

WEDNESDAY, OCTOBER 11

MOZART HALL

DEEP MINING AND TUNNELLING (T04)

Chair: Wulf SCHUBERT, Debashish CHAKRAVARTY
Room: Mozart Hall (ground floor)

02:15 p.m. **Current Situation of and Prevention Measures for Rock Burst of Coal Mines in China**
Dechang ZHOU

02:45 p.m. **Application of a new brittleness index to estimate the proneness to brittle failure of rock around a deep tunnel**
Lorenzo MILAN, Monica BARBERO, Mauro BORRI-BRUNETTO

03:00 p.m. **An investigation of the effect of rock brittleness on rockburst prediction in seismically active mines**
Alexey SHARIPOV, Amoussou ADOKO

03:15 p.m. **Assessment of energy release and redistribution on excavation instabilities for underground mining**
Yang ZOU, Ping ZHANG

03:30 p.m. **An implicit numerical modeling approach for destress blasting design optimization for tunneling and mine development in high stress conditions**
Ali HASHEMI, Neda DADASHZADEH, Kathy KALENCHUK

Application of hydraulic fracturing for destressing mining-induced stresses in underground coal mines
Hongpu KANG, Yanjun FENG, Fuqiang GAO

A conceptual study on the prediction of destress blasting efficiency using geostatistical approaches
Tawanda ZVARIVADZA

Experimental study of coal bursts caused by decrease of local mine stiffness
Fuqiang GAO, Guiyang YUAN, Xiangyuan PENG

A modification of the nearest neighborhood triggering mechanism in longwall mining: do seismic events only triggered by its closest neighbors?
Xu Li, Guangyao Si, Joungh OH, Ismet CANBULAT

COFFEE BREAK

DEEP MINING AND TUNNELLING (T04)

Chair: Wulf SCHUBERT, Debashish CHAKRAVARTY
Room: Mozart Hall (ground floor)

04:30 p.m. **Novel method of multi-face destress blasting efficiency assessment**
Krzysztof FUŁAWKA, Piotr MERTUSZKA, Marcin SZUMNY, Lech STOLECKI, Izabela JAŚKIEWICZ-PROĆ

04:45 p.m. **Numerically simulated Rate of Energy Release and its correlation with measured seismic potency**
Sevda DEHKHODA, David BECK, Vladislav LEVKOVITCH

05:00 p.m. **Numerical modelling of induced seismicity considering metre-scale stress heterogeneity in a fault damage zone**
Aitsushi SAIONKI

05:15 p.m. **Modulated thermal wave imaging approach to detect subsurface microcracks and their coalescence in deep mines for rock burst (strain burst) prediction**
Mrityunjay JAISWAL, Resmi SEBASTIAN, Ravibabu MULAVEESALA

05:30 p.m. **A numerically based geomechanics risk assessment of the cut and fill underground mining method**
Kamiliya OMIRZHANKYZY, Ali MORTAZAVI

05:45 p.m. **Origin of seismic repeaters in a deep mine: what do we learn from in-situ investigation coupling geology, geomechanics and geophysics?**
Emeline LHOUMAUD, Yann GUNZBERGER, Jannes KINSCHER, Marianne CONIN

Development of failure criterion for extensile fracturing of Kannur limestone under triaxial stresses
Arpan NANDY, K Seshagiri RAO, Tanusree CHAKRABORTY

Mechanical and fracturing characteristics of defected cement mortar samples under biaxial confinements
Pengxuan Ji, Qianbing ZHANG, Gisela VIEGAS

Reliability of Predicting damage in hard rock mass around deep tunnels in terms of its convergence
Rodolfo Enrique CABEZAS, Adeline DELONCA

Coupled Geomechanical CFD Modelling of Goaf under Goaf Gas Drainage: Impact of Goaf Characteristics
Yuehan WANG, Guangyao Si, Joungh OH

EUROPA HALL

OPENING CEREMONY

08:30 a.m. **Prof. Wulf Schubert, Congress chairperson, & President of the Austrian Society for Geomechanics**

08:35 a.m. **Dr. Florian Kreibich, Municipal Councillor City of Salzburg**

08:40 a.m. **Prof. Resat Ulusay, ISRM President**

08:45 a.m. **Prof. Chungsik Yoo, President of FedIGS**

08:50 a.m. **Cultural moment**

09:00 a.m. **"The status of the ISRM" by the Secretary General**

09:15 a.m. **Keynote Lecture by Prof. Christian Hellmich**

COFFEE BREAK

10:30 a.m. **Rocha Medal Award and Lecture**

11:05 a.m. **Müller Award**

11:55 a.m. **Fellows' induction ceremony**

12:15 a.m. **FedIGS Lecture by Vassilis Marinou**

ROCK BOWL + LUNCH BREAK

02:00 p.m. **Sponsors contribution DSI by Robert Penczek**

CHALLENGING ROCK ENGINEERING PROJECTS (T01)

Chair: Nedim RADONČIĆ, Karoline PRALL
Room: Europa Hall (2nd upper floor)

Burgenland's first tunnel takes its tribute – geotechnical retrospective of a tunnel collapse
Thomas PILGERSTORFER, Katharina HOFER, Yvonne MONSBERGER, Jürgen VORINGER

Collapse mechanism and treatment technology of large-span soft rock highway tunnel
Shikang QIN, Chen XU, Xichen LI, Yabin HUANG, Qing YAO

Pandoh Highway Tunnels in Indian Himalaya - a rock mechanical challenge in design and construction
Andreas GORICKI, Vipin PARIHAR

Tunnelling in Slovenian Dinaric karst: challenges and solutions
Vojkan JOVIČIĆ, Boštjan VOLK, Gregor VESEL, Jože RATEJ, Markus SCHMIDT

50 km of Tunnels in Inner-City Areas – Rock Mechanics and Tunneling Issues in Connection with the large-scale Railway Project Stuttgart 21 – A Success Story
Walter WITTKÉ, Martin WITTKÉ, Patricia WITTKÉ-GATTERMANN, Bettina WITTKÉ-SCHMITT

Soil-structure interaction of preliminary deformable lining for conventional tunnel in squeezing conditions using HiDStE elements
Lorenzo BATOCCHIONI, Valeria GONZALEZ RODRIGUEZ, Salvatore MILIZIANO

Complex tasks to evaluate the feasibility of two railway tunnel variants in terms of tunnel construction
Joachim MICHAEL, Lisa WILFING

Theory and practice in the boulders and rock blocks blasting in urban areas applied to civil engineering activities
Lineu Aзуага AYRES DA SILVA, Guilherme Gianotti de ANDRADE, Anna Luiza Marques AYRES DA SILVA, Fábio ZATZ

COFFEE BREAK

CHALLENGING ROCK ENGINEERING PROJECTS (T01)

Chair: Nedim RADONČIĆ, Karoline PRALL
Room: Europa Hall (2nd upper floor)

Brenner Base Tunnel: three DS-TBMs excavating in parallel under the Alps in Italy – Findings, difficulties and achievements from a geological-geotechnical point of view
Stefan SKUK, Harald EGGER, Emanuele BARNABEI, Umberto Marco CONTI, Giuseppe FODERÀ, Gianluca LIUZZI, Gianluca MAGGIO, Davide RENGHI, Antonio SPAZIANI, Antonio VOZA

Performance of different diameter Double Shield TBMs: experiences from the excavation of exploratory tunnel and main tubes of the Italian lot Mules 2-3 – Brenner Base Tunnel
Harald EGGER, Marco Giuseppe FODERÀ, Gianluca LIUZZI, Antonio SPAZIANI, Antonio VOZA, Daniela BOLDINI

Semmering Base Tunnel (SBT) - current state of the project
Gerhard GOBIET, Gernot NIPITSCH, Oliver Kai WAGNER

Semmering Base Tunnel – Geotechnical challenges at crossing a fault system in combination with high water pressure
Mario HEIN, Zafer EKICI, Christine PEINTNER, Robert HOLZER, Thomas HOFMANN

Challenges faced and mitigation measures adopted in construction of head race tunnel of Kameng hydro electric project (600 MW), Arunachal Pradesh, India
Rajnish RANJAN, Girish KALITA

Advancements in drillability prediction for conventional hard rock drill and blast tunnelling – implementing automation into the equation
Tanja SATTLER, Kurosch THURO

Design of controlled rock blasting for tunneling and tunnel portals
Lineu Aзуага AYRES DA SILVA, Anna Luiza Marques AYRES DA SILVA, Guilherme Gianotti de ANDRADE, Geronimo Lima RODRIGUES

Extensive sensitivity analysis of the Kivenlahti metro center using DEM
Oskar Leonard VAN DER WEIJ, Daniele MARTINELLI

TRAKL HALL

COMPARISON OF INTERNATIONAL TUNNELLING CONTRACTS (T02) NATM VERSUS TBM (T11)

Chair: Dietmar BACH, Davide MERLINI
Room: Trakl Hall (3rd upper floor)

Probabilistic Analysis of the Delivery Models Unit Price and Alliance applied at the Project Gemeinschaftskraftwerk Inn with Focus on the Construction Time
Carl Philipp FRIEDINGER, Klaus MITTEREGGER, Philip SANDER

Case Histories of contractual management of geological risks
Davide MERLINI, Daniele STOCKER, Matteo FALANESCA, Matthias NEUENSCHWANDER

Cutting performance evaluation of Actuated Disc Cutting by linear cutting test
Hoyoung JEONG, Yudhida WICAKSANA, Sehun KIM, Seokwon JEON, Jeong-Gi UM

Compression test of TBM thrust jack for validation of bucking strength under inclined loading condition
Han-Young JEONG, Mun-Gyu KIM, Yun-Joo NAM, Min-Gi CHO, Jung-Woo CHO, Sung-Bo SHIM

Performance validation of rock cutting-splitting method by scaled model tests and rock slope excavation
Mun-Gyu KIM, Han-Young JEONG, Joo-Young OH, Jung-Woo CHO Sang-Hwa YU, Ho-Young JEONG

COFFEE BREAK

EARLY CAREER FORUM (YOUNG RESEARCHERS) (T18)

Chair: Vojkan JOVIČIĆ, Resat ULUSAY, Yang QIANG
Room: Trakl Hall (3rd upper floor)

Some thoughts on Rock Mechanics and Rock Engineering in Mars
Ömer AYDAN

How to form competent rock engineers
Michael ALBER, Leandro ALEJANO, Tobias BACKERS

Experimental assessment of high temperature-induced changes on frictional behavior of planar rock joints
Gustavo André PANEIRO, Ignacio PÉREZ-REY, Xian ESTÉVEZ-VENTOSA, Leandro R. ALEJANO

Stability analysis of a rock slope: Fully-probabilistic approach
Renato PEREIRA, José MURALHA, Luís LAMAS

Application of empirical rockfall classification methods to risk management in an Alpine valley road
Maria Teresa CARRIERO, Maria Rita MIGLIAZZA, Claudio SCAVIA, Leandro R. ALEJANO

A study on the correlation between Hoek–Brown mi constant and Brinell hardness of intact rocks
Anastasios TSIRIKIIS, Vassilis MARINOS, Theodosios PAPANIANGAS

Mechanical behavior of granitic rocks under elevated temperatures: implications for underground radioactive waste disposal safety and tunnelling
Andor NÉMETH, Ákos TÖRÖK

Skavica Hydropower plant, one of the most important energetic projects to be constructed in Albania
Ardita MALAJ, Skender ALLKJA, Iljana KERO, Julian BELLIU, Besian XHAGOLLI

DOPPLER HALL

DEEP GEOTHERMAL ENERGY (T03)

Chair: Kurosch THURO, Klaus VOIT
Room: Doppler Hall (4th upper floor)

Informing deep geothermal reservoir rock mass properties from drilling data - experience from Krafla, Iceland
Marlene VILLENEUVE, Ben KENNEDY, Anette MORTENSEN, Elodie SAUBIN, Aliaa HAMMOUD

Relationship between thermal conductivity and porosity in sedimentary soft rocks by an experimental approach
Weiren LIN, Osamu TADAI

Borehole stability in geothermal reservoirs – A combined laboratory and numerical approach
Justin MATTHEIS, Catharina DREXL, Martin POTTEN, Georg Maximilian STOCKINGER, Kurosch THURO

Induced fracture analysis from microseismic catalogues: Salton Sea EGS case study
Juan Miguel REYES-MONTES

Carbon dioxide (CO2) fracturing of volcanic rocks under geothermal conditions
Kohei TAKUMA, Yuto WATANABE, Kiyotoshi SAKAGUCHI, Kazumi OSATO, Amane TERAJ, Noriaki WATANABE

Correlations between thermal properties and elastic wave velocities of volcanic rocks
Shuai FENG, Weiren LIN, Susumu SHIBUTANI, Terasu SANO, Nana KAMIYA

Influence of stress state based on hydraulic-mechanical coupling and water loading path on fault activity
Yujie ZHU, Chen XU, Yingguo HU, Xiaoli LIU, Enzhi WANG

Stress and seismicity related to cooling of geothermal wells
Arno ZANG, Hannes HOFMANN, Gergő HUTKA, Bakul MATHUR, Mauro CACACE, Serge SHAPIRO, Beau WHITNEY, Cedric DUVAİL, Ramon Secanell GALLART, Niels GROBBE, Annemarie MUNTENDAM-BOS

Design of CaO-Al2O3-SiO2-H2O hydrothermal synthesis systems for high temperature and high pressure applications
Chuangchuang WANG, Xuayu PANG, Guodong CHENG, Jiankun QIN, Huajie LIU

COFFEE BREAK

UNDERGROUND STORAGE FOR LIQUID AND GASEOUS MEDIA (T16)

Chair: Robert GALLER, Johann HERDINA
Room: Doppler Hall (4th upper floor)

Mechanical stability of a salt cavern used for hydrogen storage
Hippolyte DJIZANNE, Benoit BROUARD, Grégoire HEVIN

Numerical Modelling of Induced Seismicity along a Fault during CO2 Injection into a Subsurface Reservoir
James Edward John BURTONSHAW, Adriana PALUSZNY, Robert ZIMMERMAN

Large rock caverns for heat storage in district heating networks – A comparative study for the city of Salzburg
Sophie MESSERKLINGER, Mikkel SMAADAH, Daniel PÖTSCH, Carlo RABAIOTTI, Erich SAURER

What can be the future of underground storages in the context of green energy? - Geomechanical aspect
Philippe VASKOU, Nicolas GATELIER

Hybrid CO2 based thermo-mechanical underground energy storage - a numerical geomechanical review
Daniel Hubert BÜCKEN, Tobias BACKERS

A guidance for the optimal site location of Cavern Thermal Energy Storage (CTES)
Stefan ZELZER, Thomas GEISLER, Thomas MARCHER

Thermomechanical Behaviour of Rock Salt
Sasan MORAVEJ, Mehdi SERATI, Mojtaba BAHAAADDINI, David WILLIAMS

The fracture behavior of rock salt under present gas pressure in mechanical extension experiments
Lukas BAUMGÄRTEL, Felina KÖRNER

Experimental study on creep behavior of rock salt under complex stress paths
Zongze LI, Jinyang FAN, Marion FOURMEAU, Chao DU, Deji JIANG, Daniel NELIAS

POSTER SESSION
03:45 p.m. - 04:00 p.m.

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06:00 p.m. - 06:15 p.m.

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06:00 p.m. - 06:15 p.m.

THURSDAY, OCTOBER 12

PAPAGENO HALL	
NUMERICAL METHODS IN ROCK ENGINEERING (T13) Chair: Helmut F. SCHWEIGER, Daniela BOLDINI Room: Papageno Hall (ground floor)	
08:30 a.m.	Modeling brittle rock mass behaviour in deep underground excavation Giuseppe CAMMARATA, Davide ELMO, Sandro BRASILE
08:45 a.m.	Anisotropy Effects on the Response of Deep Tunnels Excavated in Claystone Miguel Angel MÁNICA, Antonio GENIS, Jean VAUNT, Gilles ARMAND, Minh-Ngoc VU
09:00 a.m.	Numerical investigation of the behaviour of underground strata reinforced with polymer liner, steel mesh and bolts subjected to buckling failure Saurav KARR, Ian PORTER, Shakumar KAREKAL
09:15 a.m.	Analyzing numerically grouted rockbolt behaviour in jointed pseudo-discontinuum models Caitlin FISCHER, Mark DIEDERICHS
09:30 a.m.	On advanced numerical techniques for the modeling of bolt reinforced rock mass Tzun-Anh BUI, Giuseppe CAMMARATA, Varun Choudary KANCHARLA, Ronald BRINKGREVE, Sandro BRASILE
09:45 a.m.	Modeling of joints of segment linings under complex relation between lining and ground conditions Kyeonghye AHN, Amade POUTA, Gye-Chun CHO
10:00 a.m.	Consideration of Creep Deformation in Deep Underground Gallery Excavation in Claystone Richard WITPASE, Jean-François BRUCHON, Sébastien BURLON

COFFEE BREAK

NUMERICAL METHODS IN ROCK ENGINEERING (T13)	
Chair: Helmut F. SCHWEIGER, Daniela BOLDINI Room: Papageno Hall (ground floor)	
10:45 a.m.	FDEM modeling of hydraulic fracturing in jointed rocks Mansour SHARAFISAFIA, Zenab ALUABADIN, Akira SATO, Luming SHEN
11:00 a.m.	Numerical modelling of the swelling of clayey geomaterials by a multiscale approach Hamza MHAAMDI ALAOUI, Richard GIOT, Dimitri PRÉT, Philippe COSEZKA, Stepha HEDAN
11:15 a.m.	A numerical modelling study of the effect of pillar shape on pillar strength Jan Abram MARZITZ, Daniel Franco MALAN
11:30 a.m.	Discussion
11:45 a.m.	Phase-field model of compressive and tensile fractures in ductile sandstone, calibrated by P wave velocity measurement and moment tensor inversion Yu-Li Guo, Guangyi Si, Jiong CHU, Ismet CANBULAT
12:00 p.m.	Analyzing the influence of finite deformations treatment towards the safety assessment of nuclear waste repositories Steffen BEESE, Rafi EICKEMEIER, Jobs MASSMANN, Sandra FAHLAND

COFFEE BREAK

ROCK SLOPE ENGINEERING (T17)	
Chair: Alexander PREH, Johann Thomas SAUSGRUBER Room: Mozart Hall (ground floor)	
10:45 a.m.	Developing a Digital Twin: A Semi-Brittle Slope Failure Case Study from Pueblo Viejo Gold Mine Miosoty BAUTISTA, Juan Carlos COBIAN SALAS, Jessica LOPEZ, Neil BAR, Nicolò COLI, Francesco COPPI, Andreas GAICH, Markus POTSCH, Miran BALJUMGARR, Alison MCQUILLAN
11:00 a.m.	Comparing different rock mass classifications using field and point cloud data on a rock cut Dragana SLAVKOVIĆ, Aljoša MITIĆ, Miloš MARIANOVIĆ
11:15 a.m.	Sub-critical crack growth based time-dependent deformation model and its application to open-pit slope stability Zhou XU, Zhiqiao LI, Tianhong YANG, Xiaobing ZHENG, Wanqiang TAO, Xuefeng FU
11:30 a.m.	A Parametric Study Illustrating the Effects of Moderately Anisotropic Rock Strength on the Stability of Large Slopes using Limit Equilibrium Analysis Ryan Anderson, Robert ZIEBARTH, Andrew G. CORKUM, Ian R. STUWELL, Derek KINAKIN
11:45 a.m.	Geotechnical and geophysical investigation of a rock mass for the design check of an ornamental stone quarry Maria Teresa CARRERO, Cesare COMINA, Anna Maria FERRERO, Maria Rita MIGLIAZZA, Battista TABONI, Gessica UMLI, Federico VAGNONI, Sergio Carmelo VINGUERRA
11:50 a.m.	A reliability-based design approach for geotechnical domain modelling in pit slope design Antonios ADOKI, Hayes ANYASODOR
12:00 p.m.	Rock Mechanics Characterization of Columbar Sandstone of Cerro Koi (Paraguay) and Some Slope Stability Issues of the Associated Open Pits Ómer AYDAN, Resat ULUSAY, Jose PAVON, Nazli Tuzar QZCAN
12:15 p.m.	A critical look to the practical use of Rock Mass Rating (RMR) and Slope Mass Rating (SMR) Miguel CANO, José Luis PASTOR, Roberto TOMÁS, Adrián RIQUELME, Luis JORDA, José SERÓN
12:30 p.m.	Site specific joint spacing distribution of roadcut slopes in a selected stretch of national highway in Indian Garwhal Himalayas Lal HIRAKUMAR, Mahendra SINGH, Sarada Prasad PRADHAN, Jaspreet SINGH
12:45 p.m.	Assessment of structurally-controlled slope failure in a steeply dipping iron ore mine Suryavejoti NANDA, Satyam CHODHURY, Shantanu PATEL
12:50 p.m.	Rock slope design and residual risk management for Actopac Copper Mine, Kazakhstan Nurkhair TELEULI, Neil BAR, Herman ZLOBIN, Philipp MOHR

LUNCH BREAK

NUMERICAL METHODS IN ROCK ENGINEERING (T13)	
Chair: Helmut F. SCHWEIGER, Daniela BOLDINI Room: Papageno Hall (ground floor)	
02:15 p.m.	The correlation between aperture evolution and induced seismicity during simulated hydraulic fracturing in lab-scale coal samples Xin ZHANG, Guangyao Si, Jiong CHU
02:30 p.m.	Discussion
02:45 p.m.	A 3D breakable Grain-Based Discrete Element model for transverse isotropic rocks Leandro LUNA RAMSUSSEN, Ki-Bok MIN
03:00 p.m.	Novel numerical approach to modeling excavation in hard rocks Erick ROGÉNES, Leandro RAMSUSSEN, Márcio FARIAS, Alessandra GOMES
03:15 p.m.	Development of a 3D discrete element method approach to study the evolution of rock cutting mechanism in high-depth conditions application to Vosges Sandstone Nicolas GONZE, Fanny DESCAUMPS, Jean-Pierre TSHIBANGU
03:30 p.m.	A new perspective of load-transfer behavior of rough rock-socketed piles José G. GUTIÉRREZ-CH, Salvador SENENT, Svetlana MELNIUTVIEC, Rafael JIMÉNEZ
03:45 p.m.	A continuum-oriented finite-discrete element method (cFDEM) for rock fracturing simulation Ke GAO, Weibang Cai, Shuangqi Ai
04:00 p.m.	The shear behavior of the rock-concrete interface with different angles Yingcai ADEI, Lushan SHU, Kai SHEN, Yadong XUE
04:15 p.m.	Development of an efficient parallelization scheme for fully implicit discontinuous deformation analysis (fda) Tatsuki TOKUDA, Ryohei HASHIMOTO
04:30 p.m.	Shear wave propagation across jointed rocks of varying seismic impedance Kallot SAHA, Resmi SEBASTIAN
04:45 p.m.	Numerical Calibration of Laboratory Results of 3D Printed Sandstone Analogues using Finite/Discrete Element Method (FDEM) Dima SHABDINIE, Romya HANADI, Firnan ARIANWI
05:00 p.m.	Effect of joint dip on the transmission of stress waves from a moving point load in a parallel jointed rock mass Harry HOLMES, Chrysothemis PARASKEVOPOULOU, Mark HILDYARD, Krishna NEAUPANE, David CONNOLLY
05:15 p.m.	Applicability of DEM - Rate Process Theory approach for rock creep simulation José G. GUTIÉRREZ-CH, Salvador SENENT, Eliana GRATEROL, Peng ZENG, Rafael JIMÉNEZ

COFFEE BREAK

NUMERICAL METHODS IN ROCK ENGINEERING (T13)	
Chair: Helmut F. SCHWEIGER, Daniela BOLDINI Room: Papageno Hall (ground floor)	
04:30 p.m.	Numerical Modelling-Based Methodology for Generating Fragility Curves of Underground Tunnels under Static Loading Shahyir HEIDARZADEH, Ali SAEDI
04:45 p.m.	The mechanical properties of rock mass inversely from dynamic test data Rui HUANG, Takafumi SEKI, Qixi DONG, Hai WANG, Ömer AYDAN
05:00 p.m.	Influence of contact shape and distribution on fluid flow through a fracture Masoud TORHAN, Amir HOSEINI KHORASGANI, Lauri UUTINEN, Alireza BAGHBANIAN, Mikael RINNE
05:15 p.m.	Assessment on the in-situ rock stress condition along an unlined pressure tunnel/shaft of a Norwegian Hydropower Project using numerical modeling Bikash CHAUDHARY, Krishna Kanta PANTHI, Nghia Quoc TRINH
05:30 p.m.	Effect of blast damage on pillars of caving mines Edgar MONTIEL, Max BLODEL, Edjan BUSTAMANTE, Esteban HORMAZABAL
05:45 p.m.	Optimum spacing of TBM disc cutters using an explicit finite element approach Asif Jeelani BHAT, Dr vidya Bhusan MAJI
06:00 p.m.	Data Assimilation for Prediction of Surrounding Rock Mass Behavior during Underground Structure Construction Phases Yusufusa AONO, Tetsuo OKUNO

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COFFEE BREAK

ROCK AND ROCK MASS PROPERTIES (T15)	
Chair: Andreas GÖRICK, Thomas FRUHWIRT Room: Mozart Hall (ground floor)	
04:30 p.m.	The Tauerern pressure tunnel: a multidisciplinary approach to verify and ensure design rock mass conditions during construction Andreas MAYER, Franz REITER, Franz REUBENHARTNER, Miroslav MARENCE
04:45 p.m.	Hard soil and rock classification - Pressuremeter data versus tests on samples Peter Allan, Jean-Pierre BAUD, Robert HEINTZ
05:00 p.m.	Fundamental study on estimation of permeability at in-situ EDZ from pore air pressure response Masahiko OSADA, Koji OSAWA, Christina Putri WIDYANINGTYAS, Isha TOGASHI
05:15 p.m.	Intact Strength Determination of Rock Containing Mesodefects using the Leeb Hardness Test Andreas GARNER, CORRIAM, Derek KINAKIN, Diego MANS NAVAS
05:30 p.m.	Effect of cyclic thermal loading on a carbonate rock: implications for the thermal energy storage Katharina Meta NEULMANN, Mandy DUDA, Tobias BACKERS
05:45 p.m.	Assessment of the creep behavior of siltstone for the Snowy 2 hydropower station using multistage uniaxial and triaxial creep tests Yoshinori HAYASHI, Koji OSAWA, Christina Putri WIDYANINGTYAS, Isha TOGASHI
06:00 p.m.	A practical approach to determining the basic friction angle of natural and rough discontinuities in carbonate rock slopes Zhen Ye, Qian Liu, Qiang Xu, Xujun Dong, Feng PU
06:15 p.m.	Evaluation of different methods for determining rock masses stiffness Neil BAR, Wulf SCHUBERT
06:30 p.m.	Estimation of cutting force considering intermediate dynamic rock strength using multiple linear regression Yudhivya WICKASANA, Suseno KRAMADIBRATA, Seokwon JEON
06:45 p.m.	Classification of weak, carbonate fault rocks Vasileios KALLIMOGIANNIS, Charalampos SAROLOU
07:00 p.m.	Effect of scale and in-situ stress ratio on the deformation modulus of rock mass around tunnels Sai Srujan Kumar CHAUVAUD, Mahendra SINGH, Yogendra SINGH, Jayasing CHOUDHURY
07:15 p.m.	New testing equipment to study dynamic fracture of rock and cement-based materials subjected to the action of roadheaders Diego-José GUERRERO-MIGUEL, Martina-Immaculada ÁLVAREZ-FERNÁNDEZ, María-Belen PRENDES-GERÓ, Celestino GONZÁLEZ-NICÉZA, Covadonga BETEGÓN-BIEMPIKA, Emilio MARTÍNEZ-PAÑEDA
07:30 p.m.	Discussion
07:45 p.m.	Swelling pressures of clay rocks from laboratory tests: experience and improvements Walter STEINER, Fritz MADSEN, Jean-François MATHIER
08:00 p.m.	The influence of microwave treatment on the Cerchar abrasivity of igneous rocks Sair KAH-RAMAN, Egemem SAYGIN, Mustafa FENER
08:15 p.m.	Experimental and numerical study on the creep behavior of a rock mass with filled joints Maximiliano R. VERGARA, Ana LIBREROS, Karl Balzhassar
08:30 p.m.	Spatial modeling of rock strength heterogeneity and anisotropy using Universal Discontinuity Index (UDI) Armin HEKMATIENAD, Eduardo ROSAS, Álvaro PEÑA, Brent COSPIN
08:45 p.m.	A theoretical framework for calibrating the transversely isotropic elastic rock parameters from UCS tests on cylindrical specimens using circumferential strain measurements Manuel WINKLER, Thomas FRUHWIRT, Thomas MARCHER
09:00 p.m.	Estimation models for deformability of marlstones based on their physical and mechanical properties and for variable load range Srdan KOSTIĆ
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COFFEE BREAK

ROCK AND ROCK MASS PROPERTIES (T15)	
Chair: Andreas GÖRICK, Thomas FRUHWIRT Room: Mozart Hall (ground floor)	
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FRIDAY, OCTOBER 13

PAPAGENO HALL

NEW DEVELOPMENTS IN ROCK SUPPORT (T12)	
Chair: Robert GALLER, Karl BÖHM Room: Papageno Hall (ground floor)	
08:30 a.m.	Research of safety-relevant natural and structural factors influencing the load-bearing capacity of rock stabilization with chemical grouts Conrad BOLEY, Paul PRATTER, Lisa WILFING
08:45 a.m.	Verification of design relevant parameters for new pipe umbrella support systems Günther M. VOLKMANN
09:00 a.m.	Rational design for tunnel ground support with membranes based on the geomechanically classification of Q by Barton Roberto LUIS, Rico BRÄNDLE, Gabriel VON RICKENBACH, German FISCHER, Sergio MARK
09:15 a.m.	Prevention of catastrophic corrosion failure of rockbolt and cable bolt in underground coal mines Honghao CHEN, Hamed Lamei RAMAND, Imrana KABIR, Onder KIMYON, Ren CHEN, Naresh KUMAR, Cindy GUNAWAN, Peter CRAIG, Ismet CANBULAT, Micheal MANEFIELD, Serkan SAYDAM
09:30 a.m.	Full-Scale Pullout Tests of Rock Anchors in Limestone Testing the Interfacial Bond Strengths Bjarte GRINDHEIM, Charlie Chunlin LI, Are Håvard HØIEN
09:45 a.m.	Experimental Investigations of Instrumented Fully Grouted Rock Bolts under Pull Load Jemshikumar Vijaykumar MODI, Debasis DEB, Rakesh KUMAR
10:00 a.m.	Research on application of new combined support structures in reinforcing rocky slopes containing weak interlayers Fei ZHAO, Zhenming SHI, Songbo YU

COFFEE BREAK

NEW DEVELOPMENTS IN ROCK SUPPORT (T12)

NEW DEVELOPMENTS IN ROCK SUPPORT (T12)	
Chair: Robert GALLER, Karl BÖHM Room: Papageno Hall (ground floor)	
10:45 a.m.	New yielding elements made of high-strength expanded polystyrene (HS-EPS) Manuel ENTFELLNER, Helmut WANNENMACHER
11:00 a.m.	Reinforcement effect of deformation-controlled tunnelling supports based on three-dimensional tunnel excavation analysis Yasuhiro YOKOTA, Kensuke DATE, Atsushi SAINOKI, Masako ISHII, Kazuhiko MASUMOTO, Mori UTSUNO
11:15 a.m.	Microfibrillated cellulose as additive for wet-mix shotcrete Mathias LAURAEUS, Mikael RINNE, Antti LAUKKANEN
11:30 a.m.	On The Expected Location of Fire-Induced Concrete Spalling Dorna EMAMI, Souvik SAHA, Mehdi SERATI, Harry ASCHE, David J WILLIAMS
11:45 a.m.	Influence of rock crystal structure on bond strength at the rock-shotcrete interface Kunze LI, Hamed LAMEI RAMANDI, Chengguo ZHANG, Sahand TAD-BIRI, Serkan SAYDAM, Joung OH
12:00 p.m.	Blast Induced Vibrations and Strain Rate Effects in Dynamic Capacity of Underground Concrete Structures Frederick KUHNOW
12:15 p.m.	Discussion

LUNCH BREAK

GEOLOGICAL RISKS AND NATURAL HAZARDS (T07)

GEOLOGICAL RISKS AND NATURAL HAZARDS (T07)	
Chair: Christian ZANGERL, Haris SAROGLU Room: Papageno Hall (ground floor)	
01:45 p.m.	System of highway slope disaster information collection, integration, simulation and judgement Chia-Chi CHIU, Wen-Jie SHIU, Ching-Fang LEE, Meng-Chia WENG, Che-Ming YANG
02:00 p.m.	Effect of shape on the survival probability of rock replicas during free fall tests Olivier BUZZI, Davide GUCCIONE
02:15 p.m.	Numerical analysis of rockfall fragmentation mechanism Jian HUANG, Jingqing YUAN, Jianhong LIAO
02:30 p.m.	Closing the gap from spatio-temporal displacement monitoring to geomechanical process understanding of cascading multi-hazards caused by deep-seated gravitational slope deformations Johannes BRANKE, Jan PFEIFFER, Thomas ZIEHER, Magnus BREMER, Martin RÜTZINGER, Bernhard GEMS, Margreth KEILER, Barbara SCHNEIDER-MUNTAU
02:45 p.m.	10 years of thermo-mechanical monitoring of rock columns - les chandeliers de l'Escalate, France Muriel GASC-BARBIER, Véronique MERRIEN-SOUKATCHOFF, Jean-Luc GENOIS, Charly MOUGIN, Pierre AZÉMARD
03:00 p.m.	Kinematic Analysis and Distinct Element Modelling of a polyphase Rock Fall Reinhard GERSTNER, Christine FEY, Klaus VOIT, Erik KUSCHEL, Gerald VALENTIN, Christian ZANGERL
03:15 p.m.	Discussion

MOZART HALL

ROCK AND ROCK MASS PROPERTIES (T15)	
Chair: Andreas GORICKI, Thomas FRUHWIRT Room: Mozart Hall (ground floor)	
08:30 a.m.	Application of Digital Image Correlation for Analysis of Anisotropic Materials Under Tension Timothy Robert Michael PAKKULAK, Émélie GAGNON, Samuel Keith WOODLAND, Jennifer Jane DAY
08:45 a.m.	On the crack initiation location in the Brazilian test: Griffith-based insight Yousef NAVIDTEHRANI, Covadonga BETEGÓN, Robert W. ZIMMERMAN, Emilio MARTÍNEZ-PAÑEDA
09:00 a.m.	Micro-fracturing in SCB test: Acoustic emission analysis Matej PETRUZALEK, Ali AMINZADEH, Václav VAVRÝČUK, Zuzana JECHUMTALOVA, Petr KOLAR, Josef ROTT, Tomas LOKAJICEK
09:15 a.m.	Influence of the specimen slenderness on the direct tensile strength of rocks Mauro MUNIZ-MENÉNDEZ, Ignacio PÉREZ-REY
09:30 a.m.	A new simple shear test of rock prism specimen by torsional shearing Yota TOGASHI, Rho HIRASAWA, Masahiko OSADA
09:45 a.m.	Determining the transversely isotropic elastic constants from strain data by means of different mathematical approaches Manuel A GONZÁLEZ-FERNÁNDEZ, Ignacio PÉREZ-REY, Leandro R ALEJANO, José MURALHA, Seungki HONG, Ki-Bok MIN
POSTER SESSION 10:00 a.m. - 10:15 a.m.	Numerical modelling and tunneling experience of the Emergency Stop in Trens, Lots Mules 2-3 (Italy) - Brenner Base Tunnel Davide MERLINI, Matteo FALANESCA, Gianluca BELLA, Antonio SPAZIANI, Antonio VOZA
	Coupled thermal and unloading-induced permeability of rock fractures Tao LIN, Zhibong ZHAO, Wen MENG, Xingguang ZHAO
	Evaluation of rock stresses measured in a long water tunnel at deep depth Tatsuya YOKOYAMA, Akira MITO

COFFEE BREAK

ROCK AND ROCK MASS PROPERTIES (T15)

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Chair: Andreas GORICKI, Thomas FRUHWIRT Room: Mozart Hall (ground floor)	
10:45 a.m.	Failure response of rocks under different cyclic loading histories Abbas TAHERI, Roohollah SHIRANI FARADONBEH
11:00 a.m.	Cracking evolution for deep hard coal using X-ray in-situ micro-CT technology and fractal theory Liang ZHANG, Xiaopeng LI, Qingxin QI, Haitao LI
11:15 a.m.	Characterization of Mobilized Cohesion, Friction and Dilatation Angles of Brittle Rock During Plastic Deformation Sarbartha SARKAR, Rakesh KUMAR
11:30 a.m.	4D imaging of crack evolution and failure mode in 3DP rock-like samples under uniaxial compression by using in-situ micro-ct technology Yueling SHAO, Jiseon KIM, Jae-Joon SONG
11:45 a.m.	Mechanical properties of 3D printed sandstone analogue with different binder rates Minoru SATO, Takato TAKEMURA, Daisuke ASAHINA
12:00 p.m.	Influence of microstructural composition on the strength of rock-like materials under various loading rates Meng-Chia WENG, Hoang-Khanh LE, Hung-Hui LI, Chih-Shan LEE, Chia-Chi CHIU
POSTER SESSION 12:15 p.m. - 12:30 p.m.	Study on the relationship between uniaxial compressive strength and elastic properties of limestone with various sample diameter Hassan ARMAN, Safwan PARAMBAN
	Numerical Analysis of Thermo-Mechanical Characterization of Indian Sandstone under Dynamic Compressive Loading Condition Abhishek MOHAPATRA, Anjali KUMARI, Sunita MISHRA
	Evaluation of the dilatant behavior of a crystalline rock using full-field optical imaging and ultrasonic monitoring Deepanshu SHIROLE, Gabriel WALTON, Ahmadrada HEDAYAT, Sankhaneel SINHA
	Effect of rock stiffness change on acoustic emission Vladimir FRID
	The combined effects of water saturation and strain rate on crack initiation and damage stress of rock Jun ZHU, Jianhui DENG
	Characterization of Poisson's ratio and Elastic Modulus of granitic rocks: from micro-crack initiation to failure Samad NARIMANI GHOURTLAR, Seyed Morteza DAVAR-PANAH, László KOVÁCS, Balázs VÁSÁRHELYI
	Understanding the Microscopic Mechanisms of the bi-modular behavior of rock Samarjeet KUMAR, Aditi NUJWAL, Shantanu Kumar PATEL

LUNCH BREAK

PETROLEUM ENGINEERING AND CARBON SEQUESTRATION (T14)

PETROLEUM ENGINEERING AND CARBON SEQUESTRATION (T14)	
Chair: Marlène VILLENEUVE, Aïlaa HAMMOUD Room: Mozart Hall (ground floor)	
01:45 p.m.	Determining the Magnitudes of Maximum and Minimum Horizontal Stresses from Borehole Data: Comparison Between Borehole Failure Approach and Poroelastic Strain Model Nazar MAFAKHERI BASHMAGH, Weiren LIN, Abbas KHAKSAR MANSHAD
02:00 p.m.	Understanding shale fracture network complexity in the laboratory Aly ABDELAZIZ, Phyllis S. WU, Mei LI, Earl MAGSIPOC, Karl PETERSON, Giovanni GRASSELLI
02:15 p.m.	Numerical investigations on THM coupled process during water flooding with multiple well patterns under non-isothermal two phase flow Yuhao LIU, Fengshou ZHANG, Dingwei WENG, Hongbo LIANG, Chunming HE
POSTER SESSION 02:30 p.m. - 03:30 p.m.	Mechanical anisotropy and tension-shear characteristics of shale in Pengshui area, Chongqing Shouding LI, Zhiqian YU, Supeng ZHANG, Jianming HE, Zhaobin ZHANG, Xiao LI
	Well Cement Composition Optimization for Deep Well Applications Guodong CHENG, Xuexu PANG, Zhengsong QIU, Jiankun QIN, Ning LI
	Laboratory hydraulic fracturing experiments on thermally treated tight sandstone samples under step up incremental loading Pankaj RAWAT, Narendra Kumar SAMADHIYA
	Carbon dioxide impact on the mechanical properties of a sandstone from San Jorge Gulf Basin (Argentina) Cecilia LASKOWSKI, Diego MANZANAL, Mauro MUÑOZ-MENÉNDEZ, Sandra ORLANDI, José ALLARD
	Prediction of Safe Mud Window Based on Seismic Data in Carbonate Formation Huiven PANG, Hanqing WANG, Yan JIN

EUROPA HALL

DEEP MINING AND TUNNELLING (T04)	
Chair: Wolfgang HOHL, David BECK Room: Europa Hall (2nd upper floor)	
08:30 a.m.	Addressing rock engineering challenges faced in the development of a novel, deep mining method Tobias LADINIG, Patrick GAMS, Horst WAGNER, Matthias WIMMER, Michal GRZYNIENKO
08:45 a.m.	Unplanned ore dilution control in longhole mining using sill pillars - A case study Tuo CHEN, Hani S. MITRI
09:00 a.m.	Displacement and energy demand imposed by rapid bulking and tunnel shape change Fedilberto J. GONZALEZ, Peter K. KAISER, Mark S. DIEDERICHS
09:15 a.m.	Analysis of the behaviour of the Barrier Pillars and Gateroads of the deep Longwall Panel of India using the 3D Finite Element Modelling approach Rajashakar Yadav AVUVA, Sreenivasa Rao ISLAVATH
09:30 a.m.	In-situ stress measurement using non-destructive and relief methods Zulfigar ALI, Murat KARAKUS, Giang D. NGUYEN, Khalid AMROUCH, Chris CHESTER
09:45 a.m.	Source mechanisms of mining-induced seismicity at Kloof Gold Mine, South Africa - moment tensor analysis of M _L 1.5 events Richard MASETHE, Raymond DURRHEIM, Musa MANZI
POSTER SESSION 10:00 a.m. - 10:15 a.m.	Characteristics of hydro-magnesite of Salda Lake (Turkey) and their implications on rocks of Jezero Crater in Mars Haili KUMSAR, Ömer AYDAN, Hitoshi MATSUBARA, Kouki MORI
	Using borehole breakout data to constrain the in situ stress tensor Junxiang YANG, Sebastian D. GOODFELLOW, John P. HARRISON

COFFEE BREAK

DEEP MINING AND TUNNELLING (T04)

DEEP MINING AND TUNNELLING (T04)	
Chair: Wolfgang HOHL, David BECK Room: Europa Hall (2nd upper floor)	
10:45 a.m.	Prediction of long-term deformation and dimensioning of support in squeezing rock under high overburden Jörg-Martin HOHBERG
11:00 a.m.	On the short-term response of Opalinus Clay to tunnelling Linard CANTIERI, Alexandros N. NORDAS, Dennis MOROSOLI, Georg ANAGNOSTOU
11:15 a.m.	The influence of brittle failure and its impact on face stability in high-stress tunnelling conditions Joel CHIWARA, Ioannis VAZAIOS, Chrysothemis PARASKEVOPOULOU
11:30 a.m.	The Brown-Hoek stress-depth relation revisited Tobias BÄCKERS, Simon KATTENBECK, Mandy DUDA
11:45 a.m.	Comparison of regression and classification Machine Learning algorithms for determining excavation damage zones depths Yousef GOLABCHI, Matthew A. PERRAS
12:00 p.m.	18 years of monitoring pore pressure evolution during and after excavation in the Calveo-Oxfordian claystone: the main insights Gilles ARMAND, Carlos PLUA, Minh-Ngoc VU
POSTER SESSION 12:15 p.m. - 12:30 p.m.	Modeling uncertainty of activity duration in probabilistic time estimation of tunneling projects Mohammad MOHAMMADI, Johan SPROSS
	Stability analysis of surrounding rock mass in underground powerhouse based on octree and catastrophe theory Yuepeng SUN, Biao LI, Nuwen XU, Qi WANG, Bei JIANG

LUNCH BREAK

HYDROPOWER PROJECTS AND DAMS (T08)

HYDROPOWER PROJECTS AND DAMS (T08)	
Chair: Johann NEUNER, Paul BONAPACE Room: Europa Hall (2nd upper floor)	
01:45 p.m.	275 m high Yusufeli arch dam - Geotechnical modelling during construction Johannes KLEBERGER, Irmina PÖSCHL, Jonas WEIL
02:00 p.m.	A possible way forward to predict the peak shear strength of a natural, unfilled rock joint under concrete dams based on field data Francisco RÍOS BAYONA, Fredrik JOHANSSON, Diego MAS IVARS, Carl-Oscar NILSSON
02:15 p.m.	The material extraction for the Kühai Da Steffen BAUER, Sebastian PERZLMAIER
02:30 p.m.	Discussion
02:45 p.m.	Evaluation of the effect of rock surface irregularities on energy gradient in unlined dam spillways Yavar JALILI KASHTIBAN, Ali SAEIDI, Marie-Isabelle FARINAS, Javier PATARROYO
03:00 p.m.	A Block Theory approach for rock erodibility assessment incorporating 3D high-resolution site characterization data Mike GEORGE
POSTER SESSION 03:15 p.m. - 03:30 p.m.	Deformation behavior analysis of an arch dam during initial impoundment based on clustering and panel data regression Ruiju ZHANG, Wenyu ZHUANG, Jianjun XU, Liang YIN, Haining WEI, Yaoru LIU
	HEPP cavern Kühai, excavation design and construction experience Rupert STEIGER, Peter WETZLINGER
	Challenges associated with the construction of vertical and inclined shafts in the Himalayan Region Tek Bahadur KATUWAL, Krishna Kanta PANTHI, Chhatra Bahadur BASNET
POSTER SESSION 03:15 p.m. - 03:30 p.m.	Behavior of the Rock Foundation of a Concrete Dam Affected by Alkali-Aggregate Reactivity Marco QUIRION, Dolice DONTSI MAKEN
	3D numerical modelling of stability of underground pumped storage hydropower (UPSH) Yuxi LIU, Qianbing ZHANG, Ivan CHING
	Experimental study of joint opening and block protrusion effects on rock mass erosion in unlined spillway Marie-Hélène WISSE, Ali SAEIDI, Marco QUIRION

CLOSING CEREMONY

03:45 p.m.	Austrian Society for Geomechanics Leopold Müller Prize
04:00 p.m.	ISRM 2022 Awards - John Hudson Rock Engineering Award to Dr Christine Detournay - Science Achievement Award to Prof. Jean Sulem - Young Rock Engineer Award to Dr Yota Togashi
04:15 p.m.	ISRM 2023 Awards - Technological Innovation Award to Shandong University - Young Rock Engineer Award to Dr Wang Qi - Best Performing National Group Award 2021-2023 - Outstanding Commission Award 2019-2023
04:35 p.m.	Presentation of the main forthcoming conferences - 2024 ISRM International Symposium - 2027 ISRM Congress
04:45 p.m.	Farewell speech by the Chair of the Organizing committee
04:50 p.m.	Farewell to the outgoing Board
05:05 p.m.	Inauguration ceremony of the new Board
05:25 p.m.	The Chair of the Organizing committee declares the Congress closed

TRAKL HALL

GEOLOGICAL INVESTIGATION AND CHARACTERIZATION (T06)	
Chair: Scott KIEFFER, Michael F. GEORGE Room: Trakl Hall (3rd upper floor)	
08:30 a.m.	The impact of rock strength on the measurement of shear modulus from cavity expansion testing Yasmin Nicole BYRNE, Robert WHITTLE
08:45 a.m.	Interpreting variability of uniaxial compressive strength with insights from vein microstructures Emelle GAGNON, Jennifer J. DAY
09:00 a.m.	Visualization of Fracture Intersections from 3D X-ray Imaging Madelyn SUMNER, Laura PYRAK-NOLTE
09:15 a.m.	Discussion
09:30 a.m.	Development of T-DrillPacker measurement system for groundwater inflow rate and pressure in advanced boring Yusuke HIRATSUKA, Sou KUMAMOTO, Hajime YAMAMOTO
09:45 a.m.	Roman gold exploitation at the archeological site of Las Médulas (NW-Spain) by means of Ruina Montium: a rock and fluid mechanics perspective Leandro R. ALEJANO, Elena MARTÍN, Ignacio PÉREZ-REY, Brais X. CURRÁS-REFOJOS, Fco. Javier SÁNCHEZ-PALENCIA

POSTER SESSION 10:00 a.m. - 10:15 a.m.	Multi-scale analysis of a porous carbonate rock under triaxial conditions Catherine DORÉ-OSSIPYAN, Jean SULEM, Michel BORNERT, Alexandre DIMANOV, Patrick AIMÉDIEU, Vincent DE GREFF, Andrew KING
	Relations between elastic waves speeds and densities J.L. GRESS, M. FERREIRA, R.M. FAURE
	One-dimensional consolidation properties of sedimentary soft rocks from the Boso Peninsula, central Japan using a constant strain-rate loading system Nana KAMIYA, Weiren LIN
	Characteristics of hydro-magnesite of Salda Lake (Turkey) and their implications on rocks of Jezero Crater in Mars Haili KUMSAR, Ömer AYDAN, Hitoshi MATSUBARA, Kouki MORI
	Using borehole breakout data to constrain the in situ stress tensor Junxiang YANG, Sebastian D. GOODFELLOW, John P. HARRISON

COFFEE BREAK

CHALLENGING ROCK ENGINEERING PROJECTS (T01)

CHALLENGING ROCK ENGINEERING PROJECTS (T01)	
Chair: Medim RADONČIĆ, Karoline PRALL Room: Trakl Hall (3rd upper floor)	
10:45 a.m.	Design and Construction of the Montreal Largest Transit System Věrya NASRI
11:00 a.m.	Stability issues associated with the construction of underground caverns of Super Dordi Hydropower Project, Nepal Sailesh ADHIKARI, Krishna Kanta PANTHI, Chhatra Bahadur BASNET
11:15 a.m.	The Blue Line Jerusalem LRT Underground Section - Public Transport in a challenging Project environment Anton KALTENBÖCK, Martin PURUCKER, Bernhard STACHERL
11:30 a.m.	Hard Rock Caverns with low overburden in urban environment - a case study Manuel BODE, Magdalena SALLINGER, Paolo ZANANDREA, Thomas MARCHER
11:45 a.m.	PU grouting and sealing measures on the Kramer Tunnel Johannes JESSEN, Jochen FILLIBECK, Florian ZAHLER, Raphael ZUBER
12:00 p.m.	Discussion
POSTER SESSION 12:15 p.m. - 12:30 p.m.	Study on anti-dislocation measures for railway tunnels crossing active faults in complex and dangerous mountainous areas Lianjin TAO, Haixiang ZHANG, Zhibo JIA, Ming SHI, Zhigang WANG, Cheng SHI
	A method for investigating dynamic direct shear behavior of artificial jointed rocks using CNS direct shear box and Long Bar Drop Impact (LBDI) System Hanlim KIM, Gyeongjo MIN, Gyeongyoo KIM, Youngjun KIM, Jusuk YANG, Kyungjae YUN, Sangho CHO
	The phenomenon of 'tools' wear in a marble quarry: laboratory tests to evaluate the performance of conditioning as a wear preventer Alfio DI GIOVANNI, Carmine TODARO, Simone SALTARIN, Marilena CARDU

LUNCH BREAK

DOPPLER HALL

NUMERICAL METHODS IN ROCK ENGINEERING (T13)	
Chair: Helmut F. SCHWEIGER, Daniela BOLDINI Room: Doppler Hall (4th upper floor)	
08:30 a.m.	Applicability of Artificial Neural Networks (ANN) for equilibrium state prediction in tunnel excavation Alec TRISTANI, Lina-Maria GUAYACÁN-CARRILLO, Jean SULEM, Sebastián Ariel DONZIS
08:45 a.m.	Semmering Base Tunnel, Alternative Numeric Modelling of Long-term Rock Mass Behavior and Conceptual Support Design Alexander POISEL, Gunter GSCHWANDTNER, Markus SITZWOHL, Oliver Kai WAGNER

09:00 a.m.	CERN (HL-LHC): challenges and tunneling experience for the design of new underground structures at Point 5 Davide MERLINI, Matteo FALANESCA, Filippo GIANELLI, Gianluca BELLA, Roberto SCHÜRCH, Anastasia LOPEZ-HERNANDEZ
09:15 a.m.	Production Sequence Analysis of an Overhand Cut-And-Fill Mine in a Narrow-Vein Type Orebody Using Numerical Modelling Ahmet Gunes YARDIMCI, Mustafa ERKAYAOGLU
09:30 a.m.	Influence of deep coal mines on the stability of shallow cavities Temenuga GEORGIEVA, Fanny DESCAMPS, George AIDANLIJSKY, Sara VANDYCKE, Nicolas GONZE, Jean-Pierre TSHIBANGU
09:45 a.m.	Comparison of analytical and numerical solutions for stresses and displacements around unlined tunnels with arbitrary cross sections inside anisotropic rock masses Manuel Bernhard WINKLER, Ali YAZ, Thomas MARCHER

POSTER SESSION 10:00 a.m. - 10:15 a.m.	Numerical modelling of pillars with weak alteration layers using the TEXAN code Paul Michael COUTO, Daniel Francois MALAN
	Slope support analysis at Iwaneg Mine Christian CANCINO, Loren LORIG, Augusto LUCARELLI, Kabo GAB-ANAKGOSI, Otsile BARE
	Finite element analysis-aided performance examination of the umbrella arch method for tunneling through weak zone Hsin Chen CHOU, Cheng Han LIN, On Lei Annie KWOK, Yu Chao LIN, Ming Lang LIN
	An iterative scheme for the determination of the conformal mapping coefficients used in closed-form solutions for tunnels with arbitrary geometry Manuel Bernhard WINKLER, Thomas MARCHER, Ali YAZ
	Simulation of ground deformation of subway station using pile-beam-arch method Hui HE, Chao WANG, Hua JIANG, Zhengyuan LIU, Zhiyong YANG, Yusheng JIANG, Jii FENG
	Numerical evaluation of surface settlement induced by shield tunneling at rock mass Jun-Beom AN, Jeonguk BANG, Joo-Hyun SEONG, Gye-Chun CHO

COFFEE BREAK

NUMERICAL METHODS IN ROCK ENGINEERING (T13)

NUMERICAL METHODS IN ROCK ENGINEERING (T13)	
Chair: Helmut F. SCHWEIGER, Daniela BOLDINI Room: Doppler Hall (4th upper floor)	
10:45 a.m.	Numerical modeling of cracking process in partially saturated porous media and application to rainfall-induced slope instability analysis Meng WANG, Zhan YU, Jianfu SHAO
11:00 a.m.	Numerical prediction of thermal weakening effects on granite rock Limo SAKSALA
11:15 a.m.	GSI or JRC - continuum or discontinuum modelling - some suggestions and some critique Nicholas Ryland BARTON
11:30 a.m.	A numerical analysis of weakening of a granitic rock by piezoelectric excitation of quartz Raifad Arturo RUBIO RUIZ, Timo SAKSALA, Alexandre KANE, Mikko HOKKA
11:45 a.m.	Modelling the hydro-mechanical behaviour of a 3D rough-walled rock joint Xu ZHU, Min GAO, Guangyao SI, Chengguo ZHANG, Joung OH
12:00 p.m.	Fluid injection influence on fracture propagation near an underground drift Mohammad Yousef FALLAH SOLTANABAD, Amade POUYA, Lina Maria GUAYACAN CARRILLO, Laurent BROCHARD, Christophe DE LESQUEN, Minh-ngoc VU
POSTER SESSION 12:15 p.m. - 12:30 p.m.	Mathematical model to describe the movement of rocks due to gravity in block caving mining Sergio PALMA, Rodolfo MORALES
	Numerical simulation of THM coupled behavior in the high-level radioactive waste disposal using OGS-FLAC Taehyun KIM, Chan-Hee PARK, Changsoo LEE, Jin-Seop KIM
	Modelling time-dependent processes resulting from thermo-viscoelastic behaviour of rocks Donát M. TAKÁCS, Tamás FÜLÖP, Áron POZSÁR, Róbert KOVÁCS, Mátys SZÜCS, Péter VÁN
	Probabilistic assessment of rock loads for tunnel support design Jiwoo AHN, Jurij KARLOVŠEK, Adrian SMITH
	The effect of different rock mass properties on deformation distribution detected with intelligent rock bolts in underground mining Michel VARELIJA, Michael NÖGER, Philipp HARTLIEB, Peter MOSER, Dominik DENDL
	Seismic velocity estimation using a digital rock without segmentation - tips for accurate calibration and estimation Kazuya ISHITSUKA, Hitoshi MATSUI, Weiren LIN, Nana KAMIYA, Yoshitaka NARA

LUNCH BREAK