Srpska, Bosnia and Herzegovina: MATHEMATICAL MODELING OF PRODUCTION PLAN FOR THE REQUIRED AMOUNT OF BIOMASS ON DEGRADED MINE SURFACES

Snezana Aleksandrovic, Ilija Jeftenic, Serbia: ANALYSIS OF VOLTAGE FLUCTUATIONS INFLUENCE ON THE MINING PLANTS EFFICIENCY

Miodrag Kezovic, Serbia: THE IMPORTANCE OF GEOLOGY FOR THE RATIONAL USE OF KOLUBARA COAL

27.09.2019 FRIDAY

10.00-14.00

Second Working session

⑤ Phan Quang Van, Tran The Dinh, Dao Trung Thanh, Than Van Lien, Vietnam: SEPARATION METHOD OF THE URANIUM AND THORIUM ELEMENTS FROM RARE EARTH ORE PROCESSING – CASE STUDY FOR NAMXE RARE EARTH DEPOSIT IN LAICHAU, VIETNAM

— Maja Kokunesoski, Ljiljana Jankovic Mandic, Zvezdana Bascarevic, Djordje Saponjic, Svetlana Ilic, Adela Egelja, Aleksandra Saponjic, Serbia: COMPOSITION AND NATURAL RADIONUCLIDES IN CLAY FROM KOLUBARA MINING BASIN, SERBIA

— Josip Isek, Dusan Danilovic, Miroslav Crnogorac, Branko Lekovic, Serbia: RADIOACTIVE ISOTOPE ²²⁶Ra IN OILFIELD PRODUCED WATER

- Aleksandra Saponjic, Ljiljana Jankovic Mandic, Zvezdana Bascarevic, Svetlana Ilic, Djordje Saponjic, Adela Egelja, Maja Kokunesoski, Serbia: CHARACTERIZATION AND RADIONUCLIDE CONTENTS OF DIATOMSCEOUS EARTH FROM KOLUBARA MINING BASIN, SERBIA
- ④ Boris Vakanjac, Neil Rutherford, Vesna Ristic Vakanjac, Suzana Djordjevic Milosevic, Tanita Djumic, Serbia, Australia: NATURAL RADIOACTIVE PHOSPHATE-BEARING ANOMALIES OF DORNOGOVI, MONGOLIA
- ④ Miroslav Pavlovic, Marijana Pantovic Pavlovic, Pavel Bartl, Jasmina Stevanovic, Radoje Pantovic, Katarina Pantovic Spajic, Bojan Radak, Serbia, Czech Republic: RADIOTRACER PARAMETERS FOR FLOW METER CALIBRATION
- ➡ Vaso Taleski, Ivica Dimkic, Blazo Boev, Ivan Boev, Sanja Zivkovic, Milka Zdravkovska, Slavisa Stankovic, North Macedonia, Serbia: MICROBIAL DIVERSITY IN UNIQUE WORLD MINE ALLCHAR - RESERVOIR OF MINERALS AND MICROBES-
- Irma Dervisevic, Almin Dervisevic, Jovana Galjak, Jelena Djokic, Serbia: THE INTEGRATED MODIFIED TECHNOLOGICAL AND THE BIOLEACHING PROCESS OF RECYCLING VALUABLE METALS FROM PCBs OF THE COMPUTER AND MOBILE PHONES
- ④ Svetlana Ristic, Slavisa Stamenkovic, Robert Sajin, Milica Stojkovic Piperac, Serbia, Slovenia: SPATIAL DISTRIBUTION OF AIR POLLUTION IN SERBIA USING LICHEN
- Sonja Milicevic, Milan Kragovic, Vladan Milosevic, Sanja Martinovic, Jelena Carapic, Serbia: COPPER REMOVAL CAPACITY BY ZEOLITE: COMPARATION IN A BATCH AND FIXED-BED SYSTEM
- Maja Pagnacco, Milan Kragovic, Jelena Gulicovski, Jelena Maksimovic, Marija Stojmenovic, Aleksandra Milutinovic-Nikolic, Predrag Bankovic, Serbia: THE EFFECTS OF DIFFERENT SIZE CLASSES ZEOLITE FROM VRANJSKA BANJA DEPOSIT ON OSCILLATORY BRIGGS – RAUSCHER REACTION
- Zorica Lopacic, Milan Kragovic, Jelena Milojkovic, Tatjana Sostaric, Aleksandra Janjicijevic, Marija Mihajlovic, Marija Kojic, Serbia: LEAD REMOVAL FROM CONTAMINATED WATERS - RENEWABLE VS. NONRENEWABLE RESOURCES
- ④ Vesna Ristic Vakanjac, Jugoslav Nikolic, Boris Vakanjac, Dusan Polomcic, Marina Cokorilo Ilic, Dragoljub Bajic, Milan Kresojevic, Serbia: SURFACE WATER FLOWS AS IMPACTED BY SAND AND GRAVEL MINING: CASE STUDY OF THE VELIKA MORAVA RIVER, SERBIA
- Dusica Vucinic, Djurica Niksic, Predrag Lazic, Serbia: CLAYED WASTEWATER TREATMENT
- ④ Robert Sajin, Aleksandra Trenčovska, Slovenia: MINERAL POTENTIAL OF MINING AND PROCESSING TAILINGS IN THE ESEE REGION
- Ksenija Djokovic, Gordana Hadzi-Nikovic, Nenad Susic, Serbia: ASSESSMENT CLASS OF DISPERSIVITY OF FLY ASH-SOIL MIXTURE

14.00-15.00	Lunch Break
15.00-18.30	Third Working session
18.30-19.00	Closing Session
20.00	Official Dinner

Daniela Marasová, Ľubomír Ambriško, Janka Saderová, Slovakia: EXPERIMENTAL RESEARCH OF DYNAMIC IMPACT STRESS BY USING IMPACT BARS

Ales Sliva, Robert Brazda, Czech Republic: NEW TECHNOLOGY OF A BALL MILL DESIGN WITH A FLUIDIZATION DEVICE

Janka Saderová, Daniela Marasová, Peter Bindzár, Slovakia: THE MINERAL RESOURCES LOADING PROCESS

Danijela Ignjatovic Stupar, Janez Roser, Milivoj Vulic, France, Slovenia: STATISTICAL ANALYSIS OF MINE SUBSIDENCE MONITORING USING DIFFERENT METHODS

Ales Lazar, Goran Vizintin, Tomaz Begus, Milivoj Vulic, Slovenia: DETECTING OF SLIDING SURFACE IN LAŽE QUARRY, SLOVENIA

Andrej Pal, Drago Potocnik, Milivoj Vulic, Slovenia: ANALYSING THE BEHAVIOUR OF A ROCKFILL DAM WITH THE USE OF GEODETIC MONITORING DATA AND A MATHEMATICAL MODEL

Andrej Pal, Janez Roser, Milivoj Vulic, Slovenia: 3D POINT CLOUD ANALYSIS FOR DETECTION AND CLASSIFICATION OF SURFACE SUBSIDENCE ABOVE LONGWALL COAL MINING

Zoran Gojkovic, Aleksandar Ganic, Aleksandar Milutinovic, Serbia: QUALITY ANALYSIS BETWEEN DIGITAL AERIAL PHOTOGRAMETRY AND GPS MEASUREMENTS

Dragan Ignjatovic, Predrag Jovancic, Stevan Djenadic, Ivan Jankovic, Ivica Ristic, Serbia: THE OPTIMIZATION OF AUXILIARY MACHINERY IN OPEN-CAST LIGNITE MINES: A CASE STUDY OF BULLDOZERS

Luka Crnogorac, Rade Tokalic, Djurica Niksic, Sasa Jovanovic, Serbia: POSSIBILITY OF APPLICATION OF FUZZY LOGIC FOR STABILITY ASSESSMENT OF UNDERGROUND FACILITIES

Dusko Djukanovic, Branko Djukic, Vladimir Todorovic, Serbia: MULTI-CRITERIA ANALYSIS OF THE SELECTION OF ROADHEADER TYPE FOR TUNNELING IN SERBIAN UNDERGROUND COAL MINES

Radmila Gacina, Cedomir Beljic, Serbia: ECONOMIC EVALUATION OF SECONDARY PRODUCTION OF SEPIOLITE AND POSSIBILITY OF APPLICATION

Katarina Urosevic, Cedomir Beljic, Jelena Zakonovic, Suzana Lutovac, Jelena Ignjatovic, Serbia: TECHNO-ECONOMIC ASPECTS OF DETERMINATION OF DRILLING AND BLASTING PARAMETERS IN PURPOSE OF HEALTH AND SAFETY ENVIRONMENT

Suzana Lutovac, Branko Gluscevic, Milos Gligoric, Jelena Majstorovic, Rade Tokalic, Serbia: DETERMINING PARAMETERS OF ROCK MASS OSCILLATION EQUATION BY APPLYING LAGRANGE'S THEOREM FOR THE DRENOVAC OPEN PIT

Milanka Negovanovic, Lazar Kricak, Nemanja Pesic, Jelena Majstorovic Neckovic, Serbia: EXPANSIVE CRACKING AGENTS FOR THE EXTRACTION OF DIMENSION STONE BLOCKS

Snezana Savkovic, Jelena Majstorovic, Bojan Dimitrijevic, Serbia: ECONOMIC ANALYSIS FOR EVALUATING THE JUSTIFICATION OF THE BUCKET WHEEL EXCAVATOR REVITALIZATION

Branka Jovanovic, Nenad Makar, Sanja Grujicic, Serbia: TECHNOLOGY OF UNDERWATER EXPLOITATION OF COAL AND ACCOMPANYING SEDIMENTS AT THE COAL DEPOSIT KOVIN

Vesna Karovic Maricic, Branko Lekovic, Dusan Danilovic, Miroslav Crnogorac, Lola Tomic, Serbia: TECHNOLOGICAL ADVANCES IN APPLICATION OF METHODS FOR HEAVY OIL RESERVOIR EXPLOITATION

Aleksandar Micovic, Srdjan Jovic, Ivica Camagic, Serbia: ASSESSMENT OF HARMFUL INFLUENCE OF HUMAN VIBRATIONS ON MOTOR VEHICLE DRIVER USING Db MAESTRO SOFTWARE PACKAGE

Sasa Ilic, Bojan Dimitrijevic, Serbia: ANALYSIS OF THE CAPACITY OF SELECTIVE MINING OVERBURDEN, USING A SIMULATION MODEL

28.09.2019 SATURDAY

10.00-13.00	Excursion
14.00-15.00	Lunch
15.00	Departure of participants